# Attachment M

## Additional Documentation
## Attachment to Comment 2-F2

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# What is a safe distance to live or work near high auto emission roads?

May 28, 2015 By Bill Adams — 6 Comments

A nearby roadway may be putting your household's health at risk. The same is true of workplaces, schools, and other places where people spend significant time. This health risk is from the elevated auto emissions near high traffic roadways. It's a health risk separate and in addition to the regional air pollution from auto emissions.

We have come to draw a false sense of security from our collective sharing of regional air pollution and, perhaps, the belief that regulatory agencies protect us. However, research continues to show that air pollution, particularly from auto emissions, has profound effects on health. Moreover, such impacts are unequally distributed among local populations, largely based on nearness to major roadways.

Discussions about whether or not to build or expand roadways are dominated by the topics of traffic congestion relief, urban planning, and greenhouse gasses. The impact of roadways on

Americans' health and morbidity is often lost in the discussions. 53,000 U.S. deaths annually are attributable to automobile emission air pollution. (Calazzo, et al., 2013) Many more are ill or incapacitated from auto emissions. Ninety percent of the cancer risk from air pollution in Southern California is attributable to auto emissions. (Hulsey, et al., 2004, par. 10) For comparison, there are 35,000 U.S. deaths a year from auto collisions (NHTSA, 2012), which is the top cause of death for U.S. males between the age of 15 and 24, and in the top ten causes of death of all Americans through the age of 54.

The impact on life and safety generally from road expansion receives little attention. However, auto emission pollution based on proximity to source, i.e. line-source pollution, is one of the most overlooked health threats in the U.S. Current U.S. policies and regulations do little to protect susceptible populations, including children, from the dangers of nearness to auto-emission sources. Undoubtedly, the disproportionate lack of urgency concerning the health impacts of air pollution is attributable to its hidden and delayed impact. Although the health impacts of air pollution on general populations are certain, individual diagnoses of disease rarely identify air pollution as the cause. As a result, the health threat fails to take on the personal dimension of other health threats. The same was true with smoking for many decades. Additionally, awareness of line-source pollution is further hindered by confusion with regional / ambient air pollution, which typically manifests in more noticeable high ozone levels, i.e., smog.

Air pollution monitored by various agencies includes particulate matter (PM), ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, and lead. However, two of these cause the most concern due to their prevalence and health significance: 1) Ozone, which causes the brown smog commonly seen over cities and 2) Particulate matter (PM), also referred to as ultra-fine particulates (UFP). Unlike ozone, PM exposure is directly related to proximity to source – primarily areas near to or downwind from high traffic areas. Moreover, for health impacts, PM pollution may be the worst of the lot. Heart disease, lung function impairment, leukemia, asthma, and lung cancer, are some of the conditions that have been associated with PM exposure resulting from proximity to high traffic sources. (Hulsey, et al., 2004, par. 6; Fuller, et al., 2012, pp. 257 – 265) As stated in a 2002 study about exposure to highway PMs:

> " Throughout the past decade, epidemiological studies have reported a consistent relationship between increases in particulate matter (PM) exposure and contemporary increases in mortality and morbidity. (Zhu, et al., 2002)

**Figure 17. Hypothesized pathways via which inhalation of UFPs may lead to effects**

**on cardiovascular and respiratory systems and on the brain. Reprinted with permission from the Health Effects Institute, Boston MA.**



Children are especially vulnerable to auto-emission health impacts because, among other reasons, they breathe more air relative to their body weight than adults, are more physically active, and spend more times outdoors during times when pollutant levels are at their highest. (Hulsey, et al., 2004) Additionally, children have many more years ahead of them in which the cumulative damage caused by auto emissions can manifest itself in disease or disability. Women who live near areas of high automobile traffic during pregnancy have a 20 – 30% higher chance of having children with lung impairment. (Morales, et al., 2014) Auto emission PM exposure from nearness to high traffic during the the third trimester of pregnancy doubles the risk for autism. (Raz, et al., 2014).

11% of U.S. residents, over 30 million people, live within 100 meters of 4 lane or greater highways. (Brugge, et al., 2007; Howard, 2011) Adding in work places, schools, and commuting, it is reasonable to extrapolate that roughly 1/3 of people spend a substantial portion of their day exposed to unhealthy levels of auto emission PMs.

So how can you determine your own exposure level or that of your children? Below are some key distances and other factors:

**Distances:**

## Ground Zero:

Curbside and in-traffic air contains high levels of all pollutants associated with auto emissions – both PMs and gaseous substances like benzene and carbon monoxide. (Hulsey, et al., 2004, par. 7) PM exposure at intersections is as much as 29 times higher than other portions of the road. (Goel & Kumar, 2015) Cyclists, auto occupants with windows down or vents open, toll booth operators, and roadside residents and businesses receive up to 25 times the level of PM exposure. (Zhu, et al., 2002) Moreover, the air inside a car typically contains higher concentrations of these pollutants than the air outside of the car – as much as 4 times the benzene and 10 times the carbon monoxide. (ICTA, 2000) Keeping the windows closed and the ventilation set to recirculate can reduce in-car pollutants to 20% that of air outside the car. (L.A. Times, 2013)

## High Toxicity Zone – 300 – 500 feet:

On average, PM concentration is significantly higher within 330 feet (100 meters) of major highways than it is further away. (Zhu, et al., 2002) The smallest PMs, with a peak

concentration of 1.6 x 10(5)/cm3, are the most dangerous. Smaller PMs carry toxic substances deeper into the lungs and body, and as a result, have more profound health effects. (Cal. EPA, Aug. 2014, p.29) They are concentrated in an area within 330 feet from highways. (Zhu, supra) Pregnant women who live within 500 feet of high traffic areas are prone to birth complications, including premature birth, low birth weight children, and children with medical problems. (Wilhelm & Ritz, 2003) A review of a broad range of studies has correlated early mortality — from a wide range of illnesses — with living within 330 feet of a high traffic roadway and related exposure to various auto emission substances. (Beelen, et al., 2008)

**Figure 3.2.6-4: Sensitive Receptor Locations**
**(Springdale Street to Warner Avenue) May 2012, I-405 Improvement Project**

## Elevated Toxicity Zone – 1,000 – 1,500 feet:

PMs from auto emissions are elevated within 1,000 feet (300 meters) of a major highway. (Yifang, et al., 2002, pp. 1038-1039) A Denver study indicated that children living roughly within that distance were eight times as likely to develop leukemia and six times as vulnerable to all types of cancer. (Hulsey, et al., 2004,- par. 1) In another study, children under 5 years of age admitted to hospitals with asthma emergencies were significantly more likely to live within 500 meters (1,640 feet) of a major highway when traffic flow exceeded 24,000 vehicles per hour than those who lived further away or when traffic flow was less. (Edwards & Walters, 1994) Particle levels return to near normal beyond that distance.

## Intermittently Toxic Zone – 1,500 feet – 1.5 miles:

A 2009 Study found that (Dr. Arthur Winer Sudy, UCLA, 2009 – in Updates below) ultra-fine particulate concentration in the aircan extend 1.5 miles downwind of a freeway, particularly in the hours before sunrise.

## Visualize your Location:

The LA Times published a tool that can help you see your proximity to the nearest freeway: "How close are you?"

### Other Factors Influencing Air Pollution Levels Near Roadways:

## Wind:

People living "downwind" of highways with 4 or more lanes (2 lanes in each direction) are exposed to higher levels of fine particulate matter. (Brugge, et al. 2007) However, this

circumstance does not exempt one side of a highway from PM dangers. In many regions, wind direction changes not only depending on weather conditions, but also between day and night.

## Sun, Rain & Humidity:

Areas receiving higher amounts of rain or humidity can experience reduced auto-emission pollution levels, especially ultra-fine particulate pollution. The clean air you sense after a rain storm really is cleaner. This fact is regularly demonstrated in high-pollution Bejing. (USA Today, Aug. 11, 2008) Atmospheric conditions alter the size, distribution, and composition of freshly-emitted PM through condensation, evaporation, and dilution during transport to downwind locations. (Brugge, et al., 2007) Thus, higher humidity levels can tamp down the distribution of PMs. (HEI Review Panel, 2013, p.24) Conversely, sun, heat, and lack of humidity generally favor greater distribution of PM. Additionally, ground level ozone concentration is unhealthiest on sunny and warm days.

## Topography:

PM, as well as gaseous air pollutants, tend to concentrate in valleys due to containment by topographical features. (HEI Review, supra) Inversions, in which a layer of cold air is trapped underneath a layer of warm air, keep PM concentrated near ground level and aggravate the concentration of PM in valley and canyon floors. Ibid. Fog is often an indicator of an inversion.

**A temperature inversion in a valley – clean air poster from a Teacher's Guide to Clean Air by BC Transit, Nov. 2005 – republished permission Ministry of Environment, British Columbia Canada**

## Time:

The time of day can influence PM concentrations near highways – both in terms of traffic concentrations and in terms of weather. (HEI Review Panel, supra) The pollution cloud generally extends further – up to 1.5 miles – at night and in the early morning hours due to the cooler air mass keeping the pollution closer to the ground, preventing it from dispersing. (Whiner, 2009, UCLA) Additionally, highways experience much higher traffic concentrations at certain times of the day, and when the morning rush hour combines with the cooler air mass, morning pollution can be particularly bad. However, such concentration has become less varied as employers stagger work shifts to alleviate commuting burdens and as continued highway expansion creates induced demand (tendency of freeway expansion to create more demand and congestion in the long run by facilitating sprawl). Additionally, the heating and cooling of day and night effect pollution concentrations at ground level.

# Roadway Features:



Freeway junctions, ramps, traffic jams, traffic lights, and uphill grades can all increase the amount of pollution. This can be the result of placing more strain on car engines via acceleration or engine effort, idling at a closely compacted standstill, or by increasing the number of cars in an areas.

## Auto Emission Air Pollution as a Social Justice Issue:

The unavoidable conclusion from the research is that each time a major highway is built or expanded, some of the residents living nearby will pay with their health or lives. Nevertheless, compared to industrial uses that pose potential health risks, roadway construction projects remain relatively unregulated as a direct air pollution health risk. (Hulsey, et al., 2004) The same is true of the siting of residential, employment, senior, or educational uses near highways.

**Cincinnati highway proximity health hazards. Republished permission LADCO**

Low income and minority populations are disproportionately impacted by air pollution health risks. (Beleen, 2008) Suburban expansion creates a demand for road expansion through existing neighborhoods. Lower income neighborhoods and ethnic minority populations least often wield the political influence necessary to resist road expansion projects. Additionally, multifamily and affordable housing is more likely to be sited near high traffic areas than is more expensive detached housing. More recently, the construction of high density “transit oriented developments” (TODs), which are intended to reduce auto reliance and which often include affordable housing, are frequently sited near high traffic areas. There has been little acknowledgement in U.S. transportation policy of the social inequality and the ethical issues related to sacrificing the health of members of one community to facilitate the growth and commuting of another community.

Property condemned for a road expansion project results in monetary compensation to the owner based on fair market value. However, residents put at risk by the additional traffic emissions as a result of living adjacent to or near the road project cannot recover compensation or assistance to relocate.

Construction and expansion of roadways may involve some public disclosure of health impacts via environmental reporting documents but the reporting tends to assume that “no build” highway expansion options will simply result in ever increasing congestion. However, more than a half century of highway building has demonstrated that congestion relief from

road expansion tends to be temporary, and that the long term impact is increased automobile use and traffic congestion. Such "induced demand" is increasingly recognized as the long term effect of expanding roadways to relieve current traffic congestion.

## Self Protection:

Of course, the best protection is to live and work as far from major roadways as possible, and spend as little time as possible in traffic.  Other partially helpful methods include:

Air Filters which can capture particles with a diameter less than 2.5 but greater than 0.1 micrometers ("PM 2.5") can be helpful.  Filters must be periodically replaced per the manufacturer recommendations.  Keep windows and doors closed, particularly during peak traffic and night/morning hours.  When driving, make sure the recirculate button is on.  Better yet, minimize driving.

Barriers such as sound walls can help. Also, being on a hill or trenched freeway help mitigate proximity exposure.

Measuring indoor and outdoor air pollution can also help you understand your environment better. The EPA even has a Guidebook for evaluating and using air sensors.

## Conclusion:

Increasingly, line-source proximity to auto emission pollution and the refinement and improved accuracy of roadway air pollution dispersion modeling is being used in legal and political challenges to highway expansion proposals. Given the stakes, its hard to justify the continued expansion of roadways in urban areas, the slowness of conversion to non-combustible fuel automobiles, or the proportionately small investment in public transit.  If such decisions were based solely on health criteria proportionate to other identified public risks, highways might be quarantined as an acutely elevated health hazard to those who live or work near them. Of course, such action is impractical as it would result in vast tracts of existing homes, schools, and places of employment being abandoned.

It is clear that the public is still not fully aware of the difference between ambient air pollution effecting the general populace of a city and line-source air pollution impacting health based on nearness to highways. Perhaps, if the public was more aware of the direct and unequal health impacts of high-traffic roadways, transitioning from roadway expansion to transportation alternatives would receive more urgency.  One proposal for an air quality district plan in California required that builders of homes, schools, or day care centers provide notice to their customers of toxic emissions,

including those emanating from busy roads, within 1,000 feet. (Hulsey, 2004, p.13)



Without a better understanding of line-source proximity exposure by the general public, its hard to foresee substantial changes.  It may take activism and information campaigns, such as posting warning notices in neighborhoods within the 1,000 foot zone, to catch the public's attention and educate it on this health issue.

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## Updates:

Updates made February 2, 2016:

"According to a study that will appear in the Feb. 17 (2007) issue of *The Lancet* and is now available online, researchers at the Keck School of Medicine of USC found that children who lived within 500 meters of a freeway, or approximately a third of a mile, since age 10 had substantial deficits in lung function by the age of 18 years, compared to children living at least 1,500 meters, or approximately one mile, away." Living Near Highways Can Stunt Lungs, USC News (Jan. 27, 2007).

In November 2015, the U.S. EPA published a  "best practices" manual in collaboration with the South Coast Air Quality Management District and the Southern California Clean, Green, and Healthy Schools regarding the location (siting) of schools and mitigation of air pollution at schools. The EPA also has a website page summarizing the booklet, and Planetizen published a summary.

Update made September 26, 2016:

A 2009 study indicates that unhealthy levels of air pollutants extend 1.5 miles downwind of a freeway, particularly in the hours before sunrise.  Air pollution from freeway extends further than previously thought, UCLA Newsroom, June 10, 2009

Update January 5, 2017

Study shows relationship between proximity to high traffic roadway and dementia.  7% increase if living within 50 meters of roadway, 4% if within 50 – 100 meters, and 2% if within 100 – 200 meters.  A report on the study can be found here.  The study itself was published in the Lancet on January 4, 2017.

For a quick guide to air pollution types, see: "The Ultimate Guide to Air Pollution."



## Notes:

While this article cites a number of scientific articles, some "rounding" is used for the purpose of readability. In other words, this article attempts to organize and summarize current available data into a general conceptual framework for general public understanding rather than to provide new data.

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Filed Under: Ecology, environmental health, Feature Posts, San Diego, Transportation
Tagged With: air pollution, emissions, particulate matter, PM, UFP, ultra fine particulates

**About Bill Adams**

Bill Adams is the founder and chief editor of UrbDeZine. He is also a partner in the San Diego law firm of Norton, Moore, & Adams, LLP. He has been involved with land use and urban renewal for nearly 25 years, both as a professional and as a personal passion. He currently sits on the boards or committees of ,The Public Interest Advocacy Collaborative, San Diego Historic Streetcars, The Food and Beverage Association of San Diego County, and the Heal the Gash Committee (reconnecting communities divided by freeways).

## Comments

**Warning: strlen() expects parameter 1 to be string, object given in /home/urbdezin/public_html/wp-includes/formatting.php on line 3391**

**Saam says**

MAY 28, 2015 AT 8:39 AM

Thanks for consolidating so much material and data into one place! This was truly informative.

Log in to Reply

**Warning: strlen() expects parameter 1 to be string, object given in /home/urbdezin/public_html/wp-includes/formatting.php on line 3391**

**Jacquelynne Le says**

JUNE 4, 2015 AT 9:29 AM

Great! I've been looking forward to this article. I sent the link to a couple friends at Environmental Health Coalition.

Couldn't have come at a better time since there has been talk about SR-94 being widened.

PETITION: https://www.change.org/p/stop-the-sr94-express-lane-project?source_location=petition_footer&algorithm=promoted

Thanks!

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**Warning: strlen() expects parameter 1 to be string, object given in /home/urbdezin/public_html/wp-includes/formatting.php on line 3391**

**Paul McNeil says**

JUNE 4, 2015 AT 7:25 PM

Nice work, Bill. Well researched and well written. My parents moved me and my 8 siblings to a house immediately abutting the I-5 in Anaheim. The house no longer exists – the victim of the last Disney expansion of the 5. Fortunately, we only lived there for 3 years but the noise was untenable until you got used to it. We had to imagine we were living next to the ocean with waves crashing and swooshing on the rocks. No one had AC and the windows were open half the year. That was in the years before they removed lead from our gasoline. I can't imagine what all we inhaled in those 3 years but you'll be glad to know I feel fine 42 years later!

I still believe we need to densify the communities near transportation corridors. Maybe electric cars and short term rental communities are the answer.

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## Trackbacks

**Warning**: strlen() expects parameter 1 to be string, object given in **/home/urbdezin/public_html/wp-includes/formatting.php** on line **3391**

**United Kingdom Lung Cancer Coalition | mesotheliomabox.com** says:

May 10, 2016 at 5:27 pm

[…] What is a safe distance to live or work … – Low income and minority populations are disproportionately impacted by air pollution health risks. (Beleen, 2008) Suburban expansion creates a demand for … […]

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**Warning**: strlen() expects parameter 1 to be string, object given in **/home/urbdezin/public_html/wp-includes/formatting.php** on line **3391**

**Niños indígenas se amparan contra Peña Nieto y empresa afín por destrucción de su hábitat – Agencia de Información Pública** says:

September 6, 2016 at 2:42 pm

[…] acuerdo la revista de planeamiento urbano San Diego UrbDeZine, las autopistas a menos de 300 metros de una población causan fuertes efectos en la salud por las […]

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**Niños indígenas se amparan contra Peña Nieto y empresa afín por destrucción de su hábitat | Antena San Luis** says:

September 6, 2016 at 3:56 pm

[…] acuerdo la revista de planeamiento urbano San Diego UrbDeZine, las autopistas a menos de 300 metros de una población causan fuertes efectos en la salud por las […]

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**Diane Keogh**

Good information.

Like · Reply · 2y

**Lisa Weaver-Gorlick**

Fabulous informational website!

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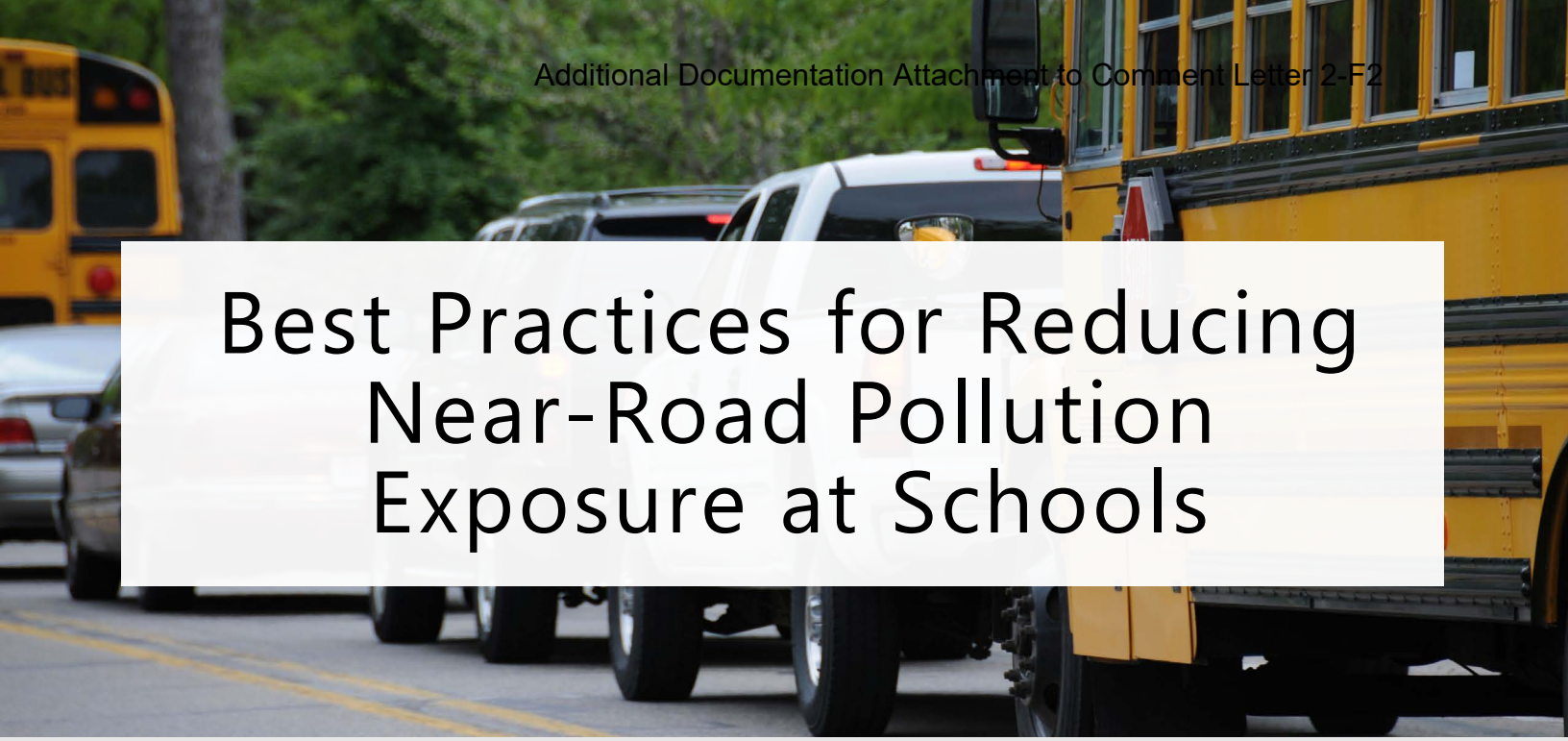
Additional Documentation Attachment to Comment Letter 2-F2

# Best Practices for Reducing Near-Road Pollution Exposure at Schools

November 2015

EPA



# Best Practices for Reducing Near-Road Pollution Exposure at Schools

U.S. Environmental Protection Agency

EPA would like to acknowledge the following organizations that provided comments on an earlier draft of this document:

South Coast Air Quality Management District

Southern California Green, Clean and Healthy Schools Partnership

# Contents

# Introduction

## Purpose of This Publication

This publication can help school communities identify strategies for reducing traffic-related pollution exposure at schools located downwind from heavily traveled roadways (such as highways), along corridors with significant trucking traffic, or near other traffic or vehicular pollution sources. Many of these strategies are already being used by schools across the country to reduce exposures to traffic-related air pollution. We hope that this compilation of best practices will help other schools that want to take steps to address concerns about traffic-related pollution exposure.

Many of the best practices outlined in this publication may also be effective in reducing exposure at schools near other sources of particulate air pollution, such as rail yards, ports, and industrial facilities.

Contact your **state or local air pollution agency** for assistance in evaluating the impacts, if any, that traffic-related air pollution may have on your school. EPA's *School Siting Guidelines* also include information on evaluating impacts of nearby sources of air pollution. Evaluating the potential impact of traffic-related air pollution may be performed as part of an overall environmental evaluation for your school.

## Intended Audience

This publication was designed for school administrators, facility managers, school staff, school nurses, school-based health centers, parents, students, and others in the school community who are concerned about traffic-related air pollution exposure due to a school's proximity to a heavily traveled roadway or trucking corridor and who want to understand potential approaches to reduce exposures. Other audiences that may find this resource applicable to their work include community-based environmental and health organizations; HVAC professionals, architects, design engineers, and construction contractors who can apply the principles of this document during facility siting, design, and construction; and other federal, state, local, and tribal agencies.

## Other EPA Resources for Schools

The EPA website (**www.epa.gov/schools**) offers many documents and tools to help states, districts, schools, teachers, parents, and students create or enhance productive and healthy learning environments. These resources address a broad range of issues that affect children's health in schools, from selecting appropriate locations for schools to maintaining the buildings and grounds. Some of these resources may address strategies that are discussed in this publication. You can use these comprehensive resources to assess your school's environmental health efforts and implement or improve related programs, policies, and procedures. If you have questions about EPA's resources for schools, contact your **regional school coordinator**.

# Reducing Near-Road Pollution Exposure at Schools

Exposure to traffic-related air pollution has been linked to a variety of short- and long-term health effects, including asthma, reduced lung function, impaired lung development in children, and cardiovascular effects in adults. Children's exposure to traffic-related air pollution while at school is a growing concern because many schools are located near heavily traveled roadways. This document briefly introduces the health risks associated with traffic-related pollution exposure and offers strategies to reduce students' exposure in new and existing schools.

## Near-Road Air Pollution and Children's Health

Pollutants directly emitted from cars, trucks, and other motor vehicles are found in higher concentrations near major roads. Examples of directly emitted pollutants include particulate matter (PM), carbon monoxide, oxides of nitrogen, and benzene, though hundreds of chemicals are emitted by motor vehicles. Motor vehicles also emit compounds that lead to the formation of other pollutants in the atmosphere, such as nitrogen dioxide, which is found in elevated concentrations near major roads, and ozone, which forms further downwind. Beyond vehicles' tailpipe and evaporative emissions, roadway traffic also emits brake and tire debris and can throw road dust into the air. Individually and in combination, many of the pollutants found near roadways have been associated with adverse health effects.

**Studies show** that concentrations of traffic-related air pollutants can be elevated inside classrooms, and that traffic is one of the most significant sources of air pollution in both the indoor and outdoor school environments.

Motor vehicle pollutant concentrations tend to be higher closer to the road, with the highest levels generally within the first 500 feet (about 150 meters) of a roadway and reaching background levels within approximately 2,000 feet (about 600 meters) of a roadway, depending on the pollutant, time of day, and surrounding terrain.[1] Many scientific studies have found that people who live, work, or attend school near major roads appear to be more at risk for a variety of short- and long-term health effects, including asthma, reduced lung function, impaired lung development in children, and cardiovascular effects in adults.

Children are particularly susceptible to health problems resulting from air pollution exposure due to:

- Respiratory systems that are not fully developed. Studies show exposures to air pollution in childhood can result in decreased lung function.[2]
- Higher rates of exposure than adults because they are more active and they breathe more rapidly.

Children spend a lot of time at school, and nearly 17,000 schools in rural and urban areas across the U.S. are located within 250 meters (~820 feet) of a heavily traveled road.[3] Exposure to traffic-related pollution is a concern both indoors and outdoors—

[1] Karner, A. A., Eisinger, D. S., & Niemeier, D. A. (2010). Near-roadway air quality: Synthesizing the findings from real-world data. *Environmental Science & Technology, 44*(14), 5334-5344. doi:10.1021/es100008x

[2] Health Effects Institute. (2010). Traffic-related air pollution: A critical review of the literature on emissions, exposure, and health effects. *Special Report 17.* Available at http://pubs.healtheffects.org/view.php?id=334

[3] Kingsley, S. L., Eliot, M. N., Carlson, L., Finn, J., MacIntosh, D. L., & Suh, H. H. (2014). Proximity of US schools to major roadways: A nationwide assessment. *Journal of Exposure Science and Environmental Epidemiology, 24*, 253–259. doi:10.1038/jes.2014.5. This study defines major roadways as those with a Census Feature Class Code classification of A1 (primary road with limited access or interstate highway) or A2 (primary road without limited access).

concentrations tend to be higher outdoors, yet numerous studies have found that concentrations of traffic-related pollutants can also be elevated inside classrooms, where children spend most of the school day.[4,5] In addition, diesel-powered school buses can be a significant source of pollution near schools.

## How Can Near-Road Pollution Exposure Be Reduced in Schools?

Over the past several decades, emission control technologies and regulations have led to large decreases in emissions per vehicle. Pollutant concentrations have also declined, though at a slower rate, because there has been growth in both the number of vehicles and vehicle miles traveled. Government and industry are still working to reduce the amount of pollutants emitted by motor vehicles. In the meantime, several strategies are being used by communities and schools across the country to reduce traffic-related pollution exposure. Some of these strategies aim to reduce indoor exposure at the individual building level, while others target reductions indoors and outdoors on a larger scale. Given the importance of PM in general, and diesel PM specifically as a harmful pollutant, the focus of this document is on strategies that can be used to mitigate PM exposure, although some techniques may be applicable to gaseous pollutants (e.g., carbon monoxide, benzene) as well. This document addresses the following mitigation strategies that can be implemented by local school authorities: ventilation, filtration, actions for building occupants, transportation policies, site location and design, and the use of roadside barriers. Many of these strategies may also be effective at reducing exposure at schools near other sources of particulate air pollution (e.g., railyards, industry) and near facilities that have increased truck and car traffic (e.g., warehouses, ports). In planning, implementing, and evaluating mitigation strategies, it may be valuable to assemble a diverse project team that is committed to ensuring a healthy environment for children and staff.[6]

**Elevated PM concentrations in schools** have been linked to:

- Poor ventilation;
- Ineffective or nonexistent air filtration;
- Proximity to roadways;
- Open windows and doors allowing entry of polluted outdoor air during rush hours;
- Infrequent and incomplete cleaning of indoor surfaces; and
- High occupancy levels.[7,8]

## Building Design and Operation Strategies for Reducing Near-Road Pollution Exposure

### Ventilation, Filtration, and Indoor Air Quality in Schools

Proper building ventilation is crucial for maintaining healthy indoor air quality. Ventilation in schools is achieved passively (e.g., via open windows and doors) or mechanically by a building's heating, ventilating, and air conditioning (HVAC) system.

[4] Mejia, J. F., Choy, S. L., Mengersen, K., & Morawska, L. (2011). Methodology for assessing exposure and impacts of air pollutants in school children: Data collection, analysis and health effects - A literature review. *Atmospheric Environment, 45*(4), 813-823. doi:10.1016/j.atmosenv.2010.11.009

[5] Mullen, N. A., Bhangar, S., Hering, S. V., Kreisberg, N. M., & Nazaroff, W. W. (2011). Ultrafine particle concentrations and exposures in six elementary school classrooms in northern California. *Indoor Air, 21*(1), 77-87. doi:10.1111/j.1600-0668.2010.00690.x

[6] For more information on developing a project team, see EPA's Energy Savings Plus Health guidelines (Appendix A). U.S. Environmental Protection Agency. (2014). *Energy savings plus health: Indoor air quality guidelines for school building upgrades.* Available at http://www.epa.gov/iaq/schools/pdfs/Energy_Savings_Plus_Health_Guideline.pdf

[7] Stranger, M., Potgieter-Vermaak, S. S., & Van Grieken, R. (2008). Characterization of indoor air quality in primary schools in Antwerp, Belgium. *Indoor Air, 18*(6), 454-463.

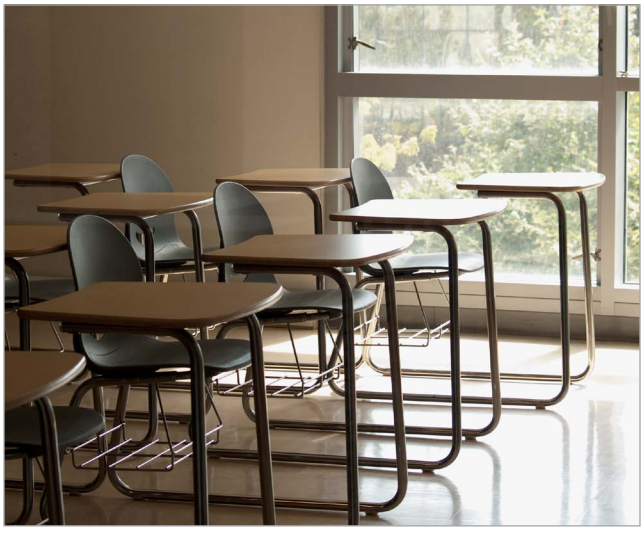
[8] McCarthy, M. C., Ludwig, J. F., Brown, S. G., Vaughn, D. L., & Roberts, P. T. (2013). Filtration effectiveness of HVAC systems at near-roadway schools. *Indoor Air, 23*(3), 196-207. doi:10.1111/ina.12015

Studies have shown that in addition to reducing health effects related to air pollution exposure, proper ventilation contributes to a comfortable learning environment associated with better test scores and attendance.[9]

However, improved ventilation does not always improve air quality. For example, if filtration is not used, higher ventilation rates can increase pollutant levels indoors if outdoor pollutant concentrations are higher than indoor concentrations.

## *Passive/Natural Ventilation*

In passive or natural ventilation systems, air is supplied to a classroom through open windows or doors or by leaks in the building envelope (e.g., gaps around windows and doors). Passive systems rely on dilution of indoor air contaminants by mixing indoor air with outdoor air. This approach is only effective if the outdoor air is less polluted than the indoor air. It is often challenging to achieve proper ventilation using passive methods because assessing ventilation needs and outdoor air quality, as well as controlling ventilation rates, can be difficult for building occupants to carry out. Strategies for reducing pollution exposure in naturally ventilated classrooms include reducing indoor sources of air pollution and, at schools near heavily traveled roads, timing air intake (i.e., opening and closing doors and windows) to avoid bringing in outdoor air during peak travel times (see Actions for Building Occupants section for more information).



Additionally, there are filtration-related options for schools with passive systems, which are described in the sections that follow.

## Recommendations

- Keep windows and doors closed during peak traffic times (e.g., morning and evening rush hours).
- Minimize indoor sources of air pollution.
- Use a stand-alone filtration unit or upgrade to a mechanical ventilation system.

## *Mechanical Ventilation*

In mechanical ventilation systems, air is circulated through a building by air intake and/or exhaust fans. Mechanical systems used in schools can be grouped into two categories: units that serve a single room without air ducts (such as a unit ventilator or individual heat pump) and central air handling units that serve multiple rooms via ductwork. The effectiveness of mechanical ventilation depends on HVAC system type, design, maintenance, and operation. An imbalance in a building's HVAC system can result in the building becoming pressurized. Negative pressure can allow outdoor contaminants to enter the building through the building envelope, while positive pressure prevents infiltration of outdoor air but can force moisture into the walls of the building. In cold climates, moisture can condense in walls and promote mold growth. Therefore, pressure relief dampers that allow air to exit the building or exhaust fans that draw air out are typically recommended.

The U.S. Environmental Protection Agency (EPA) recommends[10] that central HVAC air handling units be used when possible, as they are often quieter (and therefore less likely to be turned off), easier to maintain because of the reduced number of individual units, and compatible with higher efficiency filtration.

While central units typically achieve higher air exchange rates and therefore better indoor air

[9] Mendell, M. J., & Heath, G. A. (2005). Do indoor pollutants and thermal conditions in schools influence student performance? A critical review of the literature. *Indoor Air, 15*(1), 27-52.

[10] U.S. Environmental Protection Agency. (2012). *Heating, ventilation and air-conditioning (HVAC) systems*. Available at www.epa.gov/iaq/schooldesign/hvac.html

quality, the necessary ducting and registers tend to increase system cost. Ductwork in central ventilation systems should be kept clean and tested regularly for leaks. Regardless of the type of system used, mechanical ventilation systems are typically more reliable than natural methods because airflow rates are controllable.

## Recommendations

- Use mechanical ventilation if possible. Central HVAC units that serve multiple classrooms are typically more effective than single-room unit systems.
- In classrooms where sufficient mechanical ventilation can be ensured, seal the building envelope to prevent infiltration of polluted air through cracks around windows, doors, and HVAC ducts.
- With a properly performing mechanical ventilation system, keep windows and doors closed to avoid bringing in polluted outdoor air.
- Ensure that HVAC systems are properly maintained and operated.
- Locate air intakes away from roadways, bus idling, drop-off zones, and other pollutant sources, such as designated smoking areas.[11]

### *Filtration*

Although diluting air contaminants through ventilation is sometimes adequate, many buildings (including schools) require additional air treatment to achieve suitable indoor air quality. Studies have shown that filtration in schools can improve indoor air quality by reducing particle concentrations by as much as 97% relative to outdoor levels.[12] Achieving maximum performance of filtration systems requires:

- Proper installation;
- Continuous operation;
- A tight building envelope (i.e., minimal air leaks);
- Effective air distribution;
- Careful placement of air inlet and outlet locations; and
- Regular maintenance, including replacement of filters.

Filtration has some practical limitations. Filtration is only effective at removing particles that enter the system through an outside air intake and particles that enter through the return air ducts usually located at ceiling level. Particles entering the school through other pathways may not be removed (for instance, particles entering the classroom through open doors or windows, through leakage in the building envelope, from indoor sources, or from re-suspension from floors). In addition, removal of gaseous pollutants by filtration is typically less effective than particle removal; filters that are able to remove gaseous pollutants are costly and are not commonly used in schools.

Indoor air filtration is typically incorporated into a building's HVAC system, although portable, stand-alone air cleaners are also available. Both system types typically employ filters that remove air contaminants based on particle size.[13]

**Schools undertaking** energy efficiency upgrade projects may wish to consider concurrent opportunities to improve indoor air quality.[14]

[11] The Centers for Disease Control and Prevention recommends that schools prohibit all tobacco use at all school facilities and events at all times. See http://www.cdc.gov/healthyschools/tobacco for more recommendations on tobacco use prevention through schools.

[12] McCarthy, M. C., Ludwig, J. F., Brown, S. G., Vaughn, D. L., & Roberts, P. T. (2013). Filtration effectiveness of HVAC systems at near-roadway schools. *Indoor Air, 23*(3), 196-207. doi:10.1111/ina.12015

[13] Some portable, stand-alone air cleaners use alternate technologies to remove contaminants, such as electrostatic precipitators. While effective at removing particles, electrostatic precipitators tend to be more expensive than traditional filters, require more maintenance over time, and can generate small amounts of ozone as a by-product of air purification. In addition, some air cleaners are designed to intentionally generate ozone and are not recommended. The California Air Resources Board maintains a list of air cleaning devices tested and certified by the State of California to meet California's electrical safety and ozone emission requirements. See http://www.arb.ca.gov/research/indoor/aircleaners/certified.htm

[14] U.S. Environmental Protection Agency. (2014). *Energy savings plus health: Indoor air quality guidelines for school building upgrades.* Available at http://www.epa.gov/iaq/schools/energy_savings_plus_health.html

The degree of indoor air quality improvement from filtration depends on the filter's Minimum Efficiency Reporting Value (MERV) rating. Filters with MERV ratings from 1 to 4 are effective at removing large particles (e.g., pollen, dust mites, paint dust), but are less effective at removing small, traffic-related particles that can enter the respiratory system and cause adverse health effects. Filters with higher MERV ratings are increasingly more effective at removing very small particles.

Studies examining filtration systems in schools have found that all types of filtration systems improve air quality conditions inside classrooms and can be used to reduce exposure to traffic-related pollutants indoors. Central HVAC systems equipped with filters tend to be more effective than unit systems (e.g., window units) with filters. In schools with central HVAC systems, medium-efficiency filters (MERV 6–7) tend to reduce particle concentrations by approximately 20% to 65%, while higher performance filters (MERV 11–16) can reduce particle concentrations from 74% to 97% relative to outdoor concentrations.[15] Higher MERV ratings are generally associated with higher particle removal rates. Stand-alone systems, although slightly less effective, are well-suited for classrooms that are not equipped with a central HVAC system and can achieve removal efficiencies close to 90%.[17] However, performance depends on the amount of air that can be processed by the unit and other classroom layout features that influence airflow to the system. A downside of some stand-alone units is that they can be noisier than HVAC-based filtration. However, quieter stand-alone units are available that meet the noise level requirements for new classroom equipment.[18]

**In a pilot study of high-performance** filtration in schools, the South Coast Air Quality Management District found that the combined use of register-based and high-performance panel filters was most effective at reducing particle concentrations, with reductions of 87–96%, while the use of the high-performance panel filter alone reduced particle concentrations by close to 90%.[16]

It is important to maintain HVAC filtration performance through regular maintenance and proper HVAC system operation. Excessive depressurization can be avoided by routine cleaning and filter replacement as necessary. Monitoring the system pressure can help identify when filter replacement is needed and can maximize performance, minimize energy costs, and prevent early disposal of useful filters. Inexpensive pre-filters can be used to remove a majority of particle mass and extend the life of the more expensive main filter. Filter performance and lifetime can also be improved by locating outdoor air intakes away from potential pollution sources so that cleaner air is drawn into the system.

Some schools may be able to incorporate high-efficiency filtration into their existing HVAC system. However, not all HVAC systems are compatible with high MERV-rated filters. In some systems, the addition of a high MERV-rated filter can result in

[15] McCarthy, M. C., Ludwig, J. F., Brown, S. G., Vaughn, D. L., & Roberts, P. T. (2013). Filtration effectiveness of HVAC systems at near-roadway schools. *Indoor Air, 23*(3), 196-207. doi:10.1111/ina.12015

[16] Polidori, A., Fine, P. M., White, V., & Kwon, P. S. (2013). Pilot study of high-performance air filtration for classroom applications. *Indoor Air, 23*(3), 185-195. doi:10.1111/ina.12013

[17] Polidori, A., Fine, P. M., White, V., & Kwon, P. S. (2013). Pilot study of high-performance air filtration for classroom applications. *Indoor Air, 23*(3), 185-195. doi:10.1111/ina.12013

[18] Polidori, A., Fine, P. M., White, V., & Kwon, P. S. (2013). Pilot study of high-performance air filtration for classroom applications. *Indoor Air, 23*(3), 185-195. doi:10.1111/ina.12013

a large drop in system pressure. The magnitude of the pressure drop varies by filter type and not all high-efficiency filters result in a large drop in pressure. For example, the South Coast Air Quality Management District's school air filtration program uses high-performance panel filters that have air resistance properties similar to conventional filters, do not require the use of a pre-filter, and do not reduce airflow through the HVAC system. In addition, these filters have longer lifespans than the medium-efficiency MERV filters typically in use, requiring replacement approximately once per year rather than every four months.[19] Depending on the HVAC system, installing the highest MERV-rated filter that the current system can handle may be a cost-effective way to improve indoor air quality. In other cases, improving or replacing the existing HVAC system may be required to achieve the pumping capacity necessary to accommodate high-efficiency filtration because of limited airflow.

Capital and/or increased operating costs may pose limitations to these improvements; however, potential savings associated with any system upgrades should also be considered. For example, the cost of purchasing an air sensor to monitor ventilation needs, and thereby help optimize ventilation rates, could offset long-term, higher energy costs due to over-ventilation.

## Recommendations

- For classrooms relying on passive/natural ventilation, use quiet, portable, stand-alone filtration systems to reduce indoor concentrations.
- For schools with mechanical ventilation systems, use high-efficiency filtration to reduce particle pollution exposure inside classrooms.
- Upgrade filtration to the highest MERV-rated filters that the HVAC system can handle.
- Consider HVAC system upgrades to accommodate high-efficiency filtration, including the installation of pre-filters, if necessary.
- Inspect and replace filters regularly according to manufacturer recommendations.
- Where possible, locate air intakes away from pollution sources.

## Actions for Building Occupants

The actions of building occupants can greatly affect near-road pollution exposure indoors. For instance, opening windows or doors for ventilation in classrooms can allow polluted air to enter into the classroom and overwhelm the air quality benefits of an HVAC filtration system. Keeping windows and doors closed is especially important during periods of peak traffic (e.g., morning and evening rush hours) when near-road pollutant concentrations are typically highest. Although the classroom is a noise-sensitive environment, it is important that HVAC systems are not turned off during the day.

For naturally ventilated classrooms, there may be opportunities to time air intake to avoid bringing in outdoor air during peak concentration times.

Although the focus of this document is traffic-related pollution exposure, it is important to note that indoor sources can largely impact (or even dominate) indoor concentrations of PM and gaseous pollutants. Indoor

[19] Polidori, A., Fine, P. M., White, V., & Kwon, P. S. (2013). Pilot study of high-performance air filtration for classroom applications. *Indoor Air, 23*(3), 185-195. doi:10.1111/ina.12013

sources include combustion sources, secondhand smoke, dust from student activity (PM), and (gaseous) emissions, such as from building materials, furniture, carpets, air fresheners, personal care products, biologically derived emissions from mold and bacteria, and classroom supplies (e.g., dry erase markers and some cleaners).

Exposure outdoors may be reduced by carefully timing outdoor activities to avoid times of peak pollution. Ozone pollution is often worse on hot, sunny days, especially during the afternoon and early evening. Particle pollution can be high any time of day, but higher levels can be found near idling cars, trucks, and buses and near busy roads, especially during rush hour. If possible, plan strenuous outdoor activities outside of rush hour and drop-off/pick-up times, and consider locating activities farther from roads and loading zones. In addition, many schools implement the Air Quality Flag program to raise awareness of the daily air quality forecast. The school flags, combined with information on current air quality from **www.airnow.gov**, can be used to help plan outdoor activities.

Raising awareness about indoor and outdoor air quality issues and providing training for staff on optimal building operating practices (including HVAC operation) specific to the design of their school are inexpensive strategies that can supplement upgrades to the ventilation and filtration system and building and site design. EPA's *IAQ Tools for Schools* program provides an easy-to-use framework and set of tools to train staff on indoor air quality (IAQ) management (**www.epa.gov/iaq/schools**). Training is recommended as a complementary strategy and should not be considered an alternative to ventilation upgrades.

## Recommendations

Train teachers and school staff on best ventilation practices, including:

- Keeping windows and doors closed in mechanically ventilated classrooms to prevent entry of polluted outdoor air.
- Keeping windows and doors closed in naturally ventilated classrooms during peak commute times.
- Keeping HVAC systems turned on throughout the day.
- Keeping air vents clear of items that may block airflow.
- Understanding the importance of indoor pollutant sources and how to reduce emissions from indoor sources.

Plan strenuous outdoor activities during times with lower amounts of traffic.

## Summary

Ventilation and filtration needs vary by school according to occupancy, proximity to roadways or other pollutant sources, and the prevalence of indoor sources. School administrators can improve indoor air quality by modifying ventilation and filtration systems, yet it can be difficult to identify which strategies will yield the most significant improvements for the level of effort and cost required.

To evaluate which (if any) actions may be needed to help reduce exposure to traffic-related pollution, school staff can begin by making a preliminary assessment. A brief guide to assist in the assessment of a school ventilation and filtration system is provided on page 15. Once a baseline assessment of the current ventilation system is complete, mitigation strategies suitable for the system can be evaluated. **Table 1** offers mitigation strategies for different types of ventilation systems typically found in classrooms.

**Table 1.** Ventilation systems versus mitigation strategies. HVAC/ventilation system types are listed from generally less effective to more effective, and mitigation strategies are listed from the simplest (and least costly) to implement to those that require a higher level of effort.

| HVAC/Ventilation Type | Mitigation Strategies | | | | |
|---|---|---|---|---|---|
| | Educate Staff | Air-Seal Building | Improve Air Intake | Use Filtration | Upgrade System |
| Passive/natural ventilation | ✓ | May be an option if adequate ventilation to dilute and remove pollutants from indoor sources | Avoid bringing in air during periods of high traffic | Use a portable stand-alone filtration system | Switch to a mechanical ventilation method |
| Single-classroom HVAC unit (e.g., window unit) | ✓ | ✓ | Avoid airflow obstructions<br>Use quiet systems | Use highest compatible MERV-rated filter<br>Use pre-filters or high-performance panel filters | Upgrade to a central HVAC system |
| Central HVAC system serving multiple classrooms—high-efficiency filtration use limited by airflow | ✓ | ✓ | Change air intake locations if near pollution source(s) (e.g., roadway, drop-off zone, parking) | Use highest compatible MERV-rated filter<br>Use pre-filters or high-performance panel filters | Modify airflow to be compatible with higher efficiency filtration |
| Central HVAC system serving multiple classrooms—high-efficiency filtration use not limited by airflow | ✓ | ✓ | Change air intake locations if near pollution source(s) (e.g., roadway, drop-off zone, parking) | Use MERV 16+ filter<br>Use pre-filters | N/A |

# Site-Related Strategies for Reducing Near-Road Pollution Exposure

## Transportation Policies

### *Establish Anti-Idling and Idle Reduction Policies*

Bus operation and idling can produce large amounts of PM and other air pollutants. Some schools have instituted anti-idling or idle reduction policies to reduce the impact of pollution from buses and passenger vehicles near schools. Anti-idling policies can result in large decreases in particle concentrations, particularly at schools operating multiple diesel school buses.

### *Upgrade Bus Fleets*

Pollution from school buses can also be reduced by upgrading bus fleets. Fleet turnover for diesel school buses is low, with buses typically operating for 20 to 30 years. Older buses emit high levels of PM and other air pollutants. However, technological advances and tighter PM emissions standards for new buses, set by EPA, have resulted in new buses (manufactured during or after 2007) that are 60 times cleaner than buses produced prior to 1990. Emissions can be reduced by retrofitting older school buses with PM filters or oxidation catalysts, or by replacing older buses with newer models. Emissions may be reduced by using certain alternative fuels, including biodiesel blends. Engines certified to operate on alternative fuels such as liquid petroleum gas (LPG), compressed natural gas (CNG), and liquefied natural gas (LNG) can also reduce emissions. Discuss potential funding options for bus fleet upgrades with your state or local environmental or air quality agency.[20]

[20] U.S. Environmental Protection Agency. (2010). *Clean school bus.* Available at http://www.epa.gov/cleandiesel/sector-programs/csb-overview.htm

## *Encourage Active Transportation*

Promoting active transportation, such as walking and bicycling to and from schools, can help reduce traffic-related pollution by reducing the number of buses and passenger vehicles nearby. For example, the addition of walking/biking paths at Roosevelt Middle School in Eugene, Oregon, reduced traffic volumes near the school by 24%.[21]

While active transportation may contribute to improved air quality near schools, students walking or biking to school may be exposed to roadway pollution and other traffic hazards because of their proximity to motor vehicle traffic. When safe alternatives exist, biking and walking to school along routes with lower traffic volumes may help reduce exposure to pollution and safety hazards.[22]

Parallel and off-street walking/biking paths through parks or other off-road areas can also provide a good alternative to traveling along a road with many motor vehicles. Pursuing pedestrian and bicycle infrastructure improvements can help provide safer routes for students to walk and bike to school. This could include installing or improving sidewalks, crosswalks, signs, markings, and countdown timers, as well as encouraging "walking" school buses.[23] When considering walking and biking routes to school, impacts on safety, lighting, access, and maintenance requirements should be considered. The Safe Routes to School National Partnership provides many resources on promoting safe walking and biking (www.saferoutespartnership.org).

Despite the potential for increased exposure associated with active transportation, walking and biking have been shown to improve health, and people who live in highly walkable neighborhoods are generally more physically active than those who live in less walkable neighborhoods. Promoting walking and biking to school along routes or paths with lower traffic volumes (relative to other roads) will increase the likelihood that the health benefits of exercise outweigh the health risks associated with increased air pollutant exposures.

## Recommendations

- Limit school bus idling by instituting anti-idling or idle reduction policies.
- Upgrade school bus fleets by:
  - Retrofitting buses with PM filters or oxidation catalysts; and
  - Replacing older buses with newer models.
- Emissions may be reduced by using certain alternative fuels, including biodiesel blends. Engines certified to operate on alternative fuel such as LPG, CNG, and LNG can also reduce emissions.
- Discuss funding opportunities for bus fleet upgrades with your local or state environmental or air quality agency.
- Provide walking and biking paths to promote active transportation and reduce the number of buses and passenger vehicles near the school.

## Site Location and Design

In response to concerns about the impacts of near-road air pollution, several agencies, including EPA and several state agencies in California, have established siting guidelines for new schools that recommend reducing traffic-related air pollution exposure (Table 2). While California guidelines recommend that new schools should not be located within 500 feet or more of major roads, EPA's *School Siting Guidelines* note the need to consider multiple issues associated with exposure and health. For example, a school sited far from a major road

[21] Safe Routes to School National Partnership. (2012). *Safe routes to school and traffic pollution: Get children moving and reduce exposure to unhealthy air.* Available at http://www.saferoutespartnership.org/sites/default/files/pdf/Air_Source_Guide_web.pdf

[22] Safe Routes to School National Partnership. (2012). *Safe routes to school and traffic pollution: Get children moving and reduce exposure to unhealthy air.* Available at http://www.saferoutespartnership.org/sites/default/files/pdf/Air_Source_Guide_web.pdf

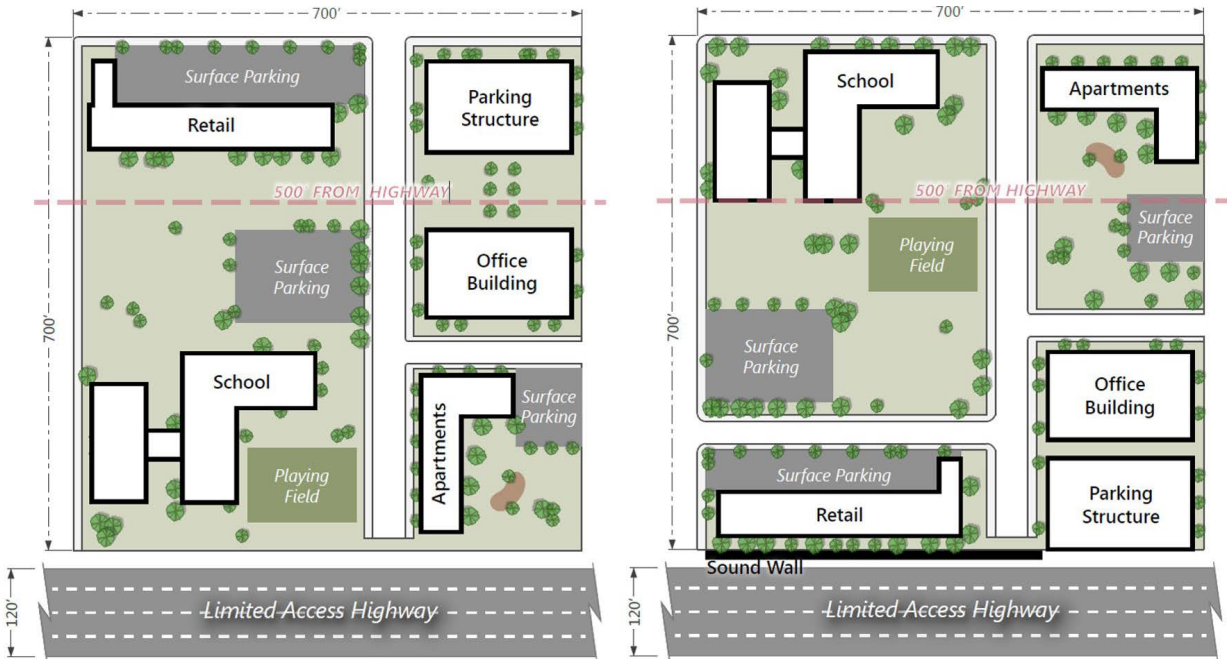
[23] National Center for Safe Routes to School. (2013). *Starting a walking school bus.* Available at http://www.walkingschoolbus.org

that requires long commutes by bus or car may result in higher overall exposure for students, compared to a school site near a major road that does not require long commutes. Overall, EPA recommends multiple strategies, as described in this document, to reduce students' overall exposure.

School sites include of a variety of land use types, such as classrooms, playgrounds, athletic fields, offices, and maintenance and storage facilities. For new school developments near roadways, there may be opportunities to reduce traffic-related pollution exposure through careful site design. By

**Table 2.** School siting documents developed by various agencies.

| Agency | Guidance | Key Outcomes |
|---|---|---|
| U.S. EPA | School Siting Guidelines (2011) | Recommends considering many factors in evaluating locations for new schools, including proximity to the community (including community amenities and infrastructure), distance from major transportation facilities, exposure to air pollutants during student commutes, feasible mitigation on site, and accessibility by walking or biking. |
| California Air Resources Board | Air Quality and Land Use Handbook (2005) | Recommends that new schools are not located within 500 feet of major roadways (>50,000 vehicles/day). |
| California Department of Education | School Site Selection and Approval Guide (2000) | Recommends distancing schools 2,500 feet from major roadways where explosives are carried and at least 1,500 feet from roads where gasoline, diesel, propane, chlorine, oxygen, pesticides, or other combustible or poisonous gases are transported. |
| South Coast Air Quality Management District | Air Quality Issues in School Site Selection: Guidance Document (2005, updated 2007) | Recommends a buffer zone of no less than 500 feet, and as much as 1,000 feet, between schools and major roadways. |
| Los Angeles Unified School District | Distance Criteria for School Siting (2008) | Recommends that new schools are not built within 500 feet of a freeway or major transportation corridor (>100,000 vehicles/day). |




*Sample layouts for a large land parcel with a school and other land uses. A less desirable layout (left) with the school located close to the highway is compared to an improved layout (right) with the school more than 500 feet from the highway (red dotted line).*

locating land uses such as maintenance, storage, parking, and office facilities in the area closest to the roadway, classroom and play areas can be located farther from the roadway in areas where air pollutant concentrations tend to be lower. Some of these strategies may also be applicable to existing school sites near roadways, or to sites located near other sources of diesel particulate air pollution such as warehouses, truck routes, railyards, and ports.

Exposure to traffic-related pollution can also be reduced by locating onsite transportation-related sources, especially school bus drop-off and pick-up locations, as far from classrooms, play areas, and building air intakes as possible. Optimal placement of offices, playgrounds, athletic fields, and classrooms within a school site depend on a variety of factors, including typical wind patterns, the amount of time spent and activities performed outdoors versus indoors, and indoor ventilation conditions.

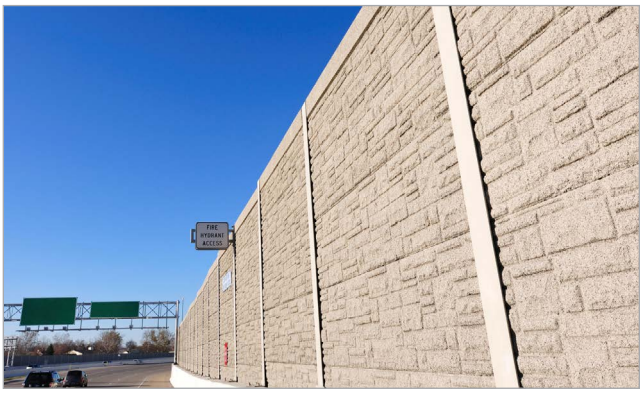
## Recommendations

- For new school developments, consider locations farther from major roads and other areas with heavy truck traffic, but still within the community.
  - A quantified evaluation of post-mitigation air quality impacts may be appropriate and/or required.
- Consider unintended consequences of any location, such as increased commute distances and decreased opportunity for walking and biking.
- Consider opportunities to locate playgrounds, athletic fields, and classrooms farther from the roadway, or other areas with heavy truck traffic, by locating maintenance, storage, parking, and office facilities in the area closest to the roadway.
- Locate bus and passenger vehicle loading zones away from classrooms, play areas, and building air intakes.

## Roadside Barriers

### *Sound Walls*

Pollutant concentrations behind a barrier located downwind of a roadway are typically lower than concentrations in the absence of a barrier. Studies show that reductions in downwind pollutant concentrations within approximately 500 feet of a highway in the presence of a well-designed sound wall can be on the order of 15% to 50%.[24]



The effectiveness of sound walls at mitigating near-road pollution exposure depends on roadway configuration, local meteorology, and barrier height, design, and endpoint location. For example, pollutant concentrations may be higher downwind of a wall if there are gaps in the wall that allow pollutants to pass through. Sound walls can be considered for schools located adjacent to highways and other busy, high-traffic roadways.

**In situations** where school authorities do not have jurisdiction or ownership over the immediate roadside environment, consider discussing the use of roadside barriers to reduce traffic-related pollution exposure with the relevant authority (e.g., state department of transportation, city planning department).

[24] Baldauf, R. W., Khlystov, A., Isakov, V., Thoma, E., Bowker, G. E., Long, T., & Snow, R. (2008). Impacts of noise barriers on near-road air quality. *Atmospheric Environment, 42*, 7502–7507.

**The combined use** of vegetation and sound walls has shown promise in reducing vehicle pollution downwind of roadways by up to 60%.[25]

## *Vegetation*

Trees and plants along roadways can reduce particle concentrations by acting as a physical barrier between roadways and schools (similar, in effect, to sound walls), or by filtering particles as they pass through and accumulate on leaf surfaces. The amount of removal depends on season, plant species, leaf size and density, and pollutant type. The effectiveness of trees and plants as physical barriers also depends on the density and height of the greenery. Mature vegetation tends to be more effective than young vegetation, evergreen species are typically more effective than deciduous species, and vegetation with needle-like greenery (e.g., conifers) tends to be more effective than broad-leaved trees. Particle removal rates tend to be higher when vegetation is located close to the pollutant source and when wind speeds are low.

The vegetation types chosen for roadside barriers should be appropriate for the location of interest, including water requirements, non-invasive species, and aesthetics. In general, the vegetation barrier should be thick (approximately 20 feet or more) and have full leaf and branch coverage from the ground to the top of the canopy along the entire length (i.e., no gaps in-between or underneath the vegetation). In some instances, this type of barrier may require the use of multiple vegetation types such as a combination of bushes and trees. The vegetation chosen should also maintain its structure during all seasons; thus, coniferous trees would be preferable to hardwood species. The vegetation types chosen should also not be emitters of air pollution or high levels of pollen. Schools can use the U.S. Department of Agriculture's (USDA's) i-Tree Species tool[26] to begin the process of choosing appropriate vegetation, in consultation with other experts from plant nurseries, local cooperative extensions, city government, or the U.S. Forest Service. All vegetation that will be located near a road should be sited consistent with state and local safety guidelines.

## Recommendations

- Use a solid roadside barrier (only along highways) and/or vegetation to block traffic-related pollutants from influencing air quality near the school.
- Minimize gaps in solid and vegetative roadside barriers.
- For vegetative barriers, use an evergreen species with mature, dense greenery and locate the barrier downwind and close to the roadway.
- Choose species appropriate for region and site, consulting with plant nurseries, local cooperative extensions, city governments, or the U.S. Forest Service.

Similar to sound walls, concentrations may be higher behind a vegetative barrier that is located downwind of the roadway if there are gaps in the vegetation such as missing or dead trees, or lack of cover from the ground to the top of the vegetation. In any case, vegetation can be used as a buffer to distance people from the roadway while creating a more attractive and shaded space that encourages active transportation (such as walking and bicycling) as an alternative to vehicle use.[27]

[25] Bowker, G. E., Baldauf, R., Isakov, V., Khylstov, A., & Petersen, W. (2007). The effects of roadside structures on the transport and dispersion of ultrafine particles from highways. *Atmospheric Environment, 41,* 8128-8139.

[26] USDA's i-Tree Species is designed to aid users in selecting proper species given the tree functions they desire. The tool is available at www.itreetools.org/species.

[27] Baldauf, R., McPherson, G., Wheaton, L., Zhang, M., Cahill, T. Hemphill Fuller, C., Withycombe, E., & Titus, K. (2013). Integrating vegetation and green infrastructure into sustainable transportation planning. *Transportation Research News*, September-October, 14-18.

# Summary of Recommendations

Table 3 outlines mitigation strategies that can be used to reduce traffic-related pollution exposure in schools, including ventilation/HVAC system requirements, benefits, drawbacks, and relevance for new and/or existing schools. Note that some of these mitigation strategies will only serve to reduce pollution exposures indoors (e.g., filtration), or will only effectively reduce some pollutants (e.g., $PM_{2.5}$) but not others (e.g., volatile organic compoundss). These mitigation strategies reduce risks, but do not eliminate them.

| Strategy | Ventilation/ HVAC System Type | Benefits | Drawbacks | New/ Existing Schools |
|---|---|---|---|---|
| Educate staff on ventilation and indoor air quality best practices | All | Teachers are less likely to turn mechanical systems off; air vents remain unobstructed; doors/windows are kept closed during peak pollution periods; indoor sources of air pollution are reduced | Effectiveness may decrease over time; results depend on training quality and staff cooperation | Both |
| Air-seal around windows, doors, HVAC ducts, etc. | Mechanical ventilation systems | Reduces the amount of unfiltered air entering the building | Indoor pollutant concentrations may build over time if ventilation is insufficient, especially if indoor pollutant generation is high | Both |
| Relocate air intake or source if roadway/pollution source is near intake vent | Central HVAC systems; single classroom HVAC units | Reduces particle and gaseous concentrations in incoming air; can increase lifespan of filters | Cost | Both |
| Use filtration | All | Reduces particle concentrations from both outdoor and indoor sources | Maintenance and replacement required; may require system upgrades | Both |
| Improve HVAC system design to be compatible with high-efficiency filtration | Central HVAC systems | Larger reductions in particle concentrations are possible | Cost | Both |
| Implement anti-idling/idle reduction policies | All | Reduces emissions of particles and gases | Lack of vehicle climate control during hot/cold weather | Both |
| Upgrade school bus fleet | All | Reduces emissions of particles and gases | Cost | Both |
| Encourage active transportation (e.g., walking and biking) to school | All | Reduces emissions of particles and gases; improved health with exercise | Walkers/bicyclists may be exposed to traffic-related pollution or other hazards during trips | Both |
| Locate school site away from pollution sources | All | May reduce student exposure to particles and gases at the school, although overall exposures may increase if an alternative site requires long commutes by bus or car | If alternative sites are limited, there may not be opportunities to locate the school farther from the road; unintended consequences from locating sites far from the community may include a decreased opportunity for walking and biking, increased traffic, and/or increased exposures during commuting | New |
| Design school site to minimize exposure to pollutant sources | All | Reduces student exposure to particles and gases | Effectiveness is site-specific; may be costly for existing schools | Both |
| Use solid and vegetative barriers | All | Reduces concentrations of particles and gases near schools; vegetative barriers may increase shade and improve aesthetics | Cost; optimal design may be site-specific; maintenance and water needs for vegetative barriers | Both |

# School Ventilation and Filtration System Assessment

1. Assess whether near-road pollution may be a problem.
   - Is there a major roadway near the school? If so:
     - How far away is it?
     - Is the school downwind of the road?
   - Where does school bus pick-up and drop-off occur?
     - Are there opportunities to reduce bus idling or relocate loading zones away from classrooms and outdoor recreation areas?
2. Assess the current ventilation and filtration system.
   - Is ventilation achieved passively or mechanically?
   - If mechanical:
     - Is a central HVAC system used or a single-classroom unit?
     - Are filters being used?
     - What is the blower capacity?
     - Is filtration being used? If so, what is the MERV rating of the filter(s)?
3. Assess ventilation operation.
   - Are teachers leaving windows and/or doors open during the day?
   - Are there opportunities to bring in air during off-peak emission times?
   - Are teachers turning systems off due to noise issues?
   - Are filters being inspected, cleaned, and replaced according to the schedule recommended by the manufacturer?
4. Assess air-sealing needs to limit infiltration of unconditioned air.
   - Can infiltration of polluted air be reduced by sealing around any of the following:
     - Windows?
     - Doors?
     - HVAC ducting?
5. Evaluate air intake location(s) relative to roadways or other pollutant sources such as school bus drop-off and pick-up locations.
   - Is air intake located near a roadway, loading zone, or other pollutant source, such as designated smoking areas?[28] Are supply and exhaust vents unobstructed?
   - Can the air intake be relocated to an area that is less influenced by pollutant sources?

[28] The Centers for Disease Control and Prevention recommends that schools prohibit all tobacco use at all school facilities and events at all times. See http://www.cdc.gov/healthyschools/tobacco for more recommendations on tobacco use prevention through schools.

# Additional Resources

Information regarding air quality and pollution mitigation in schools is available on the EPA website:

- General information about indoor air quality: **www.epa.gov/iaq**
- Creating healthy indoor environments in schools: **www.epa.gov/iaq/schools**
- Energy Savings Plus Health: Indoor Air Quality Guidelines for School Building Upgrades: **www.epa.gov/iaq/schools/energy_savings_plus_health.html**
- EPA School Siting Guidelines: **www.epa.gov/schools/guidelinestools/siting/download.html**
- Exhibit 5: Factors Influencing Exposures and Potential Risks: **www.epa.gov/schools/guidelinestools/siting/downloads/Exhibit_5_Factors_Infl encing_Exposures_and_Potential_Risks.pdf**
- Exhibit 6: Screening Potential Environmental, Public Health and Safety Hazards: **www.epa.gov/schools/guidelinestools/siting/downloads/Exhibit_6_Screening_Potential_Environmental_Public_Health_and_Safety_Hazards.pdf**
- HVAC systems in schools: **www.epa.gov/iaq/schooldesign/hvac.html**
- EPA Clean School Bus Program: **www.epa.gov/cleanschoolbus/csb-overview.htm**
- The Role of Vegetation in Mitigating Air Quality Impacts from Traffic Emissions: **http://archive.epa.gov/nrmrl/archive-appcd/web/pdf/baldauf.pdf**
- EPA School Flag Program: **http://cfpub.epa.gov/airnow/index.cfm?action=fl g_program.index**

Other useful resources include:

- California Air Resources Board, Air Quality and Land Use Handbook: **www.arb.ca.gov/ch/handbook.pdf**
- South Coast Air Quality Management District, Air Quality Issues in School Site Selection: Guidance Document: **www.aqmd.gov/docs/default-source/planning/air-quality-guidance/school_guidance.pdf**
- South Coast Air Quality Management District, Near-Road Mitigation Measures and Technology Forum Materials: **www.aqmd.gov/home/library/technology-research/technology-forums**
- California Department of Education, School Site Selection and Approval Guide: **www.cde.ca.gov/ls/fa/sf/schoolsiteguide.asp**
- Los Angeles Unified School District, Distance Criteria for School Siting: **www.lausd-oehs.org/docs/Misc/DistanceCriteriaTable%20Rev12_10_08.pdf**
- ASHRAE Standard 62.1-2013, Ventilation for Acceptable Indoor Air Quality, 2013: **www.techstreet.com/ashrae/products/1865968**
- ASHRAE Indoor Air Quality Guide: Best Practices for Design, Construction, and Commissioning, 2009: **www.ashrae.org/resources--publications/bookstore/indoor-air-quality-guide**

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# Air pollution

## Ambient air pollution: Health impacts

Health risks | Equity impacts | Climate impacts

Nicolò Lazzati

Ambient (outdoor air pollution) is a major cause of death and disease globally. The health effects range from increased hospital admissions and emergency room visits, to increased risk of premature death.

An estimated 4.2 million premature deaths globally are linked to ambient air pollution, mainly from heart disease, stroke, chronic obstructive pulmonary disease, lung cancer, and acute respiratory infections in children.

Worldwide ambient air pollution accounts for:

- 29% of all deaths and disease from lung cancer
- 17% of all deaths and disease from acute lower respiratory infection
- 24% of all deaths from stroke
- 25% of all deaths and disease from ischaemic heart disease
- 43% of all deaths and disease from chronic obstructive pulmonary disease

Pollutants with the strongest evidence for public health concern, include particulate matter (PM), ozone ($O_3$), nitrogen dioxide ($NO_2$) and sulphur dioxide ($SO_2$).

The health risks associated with particulate matter of less than 10 and 2.5 microns in diameter ($PM_{10}$ and $PM_{2.5}$) are especially well documented. PM is capable of penetrating deep into lung passageways

**Fact sheets**

Ambient (outdoor) air quality and health
Fact sheet

Household air pollution and health
Fact sheet

**Related links**

Public Health, Environmental and Social Determinants of Health (PHE)

**Contact us**

**Department of Public Health, Environmental and Social Determinants of Health (PHE)**
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1211 Geneva 27
Switzerland
Email: ambientair@who.int

and entering the bloodstream causing cardiovascular, cerebrovascular and respiratory impacts. In 2013, it was classified as a cause of lung cancer by WHO's International Agency for Research on Cancer (IARC). It is also the most widely used indicator to assess the health effects from exposure to ambient air pollution.

In children and adults, both short- and long-term exposure to ambient air pollution can lead to reduced lung function, respiratory infections and aggravated asthma. Maternal exposure to ambient air pollution is associated with adverse birth outcomes, such as low birth weight, pre-term birth and small gestational age births. Emerging evidence also suggests ambient air pollution may affect diabetes and neurological development in children. Considering the precise death and disability toll from many of the conditions mentioned are not currently quantified in current estimates, with growing evidence, the burden of disease from ambient air pollution is expected to greatly increase.

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# Air pollution

Encyclopedic entry. Air pollution consists of chemicals or particles in the air that can harm the health of humans, animals, and plants. It also damages buildings.

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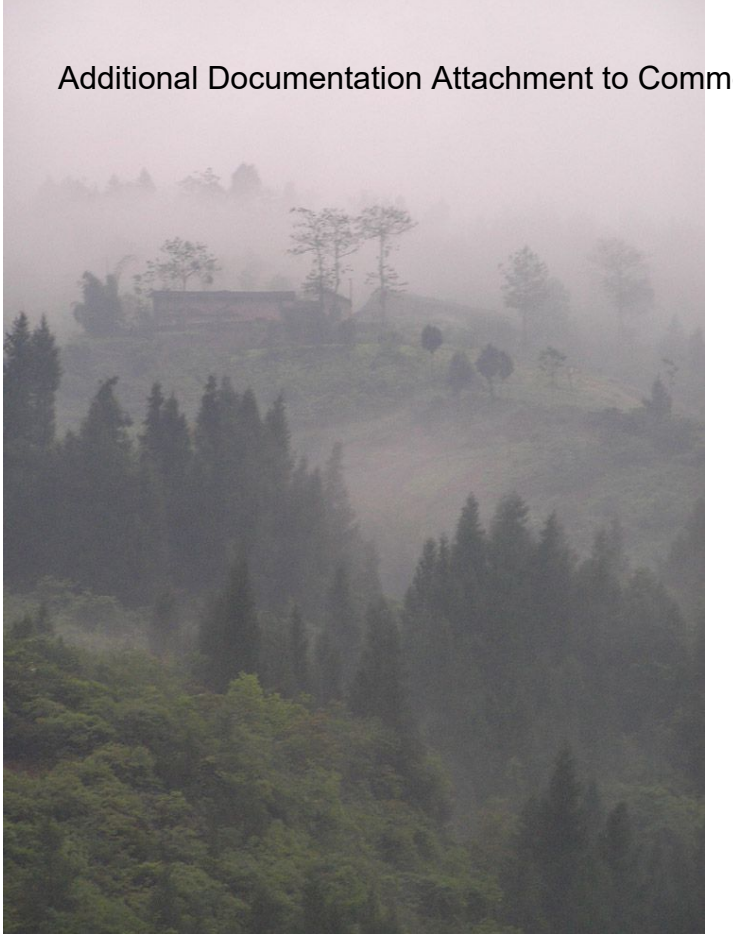

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IMAGE

## Air Pollution along the Yangtze

This densely wooded hillside along the banks of the Yangtze River, China, is shrouded by air pollution. Rapidly developing countries like China must often deal with air pollution as new factories emit substances such as smoke and carbon dioxide into the atmosphere.

PHOTOGRAPH BY TRUDY MUEGEL, MYSHOT

Air pollution consists of chemicals or particles in the air that can harm the health of humans, animals, and plants. It also damages buildings. Pollutants in the air take many forms. They can be gases, solid particles, or liquid droplets.

**Sources of Air Pollution**

Pollution enters the Earth's atmosphere in many different ways. Most air pollution is created by people, taking the form of emissions from factories, cars, planes, or aerosol cans. Second-hand cigarette smoke is also considered air pollution. These man-made sources of pollution are called anthropogenic sources.

Some types of air pollution, such as smoke from wildfires or ash from volcanoes, occur naturally. These are called natural sources.

Air pollution is most common in large cities where emissions from many different sources are concentrated. Sometimes, mountains or tall buildings prevent air pollution from spreading out. This air pollution often appears as a cloud making the air murky. It is called smog. The word "smog" comes from combining the words "smoke" and "fog."

Large cities in poor and developing nations tend to have more air

Large cities in poor and developing nations tend to have more air pollution than cities in developed nations. According to the World Health Organization (WHO), some of the worlds most polluted cities are Karachi, Pakistan; New Delhi, India; Beijing, China; Lima, Peru; and Cairo, Egypt. However, many developed nations also have air pollution problems. Los Angeles, California, is nicknamed Smog City.

**Indoor Air Pollution**

Air pollution is usually thought of as smoke from large factories or exhaust from vehicles. But there are many types of indoor air pollution as well.

Heating a house by burning substances such as kerosene, wood, and coal can contaminate the air inside the house. Ash and smoke make breathing difficult, and they can stick to walls, food, and clothing.

Naturally-occurring radon gas, a cancer-causing material, can also build up in homes. Radon is released through the surface of the Earth. Inexpensive systems installed by professionals can reduce radon levels.

Some construction materials, including insulation, are also dangerous to people's health. In addition, ventilation, or air movement, in homes and rooms can lead to the spread of toxic mold. A single colony of mold may exist in a damp, cool place in a house, such as between walls. The mold's spores enter the air and spread throughout the house. People can become sick from breathing in the spores.

## Effects On Humans

People experience a wide range of health effects from being exposed to air pollution. Effects can be broken down into short-term effects and long-term effects.

Short-term effects, which are temporary, include illnesses such as pneumonia or bronchitis. They also include discomfort such as irritation to the nose, throat, eyes, or skin. Air pollution can also cause headaches, dizziness, and nausea. Bad smells made by factories, garbage, or sewer systems are considered air pollution, too. These odors are less serious but still unpleasant.

Long-term effects of air pollution can last for years or for an entire lifetime. They can even lead to a person's death. Long-term health effects from air pollution include heart disease, lung cancer, and respiratory diseases such as emphysema. Air pollution can also cause long-term damage to people's nerves, brain, kidneys, liver, and other organs. Some scientists suspect air pollutants cause birth defects. Nearly 2.5 million people die worldwide each year from the effects of outdoor or indoor air pollution.

People react differently to different types of air pollution. Young children and older adults, whose immune systems tend to be weaker, are often more sensitive to pollution. Conditions such as asthma, heart disease, and lung disease can be made worse by exposure to air pollution. The length of exposure and amount and type of pollutants are also factors.

**Effects On The Environment**

Like people, animals, and plants, entire ecosystems can suffer effects from air pollution. Haze, like smog, is a visible type of air pollution that obscures shapes and colors. Hazy air pollution can even muffle sounds.

Air pollution particles eventually fall back to Earth. Air pollution can directly contaminate the surface of bodies of water and soil. This can kill crops or reduce their yield. It can kill young trees and other plants.

Sulfur dioxide and nitrogen oxide particles in the air, can create acid rain when they mix with water and oxygen in the atmosphere. These air pollutants come mostly from coal-fired power plants and motor vehicles. When acid rain falls to Earth, it damages plants by changing soil composition; degrades water quality in rivers, lakes and streams; damages crops; and can cause buildings and monuments to decay.

Like humans, animals can suffer health effects from exposure to air pollution. Birth defects, diseases, and lower reproductive rates have all been attributed to air pollution.

**Global Warming**

Global warming is an environmental phenomenon caused by natural and anthropogenic air pollution. It refers to rising air and ocean

temperatures around the world. This temperature rise is at least partially caused by an increase in the amount of greenhouse gases in the atmosphere. Greenhouse gases trap heat energy in the Earths atmosphere. (Usually, more of Earths heat escapes into space.)

Carbon dioxide is a greenhouse gas that has had the biggest effect on global warming. Carbon dioxide is emitted into the atmosphere by burning fossil fuels (coal, gasoline, and natural gas). Humans have come to rely on fossil fuels to power cars and planes, heat homes, and run factories. Doing these things pollutes the air with carbon dioxide.

Other greenhouse gases emitted by natural and artificial sources also include methane, nitrous oxide, and fluorinated gases. Methane is a major emission from coal plants and agricultural processes. Nitrous oxide is a common emission from industrial factories, agriculture, and the burning of fossil fuels in cars. Fluorinated gases, such as hydrofluorocarbons, are emitted by industry. Fluorinated gases are often used instead of gases such as chlorofluorocarbons (CFCs). CFCs have been outlawed in many places because they deplete the ozone layer.

Worldwide, many countries have taken steps to reduce or limit greenhouse gas emissions to combat global warming. The Kyoto Protocol, first adopted in Kyoto, Japan, in 1997, is an agreement between 183 countries that they will work to reduce their carbon dioxide emissions. The United States has not signed that treaty.

**Regulation**

In addition to the international Kyoto Protocol, most developed nations have adopted laws to regulate emissions and reduce air pollution. In the United States, debate is under way about a system called cap and trade to limit emissions. This system would cap, or place a limit, on the amount of pollution a company is allowed. Companies that exceeded their cap would have to pay. Companies that polluted less than their cap could trade or sell their remaining pollution allowance to other companies. Cap and trade would essentially pay companies to limit pollution.

In 2006 the World Health Organization issued new Air Quality Guidelines. The WHOs guidelines are tougher than most individual countries existing guidelines. The WHO guidelines aim to reduce air pollution-related deaths by 15 percent a year.

**Reduction**

Anybody can take steps to reduce air pollution. Millions of people every day make simple changes in their lives to do this. Taking public transportation instead of driving a car, or riding a bike instead of traveling in carbon dioxide-emitting vehicles are a couple of ways to reduce air pollution. Avoiding aerosol cans, recycling yard trimmings instead of burning them, and not smoking cigarettes are others.

## Maps

- AIRNow: Tracking Ozone and Particle Pollution

## Websites

- Environmental Protection Agency: Indoor Air Pollution—Volatile Organic Compounds
- National Geographic Environment: Air Pollution
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# Does air pollution affect our furry friends?

Share

There are a lot of studies that show how air pollution affects us, humans. But what about our pets?

We know that people exposed to too much air pollution may have a greater risk of developing cardiovascular diseases or respiratory symptoms such as a persistent cough, wheezing, shortness of breath, tightness of chest, and chest pain. At the extreme end, too much air pollution can lead to premature death in at-risk groups such as the elderly, young children, and people with preexisting cardiovascular diseases. Do our pets face the same risks?

Scientists are just beginning to explore the negative effects of air pollution on pets, but most agree that when air quality is poor for humans, it is also poor for pets.

# Where does air pollution come from?

People and animals are exposed to air pollution from a variety of different sources. Fumes from cars and trucks, diesel fuels, coal, gasoline, power plants, construction, and livestock all contribute to air pollution. Pollution can also occur in the home as a result of tobacco smoke, cooking, and heating sources such as wood burning fireplaces or stoves.

Animals in urban areas are at particular risk of smog and exhaust pollutants, while suburban and rural animals can be exposed to the toxins sprayed as insecticides, fungicides and herbicides.

# Recent studies

Studies show that pets living with smokers may face greater risks than their owners, due to the considerable amount of time spent near the floor. A 2011 study found that cats that were exposed to passive smoke in homes had reduced lung functioning compared to cats living in smoke-free homes.

Scientists have also linked human indoor activities (cleaning products, smoking, etc.) to carcinogens that can cause mesothelioma, bladder, lung, and nasal cancer in dogs.

Pets are also harmed by outside air pollution. Scientists in one study examined the brains of dogs that had been exposed to Mexico City's heavy air pollution and compared them with the brains of dogs from less-polluted cities. The published report stated, "[t]he Mexico City dogs' brains showed increased inflammation and pathology including amyloid plaques and neurofibrillary tangles, clumps of proteins that serve as a primary marker for Alzheimer's disease in humans."

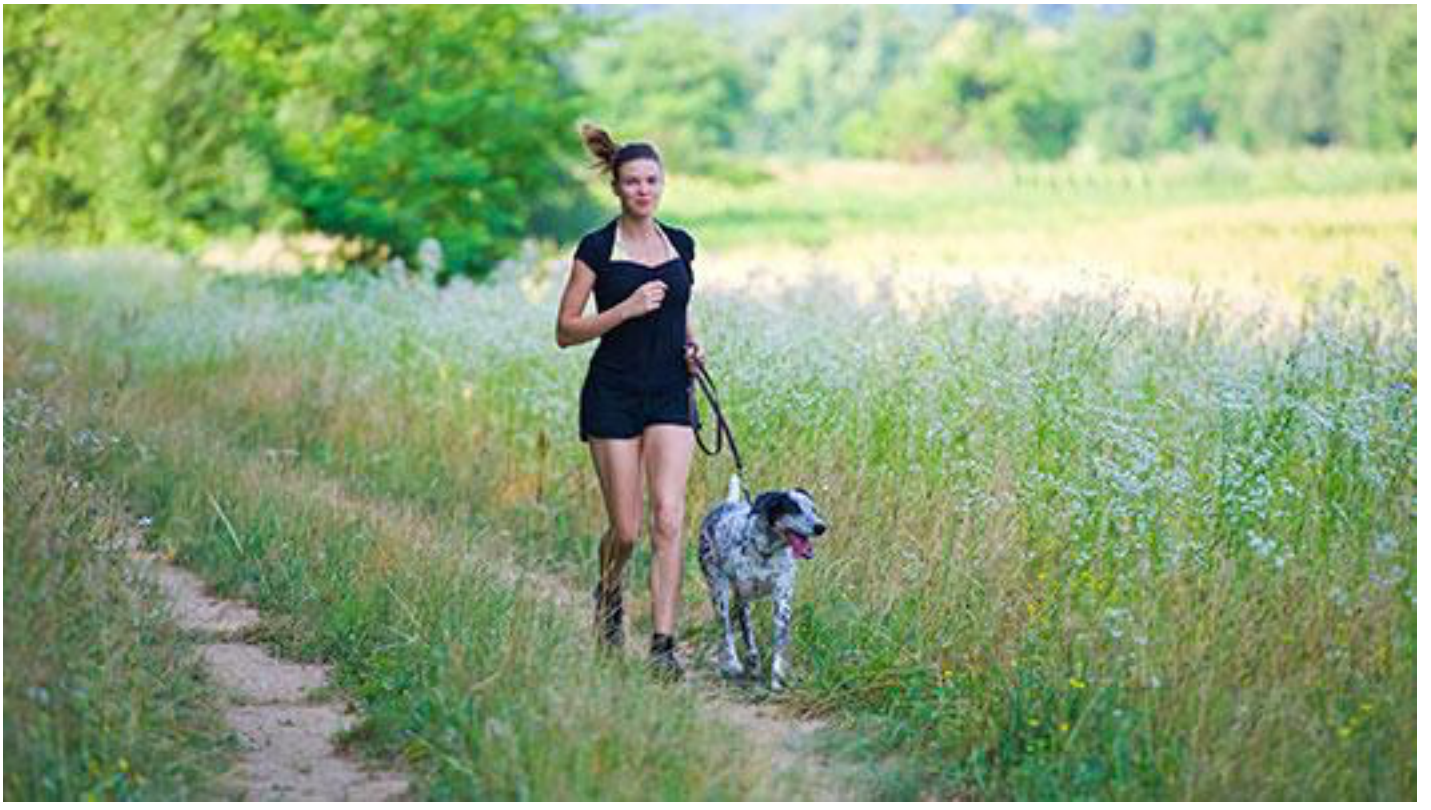
The University of Massachusetts and the Tufts University Cummings School of Veterinary Medicine did a study with 700 dog owners regarding the use of pesticides and the results were astounding. According to this study, approximately 33% of the dogs were diagnosed with canine malignant

lymphoma, a form of cancer. The study also revealed that dogs had a 70% higher chance of getting lymphoma if their owner used pesticides in their yard.



Cat lover? Scientists in one study found that one in ten cats have asthma related to indoor and outdoor air pollutants. Cats who lived with owners who smoke or burn wood fires were found to have severely decreased lung function.

# What can I do to reduce my pet's exposure to air pollution?



Many household pets spend the majority of their time indoors or in the yard. Simple actions can help you reduce your pet's exposure to air pollution.

**Protect your indoor air**

- Change your home's air filter regularly.
- Vacuum frequently to remove pet hair and other indoor air pollutants.
- Avoid smoking indoors.
- Choose your cleaning products carefully.



**Outside?**

- Do your part to improve overall air quality by taking the bus or carpooling.
- Avoid exercising your pets in high-traffic areas. When possible, choose spaces away from roadways such as parks or residential areas.
- Be careful of the products you use in your yard. Ask at your garden store for less toxic alternatives to chemical pesticides. Find out more about growing a healthy, no-waste lawn and garden.

# Find out more

- Be air aware by staying informed about the air quality in your area and keep pets inside on days with poor air quality. Sign up for air quality alerts and forecasts via email
- Learn how to Create a clean, green home.

*Tuesday, July 5, 2016*

**Bad air day? Find out.**

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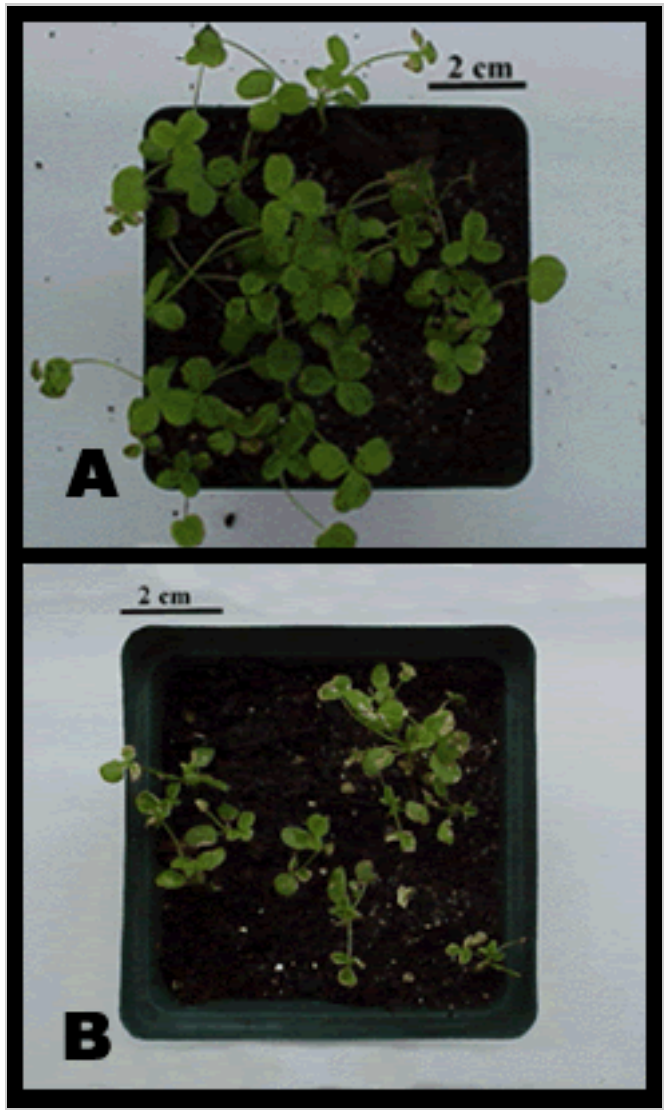


Both of these pots of clover plants have been growing for 30 days, but one looks healthier than the other! The clover plants in the top picture (A) were given normal water. The clover plants in the lower picture (B) were given acidic water (pH=2.0) for the latter 20 days. When air pollution causes acid rain, plants that rely on rain water to live and grow are endangered.
*Greg Anderson, Bates College, Department of Biology*

## Related links:

Find out more about how acid rain affects plants! (from the Bates College Biology Dept.)

Movie: Changing Environment is Killing Many of the World's Amphibians

# Air Pollution Affects Plants, Animals, and Environments



Some air pollutants harm plants and animals directly. Other pollutants harm the habitat, food or water that plants and animals need to survive. Read on to learn more about how air pollutants harm plants and animals.

**Acid rain harms living things**
When acidic air pollutants combine with water droplets in clouds, the water becomes acidic. When those droplets fall to the ground, the acid rain can damage the environment. Damage due to acid rain kills trees and harms animals, fish, and other wildlife. Acid rain can destroy the leaves of plants like in the picture at the left. When acid rain soaks into the ground, it can make the soil an unfit habitat for many living things. Acid rain also changes the chemistry of the water in lakes and streams, harming fish and other aquatic life.

**The thinning ozone layer harms living things**
Air pollutants called *chlorofluorocarbons*(or CFCs) have destroyed parts of the ozone layer.The ozone layer, located in the stratosphere layer of Earth's atmosphere, shields our planet from the Sun's ultraviolet radiation. The areas of thin ozone are called *ozone holes*. Ultraviolet radiation causes skin cancer and damages plants and wildlife.

**Tropospheric ozone harms living things**
Ozone molecules wind up near the Earth's surface as a part of air pollution. Ozone molecules near the ground damages lung tissues of animals and prevent plant respiration by blocking the openings in leaves where respiration occurs. Without respiration, a plant is not able to photosynthesize at a high rate and so it will not be able to grow.

**Global warming harms living things**
Our planet is currently warming much more rapidly than expected because additional greenhouse gases are being released into the atmosphere from air pollution. When fuels are burned, some of the pollutants released are greenhouses gases. Through the process of photosynthesis, plants convert carbon dioxide into oxygen and use the carbon to grow larger. However, the amount of carbon dioxide released by burning fuels is much more than plants can convert.

Global warming is causing changes to the places where plants and animals live around the world. For example:

- Near the poles, ice and frozen ground are melting. This causes changes in the habitat and resources for plants and animals living there.
- Ocean warming, rising sea levels, runoff, and coral diseases are causing change in shallow marine environments such as coral reefs.

- Global warming is causing less rain to fall in the middle of continents. This makes these areas very dry and limits water resources for plants and animals.

Last modified January 19, 2010 by Randy Russell.


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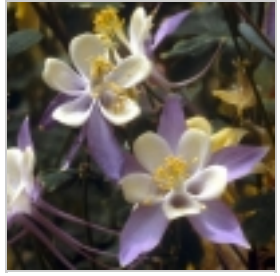
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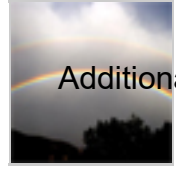
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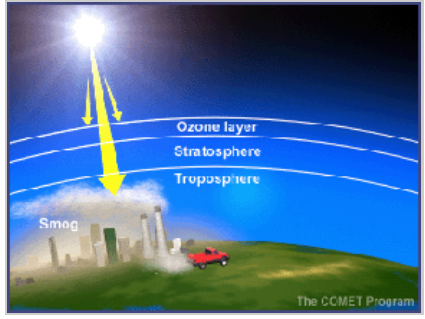
### Acid Rain

Acid rain is a general term used to describe different kinds of acidic air pollution. Although some acidic air pollutants return directly back to Earth, a lot of it returns in rain, snow, sleet, hail,...more




# Ozone - An Overview

The Ozone Hole. Pollution. Skin Cancer. Why does the topic of ozone make the news so much? How important is the ozone in our atmosphere? Why are scientists so concerned about its increase near the surface...more

MINNESOTA POLLUTION CONTROL AGENCY

# Does air pollution affect our furry friends?

There are a lot of studies that show how air pollution affects us, humans. But what about our pets?

We know that people exposed to too much air pollution may have a greater risk of developing cardiovascular diseases or respiratory symptoms such as a persistent cough, wheezing, shortness of breath, tightness of chest, and chest pain. At the extreme end, too much air pollution can lead to premature death in at-risk groups such as the elderly, young children, and people with preexisting cardiovascular diseases. Do our pets face the same risks?

Scientists are just beginning to explore the negative effects of air pollution on pets, but most agree that when air quality is poor for humans, it is also poor for pets.

# Where does air pollution come from?

People and animals are exposed to air pollution from a variety of different sources. Fumes from cars and trucks, diesel fuels, coal, gasoline, power plants, construction, and livestock all contribute to air pollution. Pollution can also occur in the home as a result of tobacco smoke, cooking, and heating sources such as wood burning fireplaces or stoves.

Animals in urban areas are at particular risk of smog and exhaust pollutants, while suburban and rural animals can be exposed to the toxins sprayed as insecticides, fungicides and herbicides.

# Recent studies

Studies show that pets living with smokers may face greater risks than their owners, due to the considerable amount of time spent near the floor. A 2011 study found that cats that were exposed to passive smoke in homes had reduced lung functioning compared to cats living in smoke-free homes.

Scientists have also linked human indoor activities (cleaning products, smoking, etc.) to carcinogens that can cause mesothelioma, bladder, lung, and nasal cancer in dogs.

Pets are also harmed by outside air pollution. Scientists in one study examined the brains of dogs that had been exposed to Mexico City's heavy air pollution and compared them with the brains of dogs from less-polluted cities. The published report stated, "[t]he Mexico City dogs' brains showed increased inflammation and pathology including amyloid plaques and neurofibrillary tangles, clumps of proteins that serve as a primary marker for Alzheimer's disease in humans."

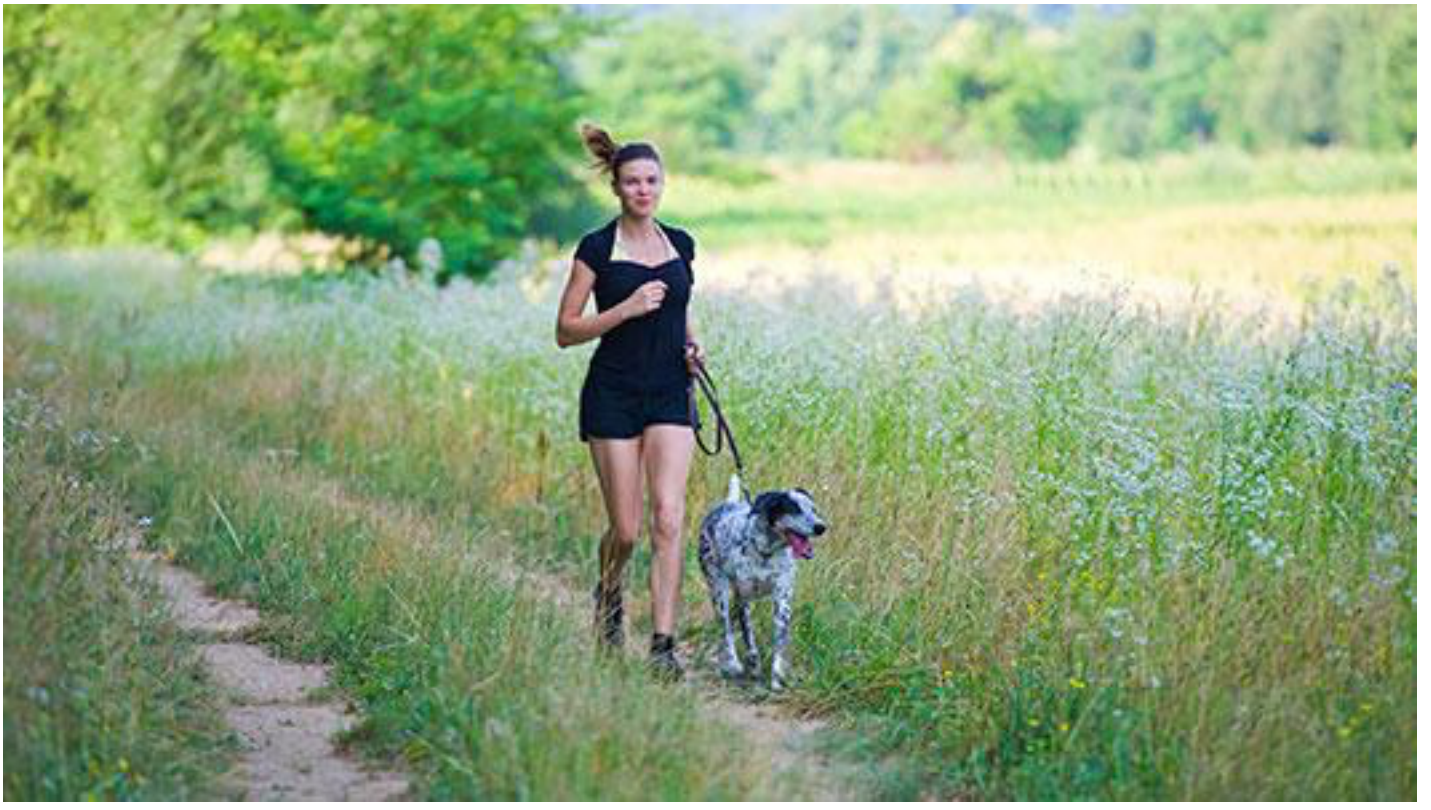
The University of Massachusetts and the Tufts University Cummings School of Veterinary Medicine did a study with 700 dog owners regarding the use of pesticides and the results were astounding. According to this study, approximately 33% of the dogs were diagnosed with canine malignant

lymphoma, a form of cancer. The study also revealed that dogs had a 70% higher chance of getting lymphoma if their owner used pesticides in their yard.



Cat lover? Scientists in one study found that one in ten cats have asthma related to indoor and outdoor air pollutants. Cats who lived with owners who smoke or burn wood fires were found to have severely decreased lung function.

# What can I do to reduce my pet's exposure to air pollution?



Many household pets spend the majority of their time indoors or in the yard. Simple actions can help you reduce your pet's exposure to air pollution.

**Protect your indoor air**

- Change your home's air filter regularly.
- Vacuum frequently to remove pet hair and other indoor air pollutants.
- Avoid smoking indoors.
- Choose your cleaning products carefully.



**Outside?**

- Do your part to improve overall air quality by taking the bus or carpooling.
- Avoid exercising your pets in high-traffic areas. When possible, choose spaces away from roadways such as parks or residential areas.
- Be careful of the products you use in your yard. Ask at your garden store for less toxic alternatives to chemical pesticides. Find out more about growing a healthy, no-waste lawn and garden.

# Find out more

- Be air aware by staying informed about the air quality in your area and keep pets inside on days with poor air quality. Sign up for air quality alerts and forecasts via email
- Learn how to Create a clean, green home.

*Tuesday, July 5, 2016*

**Bad air day? Find out.**

Sign up for air quality alerts and forecasts via email

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Next

# Health impacts of air pollution

Our health depends on strong clean air protections

Air pollution is one of the world's largest killers, responsible for 6.4 million deaths per year (1 in 9 deaths), of which 600,000 are children. This is more than the number of deaths from AIDS, Malaria and tuberculosis combined. The World Health Organization estimates that 2 billion children live in areas where outdoor air pollution exceeds international limits and 300 million children live in areas where outdoor air pollution exceeds 6 times international limits. Children, the elderly, and people with heart or lung disease, diabetes, minority and low - income communities are particularly vulnerable to adverse health outcomes from exposure to air pollution, including cardiovascular disease, asthma and other respiratory diseases, and cancer. Recent evidence suggests that air pollution is also linked to higher risk of diabetes, autism, and lower IQ.

What we typically think of as "air pollution" is actually a mixture of small particles (such as: black carbon gases like nitrogen oxides,

ozone, and sulfur dioxide.



# Particulate matter ($PM_{10}$, $PM_{2.5}$)

Particulate matter (PM) is made up of small airborne particles like dust, soot, and drops of liquids. The majority of PM in urban areas is formed directly from burning of fossil fuels by power plants, automobiles, non-road equipment, and industrial facilities. Other sources are dust and diesel emissions and secondary particle formation from gases and vapors.

Coarse particulate matter ($PM_{10}$, particles < 10 microns in diameter) is known to cause nasal and upper respiratory tract health problems. Fine particles ($PM_{2.5}$, particles < 2.5 microns in diameter; Ultra Fine Particles) penetrate deeper into the lungs and cause heart attacks, strokes, asthma, and bronchitis, as well as premature death from heart ailments, lung disease, and cancer. Studies show that higher $PM_{2.5}$ exposure can impair brain development in children.

# Black Carbon (BC)

Black carbon is one of the components of particulate matter and comes from burning fuel (especially diesel, wood, coal, and others). Most air pollution regulations focus on $PM_{2.5,}$ but exposure to black

carbon is a serious health threat as well. Populations with higher exposures to black carbon over a long period are at a higher risk for heart attacks and stroke. In addition, black carbon is associated with hypertension, asthma, chronic obstructive pulmonary disease (COPD), bronchitis, and a variety of types of cancer.

# Nitrogen Oxides (NO and $NO_2$)

Nitrogen oxide (NO) and Nitrogen dioxide ($NO_2$) are produced primarily by the transportation sector. NO is rapidly converted to $NO_2$ in sunlight. $NO_x$ (a combination of NO and $NO_2$) is formed in high concentrations around roadways, and can result in development and exacerbations of asthma, bronchitis, as well as lead to a higher risk of heart disease.

# Ozone ($O_3$)

Ozone high up in the atmosphere can protect us from ultraviolet radiation. But ozone at ground level (where it is part of what is commonly called smog) is a well-established respiratory irritant. Ozone is formed in the atmosphere through reactions of volatile organic compounds and nitrogen oxides, both of which are formed as a result of combustion of fossil fuels. Short-term exposure to ozone

can cause chest pain, coughing, throat irritation, while long term exposure can lead to decreased lung function and cause chronic obstructive pulmonary disease (COPD). In addition, ozone exposure can aggravate existing lung diseases.

# Sulfur dioxide ($SO_2$)

$SO_2$ is emitted into the air by the burning of fossil fuels that contain sulfur. Coal, metal extraction and smelting, ship engines, and heavy equipment diesel equipment burn fuels that contain sulfur. Sulfur dioxide causes eye irritation, worsens asthma, increases susceptibility to respiratory infections, and impacts the cardiovascular system. When $SO_2$combines with water, it forms sulfuric acid; this is the main component of acid rain, a known contributor to deforestation.

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# Volvo Is Expanding Its Electric Big Rig Truck Lineup

*Can these heavy trucks go the distance on electricity?*

By **Andre Smirnov** - December 11, 2019

Volvo Trucks electric Concept Truck (photo: Volvo Trucks)

Volvo is looking to expand its lineup of electric big rig trucks in Europe and beyond. The company already started sales of electric heavy trucks in Europe for short range delivery and waste management duties, but the company sees an expanding market and demand for more quiet and environmentally sustainable transportation solutions.

Volvo is specifically focused on heavy trucks in big cities and urban environments where near silent trucks with zero emissions are more attractive.

Heavy construction trucks are next in the expansion. Volvo is planning to expand the electric FL and FE truck segments. According to a report from InsideEvs – these "regional delivery" trucks average about 80,000 km (50,000 miles) per year. This calculates to a required loaded driving range requirement of under 200 miles per day.

There is no question that electric motors deliver more than enough power to drive very heavy vehicles. The limiting factor remains with the amount of energy stored in the batteries. A gallon of regular gasoline provides approximately 33 kWh of energy. One gallon of diesel fuel is equivalent to about 40 kWh of energy. Many current semi trucks carry 100-200 gallons of diesel fuel on board.

These electric big rig trucks will have to pack *A LOT* of battery capacity to provide usable driving range.

If a current diesel-powered big rig averages 7 MPG with a full combined weight of 80,000 lbs. It means a diesel truck burns nearly 29 gallons of diesel to go 200 miles. 29 gallons of diesel converts into 1,170 kWh of required energy. Electric motors can run more efficiently than diesel engines, but we are still talking about lots of big and heavy lithium-ion batteries to get an electric truck

to go the distance.



Here are all of the results of our real-world towing and hauling tests with a Tesla Model X.

**Andre Smirnov**

Andre Smirnov is an Automotive Enthusiast, Producer, Reviewer, Videographer, Writer, Software Engineer, Husband, Father, and Friend.

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## 8 electric truck and van companies to watch in 2020

Shane Downing
Monday, January 13, 2020 - 1:33am

Daimler Trucks North America
Daimler's Freightliner eCascadia electric truck will go into series production in 2021.

In recent months, we've shone attention on companies racing to bring electric aviation to the skies in the coming decades. Now, it's time to spotlight startups and automotive giants working to electrify dirty delivery and distribution trucks in the coming years. That's right. We're talking all-electric heavy-duty big rigs, semi-trucks, box trucks, delivery vans and more.

Unlike the regulatory challenges that pioneering aviation companies have to deal with before they can take flight, the major obstacles facing the automotive industry are ones of scale, price points and battery technology. There's also the challenge of building an interstate network of electric vehicle (EV) charging stations capable of keeping the next generation of long-haul trucks on the road.

However, because 80 percent of freight (PDF) in the United States is transported less than 250 miles, the front-of-the-pack all-electric trucks are designed to travel on predictable regional or last-mile routes that allow them to return to a central depot for charging.

That doesn't mean building the centralized charging infrastructure will be easy. In a joint survey that GreenBiz conducted with UPS last year on fleet electrification, 92 percent of survey respondents said their facility isn't "very well equipped" to accommodate commercial charging needs.

Despite the potholes and growing pains that lie ahead, over the next 10 years, we can expect to see more electric vehicles driving alongside or even replacing the diesel- and gas-powered trucks and vans that America relies on to carry goods across the country.

Less than 1 percent of fleet vehicles is electric, but that number is expected to grow to 12 percent by 2030. Moreso, falling battery costs, industry partnerships and government incentives and mandates for zero-emission trucks from states such as California are pressuring the industry's biggest multinational producers to step on the gas — so to speak.

Here are eight big-name players to keep an eye on in 2020.


BYD is the world's largest EV maker in terms of volume of vehicles sold.

**BYD**

Unlike other companies looking to disrupt the long-haul trucking industry, BYD is eyeing the short-haul goods movement sector, primarily in America's ports, rail yards and freight-handling facilities. BYD is headquartered in Shenzhen, China, with offices and an assembly factory in Lancaster, California. In 2020, it's preparing to roll out more of its battery-electric trucks to customers across the United States.

BYD is the world's largest EV maker in terms of volume of vehicles sold (including buses, forklifts, cars and rail systems). That includes its long-range battery-electric Class 8 Day Cab, a Class 6 truck, a terminal tractor and two models of all-electric refuse trucks.

BYD's Class 8 Day Cab has a range of 125 miles and a top speed of 65 miles per hour. The truck's battery packs can recharge in as little as two hours with a high-speed direct current system or about 14 hours with a standard 240-volt charging system.

Whereas the majority of BYD's growth continues to come from its electric bus sales, the company's trucking division says its medium- and heavy-duty electric trucks are making up an increasing part of the company's U.S. operations.

Unlike other aspiring all-electric truck producers, BYD is already filling orders for its Class 8 Day Cab. Anheuser-Busch deployed 21 BYD Class 8 trucks in its Southern California fleet at the tail end of 2019.

In 2018, Ryder announced it would buy 900 of Chanje's Class 5 electric vans to lease to FedEx.

## Chanje

One company aiming to electrify the package delivery industry is a Los Angeles-based, Chinese-backed startup called Chanje.

The company's nearly 30-foot long V8100 electric medium-duty panel van can carry a 3-ton payload. What's more, the van's lithium-ion battery pack holds enough charge for a 150-mile range. According to the company, that's more than double the number of miles the majority of commercial delivery vans drive in a day.

Chanje's V8100s are already on the roads. In 2018, Ryder System announced it would buy 900 of Chanje's Class 5 electric vans to lease to FedEx. Later, the delivery and logistics company said it would buy an additional 100 of the all-electric trucks (all of FedEx's 1,000 Chanje V8100s will operate in California), and Ryder ordered 500.

Earlier this year, Thermo King and Chanje partnered to create a fully integrated refrigerated version of its V8100 delivery van.

Daimler, the largest truck maker in the world, expects to have the 250-mile-range Freightliner eCascadia model in production during 2021.

## Daimler Trucks

In 2018, German automaker Daimler, the largest truck maker in the world, announced its all-electric 18-wheeler: the Freightliner eCascadia.

The big rig has a 250-mile range and was designed for regional transportation and port service. Daimler's other all-electric model, the Freightliner eM2 106, has a 230-mile range and is intended for more local distribution and deliveries. The company also has an all-electric box truck (for urban deliveries) and a school bus in the pipeline.

Daimler said it's expecting to have the eCascadia and eM2 106 in production in its Portland, Oregon factory in late 2021.

Given that the company, best known for its Mercedes-Benz brand, has a 40 percent share in North America's approximately $39 billion heavy-duty truck market, it'll be interesting to watch whether Daimler will be a leader or a laggard in the race to all-electric delivery vehicles.


Each Nikola Motors semi-truck will be available with either fully electric or hydrogen fuel cell electric capabilities, and ranges are anticipated between 500 and 700 miles.

## Nikola Motors

Whereas many know that Tesla Inc. was named after Nikola Tesla, the Serbian-American inventor who created electric motors, few are likely to be familiar with the Phoenix-based startup that got the naming rights to Tesla's first name. However, over the past five years, Nikola Motor Co. has slowly but surely emerged as a pioneer in this space.

The company has created the Nikola One and Nikola Two for North American roadways, and the Nikola Tre for Asia, Australia and Europe. Each semi-truck will be available with either fully electric or hydrogen fuel cell electric capabilities, and their anticipated ranges are between 500 and 700 miles. The company has yet to publicly release exact pricing for each of its three semi-truck models.

To refuel the tens of thousands of hydrogen-powered big rigs it plans to put on America's roads, the company plans to build a coast-to-coast network of 700 hydrogen stations across the United States by 2028. (To put that into perspective, according to the International Energy Agency, there are currently about 400 hydrogen fueling stations worldwide.) The company says each refueling station will use electricity from renewable energy sources such as wind and solar to extract hydrogen fuel from water. It will take between 10 and 15 minutes to refill one of its semi-trucks. More so, the company wants carmakers including Daimler, General Motors and Toyota to use its fueling stations to expand their own hydrogen fuel cell vehicle sales outside of California.

According to Nikola, it plans to begin full production of its semis in 2021, and it already has orders to lease 14,000 of its big rigs. It's aiming to have all of those pre-ordered vehicles on the road by 2028. The company likely will roll out the battery-electric versions of its three truck models before its fuel cell vehicles.

A final comparison between Tesla and Nikola: Anheuser-Busch Co. placed orders with both companies: 40 trucks from Tesla and 800 trucks from Nikola. One reason? Nikola's hydrogen fuel-cell trucks don't require heavy lithium batteries, which makes them about 5,000 pounds lighter than a Tesla Semi.


Rivian made headlines in September when Amazon (one of its investors) announced its plans to purchase 100,000 of the automotive startup's all-electric delivery trucks.

## Rivian

Rivian made headlines in September when Amazon (one of its investors) announced its plans to purchase 100,000 of the automotive startup's all-electric delivery trucks. It was a huge, China-scale order, geared toward helping Amazon reach its 2040 net-zero carbon goal. Fulfilling that order, however, will be challenging.

First, in its 10 years of existence, Michigan-based Rivian has yet to produce an EV for the masses. It's in the final stages of testing its electric pickup truck, the R1T, which it plans to begin full-scale production on in 2020. According to Amazon, that's also when it will make its first delivery with a Rivian prototype.

The company expects to have 10,000 Rivian delivery vehicles on the road by 2022, and Rivian said that all 100,000 electric delivery trucks will be in service by 2023 (it remains unclear whether those vehicles will operate in the United States and/or globally).

As lofty a goal as this is for Amazon (and as herculean a task it is for Rivian), Amazon's eyebrow-raising order likely will pressure other companies such as DHL, FedEx and UPS to make bigger investments to add electric delivery vehicles to their own last-mile fleets sooner rather than later.

There are two Tesla Semis: one with a 300-mile range and one with a 500- to 600-mile range.

## Tesla

Given Tesla's leadership with EVs, it's no surprise the company is at the forefront of replacing diesel-guzzling, long-haul big rigs with all-

electric, heavy-duty semi-trucks. Tesla first announced the Tesla Semi in 2017 and said production would begin in early 2019. That production date later was pushed back to late 2020.



There are two Tesla Semis: one with a 300-mile range and one with a 500- to 600-mile range. According to the company, the expected base prices for those trucks are $150,000 and $180,000, respectively. (To put that into perspective, a typical Class 8 diesel day-cab starts at roughly $120,000.) The company also says the Tesla Semi will have a two-year payback period. That's taking into consideration fuel savings and the fact that the Tesla Semi will have fewer systems to maintain compared to diesel vehicles.

The Tesla Semi has four Model 3-derived electric motors, which will allow it to accelerate from 0 mph to 60 mph in 20 seconds while carrying a full load (roughly 40 tons). The truck can maintain that 60-mph speed while traveling up a 5 percent grade.

The company claims the Tesla Semi uses less than 2 kilowatt-hours of power per mile, and a future "Convoy Mode" feature will allow multiple Tesla Semis to semi-autonomously slipstream, further reducing drag and increasing efficiency.

Although big-name companies such as Anheuser-Busch, FedEx, PepsiCo, UPS and Walmart have expressed interest in the Tesla Semi, Tesla CEO Elon Musk said that only "about 2,000" Tesla Semis had been ordered as of May. That's well short of his earlier claims in 2018, when he said it was reasonable to expect Tesla Semi orders to hit 100,000 a year by 2022.

Given Tesla's challenges with ongoing labor feuds and struggling profitability (not to mention that the company has yet to announce the location of its Tesla Semi production factory, and it still needs to build out a network of "Megacharger" stations that can cater to long-haul truck routes), some think 2021 is a more likely production timeline for the Tesla Semi.

Like other companies, Volvo plans to offer month-to-month lease agreements for its electric trucks that will include insurance and maintenance.

## Volvo

Volvo Trucks has developed a zero-emission truck called the VNR Electric that is intended for regional use in North America. The company reportedly began highway road tests in 2019; it has said commercial production and sales will begin in late 2020.

Although Volvo invested $400 million into its New River Valley, Virginia, factory to assemble the trucks, VNR Electric will hit Southern California's roadways first (five already did in 2019). In 2020, a total of 23 battery-electric Volvo trucks will run routes in and around Los Angeles, including the cities of Ontario, Chino and Fontana, as well as the Long Beach and Los Angeles port complex.

VNR Electric is part of Volvo's broader Low-Impact Green Heavy Transport Solutions (LIGHTS) initiative with California's South Coast Air Quality Management District (SCAQMD). According to a company statement, the $90 million pilot program (half of which is funded by the California Air Resources Board) is part of California Climate Investments, a statewide initiative that funnels billions of Cap-and-Trade dollars toward reducing greenhouse gas emissions and improving public health.

Volvo has yet to announce the VNR Electric's range, and it's waiting to announce the price for each vehicle. However, like other companies, Volvo plans to offer month-to-month lease agreements that will include insurance and maintenance. Additionally, Volvo said it will lease out charging installation and necessary infrastructure improvements for its trucks.


Workhorse, which started with electric pickup trucks, is competing for a $6.3 billion contract to produce 186,000 new U.S. Postal Service mail trucks

## Workhorse

Another electric truck startup to watch in 2020 is Workhorse Group. The company is behind the Workhorse W-15 plug-in electric pickup truck, and it's also developing an all-electric delivery van called the C1000. Workhorse is reportedly building 950 electric delivery vans for UPS, most likely in the former General Motors' plant it purchased in Lordstown, Ohio, in November.

Where Workhorse really stands to grab headlines this year is with the United States Postal Service (USPS). That's because the USPS is moving forward with long-delayed plans to award an estimated $6.3 billion contract to produce 186,000 new mail trucks over the next five to seven years. That's nearly double Amazon's order for Rivian's all-electric delivery trucks.

Four teams, split across six companies, compete for the USPS contract: India's Mahindra Automotive North America; Turkey's Karsan/Michigan's Morgan Olson; American companies Oshkosh/Ford; and Workhorse. The companies are barred in their contracts from publicly commenting on their prototypes, but two contenders are fully electric and at least one of the other two is a hybrid model.

The USPS already said it's open to splitting the multi-billion-dollar contract between multiple companies. It claims that sticker price alone won't determine who's awarded a contract. That's good news for companies such as Workhorse that are developing hybrid- and all-electric vehicles, which likely will be more expensive to produce. What's bad news, at least for Mahindra Automotive and Karsan, is the current sentiment in Washington, D.C., to "Buy American."

Despite its aging fleet, the USPS has been slow to innovate. Prototype trials took roughly three times longer than initially expected, and it's unclear how long the agency will take to evaluate the companies after it officially releases its RFP. The USPS' sluggish pace forward has been compounded by scrutiny from the Trump administration, which repeatedly has called for the money-losing agency's restructuring.

However, should Workhorse be awarded all or some of the USPS contract, it likely will pave the way to a more certain future for a startup that still has a lot of questions swirling around it, including its lack of experience in mass vehicle production.

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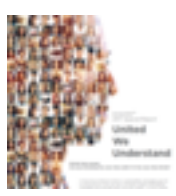

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# *To My Local Government Colleagues....*

I am pleased to introduce this informational guide to air quality and land use issues focused on community health. As a former county supervisor, I know from experience the complexity of local land use decisions. There are multiple factors to consider and balance. This document provides important public health information that we hope will be considered along with housing needs, economic development priorities, and other quality of life issues.

An important focus of this document is prevention. We hope the air quality information provided will help inform decision-makers about the benefits of avoiding certain siting situations. The overarching goal is to avoid placing people in harm's way. Recent studies have shown that public exposure to air pollution can be substantially elevated near freeways and certain other facilities. What is encouraging is that the health risk is greatly reduced with distance. For that reason, we have provided some general recommendations aimed at keeping appropriate distances between sources of air pollution and land uses such as residences.

Land use decisions are a local government responsibility. The Air Resources Board's role is advisory and these recommendations do not establish regulatory standards of any kind. However, we hope that the information in this document will be seriously considered by local elected officials and land use agencies. We also hope that this document will promote enhanced communication between land use agencies and local air pollution control agencies. We developed this document in close coordination with the California Air Pollution Control Officers Association with that goal in mind.

I hope you find this document both informative and useful.

Barbara Riordan

Mrs. Barbara Riordian
Interim Chairman
California Air Resources Board

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## APPENDICES

## Acknowledgments

The ARB staff would like to acknowledge the exceptional contributions made to this document by members of the ARB Environmental Justice Stakeholders Group. Since 2001, ARB staff has consistently relied on this group to provide critical and constructive input on implementing the specifics of ARB's environmental justice policies and actions. The Stakeholders Group is convened by the ARB, and comprised of representatives from local land use and air agencies, community interest groups, environmental justice organizations, academia, and business. Their assistance and suggestions throughout the development of this Handbook have been invaluable.

## Executive Summary

The Air Resources Board's (ARB) primary goal in developing this document is to provide information that will help keep California's children and other vulnerable populations out of harm's way with respect to nearby sources of air pollution. Recent air pollution studies have shown an association between respiratory and other non-cancer health effects and proximity to high traffic roadways. Other studies have shown that diesel exhaust and other cancer-causing chemicals emitted from cars and trucks are responsible for much of the overall cancer risk from airborne toxics in California. Also, ARB community health risk assessments and regulatory programs have produced important air quality information about certain types of facilities that should be considered when siting new residences, schools, day care centers, playgrounds, and medical facilities (i.e., sensitive land uses). Sensitive land uses deserve special attention because children, pregnant women, the elderly, and those with existing health problems are especially vulnerable to the non-cancer effects of air pollution. There is also substantial evidence that children are more sensitive to cancer-causing chemicals.

Focusing attention on these siting situations is an important preventative action. ARB and local air districts have comprehensive efforts underway to address new and existing air pollution sources under their respective jurisdictions. The issue of siting is a local government function. As more data on the connection between proximity and health risk from air pollution become available, it is essential that air agencies share what we know with land use agencies. We hope this document will serve that purpose.

The first section provides ARB recommendations regarding the siting of new sensitive land uses near freeways, distribution centers, rail yards, ports, refineries, chrome plating facilities, dry cleaners, and gasoline dispensing facilities. This list consists of the air pollution sources that we have evaluated from the standpoint of the proximity issue. It is based on available information and reflects ARB's primary areas of jurisdiction – mobile sources and toxic air contaminants. A key air pollutant common to many of these sources is particulate matter from diesel engines. Diesel particulate matter (diesel PM) is a carcinogen identified by ARB as a toxic air contaminant and contributes to particulate pollution statewide.

Reducing diesel particulate emissions is one of ARB's highest public health priorities and the focus of a comprehensive statewide control program that is reducing diesel PM emissions each year. ARB's long-term goal is to reduce diesel PM emissions 85% by 2020. However, cleaning up diesel engines will take time as new engine standards phase in and programs to accelerate fleet turnover or retrofit existing engines are implemented. Also, these efforts are reducing diesel particulate emissions on a statewide basis, but do not yet capture every site where diesel vehicles and engines may congregate. Because living or going to school too close to such air pollution sources may increase both cancer and non-cancer health risks, we are recommending that proximity be considered in the siting of new sensitive land uses.

There are also other key toxic air contaminants associated with specific types of facilities. Most of these are subject to stringent state and local air district regulations. However, what we know today indicates that keeping new homes and other sensitive land uses from siting too close to such facilities would provide additional health protection. Chrome platers are a prime example of facilities that should not be located near vulnerable communities because of the cancer health risks from exposure to the toxic material used during their operations.

In addition to source specific recommendations, we also encourage land use agencies to use their planning processes to ensure the appropriate separation of industrial facilities and sensitive land uses. While we provide some suggestions, how to best achieve that goal is a local issue. In the development of these guidelines, we received valuable input from local government about the spectrum of issues that must be considered in the land use planning process. This includes addressing housing and transportation needs, the benefits of urban infill, community economic development priorities, and other quality of life issues. All of these factors are important considerations. The recommendations in the Handbook need to be balanced with other State and local policies.

Our purpose with this document is to highlight the potential health impacts associated with proximity to air pollution sources so planners explicitly consider this issue in planning processes. We believe that with careful evaluation, infill development, mixed use, higher density, transit-oriented development, and other concepts that benefit regional air quality can be compatible with protecting the health of individuals at the neighborhood level. One suggestion for achieving this goal is more communication between air agencies and land use planners. Local air districts are an important resource that should be consulted regarding sources of air pollution in their jurisdictions. ARB staff will also continue to provide updated technical information as it becomes available.

Our recommendations are as specific as possible given the nature of the available data. In some cases, like refineries, we suggest that the siting of new sensitive land uses should be avoided immediately downwind. However, we leave definition of the size of this area to local agencies based on facility specific considerations. Also, project design that would reduce air pollution exposure may be part of the picture and we encourage consultation with air agencies on this subject.

In developing the recommendations, our first consideration was the adequacy of the data available for an air pollution source category. Using that data, we assessed whether we could reasonably characterize the relative exposure and health risk from a proximity standpoint. That screening provided the list of air pollution sources that we were able to address with specific recommendations. We also considered the practical implications of making hard and fast recommendations where the potential impact area is large, emissions will be reduced with time, and air agencies are in the process of looking at options for additional emission control. In the end, we tailored our recommendations to minimize the highest exposures for each source category independently. Due to the large variability in relative risk in the source categories, we chose not to apply

a uniform, quantified risk threshold as is typically done in air quality permitting programs. Instead, because these guidelines are not regulatory or binding on local agencies, we took a more qualitative approach in developing the distance-based recommendations.

Where possible, we recommend a minimum separation between a new sensitive land use and known air pollution risks. In other cases, we acknowledge that the existing health risk is too high in a relatively large area, that air agencies are working to reduce that risk, and that in the meantime, we recommend keeping new sensitive land uses out of the highest exposure areas. However, it is critical to note that our implied identification of the high exposure areas for these sources does not mean that the risk in the remaining impact area is insignificant. Rather, we hope this document will bring further attention to the potential health risk throughout the impact area and help garner support for our ongoing efforts to reduce health risk associated with air pollution sources. Areas downwind of major ports, rail yards, and other inter-modal transportation facilities are prime examples.

We developed these recommendations as a means to share important public health information. The underlying data are publicly available and referenced in this document. We also describe our rationale and the factors considered in developing each recommendation, including data limitations and uncertainties. These recommendations are advisory and should not be interpreted as defined "buffer zones." We recognize the opportunity for more detailed site-specific analyses always exists, and that there is no "one size fits all" solution to land use planning.

As California continues to grow, we collectively have the opportunity to use all the information at hand to avoid siting scenarios that may pose a health risk. As part of ARB's focus on communities and children's health, we encourage land use agencies to apply these recommendations and work more closely with air agencies. We also hope that this document will help educate a wider audience about the value of preventative action to reduce environmental exposures to air pollution.

## 1. ARB Recommendations on Siting New Sensitive Land Uses

Protecting California's communities and our children from the health effects of air pollution is one of the most fundamental goals of state and local air pollution control programs. Our focus on children reflects their special vulnerability to the health impacts of air pollution. Other vulnerable populations include the elderly, pregnant women, and those with serious health problems affected by air pollution. With this document, we hope to more effectively engage local land use agencies as partners in our efforts to reduce health risk from air pollution in all California communities.

Later sections emphasize the need to strengthen the connection between air quality and land use in both planning and permitting processes. Because the siting process for many, but not all air pollution sources involves permitting by local air districts, there is an opportunity for interagency coordination where the proposed location might pose a problem. To enhance the evaluation process from a land use perspective, section 4 includes recommended project related questions to help screen for potential proximity related issues.

Unlike industrial and other stationary sources of air pollution, the siting of new homes or day care centers does not require an air quality permit. Because these situations fall outside the air quality permitting process, it is especially important that land use agencies be aware of potential air pollution impacts.

The following recommendations address the issue of siting "sensitive land uses" near specific sources of air pollution; namely:

- High traffic freeways and roads
- Distribution centers
- Rail yards
- Ports
- Refineries
- Chrome plating facilities
- Dry cleaners
- Large gas dispensing facilities

The recommendations for each category include a summary of key information and guidance on what to avoid from a public health perspective.

> *Sensitive individuals refer to those segments of the population most susceptible to poor air quality (i.e., children, the elderly, and those with pre-existing serious health problems affected by air quality). Land uses where sensitive individuals are most likely to spend time include schools and schoolyards, parks and playgrounds, daycare centers, nursing homes, hospitals, and residential communities (sensitive sites or sensitive land uses).*

We are characterizing sensitive land uses as simply as we can by using the example of residences, schools, day care centers, playgrounds, and medical facilities. However, a variety of facilities are encompassed. For example, residences can include houses, apartments, and senior living complexes. Medical facilities can include hospitals, convalescent homes, and health clinics. Playgrounds could be play areas associated with parks or community centers.

In developing these recommendations, ARB first considered the adequacy of the data available for each air pollution source category. We assessed whether we could generally characterize the relative exposure and health risk from a proximity standpoint. The documented non-cancer health risks include triggering of asthma attacks, heart attacks, and increases in daily mortality and hospitalization for heart and respiratory diseases. These health impacts are well documented in epidemiological studies, but less easy to quantify from a particular air pollution source. Therefore, the cancer health impacts are used in this document to provide a picture of relative risk. This screening process provided the list of source categories we were able to address with specific recommendations. In evaluating the available information, we also considered the practical implications of making hard and fast recommendations where the potential impact area is large, emissions will be reduced with time, and air agencies are in the process of looking at options for additional emission control. Due to the large variability in relative risk between the source categories, we chose not to apply a uniform, quantified risk threshold as is typically done in regulatory programs. Therefore, in the end, we tailored our recommendations to minimize the highest exposures for each source category independently. Additionally, because this guidance is not regulatory or binding on local agencies, we took a more qualitative approach to developing distance based recommendations.

Where possible, we recommend a minimum separation between new sensitive land uses and existing sources. However, this is not always possible, particularly where there is an elevated health risk over large geographical areas. Areas downwind of ports and rail yards are prime examples. In such cases, we recommend doing everything possible to avoid locating sensitive receptors within the highest risk zones. Concurrently, air agencies and others will be working to reduce the overall risk through controls and measures within their scope of authority.

The recommendations were developed from the standpoint of siting new sensitive land uses. Project-specific data for new and existing air pollution sources are available as part of the air quality permitting process. Where such information is available, it should be used. Our recommendations are designed to fill a gap where information about existing facilities may not be readily available. These recommendations are only guidelines and are not designed to substitute for more specific information if it exists.

A summary of our recommendations is shown in Table 1-1. The basis and references[1] supporting each of these recommendations, including health studies, air quality modeling and monitoring studies is discussed below beginning with freeways and summarized in Table 1-2. As new information becomes available, it will be included on ARB's community health web page.

[1]Detailed information on these references are available on ARB's website at: http://www.ARB.ca.gov/ch/landuse.htm.

**Table 1-1**

**Recommendations on Siting New Sensitive Land Uses Such As Residences, Schools, Daycare Centers, Playgrounds, or Medical Facilities***

| Source Category | Advisory Recommendations |
|---|---|
| | |
| Freeways and High-Traffic Roads | • Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day. |
| Distribution Centers | • Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week).<br>• Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points. |
| Rail Yards | • Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard.<br>• Within one mile of a rail yard, consider possible siting limitations and mitigation approaches. |
| Ports | • Avoid siting of new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the ARB on the status of pending analyses of health risks. |
| Refineries | • Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult with local air districts and other local agencies to determine an appropriate separation. |
| Chrome Platers | • Avoid siting new sensitive land uses within 1,000 feet of a chrome plater. |
| Dry Cleaners Using Perchloro-ethylene | • Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air district.<br>• Do not site new sensitive land uses in the same building with perc dry cleaning operations. |
| Gasoline Dispensing Facilities | • Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities. |

*Notes:

- These recommendations are advisory. Land use agencies have to balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues.

- Recommendations are based primarily on data showing that the air pollution exposures addressed here (i.e., localized) can be reduced as much as 80% with the recommended separation.
- The relative risk for these categories varies greatly (see Table 1-2). To determine the actual risk near a particular facility, a site-specific analysis would be required. Risk from diesel PM will decrease over time as cleaner technology phases in.
- These recommendations are designed to fill a gap where information about existing facilities may not be readily available and are not designed to substitute for more specific information if it exists. The recommended distances take into account other factors in addition to available health risk data (see individual category descriptions).
- Site-specific project design improvements may help reduce air pollution exposures and should also be considered when siting new sensitive land uses.
- This table does not imply that mixed residential and commercial development in general is incompatible. Rather it focuses on known problems like dry cleaners using perchloroethylene that can be addressed with reasonable preventative actions.
- A summary of the basis for the distance recommendations can be found in Table 1-2.

**Table 1-2**

**Summary of Basis for Advisory Recommendations**

| Source Category | Range of Relative Cancer Risk[1,2] | Summary of Basis for Advisory Recommendations |
|---|---|---|
| | | |
| Freeways and High-Traffic Roads | 300 – 1,700 | • In traffic-related studies, the additional non-cancer health risk attributable to proximity was seen within 1,000 feet and was strongest within 300 feet. California freeway studies show about a 70% drop off in particulate pollution levels at 500 feet. |
| Distribution Centers[3] | Up to 500 | • Because ARB regulations will restrict truck idling at distribution centers, transport refrigeration unit (TRU) operations are the largest onsite diesel PM emission source followed by truck travel in and out of distribution centers.<br>• Based on ARB and South Coast District emissions and modeling analyses, we estimate an 80 percent drop-off in pollutant concentrations at approximately 1,000 feet from a distribution center. |
| Rail Yards | Up to 500 | • The air quality modeling conducted for the Roseville Rail Yard Study predicted the highest impact is within 1,000 feet of the Yard, and is associated with service and maintenance activities. The next highest impact is between a half to one mile of the Yard, depending on wind direction and intensity. |
| Ports | Studies underway | • ARB will evaluate the impacts of ports and develop a new comprehensive plan that will describe the steps needed to reduce public health impacts from port and rail activities in California. In the interim, a general advisory is appropriate based on the magnitude of diesel PM emissions associated with ports. |
| Refineries | Under 10 | • Risk assessments conducted at California refineries show risks from air toxics to be under 10 chances of cancer per million.[4]<br>• Distance recommendations were based on the amount and potentially hazardous nature of many of the pollutants released as part of the refinery process, particularly during non-routine emissions releases. |
| Chrome Platers | 10-100 | • ARB modeling and monitoring studies show localized risk of hexavalent chromium diminishing significantly at 300 feet. There are data limitations in both the modeling and monitoring studies. These include variability of plating activities and uncertainty of emissions such as fugitive dust. Hexavalent chromium is one of the most potent toxic air contaminants. Considering these factors, a distance of 1,000 feet was used as a precautionary measure. |
| Dry Cleaners Using Perchloro-ethylene (perc) | 15-150 | • Local air district studies indicate that individual cancer risk can be reduced by as much as 75 percent by establishing a 300 foot separation between a sensitive land use and a one-machine perc dry cleaning operation. For larger operations (2 machines or more), a separation of 500 feet can reduce risk by over 85 percent. |

| Source Category | Range of Relative Cancer Risk[1,2] | Summary of Basis for Advisory Recommendations |
|---|---|---|
| Gasoline Dispensing Facilities (GDF)[5] | Typical GDF: Less than 10<br><br>Large GDF: Between Less than 10 and 120 | • Based on the CAPCOA Gasoline Service Station Industry-wide Risk Assessment Guidelines, most typical GDFs (less than 3.6 million gallons per year) have a risk of less than 10 at 50 feet under urban air dispersion conditions. Over the last few years, there has been a growing number of extremely large GDFs with sales over 3.6 and as high as 19 million gallons per year. Under rural air dispersion conditions, these large GDFs can pose a larger risk at a greater distance. |

[1]For cancer health effects, risk is expressed as an estimate of the increased chances of getting cancer due to facility emissions over a 70-year lifetime. This increase in risk is expressed as chances in a million (e.g., 10 chances in a million).

[2]The estimated cancer risks are a function of the proximity to the specific category and were calculated independent of the regional health risk from air pollution. For example, the estimated regional cancer risk from air toxics in the Los Angeles region (South Coast Air Basin) is approximately 1,000 in a million.

[3]Analysis based on refrigerator trucks.

[4]Although risk assessments performed by refineries indicate they represent a low cancer risk, there is limited data on non-cancer effects of pollutants that are emitted from these facilities. Refineries are also a source of non-routine emissions and odors.

[5]A typical GDF in California dispenses under 3.6 million gallons of gasoline per year. The cancer risk for this size facility is likely to be less than 10 in a million at the fence line under urban air dispersion conditions.

A large GDF has fuel throughputs that can range from 3.6 to 19 million gallons of gasoline per year. The upper end of the risk range (i.e., 120 in a million) represents a hypothetical worst case scenario for an extremely large GDF under rural air dispersion conditions.

## Freeways and High Traffic Roads

Air pollution studies indicate that living close to high traffic and the associated emissions may lead to adverse health effects beyond those associated with regional air pollution in urban areas. Many of these epidemiological studies have focused on children. A number of studies identify an association between adverse non-cancer health effects and living or attending school near heavily traveled roadways (see findings below). These studies have reported associations between residential proximity to high traffic roadways and a variety of respiratory symptoms, asthma exacerbations, and decreases in lung function in children.

One such study that found an association between traffic and respiratory symptoms in children was conducted in the San Francisco Bay Area. Measurements of traffic-related pollutants showed concentrations within 300 meters (approximately 1,000 feet) downwind of freeways were higher than regional values. Most other studies have assessed exposure based on proximity factors such as distance to freeways or traffic density.

These studies linking traffic emissions with health impacts build on a wealth of data on the adverse health effects of ambient air pollution. The data on the effects of proximity to traffic-related emissions provides additional information that can be used in land use siting and regulatory actions by air agencies. The key observation in these studies is that close proximity increases both exposure and the potential for adverse health effects. Other effects associated with traffic emissions include premature death in elderly individuals with heart disease.

Key Health Findings

- Reduced lung function in children was associated with traffic density, especially trucks, within 1,000 feet and the association was strongest within 300 feet. (Brunekreef, 1997)
- Increased asthma hospitalizations were associated with living within 650 feet of heavy traffic and heavy truck volume. (Lin, 2000)
- Asthma symptoms increased with proximity to roadways and the risk was greatest within 300 feet. (Venn, 2001)
- Asthma and bronchitis symptoms in children were associated with proximity to high traffic in a San Francisco Bay Area community with good overall regional air quality. (Kim, 2004)
- A San Diego study found increased medical visits in children living within 550 feet of heavy traffic. (English, 1999)

In these and other proximity studies, the distance from the roadway and truck traffic densities were key factors affecting the strength of the association with adverse health effects. In the above health studies, the association of traffic-related emissions with adverse health effects was seen within 1,000 feet and was

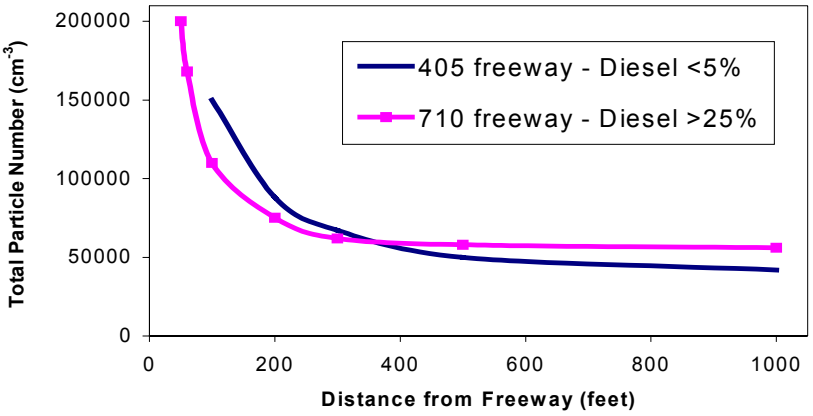
strongest within 300 feet. This demonstrates that the adverse effects diminished with distance.

In addition to the respiratory health effects in children, proximity to freeways increases potential cancer risk and contributes to total particulate matter exposure. There are three carcinogenic toxic air contaminants that constitute the majority of the known health risk from motor vehicle traffic – diesel particulate matter (diesel PM) from trucks, and benzene and 1,3-butadiene from passenger vehicles. On a typical urban freeway (truck traffic of 10,000-20,000/day), diesel PM represents about 70 percent of the potential cancer risk from the vehicle traffic. Diesel particulate emissions are also of special concern because health studies show an association between particulate matter and premature mortality in those with existing cardiovascular disease.

Distance Related Findings

A southern California study (Zhu, 2002) showed measured concentrations of vehicle-related pollutants, including ultra-fine particles, decreased dramatically within approximately 300 feet of the 710 and 405 freeways. Another study looked at the validity of using distance from a roadway as a measure of exposure

**Figure 1-1**
**Decrease In Concentration of Freeway Diesel PM Emissions With Distance**




to traffic related air pollution (Knape, 1999). This study showed that concentrations of traffic related pollutants declined with distance from the road, primarily in the first 500 feet.

These findings are consistent with air quality modeling and risk analyses done by ARB staff that show an estimated range of potential cancer risk that decreases with distance from freeways. The estimated risk varies with the local meteorology, including wind pattern. As an example, at 300 feet downwind from a freeway (Interstate 80) with truck traffic of 10,000 trucks per day, the potential cancer risk was as high as 100 in one million (ARB Roseville Rail Yard Study). The cancer health risk at 300 feet on the upwind side of the freeway was much

less. The risk at that distance for other freeways will vary based on local conditions – it may be higher or lower. However, in all these analyses the relative exposure and health risk dropped substantially within the first 300 feet. This phenomenon is illustrated in Figure 1-1.

State law restricts the siting of new schools within 500 feet of a freeway, urban roadways with 100,000 vehicles/day, or rural roadways with 50,000 vehicles with some exceptions.[2] However, no such requirements apply to the siting of residences, day care centers, playgrounds, or medical facilities. The available data show that exposure is greatly reduced at approximately 300 feet. In the traffic-related studies the additional health risk attributable to the proximity effect was strongest within 1,000 feet.

The combination of the children's health studies and the distance related findings suggests that it is important to avoid exposing children to elevated air pollution levels immediately downwind of freeways and high traffic roadways. These studies suggest a substantial benefit to a 500-foot separation.

The impact of traffic emissions is on a gradient that at some point becomes indistinguishable from the regional air pollution problem. As air agencies work to reduce the underlying regional health risk from diesel PM and other pollutants, the impact of proximity will also be reduced. In the meantime, as a preventative measure, we hope to avoid exposing more children and other vulnerable individuals to the highest concentrations of traffic-related emissions.

Recommendation

- Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.

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[2] Section 17213 of the California Education Code and section 21151.8 of the California Public Resources Code. See also Appendix E for a description of special processes that apply to school siting.

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## Distribution Centers

Distribution centers or warehouses are facilities that serve as a distribution point for the transfer of goods. Such facilities include cold storage warehouses, goods transfer facilities, and inter-modal facilities such as ports. These operations involve trucks, trailers, shipping containers, and other equipment with diesel engines. A distribution center can be comprised of multiple centers or warehouses within an area. The size can range from several to hundreds of acres, involving a number of different transfer operations and long waiting periods. A distribution center can accommodate hundreds of diesel trucks a day that deliver, load, and/or unload goods up to seven days a week. To the extent that these trucks are transporting perishable goods, they are equipped with diesel-powered transport refrigeration units (TRUs) or TRU generator sets.

The activities associated with delivering, storing, and loading freight produces diesel PM emissions. Although TRUs have relatively small diesel-powered engines, in the normal course of business, their emissions can pose a significant health risk to those nearby. In addition to onsite emissions, truck travel in and out of distribution centers contributes to the local pollution impact.

ARB is working to reduce diesel PM emissions through regulations, financial incentives, and enforcement programs. In 2004, ARB adopted two airborne toxic control measures that will reduce diesel PM emissions associated with distribution centers. The first will limit nonessential (or unnecessary) idling of diesel-fueled commercial vehicles, including those entering from other states or countries. This statewide measure, effective in 2005, prohibits idling of a vehicle more than five minutes at any one location.[3] The elimination of unnecessary idling will reduce the localized impacts caused by diesel PM and other air toxics

[3] For further information on the Anti-Idling ATCM, please click on: http://www.arb.ca.gov/toxics/idling/outreach/factsheet.pdf

in diesel vehicle exhaust. This should be a very effective new strategy for reducing diesel PM emissions at distribution centers as well as other locations.

The second measure requires that TRUs operating in California become cleaner over time. The measure establishes in-use performance standards for existing TRU engines that operate in California, including out-of-state TRUs. The requirements are phased-in beginning in 2008, and extend to 2019.[4]

ARB also operates a smoke inspection program for heavy-duty diesel trucks that focuses on reducing truck emissions in California communities. Areas with large numbers of distribution centers are a high priority.

Key Health Findings

Diesel PM has been identified by ARB as a toxic air contaminant and represents 70 percent of the known potential cancer risk from air toxics in California. Diesel PM is an important contributor to particulate matter air pollution. Particulate matter exposure is associated with premature mortality and health effects such as asthma exacerbation and hospitalization due to aggravating heart and lung disease.

Distance Related Findings

Although distribution centers are located throughout the state, they are usually clustered near transportation corridors, and are often located in or near population centers. Diesel PM emissions from associated delivery truck traffic and TRUs at these facilities may result in elevated diesel PM concentrations in neighborhoods surrounding those sites. Because ARB regulations will restrict truck idling at distribution centers, the largest continuing onsite diesel PM emission source is the operation of TRUs. Truck travel in and out of distribution centers also contributes to localized exposures, but specific travel patterns and truck volumes would be needed to identify the exact locations of the highest concentrations.

As part of the development of ARB's regulation for TRUs, ARB staff performed air quality modeling to estimate exposure and the associated potential cancer risk of onsite TRUs for a typical distribution center. For an individual person, cancer risk estimates for air pollution are commonly expressed as a probability of developing cancer from a lifetime (i.e., 70 years) of exposure. These risks were calculated independent of regional risk. For example, the estimated regional cancer risk from air toxics in the Los Angeles region (South Coast Air Basin) is approximately 1,000 additional cancer cases per one million population.

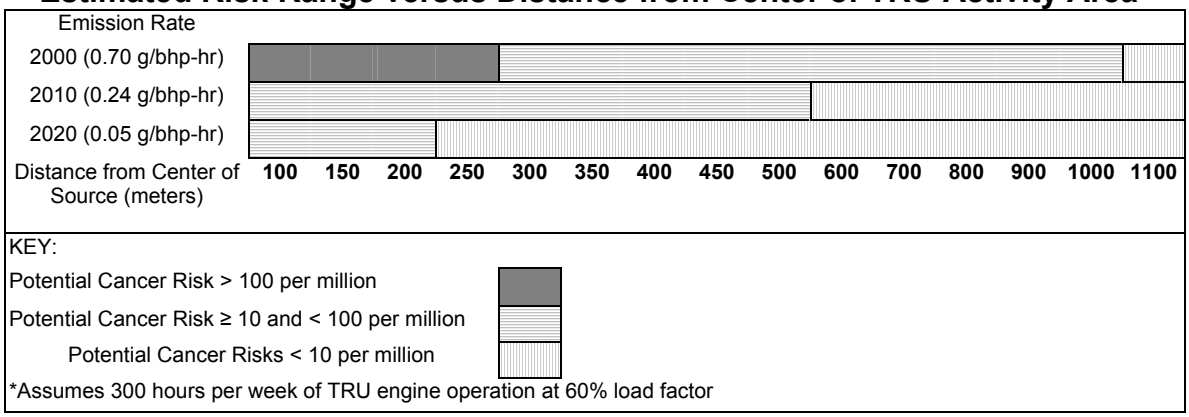
[4] For further information on the Transport Refrigeration Unit ATCM, please click on: http://www.arb.ca.gov/diesel/documents/trufaq.pdf

The diesel PM emissions from a facility are dependent on the size (horsepower), age, and number of engines, emission rates, the number of hours the truck engines and/or TRUs operate, distance, and meteorological conditions at the site. This assessment assumes a total on-site operating time for all TRUs of 300 hours per week. This would be the equivalent of 40 TRU-equipped trucks a day, each loading or unloading on-site for one hour, 12 hours a day and seven days a week.

As shown in Figure 1-2 below, at this estimated level of activity and assuming a current fleet diesel PM emission rate, the potential cancer risk would be over 100 in a million at 800 feet from the center of the TRU activity. The estimated potential cancer risk would be in the 10 to 100 per million range between 800 to 3,300 feet and fall off to less than 10 per million at approximately 3,600 feet. However with the implementation of ARB's regulation on TRUs, the risk will be significantly reduced.[5] We have not conducted a risk assessment for distribution centers based on truck traffic alone, but on an emissions basis, we would expect similar risks for a facility with truck volumes in the range of 100 per day.

**Figure 1-2**

**Estimated Risk Range versus Distance from Center of TRU Activity Area***

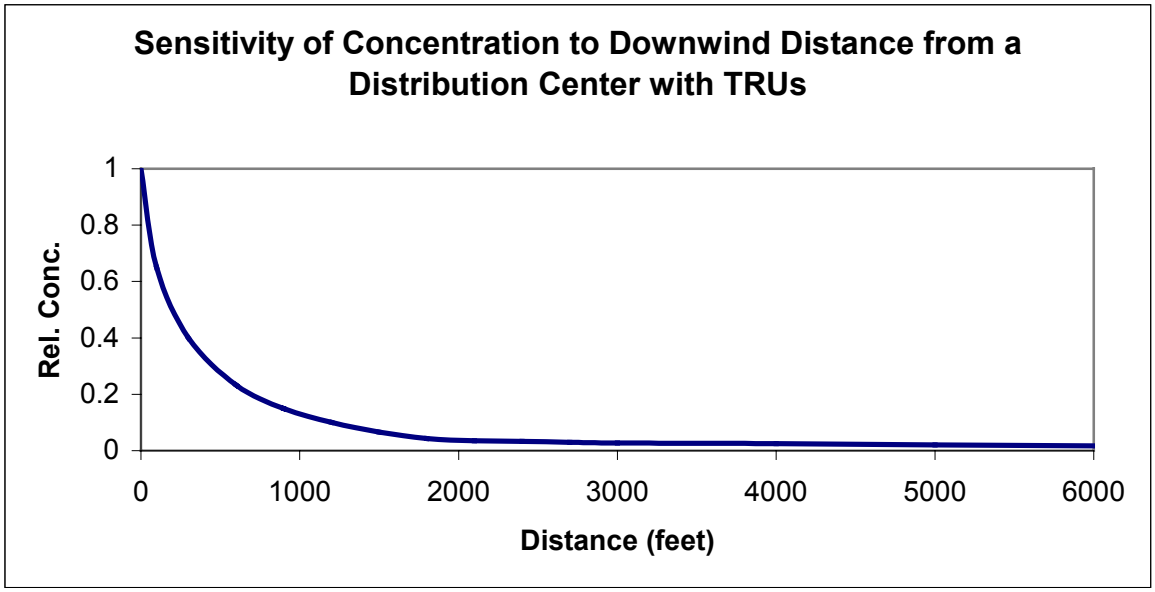



The estimated potential cancer risk level in Figure 1-2 is based on a number of assumptions that may not reflect actual conditions for a specific site. For example, increasing or decreasing the hours of diesel engine operations would change the potential risk levels. Meteorological and other facility specific parameters can also impact the results. Therefore, the results presented here are not directly applicable to any particular facility or operation. Rather, this information is intended to provide an indication as to the potential relative levels of risk that may be observed from operations at distribution centers. As shown in Figure 1-2, the estimated risk levels will decrease over time as lower-emitting diesel engines are used.

[5] These risk values assume an exposure duration of 70 years for a nearby resident and uses the methodology specified in the 2003 OEHHA health risk assessment guidelines.

Another air modeling analysis, performed by the South Coast Air Quality Management District (South Coast AQMD), evaluated the impact of diesel PM emissions from distribution center operations in the community of Mira Loma in southern California. Based on dispersion of diesel PM emissions from a large distribution center, Figure 1-3 shows the relative pollution concentrations at varying distances downwind. As Figure 1-3 shows, there is about an 80 percent drop off in concentration at approximately 1,000 feet.

**Figure 1-3**
**Decrease In Relative Concentration of Risk**
**With Distance**




Both the ARB and the South Coast AQMD analyses indicate that providing a separation of 1,000 feet would substantially reduce diesel PM concentrations and public exposure downwind of a distribution center. While these analyses do not provide specific risk estimates for distribution centers, they provide an indication of the range of risk and the benefits of providing a separation. ARB recommends a separation of 1,000 feet based on the combination of risk analysis done for TRUs and the decrease in exposure predicted with the South Coast AQMD modeling. However, ARB staff plans to provide further information on distribution centers as we collect more data and implement the TRU control measure.

Taking into account the configuration of distribution centers can also reduce population exposure and risk. For example, locating new sensitive land uses away from the main entry and exit points helps to reduce cancer risk and other health impacts.

Recommendations

- Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating TRUs per day, or where TRU unit operations exceed 300 hours per week).

- Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points.

References


- *Airborne Toxic Control Measure To Limit Diesel-Fueled Commercial Motor Vehicle Idling.* ARB (August 20, 2004). Rule effectiveness date awaiting submittal of regulation to the Office of Administration Law. http://www.arb.ca.gov/regact/idling/idling.htm

- *Revised Staff Report: Initial Statement of Reasons for Proposed Rulemaking. Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate.* ARB (October 28, 2003). http://www.arb.ca.gov/regact/trude03/revisor.doc

- *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis.* SCAQMD (August 2003) http://www.aqmd.gov/ceqa/handbook/diesel_analysis.doc

- *"Mira Loma Study: Analysis of the Impact of Diesel Particulate Emissions from Warehouse/Distribution Center Operations",* PowerPoint presentation. SCAQMD (July 31, 2002)


## Rail Yards

Rail yards are a major source of diesel particulate air pollution. They are usually located near inter-modal facilities, which attract heavy truck traffic, and are often sited in mixed industrial and residential areas. ARB, working with the Placer County air district and Union Pacific Railroad, recently completed a study[6] of the Roseville Rail Yard (Yard) in northern California that focused on the health risk from diesel particulate. A comprehensive emissions analysis and air quality modeling were conducted to characterize the estimated potential cancer risk associated with the facility.

[6] To review the study, please click on: http://www.arb.ca.gov/diesel/documents/rrstudy.htm

The Yard encompasses about 950 acres on a one-quarter mile wide by four-mile long strip of land that parallels Interstate 80. It is surrounded by commercial, industrial, and residential properties. The Yard is one of the largest service and maintenance rail yards in the West with over 30,000 locomotives visiting annually.

Using data provided by Union Pacific Railroad, the ARB determined the number and type of locomotives visiting the Yard annually and what those locomotives were doing - moving, idling, or undergoing maintenance testing. Union Pacific provided the annual, monthly, daily, and hourly locomotive activity in the yard including locomotive movements; routes for arrival, departure, and through trains; and locomotive service and testing. This information was used to estimate the emissions of particulate matter from the locomotives, which was then used to model the potential impacts on the surrounding community.

The key findings of the study are:

- Diesel PM emissions in 2000 from locomotive operations at the Roseville Yard were estimated at about 25 tons per year.

- Of the total diesel PM in the Yard, moving locomotives accounted for about 50 percent, idling locomotives about 45 percent, and locomotive testing about five percent.

- Air quality modeling predicts potential cancer risks greater than 500 in a million (based on 70 years of exposure) in a 10-40 acre area immediately adjacent to the Yard's maintenance operations.

- The risk assessment also showed elevated cancer risk impacting a larger area covering about a 10 by 10 mile area around the Yard.

The elevated concentrations of diesel PM found in the study contribute to an increased risk of cancer and premature death due to cardiovascular disease, and non-cancer health effects such as asthma and other respiratory illnesses. The magnitude of the risk, the general location, and the size of the impacted area depended on the meteorological data used to characterize conditions at the Yard, the dispersion characteristics, and exposure assumptions. In addition to these variables, the nature of locomotive activity will influence a risk characterization at a particular rail yard. For these reasons, the quantified risk estimates in the Roseville Rail Yard Study cannot be directly applied to other rail yards. However, the study does indicate the health risk due to diesel PM from rail yards needs to be addressed. ARB, in conjunction with the U.S. Environmental Protection Agency (U.S. EPA), and local air districts, is working with the rail industry to identify and implement short term, mid-term and long-term mitigation strategies. ARB also intends to conduct a second rail study in southern California to increase its understanding of rail yard operations and the associated public health impacts.

Key Health Findings

Diesel PM has been identified by ARB as a toxic air contaminant and represents 70 percent of the known potential cancer risk from air toxics in California. Diesel PM is an important contributor to particulate matter air pollution. Particulate matter exposure is associated with premature mortality and health effects such as asthma exacerbation and hospitalization due to aggravating heart and lung disease.

Distance Related Findings

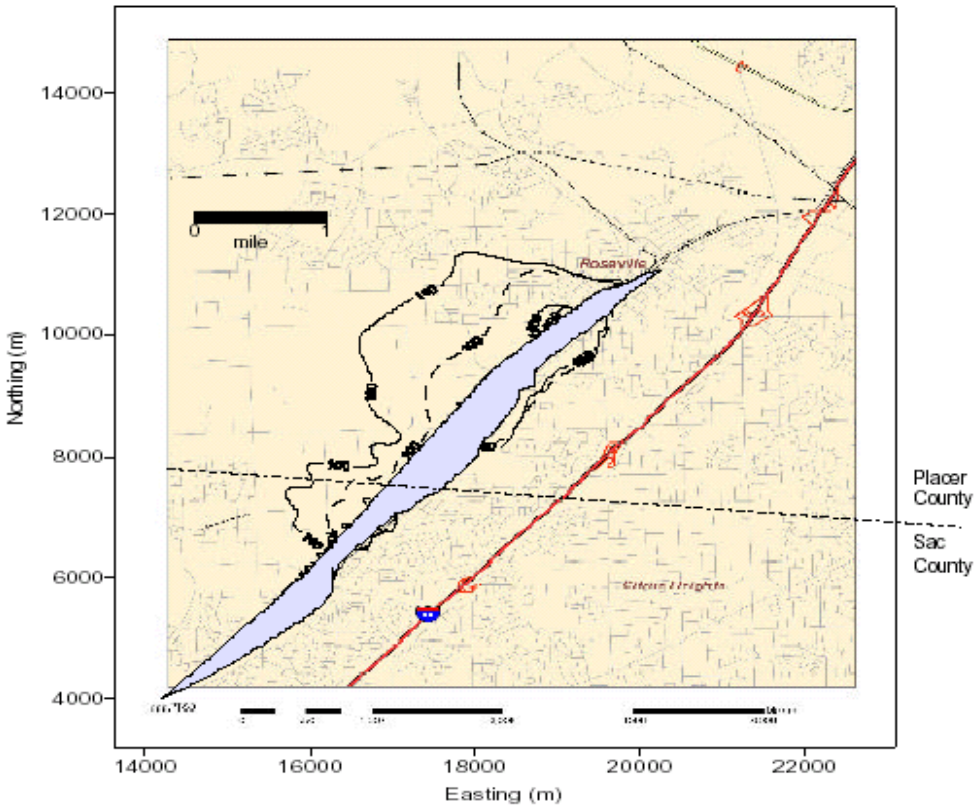
Two sets of meteorological data were used in the Roseville study because of technical limitations in the data. The size of the impact area was highly dependent on the meteorological data set used. The predicted highest impact area ranged from 10 - 40 acres with the two different meteorological data sets. This area, with risks estimated above 500 in a million, is adjacent to an area that includes a maintenance shop (see Figure 1-4). The high concentration of diesel PM emissions is due to the number of locomotives and nature of activities in this area, particularly idling locomotives.

The area of highest impact is within 1,000 feet of the Yard. The next highest impact zone as defined in the report had a predicted risk between 500 and 100 in one million and extends out between a half to one mile in some spots, depending on which meteorological conditions were assumed. The impact areas are irregular in shape making it difficult to generalize about the impact of distance at a particular location. However, the Roseville Rail Yard Study clearly indicates that the localized health risk is high, the impact area is large, and mitigation of the locomotive diesel PM emissions is needed.

For facilities like rail yards and ports, the potential impact area is so large that the real solution is to substantially reduce facility emissions. However, land use planners can avoid encroaching upon existing rail facilities and those scheduled for expansion. We also recommend that while air agencies tackle this problem, land use planners try not to add new sensitive individuals into the highest exposure areas. Finally, we recommend that land use agencies consider the potential health impacts of rail yards in their planning and permitting processes. Additional limitations and mitigation may be feasible to further reduce exposure on a site-specific basis.

**Figure 1-4**

**Estimated Cancer Risk from the Yard**
**(100 and 500 in a million risk isopleths)**




Notes: 100/Million Contours: Solid Line – Roseville Met Data; Dashed Line-McClellan Met Data, Urban Dispersion Coefficients, 80th Percentile Breathing Rate, All Locomotives' Activities (23 TPY), 70-Year Exposure

## Recommendation

- Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard[7].

- Within one mile of a rail yard, consider possible siting limitations and mitigation approaches.

## References


- *Roseville Rail Yard Study.* ARB (2004)


[7] The rail yard risk analysis was conducted for the Union Pacific rail yard in Roseville, California. This rail yard is one of the largest in the state. There are other rail yards in California with comparable levels of activity that should be considered "major" for purposes of this Handbook.

## Ports

Air pollution from maritime port activities is a growing concern for regional air quality as well as air quality in nearby communities. The primary air pollutant associated with port operations is directly emitted diesel particulate. Port-related activities also result in emissions that form ozone and secondary particulate in the atmosphere. The emission sources associated with ports include diesel engine-powered ocean-going ships, harbor craft, cargo handling equipment, trucks, and locomotives. The size and concentration of these diesel engines makes ports one of the biggest sources of diesel PM in the state. For that reason, ARB has made it a top priority to reduce diesel PM emissions at the ports, in surrounding communities, and throughout California.

International, national, state, and local government collaboration is critical to reducing port emissions based on both legal and practical considerations. For example, the International Maritime Organization (IMO) and the U.S. EPA establish emission standards for ocean-going vessels and U.S.-flagged harbor craft, respectively. ARB is pursuing further federal actions to tighten these standards. In addition, ARB and local air districts are reducing emissions from ports through a variety of approaches. These include: incentive programs to fund cleaner engines, enhanced enforcement of smoke emissions from ships and trucks, use of dockside electricity instead of diesel engines, cleaner fuels for ships, harbor craft, locomotives, and reduced engine idling. The two ATCMs that limit truck idling and reduce emissions from TRUs (discussed under “Distribution Centers”) also apply to ports.

ARB is also developing several other regulations that will reduce port-related emissions. One rule would require ocean-going ships to use a cleaner marine diesel fuel to power auxiliary engines while in California coastal waters and at dock. Ships that frequently visit California ports would also be required to further reduce their emissions. ARB has adopted a rule that would require harbor craft to use the same cleaner diesel fuel used by on-road trucks in California. In 2005, ARB will consider a rule that would require additional controls for in-use harbor craft, such as the use of add-on emission controls and accelerated turnover of older engines.

### Key Health Findings

Port activities are a major source of diesel PM. Diesel PM has been identified by ARB as a toxic air contaminant and represents 70 percent of the known potential cancer risk from air toxics in California. Diesel PM is an important contributor to particulate matter air pollution. Particulate matter exposure is associated with premature mortality and health effects such as asthma exacerbation and hospitalization due to aggravating heart and lung disease.

Distance Related Findings

The Ports of Los Angeles and Long Beach provide an example of the emissions impact of port operations. A comprehensive emissions inventory was completed in June 2004. These ports combined are one of the world's largest and busiest seaports. Located in San Pedro Bay, about 20 miles south of downtown Los Angeles, the port complex occupies approximately 16 square miles of land and water. Port activities include five source categories that produce diesel emissions. These are ocean-going vessels, harbor craft, cargo handling equipment, railroad locomotives, and heavy-duty trucks.

The baseline emission inventory provides emission estimates for all major air pollutants. This analysis focuses on diesel PM from in-port activity because these emissions have the most potential health impact on the areas adjacent to the port. Ocean vessels are the largest overall source of diesel PM related to the ports, but these emissions occur primarily outside of the port in coastal waters, making the impact more regional in nature.

The overall in-port emission inventory for diesel particulate for the ports of Los Angeles and Long Beach is estimated to be 550 tons per year. The emissions fall in the following major categories: ocean-going vessels (17%), harbor craft (25%), cargo handling (47%), railroad locomotive (3%), and heavy duty vehicles (8%). In addition to in-port emissions, ship, rail, and trucking activities also contribute to regional emissions and increase emissions in nearby neighborhoods. Off-port emissions associated with related ship, rail, and trucking activities contribute an additional 680 tons per year of diesel particulate at the Port of Los Angeles alone.

To put this in perspective, the diesel PM emissions estimated for the Roseville Yard in ARB's 2004 study are 25 tons per year. The potential cancer risk associated with these emissions is 100 in one million at a distance of one mile, or one half mile, depending on the data set used. This rail yard covers one and a half square miles. The Los Angeles and Long Beach ports have combined diesel PM emissions of 550 tons per year emitted from a facility that covers a much larger area - 16 miles. The ports have about twice the emission density of the rail yard - 34 tons per year per square mile compared to 16 tons per year per square mile. However, while this general comparison is illustrative of the overall size of the complex, a detailed air quality modeling analysis would be needed to assess the potential health impact on specific downwind areas near the ports.

ARB is in the process of evaluating the various port-related emission sources from the standpoint of existing emissions, growth forecasts, new control options, regional air quality impacts, and localized health risk. A number of public processes - both state and local - are underway to address various aspects of these issues. Until more of these analyses are complete, there is little basis for recommending a specific separation between new sensitive land uses and ports.

For example, the type of data we have showing the relationship between air pollutant concentrations and distance from freeways is not yet available.

Also, the complexity of the port facilities makes a site-specific analysis critical. Ports are a concentration of multiple emission sources with differing dispersion and other characteristics. In the case of the Roseville rail yard, we found a high, very localized impact associated with a particular activity, service and maintenance. By contrast, the location, size, and nature of impact areas can be expected to vary substantially for different port activities. For instance, ground level emissions from dockside activities would behave differently from ship stack level emissions.

Nonetheless, on an emissions basis alone, we expect locations downwind of ports to be substantially impacted. For that reason, we recommend that land use agencies track the current assessment efforts, and consider limitations on the siting of new sensitive land uses in areas immediately downwind of ports.

Recommendations

Avoid siting new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the ARB on the status of pending analyses of health risks.

References


- *Roseville Rail Yard Study.* ARB (2004)
- Final Draft, "*Port-Wide Baseline Air Emissions Inventory."* Port of Los Angeles (June 2004)
- Final Draft, "*2002 Baseline Air Emissions Inventory."* Port of Long Beach (February 2004)


## Petroleum Refineries

A petroleum refinery is a complex facility where crude oil is converted into petroleum products (primarily gasoline, diesel fuel, and jet fuel), which are then transported through a system of pipelines and storage tanks for final distribution by delivery truck to fueling facilities throughout the state. In California, most crude oil is delivered either by ship from Alaska or foreign sources, or is delivered via pipeline from oil production fields within the state. The crude oil then undergoes many complex chemical and physical reactions, which include distillation, catalytic cracking, reforming, and finishing. These refining processes have the potential to emit air contaminants, and are subject to extensive emission controls by district regulations.

As a result of these regulations covering the production, marketing, and use of gasoline and other oil by-products, California has seen significant regional air quality benefits both in terms of cleaner fuels and cleaner operating facilities. In

the 1990s, California refineries underwent significant modifications and modernization to produce cleaner fuels in response to changes in state law. Nevertheless, while residual emissions are small when compared to the total emissions controlled from these major sources, refineries are so large that even small amounts of fugitive, uncontrollable emissions and associated odors from the operations, can be significant. This is particularly the case for communities that may be directly downwind of the refinery. Odors can cause health symptoms such as nausea and headache. Also, because of the size, complexity, and vast numbers of refinery processes onsite, the occasional refinery upset or malfunction can potentially result in acute or short-term health effects to exposed individuals.

Key Health Findings

Petroleum refineries are large single sources of emissions. For volatile organic compounds (VOCs), eight of the ten largest stationary sources in California are petroleum refineries. For oxides of nitrogen (NOx), four of the ten largest stationary sources in California are petroleum refineries. Both of these compounds react in the presence of sunlight to form ozone. Ozone impacts lung function by irritating and damaging the respiratory system. Petroleum refineries are also large stationary sources of both particulate matter under 10 microns in size ($PM_{10}$) and particulate matter under 2.5 microns in size ($PM_{2.5}$). Exposure to particulate matter aggravates a number of respiratory illnesses, including asthma, and is associated with premature mortality in people with existing cardiac and respiratory disease. Both long-term and short-term exposure can have adverse health impacts. Finer particles pose an increased health risk because they can deposit deep in the lung and contain substances that are particularly harmful to human health. NOx are also significant contributors to the secondary formation of $PM_{2.5}$.

Petroleum refineries also emit a variety of toxic air pollutants. These air toxics vary by facility and process operation but may include: acetaldehyde, arsenic, antimony, benzene, beryllium, 1,3-butadiene, cadmium compounds, carbonyl sulfide, carbon disulfide, chlorine, dibenzofurans, diesel particulate matter, formaldehyde, hexane, hydrogen chloride, lead compounds, mercury compounds, nickel compounds, phenol, 2,3,7,8 tetrachlorodibenzo-p-dioxin, toluene, and xylenes (mixed) among others. The potential health effects associated with these air toxics can include cancer, respiratory irritation, and damage to the central nervous system, depending on exposure levels.

Distance Related Findings

Health risk assessments for petroleum refineries have shown risks from toxic air pollutants that have quantifiable health risk values to be around 10 potential cancer cases per million. Routine air monitoring and several air monitoring studies conducted in the San Francisco Bay Area (Crockett) and the South Coast Air Basin (Wilmington) have not identified significant health risks specifically

associated with refineries. However, these studies did not measure diesel PM as no accepted method currently exists, and there are many toxic air pollutants that do not have quantifiable health risk values.

In 2002, ARB published a report on the results of the state and local air district air monitoring done near oil refineries. The purpose of this evaluation was to try to determine how refinery-related emissions might impact nearby communities. This inventory of air monitoring activities included 10 ambient air monitoring stations located near refineries in Crockett and four stations near refineries in Wilmington. These monitoring results did not identify significant increased health risks associated with the petroleum refineries. In 2002-2003, ARB conducted additional monitoring studies in communities downwind of refineries in Crockett and Wilmington. These monitoring results also did not indicate significant increased health risks from the petroleum refineries.

Consequently, there are no air quality modeling or air monitoring data that provides a quantifiable basis for recommending a specific separation between refineries and new sensitive land uses. However, in view of the amount and potentially hazardous nature of many of the pollutants released as part of the refinery process, we believe the siting of new sensitive land uses immediately downwind should be avoided. Land use agencies should consult with the local air district when considering how to define an appropriate separation for refineries within their jurisdiction.

Recommendations

- Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult with local air districts and other local agencies to determine an appropriate separation.

References


- *Review of Current Ambient Air Monitoring Activities Related to California Bay Area and South Coast Refineries. ARB (March 2002)* http://www.arb.ca.gov/aaqm/qmosqual/special/mldrefinery.pdf
- *Community Air Quality Monitoring: Special Studies – Crockett. ARB (September 2004)* http://www.arb.ca.gov/ch/communities/studies/crockett/crockett.htm
- *Wilmington Study - Air Monitoring Results. ARB (2003)* http://www.arb.ca.gov/ch/communities/studies/wilmington/wilmington.htm


## Chrome Plating Operations

Chrome plating operations rely on the use of the toxic metal hexavalent chromium, and have been subject to ARB and local air district control programs for many years. Regulation of chrome plating operations has reduced statewide emissions substantially. However, due to the nature of chrome plating

operations and the highly toxic nature of hexavalent chromium, the remaining health risk to nearby residents is a continuing concern.

Chrome plating operations convert hexavalent chromium in solution to a chromium metal layer by electroplating, and are categorized based upon the thickness of the chromium metal layer applied. In “decorative plating”, a layer of nickel is first plated over a metal substrate. Following this step, a thin layer of chromium is deposited over the nickel layer to provide a decorative and protective finish, for example, on faucets and automotive wheels. “Hard chrome plating” is a process in which a thicker layer of chromium metal is deposited directly on metal substrates such as engine parts, industrial machinery, and tools to provide greater protection against corrosion and wear.

Hexavalent chromium is emitted into the air when an electric current is applied to the plating bath. Emissions are dependent upon the amount of electroplating done per year and the control requirements. A unit of production referred to as an ampere-hour represents the amount of electroplating produced. Small facilities have an annual production rate of 100,000 – 500,000 ampere-hours, while medium-size facilities may have a production rate of 500,000 to about 3 million ampere-hours. The remaining larger facilities have a range of production rates that can be as high as 80 million ampere-hours.

The control requirements, which reduce emissions from the plating tanks, vary according to the size and type of the operation. Facilities either install add-on pollution control equipment, such as filters and scrubbers, or in-tank controls, such as fume suppressants and polyballs. With this combination of controls, the overall hexavalent chromium emissions have been reduced by over 90 percent. Larger facilities typically have better controls that can achieve efficiencies greater than 99 percent. However, even with stringent controls, the lack of maintenance and good housekeeping practices can lead to problems. And, since the material itself is inherently dangerous, any lapse in compliance poses a significant risk to nearby residents.

A 2002 ARB study in the San Diego community of Barrio Logan measured unexpectedly high concentrations of hexavalent chromium near chrome platers. The facilities were located in a mixed-use area with residences nearby. The study found that fugitive dust laden with hexavalent chromium was an important source of emissions that likely contributed to the elevated cancer risk. Largely as a result of this study, ARB is in the process of updating the current requirements to further reduce the emissions from these facilities.

In December 2004, the ARB adopted an ATCM to reduce emissions of hexavalent chromium and nickel from thermal spraying operations through the installation of best available control technology. The ATCM requires all existing facilities to comply with its requirements by January 1, 2006. New and modified thermal spraying operations must comply upon initial startup. An existing thermal spraying facility may be exempt from the minimum control efficiency

requirements of the ATCM if it is located at least 1,640 feet from the nearest sensitive receptor and emits no more than 0.5 pound per year of hexavalent chromium.[8]

Key Health Findings

Hexavalent chromium is one of the most toxic air pollutants regulated by the State of California. Hexavalent chromium is a carcinogen and has been identified in worker health studies as causing lung cancer. Exposure to even very low levels of hexavalent chromium should be avoided.

The California Office of Environmental Health Hazard Assessment has found that: 1) many epidemiological studies show a strong association between hexavalent chromium exposure in the work place and respiratory cancer; and 2) all short-term assays reported show that hexavalent chromium compounds can cause damage to human DNA.

Hexavalent chromium when inhaled over a period of many years can cause a variety of non-cancer health effects. These health effects include damage to the nose, blood disorders, lung disease, and kidney damage. The non-cancer health impacts occur with exposures considerably higher than exposures causing significant cancer risks. It is less likely that the public would be exposed to hexavalent chromium at levels high enough to cause these non-cancer health effects. Non-cancer health effects, unlike cancer health effects, have a threshold or exposure level below which non-cancer health effects would not be expected.

Distance Related Findings

ARB's 2002 Barrio Logan Study measured concentrations of hexavalent chromium in the air near two chrome plating facilities. The study was conducted from December 2001 to May 2002. There were two chrome platers on the street - one decorative and one hard plater. The purpose of the study was to better understand the near source impact of hexavalent chromium emissions. Air monitors were placed at residences next to the platers and at varying distances down the street. The monitors were moved periodically to look at the spatial distribution of the impact. Source testing and facility inspections identified one of the facilities as the likely source.

The first two weeks of monitoring results showed unexpectedly high levels of hexavalent chromium at a number of the monitoring sites. The high concentrations were intermittent. The concentrations ranged from 1 to 22 ng/m3 compared to the statewide average of 0.1 ng/m3. If these levels were to continue for 70 years, the potential cancer risk would be 150 in one million. The highest value was found at an air monitor behind a house adjacent to one of the

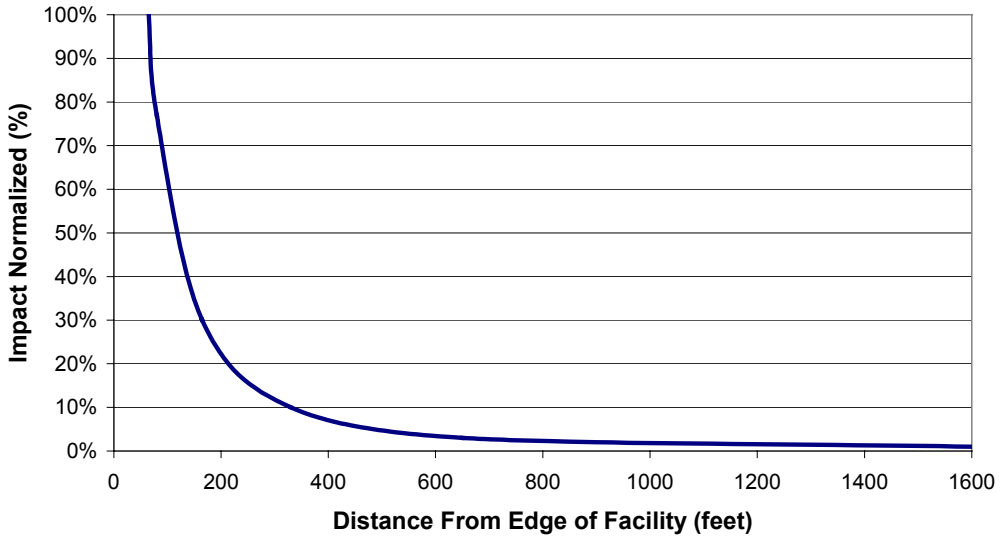
[8] For further information on the ATCM, please refer to: http://www.arb.ca.gov/regact/thermspr/thermalspr.htm

plating facilities–approximately 30 feet from the back entrance. Lower, but significant concentrations were found at an ambient air monitor 250 feet away.

The monitoring covered a period when the facility was not operating its plating tank. During this period, one of the highest concentrations was measured at an adjacent house. It appears that chromium-laden dust was responsible for high concentrations at this location since there was no plating activity at the time. Dust samples from the facility were tested and found to contain high levels of hexavalent chromium. On the day the highest concentration was measured at the house next door, a monitor 350 feet away from the plater's entrance showed very little impact. Similar proximity effects are shown in ARB modeling studies.

Figure 1-5 shows how the relative health risk varies as a function of distance from a chrome plater. This analysis is based on a medium-sized chrome plater with an annual production rate of 3 million ampere-hours. As shown in Figure 1- 5, the potential health risk drops off rapidly, with over 90 percent reduction in risk within 300 feet. This modeling was done in 2003 as part of a review of ARB's current air toxic control measure for chrome platers and is based on data from a recent ARB survey of chrome platers in California. The emission

**Figure 1-5**
**Risk vs. Distance From Chrome Plater**
**(Based on plating tank emissions)**




rates are only for plating operations. Because there are insufficient data available to directly quantify the impacts, the analysis does not include fugitive emissions, which the Barrio Logan analysis indicated could be significant.

Both the ARB Barrio Logan monitoring results and ARB's 2003 modeling analysis suggests that the localized emissions impact of a chrome plater diminishes significantly at 300 feet. However, in developing our recommendation, we also considered the following factors:

- some chrome platers will have higher volumes of plating activity,
- potential dust impacts were not modeled,
- we have only one monitoring study looking at the impact of distance, and,
- hexavalent chromium is one of the most potent toxic air contaminants ARB has identified.

Given these limitations in the analysis, we recommend a separation of 1,000 feet as a precautionary measure. For large chrome platers, site specific information should be obtained from the local air district.

Recommendation

- Avoid siting new sensitive land uses within 1,000 feet of a chrome plater.

References


- *Ambient Air Monitoring for Hexavalent Chromium and Metals in Barrio Logan: May 2001 through May 2002.* ARB, Monitoring and Laboratory Division (October 14, 2003)
- *Draft Barrio Logan Report.* ARB, Planning and Technical Support Division (November 2004)
- *Proposed Amendments to the Hexavalent Chromium Control Measure for Decorative and Hard Chrome Plating and Chromic Acid Anodizing Facilities.* ARB (April 1998)
- Murchison, Linda; Suer, Carolyn; Cook, Jeff. *"Neighborhood Scale Monitoring in Barrio Logan," (*AWMA Annual Conference Proceedings, June 2003)


**Dry Cleaners Using Perchloroethylene (Perc Dry Cleaners)**

Perchloroethylene (perc) is the solvent most commonly used by the dry cleaning industry to clean clothes or other materials. The ARB and other public health agencies have identified perc as a potential cancer-causing compound. Perc persists in the atmosphere long enough to contribute to both regional air pollution and localized exposures. Perc dry cleaners are the major source of perc emissions in California.

Since 1990, the statewide concentrations and health risk from exposure to perc has dropped over 70 percent. This is due to a number of regulatory requirements on perc dry cleaners and other sources, including degreasing operations, brake cleaners, and adhesives. ARB adopted an Airborne Toxic Control Measure (ATCM) for Perc Emissions from Dry Cleaning Operations in 1993. ARB has also prohibited the use of perc in aerosol adhesives and automotive brake cleaners.

Perc dry cleaners statewide are required to comply with ARB and local air district regulations to reduce emissions. However, even with these controls, some emissions continue to occur. Air quality studies indicate that there is still the potential for significant risks even near well-controlled dry cleaners. The South Coast AQMD has adopted a rule requiring that all new dry cleaners use alternatives to perc and that existing dry cleaners phase out the use of perc by December 2020. Over time, transition to non-toxic alternatives should occur. However, while perc continues to be used, a preventative approach should be taken to siting of new sensitive land uses.

Key Health Findings

Inhalation of perc may result in both cancer and non-cancer health effects. An assessment by California's Office of Environmental Health Hazard Assessment (OEHHA) concluded that perc is a potential human carcinogen and can cause non-cancer health effects. In addition to the potential cancer risk, the effects of long-term exposure include dizziness, impaired judgment and perception, and damage to the liver and kidneys. Workers have shown signs of liver toxicity following chronic exposure to perc, as well as kidney dysfunction and neurological effects. Non-cancer health effects occur with higher exposure levels than those associated with significant cancer risks. The public is more likely to be exposed to perchloroethylene at levels causing significant cancer risks than to levels causing non-cancer health effects. Non-cancer health effects, unlike cancer health effects, have a threshold or exposure level below which non-cancer health effects would not be expected. The ARB formally identified perc as a toxic air contaminant in October 1991.

One study has determined that inhalation of perc is the predominant route of exposure to infants living in apartments co-located in the same building with a business operating perc dry cleaning equipment. Results of air sampling within co-residential buildings indicate that dry cleaners can cause a wide range of exposures depending on the type and maintenance of the equipment. For example, a well-maintained state-of-the-art system may have risks in the range of 10 in one million, whereas a badly maintained machine with major leaks can have potential cancer risks of thousands in one million.

The California Air Pollution Control Officers Association (CAPCOA) is developing Industry-wide Risk Assessment Guidelines for Perchloroethylene Dry Cleaners which, when published, will provide detailed information on public health risk from exposure to emissions from this source.

Distance Related Findings

Risk created by perc dry cleaning is dependent on the amount of perc emissions, the type of dry cleaning equipment, proximity to the source, and how the emissions are released and dispersed (e.g., type of ventilation system, stack parameters, and local meteorology). Dry cleaners are often located near

residential areas, and near shopping centers, schools, day-care centers, and restaurants.

The vast majority of dry cleaners in California have one dry cleaning machine per facility. The South Coast AQMD estimates that an average well-controlled dry cleaner uses about 30 to 160 gallons of cleaning solvent per year, with an average of about 100 gallons. Based on these estimates, the South Coast AQMD estimates a potential cancer risk between 25 to 140 in one million at residential locations 75 feet or less from the dry cleaner, with an average of about 80 in one million. The estimate could be as high as 270 in one million for older machines.

CAPCOA's draft industry-wide risk assessment of perc dry cleaning operations indicates that the potential cancer risk for many dry cleaners may be in excess of potential cancer risk levels adopted by the local air districts. The draft document also indicates that, in general, the public's exposure can be reduced by at least 75 percent, by providing a separation distance of about 300 feet from the operation. This assessment is based on a single machine with perc use of about 100 gallons per year. At these distances, the potential cancer risk would be less than 10 potential cases per million for most scenarios.

The risk would be proportionately higher for large, industrial size, dry cleaners. These facilities typically have two or more machines and use 200 gallons or more per year of perc. Therefore, separation distances need to be greater for large dry cleaners. At a distance of 500 feet, the remaining risk for a large plant can be reduced by over 85 percent.

In California, a small number of dry cleaners that are co-located (sharing a common wall, floor, or ceiling) with a residence have the potential to expose the inhabitants of the residence to high levels of perc. However, while special requirements have been imposed on these existing facilities, the potential for exposure still exists. Avoiding these siting situations in the future is an important preventative measure.

Local air districts are a source of information regarding specific dry cleaning operations—particularly for large industrial operations with multiple machines. The 300 foot separation recommended below reflects the most common situation – a dry cleaner with only one machine. While we recommend 500 feet when there are two or more machines, site specific information should be obtained from the local air district for some very large industrial operations. Factors that can impact the risk include the number and type of machines, controls used, source configuration, building dimensions, terrain, and meteorological data.

Recommendation

- Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines provide 500 feet. For operations with 3 or more machines, consult with the local air district.

- Do not site new sensitive land uses in the same building with perc dry cleaning operations.

References


- *Proposed Amended Rule 1421 – Control of Perchloroethylene Emissions from Dry Cleaning Systems,* Final Staff Report. South Coast AQMD. (October 2002)
- *Air Toxic Control Measure for Emissions of Perchloroethylene from Dry Cleaning Operations.* ARB (1994) (http://www.arb.ca.gov/toxics/atcm/percatcm.htm)
- *"An Assessment of Tetrachloroethylene in Human Breast Milk"*, Judith Schreiber, New York State Department of Health – Bureau of Toxic Substance Assessment, Journal of Exposure Analysis and Environmental Epidemiology, Vol.2, Suppl.2, pp. 15-26, 1992.
- Draft *Air Toxics "Hot Spots" Program Perchloroethylene Dry Cleaner Industry-wide Risk Assessment Guidelines.* (CAPCOA (November 2002)
- *Final Environmental Assessment for Proposed Amended Rule 1421 – Control of Perchloroethylene Emissions from Dry Cleaning Systems.* South Coast AQMD. (October 18, 2002)


**Gasoline Dispensing Facilities**

Refueling at gasoline dispensing facilities releases benzene into the air. Benzene is a potent carcinogen and is one of the highest risk air pollutants regulated by ARB. Motor vehicles and motor vehicle-related activity account for over 90 percent of benzene emissions in California. While gasoline-dispensing facilities account for a small part of total benzene emissions, near source exposures for large facilities can be significant.

Since 1990, benzene in the air has been reduced by over 75 percent statewide, primarily due to the implementation of emissions controls on motor vehicle vapor recovery equipment at gas stations, and a reduction in benzene levels in gasoline. However, benzene levels are still significant. In urban areas, average benzene exposure is equivalent to about 50 in one million.

Gasoline dispensing facilities tend to be located in areas close to residential and shopping areas. Benzene emissions from the largest gas stations may result in near source health risk beyond the regional background and district health risk thresholds. The emergence of very high gasoline throughput at large retail or

wholesale outlets makes this a concern as these types of outlets are projected to account for an increasing market share in the next few years.

Key Health Findings

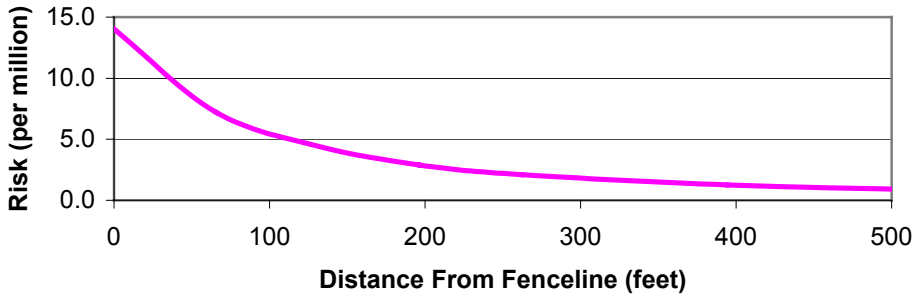
Benzene is a human carcinogen identified by ARB as a toxic air contaminant. Benzene also can cause non-cancer health effects above a certain level of exposure. Brief inhalation exposure to high concentrations can cause central nervous system depression. Acute effects include central nervous system symptoms of nausea, tremors, drowsiness, dizziness, headache, intoxication, and unconsciousness. It is unlikely that the public would be exposed to levels of benzene from gasoline dispensing facilities high enough to cause these non-cancer health effects.

Distance Related Findings

A well-maintained vapor recovery system can decrease emissions of benzene by more than 90% compared with an uncontrolled facility. Almost all facilities have emission control systems. Air quality modeling of the health risks from gasoline dispensing facilities indicate that the impact from the facilities decreases rapidly as the distance from the facility increases.

Statistics reported in the ARB's staff reports on Enhanced Vapor Recovery released in 2000 and 2002, indicated that almost 96 percent of the gasoline dispensing facilities had a throughput less than 2.4 million gallons per year. The remaining four percent, or approximately 450 facilities, had throughputs exceeding 2.4 million gallons per year. For these stations, the average gasoline throughput was 3.6 million gallons per year.

**Figure 1-6**
**Gasoline Dispensing Facility Health Risk**
**for 3,600,000 gal/yr throughput**




As shown in Figure 1-6, the risk levels for a gasoline dispensing facility with a throughput of 3.6 million gallons per year is about 10 in one million at a distance of 50 feet from the fenceline. However, as the throughput increases, the potential risk increases.

As mentioned above, air pollution levels in the immediate vicinity of large gasoline dispensing facilities may be higher than the surrounding area (although tailpipe emissions from motor vehicles dominates the health impacts). Very large gasoline dispensing facilities located at large wholesale and discount centers may dispense nine million gallons of gasoline per year or more. At nine million gallons, the potential risk could be around 25 in one million at 50 feet, dropping to about five in one million at 300 feet. Some facilities have throughputs as high as 19 million gallons.

Recommendation

- Avoid siting new sensitive land uses within 300 feet of a large gasoline dispensing facility (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities.

References


- *Gasoline Service Station Industry-wide Risk Assessment Guidelines.* California Air Pollution Control Officers Association (December 1997 and revised November 1, 2001)
- *Staff Report on Enhanced Vapor Recovery.* ARB (February 4, 2000)
- *The California Almanac of Emissions and Air Quality.* ARB (2004)
- *Staff Report on Enhanced Vapor Recovery Technology Review.* ARB (October 2002)


## Other Facility Types that Emit Air Pollutants of Concern

In addition to source specific recommendations, Table 1-3 includes a list of other industrial sources that could pose a significant health risk to nearby sensitive individuals depending on a number of factors. These factors include the amount of pollutant emitted and its toxicity, the distance to nearby individuals, and the type of emission controls in place. Since these types of facilities are subject to air permits from local air districts, facility specific information should be obtained where there are questions about siting a sensitive land use close to an industrial facility.

## Potential Sources of Odor and Dust Complaints

Odors and dust from commercial activities are the most common sources of air pollution complaints and concerns from the public. Land use planning and permitting processes should consider the potential impacts of odor and dust on surrounding land uses, and provide for adequate separation between odor and dust sources. As with other types of air pollution, a number of factors need to be considered when determining an adequate distance or mitigation to avoid odor or

**Table 1-3 – Examples of Other Facility Types That Emit[1] Air Pollutants of Concern**

| Categories | Facility Type | Air Pollutants of Concern |
|---|---|---|
| Commercial | | |
| | Autobody Shops | Metals, Solvents |
| | Furniture Repair | Solvents[2], Methylene Chloride |
| | Film Processing Services | Solvents, Perchloroethylene |
| | Distribution Centers | Diesel Particulate Matter |
| | Printing Shops | Solvents |
| | Diesel Engines | Diesel Particulate Matter |
| Industrial | | |
| | Construction | Particulate Matter, Asbestos |
| | Manufacturers | Solvents, Metals |
| | Metal Platers, Welders, Metal Spray (flame spray) Operations | Hexavalent Chromium, Nickel, Metals |
| | Chemical Producers | Solvents, Metals |
| | Furniture Manufacturers | Solvents |
| | Shipbuilding and Repair | Hexavalent chromium and other metals, Solvents |
| | Rock Quarries and Cement Manufacturers | Particulate Matter, Asbestos |
| | Hazardous Waste Incinerators | Dioxin, Solvents, Metals |
| | Power Plants | Benzene, Formaldehyde, Particulate Matter |
| | Research and Development Facilities | Solvents, Metals, etc. |
| Public | | |
| | Landfills | Benzene, Vinyl Chloride, Diesel Particulate Matter |
| | Waste Water Treatment Plants | Hydrogen Sulfide |
| | Medical Waste Incinerators | Dioxin, Benzene, PAH, PCBs, 1,3-Butadiene |
| | Recycling, Garbage Transfer Stations | Diesel Particulate Matter |
| | Municipal Incinerators | Dioxin, Benzene, PAH, PCBs, 1,3-Butadiene |
| Transportation | | |
| | Truck Stops | Diesel Particulate Matter |
| Agricultural Operations | | |
| | Farming Operations | Diesel Particulate Matter, VOCs, NOx, PM10, CO, SOx, Pesticides |
| | Livestock and Dairy Operations | Ammonia, VOCs, PM10 |

[1]Not all facilities will emit pollutants of concern due to process changes or chemical substitution. Consult the local air district regarding specific facilities.
[2]Some solvents may emit toxic air pollutants, but not all solvents are toxic air contaminants.

dust complaints in a specific situation. Local air districts should be consulted for advice when these siting situations arise.

Table 1-4 lists some of the most common sources of odor complaints received by local air districts. Complaints about odors are the responsibility of local air districts and are covered under state law. The types of facilities that can cause odor complaints are varied and can range from small commercial facilities to large industrial facilities, and may include waste disposal and recycling operations. Odors can cause health symptoms such as nausea and headache. Facilities with odors may also be sources of toxic air pollutants (See Table 1-3). Some common sources of odors emitted by facilities are sulfur compounds, organic solvents, and the decomposition/digestion of biological materials. Because of the subjective nature of an individual's sensitivity to a particular type of odor, there is no specific rule for assigning appropriate separations from odor sources. Under the right meteorological conditions, some odors may still be offensive several miles from the source.

**Table 1-4**
**Sources of Odor Complaints**

- Sewage Treatment Plants
- Landfills
- Recycling Facilities
- Waste Transfer Stations
- Petroleum Refineries
- Biomass Operations
- Autobody Shops
- Coating Operations
- Fiberglass Manufacturing
- Foundries
- Rendering Plants
- Livestock Operations

Sources of dust are also common sources of air pollution-related complaints. Operations that can result in dust problems are rock crushing, gravel production, stone quarrying, and mining operations. A common source of complaints is the dust and noise associated with blasting that may be part of these operations. Besides the health impacts of dust as particulate matter, thick dust also impairs visibility, aesthetic values, and can soil homes and automobiles. Local air districts typically have rules for regulating dust sources in their jurisdictions, but dust sources can still be a concern. Therefore, separation of these facilities from residential and other new sensitive land uses should be considered.

In some areas of California, asbestos occurs naturally in stone deposits. Asbestos is a potent carcinogenic substance when inhaled. Asbestos-containing dust may be a public health concern in areas where asbestos-containing rock is mined, crushed, processed, or used. Situations where asbestos-containing gravel has been used in road paving materials are also a source of asbestos exposure to the general public. Planners are advised to consult with local air pollution agencies in areas where asbestos-containing gravel or stone products are produced or used.

## 2. Handbook Development

ARB and local air districts share responsibility for improving statewide air quality. As a result of California's air pollution control programs, air quality has improved and health risk has been reduced statewide. However, state and federal air quality standards are still exceeded in many areas of California and the statewide health risk posed by toxic air contaminants (air toxics) remains too high. Also, some communities experience higher pollution exposures than others - making localized impacts, as well regional or statewide impacts, an important consideration. It is for this reason that this Handbook has been produced - to promote better, more informed decision-making by local land use agencies that will improve air quality and public health in their communities.

Land use policies and practices, including planning, zoning, and siting activities, can play a critical role in air quality and public health at the local level. For instance, even with the best available control technology, some projects that are sited very close to homes, schools, and other public places can result in elevated air pollution exposures. The reverse is also true – siting a new school or home too close to an existing source of air pollution can pose a public health risk. The ARB recommendations in section 1 address this issue.

> *This Handbook is an informational document that we hope will strengthen the relationship between air quality and land use agencies. It highlights the need for land use agencies to address the potential for new projects to result in localized health risk or contribute to cumulative impacts where air pollution sources are concentrated.*

Avoiding these incompatible land uses is a key to reducing localized air pollution exposures that can result in adverse health impacts, especially to sensitive individuals.

Individual siting decisions that result in incompatible land uses are often the result of locating "sensitive" land uses next to polluting sources. These decisions can be of even greater concern when existing air pollution exposures in a community are considered. In general terms, this is often referred to as the issue of "cumulative impacts." ARB is working with local air districts to better define these situations and to make information about existing air pollution levels (e.g., from local businesses, motor vehicles, and other areawide sources) more readily available to land use agencies.

In December 2001, the ARB adopted "Policies and Actions for Environmental Justice" (Policies). These Policies were developed in coordination with a group of stakeholders, representing local government agencies, community interest

groups, environmental justice organizations, academia, and business (Environmental Justice Stakeholders Group).

The Policies included a commitment to work with land use planners, transportation agencies, and local air districts to develop ways to identify, consider, and reduce cumulative air pollution emissions, exposure, and health risks associated with land use planning and decision-making. Developed under the auspices of the ARB's Environmental Justice Stakeholders Group, this Handbook is a first step in meeting that commitment.

ARB has produced this Handbook to help achieve several objectives:

- Provide recommendations on situations to avoid when siting new residences, schools, day care centers, playgrounds, and medical-related facilities (sensitive sites or sensitive land uses);

- Identify approaches that land use agencies can use to prevent or reduce potential air pollution impacts associated with general plan policies, new land use development, siting, and permitting decisions;

- Improve and facilitate access to air quality data and evaluation tools for use in the land use decision-making process;

- Encourage stronger collaboration between land use agencies and local air districts to reduce community exposure to source-specific and cumulative air pollution impacts; and

- Emphasize community outreach approaches that promote active public involvement in the air quality/land use decision-making process.

This Handbook builds upon California's 2003 General Plan Guidelines. These Guidelines, developed by the Governor's Office of Planning and Research (OPR), explain the land use planning process and applicable legal requirements. This Handbook also builds upon a 1997 ARB report, "The Land Use-Air Quality Linkage" ("Linkage Report").[9] The Linkage Report was an outgrowth of the California Clean Air Act which, among other things, called upon local air districts to focus particular attention on reducing emissions from sources that indirectly cause air pollution by attracting vehicle trips. Such indirect sources include, but are not limited to, shopping centers, schools and universities, employment centers, warehousing, airport hubs, medical offices, and sports arenas. The Linkage Report summarizes data as of 1997 on the relationships between land use, transportation, and air quality, and highlights strategies that can help to reduce the use of single occupancy automobile use. Such strategies

[9] To access this report, please refer to ARB's website or click on: http://www.arb.ca.gov/ch/programs/link97.pdf

complement ARB regulatory programs that continue to reduce motor vehicle emissions.

In this Handbook, we identify types of air quality-related information that we recommend land use agencies consider in the land use decision-making processes such as the development of regional, general, and community plans; zoning ordinances; environmental reviews; project siting; and permit issuance. The Handbook provides recommendations on the siting of new sensitive land uses based on current analyses. It also contains information on approaches and methodologies for evaluating new projects from an air pollution perspective.

The Handbook looks at air quality issues associated with emissions from industrial, commercial, and mobile sources of air pollution. Mobile sources continue to be the largest overall contributors to the state's air pollution problems, representing the greatest air pollution health risk to most Californians. Based on current health risk information for air toxics, the most serious pollutants on a statewide basis are diesel PM, benzene, and 1,3-butadiene, all of which are primarily emitted by motor vehicles. From a state perspective, ARB continues to pursue new strategies to further reduce motor vehicle-related emissions in order to meet air quality standards and reduce air toxics risk.

While mobile sources are the largest overall contributors to the state's air pollution problems, industrial and commercial sources can also pose a health risk, particularly to people near the source. For this reason, the issue of incompatible land uses is an important focus of this document.

## Handbook Audience

Even though the primary users of the Handbook will likely be agencies responsible for air quality and land use planning, we hope the ideas and technical issues presented in this Handbook will also be useful for:

- public and community organizations and community residents;
- federal, state and regional agencies that fund, review, regulate, oversee, or otherwise influence environmental policies and programs affected by land use policies; and
- private developers.

## 3. Key Community Focused Issues Land Use Agencies Should Consider

Two key air quality issues that land use agencies should consider in their planning, zoning, and permitting processes are:

1) **Incompatible Land Uses.** Localized air pollution impacts from incompatible land use can occur when polluting sources, such as a heavily trafficked roadway, warehousing facilities, or industrial or commercial facilities, are located near a land use where sensitive individuals are found such as a school, hospital, or homes.

2) **Cumulative Impacts.** Cumulative air pollution impacts can occur from a concentration of multiple sources that individually comply with air pollution control requirements or fall below risk thresholds, but in the aggregate may pose a public health risk to exposed individuals. These sources can be heavy or light-industrial operations, commercial facilities such as autobody shops, large gas dispensing facilities, dry cleaners, and chrome platers, and freeways or other nearby busy transportation corridors.

### Incompatible Land Uses

Land use policies and practices can worsen air pollution exposure and adversely affect public health by mixing incompatible land uses. Examples include locating new sensitive land uses, such as housing or schools, next to small metal plating facilities that use a highly toxic form of chromium, or very near large industrial facilities or freeways. Based on recent monitoring and health-based studies, we now know that air quality impacts from incompatible land uses can contribute to increased risk of illness, missed work and school, a lower quality of life, and higher costs for public health and pollution control.[10]

Avoiding incompatible land uses can be a challenge in the context of mixed-use industrial and residential zoning. For a variety of reasons, government agencies and housing advocates have encouraged the proximity of affordable housing to employment centers, shopping areas, and transportation corridors, partially as a means to reduce vehicle trips and their associated emissions. Generally speaking, typical distances in mixed-use communities between businesses and industries and other land uses such as homes and schools, should be adequate to avoid health risks. However, generalizations do not always hold as we addressed in section 1 of this Handbook.

In terms of siting air pollution sources, the proposed location of a project is a major factor in determining whether it will result in localized air quality impacts. Often, the problem can be avoided by providing an adequate distance or setback

[10] For more information, the reader should refer to ARB's website on community health: http://www.arb.ca.gov/ch/ch.htm

between a source of emissions and nearby sensitive land uses. Sometimes, suggesting project design changes or mitigation measures in the project review phase can also reduce or avoid potential impacts. This underscores the importance of addressing potential incompatible land uses as early as possible in the project review process, ideally in the general plan itself.

**Cumulative Air Pollution Impacts**

The broad concept of cumulative air pollution impacts reflects the combination of regional air pollution levels and any localized impacts. Many factors contribute to air pollution levels experienced in any location. These include urban background air pollution, historic land use patterns, the prevalence of freeways and other transportation corridors, the concentration of industrial and commercial businesses, and local meteorology and terrain.

When considering the potential air quality impacts of polluting sources on individuals, project location and the concentration of emissions from air pollution sources need to be considered in the land use decision-making process. In section 4, the Handbook offers a series of questions that helps land use agencies determine if a project should undergo a more careful analysis. This holds true regardless of whether the project being sited is a polluting source or a sensitive land use project.

Large industrial areas are not the only land uses that may result in public health concerns in mixed-use communities. Cumulative air pollution impacts can also occur if land uses do not adequately provide setbacks or otherwise protect sensitive individuals from potential air pollution impacts associated with nearby light industrial sources. This can occur with activities such as truck idling and traffic congestion, or from indirect sources such as warehousing facilities that are located in a community or neighborhood.

In October 2004, Cal/EPA published its Environmental Justice Action Plan. In February 2005, the Cal/EPA Interagency Working Group approved a working definition of "cumulative impacts" for purposes of initially guiding the pilot projects that are being conducted pursuant to that plan. Cal/EPA is now in the process of developing a Cumulative Impacts Assessment Guidance document. Cal/EPA will revisit the working definition of "cumulative impacts" as the Agency develops that guidance. The following is the working definition:

> *"Cumulative impacts means exposures, public health or environmental effects from the combined emissions and discharges, in a geographic area, including environmental pollution from all sources, whether single or multi-media, routinely, accidentally, or otherwise released. Impacts will take into account sensitive populations and socio-economic factors, where applicable, and to the extent data are available."*

## 4. Mechanisms for Integrating Localized Air Quality Concerns Into Land Use Processes

Land use agencies should use each of their existing planning, zoning, and permitting authorities to address the potential health risk associated with new projects. Land use-specific mechanisms can go a long way toward addressing both localized and cumulative impacts from new air pollution sources that are not otherwise addressed by environmental regulations. Likewise, close collaboration and communication between land use agencies and local air districts in both the planning and project approval stages can further reduce these impacts. Local agency partnerships can also result in early identification of potential impacts from proposed activities that might otherwise escape environmental review. When this happens, pollution problems can be prevented or reduced before projects are approved, when it is less complex and expensive to mitigate.

The land use entitlement process requires a series of planning decisions. At the highest level, the General Plan sets the policies and direction for the jurisdiction, and includes a number of mandatory elements dealing with issues such as housing, circulation, and health hazards. Zoning is the primary tool for implementing land use policies. Specific or community plans created in conjunction with a specific project also perform many of the same functions as a zoning ordinance. Zoning can be modified by means of variances and conditional use permits. The latter are frequently used to insure compatibility between otherwise conflicting land uses. Finally, new development usually requires the approval of a parcel or tract map before grading and building permits can be issued. These parcel or tract maps must be consistent with the applicable General Plan, zoning and other standards.

Land use agencies can use their planning authority to separate industrial and residential land uses, or to require mitigation where separation is not feasible. By separating incompatible land uses, land use agencies can prevent or reduce both localized and cumulative air pollution impacts without denying what might otherwise be a desirable project.[11] For instance:

- a dry cleaner could open a storefront operation in a community with actual cleaning operations performed at a remote location away from residential areas;
- gas dispensing facilities with lower fuel throughput could be sited in mixed-use areas;
- enhanced building ventilation or filtering systems in schools or senior care centers can reduce ambient air from nearby busy arterials; or
- landscaping and regular watering can be used to reduce fugitive dust at a building construction site near a school yard.

[11] It should be noted that such actions should also be considered as part of the General Plan or Plan element process.

The following general and specific land use approaches can help to reduce potential adverse air pollution impacts that projects may have on public health.

**General Plans**

The primary purpose of planning, and the source of government authority to engage in planning, is to protect public health, safety, and welfare. In its most basic sense, a local government General Plan expresses the community's development goals and embodies public policy relative to the distribution of future land uses, forming the basis for most land use decisions. Therefore, the most effective mechanism for dealing with the central land use concept of compatibility and its relationship to cumulative air pollution impacts is the General Plan. Well before projects are proposed within a jurisdiction, the General Plan sets the stage for where projects can be sited, and their compatibility with comprehensive community goals, objectives, and policies.

In 2003, OPR revised its General Plan Guidelines, highlighting the importance of incorporating sustainable development and environmental justice policies in the planning process. The OPR General Plan Guidelines provides an effective and long-term approach to reduce cumulative air pollution impacts at the earliest planning stages. In light of these important additions to the Guidelines, land use agencies should consider updating their General Plans or Plan elements to address these revisions.

The General Plan and related Plan elements can be used to avoid incompatible land uses by incorporating air quality considerations into these documents. For instance, a General Plan safety element with an air quality component could be used to incorporate policies or objectives that are intended to protect the public from the potential for facility breakdowns that may result in a dangerous release of air toxics. Likewise, an air quality component to the transportation circulation element of the General Plan could include policies or standards to prevent or reduce local exposure to diesel exhaust from trucks and other vehicles. For instance, the transportation circulation element could encourage the construction of alternative routes away from residential areas for heavy-duty diesel trucks. By considering the relationship between air quality and transportation, the circulation element could also include air quality policies to prevent or reduce trips and travel, and thus vehicle emissions. Policies in the land use element of the General Plan could identify areas appropriate for future industrial, commercial, and residential uses. Such policies could also introduce design and distance parameters that reduce emissions, exposure, and risk from industrial and some commercial land uses (e.g., dry cleaners) that are in close proximity to residential areas or schools.

Land use agencies should also consider updating or creating an air quality element in the jurisdiction's General Plan. In the air quality element, local decision-makers could develop long-term, effective plans and policies to address

air quality issues, including cumulative impacts. The air quality element can also provide a general reference guide that informs local land use planners about regional and community level air quality, regulatory air pollution control requirements and guidelines, and references emissions and pollution source data bases and assessment and modeling tools. As is further described in Appendix C of the Handbook, new assessment tools that ARB is developing can be included into the air quality element by reference. For instance, ARB's statewide risk maps could be referenced in the air quality element as a resource that could be consulted by developers or land use agencies

**Zoning**

The purpose of "zoning" is to separate different land uses. Zoning ordinances establish development controls to ensure that private development takes place within a given area in a manner in which:

- All uses are compatible (e.g., an industrial plant is not permitted in a residential area);
- Common development standards are used (e.g., all homes in a given area are set back the same minimum distance from the street); and,
- Each development does not unreasonably impose a burden upon its neighbors (e.g., parking is required on site so as not to create neighborhood parking problems).

To do this, use districts called "zones" are established and standards are developed for these zones. The four basic zones are residential, commercial, industrial and institutional.

Land use agencies may wish to consider how zoning ordinances, particularly those for mixed-use areas, can be used to avoid exacerbating poor land use practices of the past or contributing to localized and cumulative air pollution impacts in the community.

Sometimes, especially in mixed-use zones, there is a potential for certain categories of existing businesses or industrial operations to result in cumulative air pollution impacts to new development projects. For example:

- An assisted living project is proposed for a mixed-use zone adjacent to an existing chrome plating facility, or several dry cleaners;
- Multiple industrial sources regulated by a local air district are located directly upwind of a new apartment complex;
- A new housing development is sited in a mixed-use zone that is downwind or adjacent to a distribution center that attracts diesel-fueled delivery trucks and TRUs; or
- A new housing development or sensitive land use is sited without adequate setbacks from an existing major transportation corridor or rail yard.

As part of the public process for making zoning changes, local land use agencies could work with community planning groups, local businesses, and community residents to determine how best to address existing incompatible land uses.

## Land Use Permitting Processes

### ■ Questions to Consider When Reviewing New Projects

Very often, just knowing what questions to ask can yield critical information about the potential air pollution impacts of proposed projects – both from the perspective of a specific project as well as in the nature of existing air pollution sources in the same impact area. Available land use information can reveal the proximity of air pollution sources to sensitive individuals, the potential for incompatible land uses, and the location and nature of nearby air pollution sources. Air quality data, available from the ARB and local air districts, can provide information about the types and amounts of air pollution emitted in an area, regional air quality concentrations, and health risk estimates for specific sources.

General Plans and zoning maps are an excellent starting point in reviewing project proposals for their potential air pollution impacts. These documents contain information about existing or proposed land uses for a specific location as well as the surrounding area. Often, just looking at a map of the proposed location for a facility and its surrounding area will help to identify a potential adjacent incompatible land use.

The following pages are a “pull-out” list of questions to consider along with cross-references to pertinent information in the Handbook. These questions are intended to assist land use agencies in evaluating potential air quality-related concerns associated with new project proposals.

The first group of questions contains project-related queries designed to help identify the potential for localized project impacts, particularly associated with incompatible land uses. The second group of questions focuses on the issue of potential cumulative impacts by including questions about existing emissions and air quality in the community, and community feedback. Depending on the answers to these questions, a land use agency may decide a more detailed review of the proposal is warranted.

The California Department of Education has already developed a detailed process for school siting which is outlined in Appendix E. However, school districts may also find this section helpful when evaluating the most appropriate site for new schools in their area. At a minimum, using these questions may encourage school districts to engage throughout their siting process with land use agencies and local air districts. The combined expertise of these entities can be useful in devising relevant design standards and mitigation measures that can

reduce exposure to cumulative emissions, exposure, and health risk to students and school workers.

As indicated throughout the Handbook, we strongly encourage land use agencies to consult early and often with local air districts. Local air districts have the expertise, many of the analytical tools, and a working knowledge of the sources they regulate. It is also critical to fully involve the public and businesses that could be affected by the siting decision. The questions provided in the chart below do not imply any particular action should be taken by land use agencies. Rather the questions are intended to improve the assessment process and facilitate informed decision-making.

- **Project-Related Questions**

This section includes project-related questions that, in conjunction with the questions in the next section, can be used to tailor the project evaluation. These questions are designed to help identify the potential for incompatible land uses from localized project impacts.

### Questions to Consider When Reviewing New Projects

| Project-Related Questions | Cross-Reference to Relevant Handbook Sections |
|---|---|
| 1. Is the proposed project:<br>▲ A business or commercial license renewal<br>▲ A new or modified commercial project<br>▲ A new or modified industrial project<br>▲ A new or modified public facility project<br>▲ A new or modified transportation project<br>▲ A housing or other development in which sensitive individuals may live or play | See Appendix A for typical land use classifications and associated project categories that could emit air pollutants. |
| 2. Does the proposed project:<br>▲ Conform to the zoning designation?<br>▲ Require a variance to the zoning designation?<br>▲ Include plans to expand operations over the life of the business such that additional emissions may increase the pollution burden in the community (e.g., from additional truck operations, new industrial operations or process lines, increased hours of operation, build-out to the property line, etc.)? | See Appendix F for a general explanation of land use processes.<br>In addition, Section 3 contains a discussion of how land use planning, zoning, and permitting practices can result in incompatible land uses or cumulative air pollution impacts. |
| 3. Has the local air district provided comments or information to assist in the analysis? | See Section 5 and Appendix C for a description of air quality-related tools that the ARB and local air districts use to provide information on potential air pollution impacts. |
| 4. Have public meetings been scheduled with the affected community to solicit their involvement in the decision-making process for the proposed project? | See Section 7 for a discussion of public participation, information and outreach tools. |
| 5. If the proposed project will be subject to local air district regulations:<br>▲ Has the project received a permit from the local air district?<br>▲ Would it comply with applicable local air district requirements?<br>▲ Is the local air district contemplating new regulations that would reduce emissions from the source over time?<br>▲ Will potential emissions from the project | See Appendix C for a description of local air district programs. |

| Project-Related Questions | Cross-Reference to Relevant Handbook Sections |
|---|---|
| trigger the local air district's new source review for criteria pollutants or air toxics emissions?<br>▲ Is the local air district expected to ask the proposed project to perform a risk assessment?<br>▲ Is there sufficient new information or public concern to call for a more thorough environmental analysis of the proposed project?<br>▲ Are there plans to expand operations over time?<br>▲ Are there land-use based air quality significance thresholds or design standards that could be applied to this project in addition to applicable air district requirements? | |
| 6. If the proposed project will release air pollution emissions, either directly or indirectly, but is not regulated by the local air district:<br>▲ Is the local air district informed of the project?<br>▲ Does the local air district believe that there could be potential air pollution impacts associated with this project category because of the proximity of the project to sensitive individuals?<br>▲ If the project is one in which individuals live or play (e.g., a home, playground, convalescent home, etc.), does the local air district believe that the project's proximity to nearby sources could pose potential air pollution impacts?<br>▲ Are there indirect emissions that could be associated with the project (e.g., truck traffic or idling, transport refrigeration unit operations, stationary diesel engine operations, etc.) that will be in close proximity to sensitive individuals?<br>▲ Will the proposed project increase or serve as a magnet for diesel traffic?<br>▲ Are there land-use based air quality significance thresholds or design standards that could be applied to this project in addition to applicable air district requirements?<br>▲ Is there sufficient new information or public concern to call for a more thorough environmental analysis of the proposed project?<br>▲ Should the site approval process include identification and mitigation of potential | See Section 1 for recommendations on situations to avoid when siting projects where sensitive individuals would be located (sensitive sites). |

| Project-Related Questions | Cross-Reference to Relevant Handbook Sections |
|---|---|
| direct or indirect emissions associated with the potential project? | |
| 7. Does the local air district or land use agency have pertinent information on the source, such as:<br>▲ Available permit and enforcement data, including for the owner or operator of the proposed source that may have other sources in the State.<br>▲ Proximity of the proposed project to sensitive individuals.<br>▲ Number of potentially exposed individuals from the proposed project.<br>▲ Potential for the proposed project to expose sensitive individuals to odor or other air pollution nuisances.<br>▲ Meteorology or the prevailing wind patterns between the proposed project and the nearest receptor, or between the proposed sensitive receptor project and sources that could pose a localized or cumulative air pollution impact. | See Appendix C for a description of local air district programs.<br>See Appendix B for a listing of useful information that land use agencies should have on hand or have accessible when reviewing proposed projects for potential air pollution impacts.<br>Also, do not hesitate to contact your local air district regarding answers to any of these questions that might not be available at the land use agency.<br>See Section 1 for recommendations on situations to avoid when siting projects where sensitive individuals would be located (sensitive sites). |
| 8. Based upon the project application, its location, and the nature of the source, could the proposed project:<br>▲ Be a polluting source that is located in proximity to, or otherwise upwind, of a location where sensitive individuals live or play?<br>▲ Attract sensitive individuals and be located in proximity to or otherwise downwind, of a source or multiple sources of pollution, including polluting facilities or transportation-related sources that contribute emissions either directly or indirectly?<br>▲ Result in health risk to the surrounding community? | See Section 3 for a discussion of what is an incompatible land use and the potential cumulative air pollution impacts.<br>See Section 1 for recommendations on situations to avoid when siting projects where sensitive individuals would be located (sensitive sites). |
| 9. If a CEQA categorical exemption is proposed, were the following questions considered:<br>▲ Is the project site environmentally sensitive as defined by the project's location? (A project that is ordinarily insignificant in its impact on the environment may in a particularly sensitive environment be significant.)<br>▲ Would the project and successive future projects of the same type in the approximate location potentially result in cumulative impacts?<br>▲ Are there "unusual circumstances" creating the possibility of significant effects? | See CEQA Guidelines section 15300, and Public Resources Code, section 21084.<br>See Section 1 for recommendations on situations to avoid when siting projects where sensitive individuals would be located (sensitive sites).<br>See also Section 5 and Appendix C for a description of air quality-related tools that the ARB and local air districts use to provide information on potential air pollution impacts. |

- **Questions Related to Cumulative Impact Assessment**

The following questions can be used to provide the decision-maker with a better understanding of the potential for cumulative air pollution impacts to an affected community. Answers to these questions will help to determine if new projects or activities warrant a more detailed review. It may also help to see potential environmental concerns from the perspective of the affected community. Additionally, responses can provide local decision-makers with information with which to assess the best policy options for addressing neighborhood-scale air pollution concerns.

The questions below can be used to identify whether existing tools and procedures are adequate to address land use-related air pollution issues. This process can also be used to pinpoint project characteristics that may have the greatest impact on community-level emissions, exposure, and risk. Such elements can include: the compliance record of existing sources including those owned or operated by the project proponent; the concentration of emissions from polluting sources within the approximate area of sensitive sites; transportation circulation in proximity to the proposed project; compatibility with the General Plan and General Plan elements; etc.

The local air district can provide useful assistance in the collection and evaluation of air quality-related information for some of the questions and should be consulted early in the process.

**Questions Related to Cumulative Impact Assessment**

| Technical Questions | Cross-Reference to Relevant Handbook Sections |
|---|---|
| 1. Is the community home to industrial facilities? | See Appendix A for typical land use classifications and associated project categories that could emit air pollutants. |
| 2. Do one or more major freeways or high-traffic volume surface streets cut through the community? | See transportation circulation element of your general plan. See also Appendix B for useful information that land use agencies should have on hand or have accessible when reviewing proposed projects for potential air pollution impacts.<br>See Section 1 for recommendations on situations to avoid when siting projects where sensitive individuals would be located (sensitive sites). |
| 3. Is the area classified for mixed-use zoning? | See your general plan and zoning ordinances. |
| 4. Is there an available list of air pollution sources in the community? | Contact your local air district. |
| 5. Has a walk-through of the community been conducted to gather the following information: | See Appendix B for a listing of useful information that land use agencies |

| Technical Questions | Cross-Reference to Relevant Handbook Sections |
|---|---|
| ▲ Corroborate available information on land use activities in the area (e.g., businesses, housing developments, sensitive individuals, etc.)?<br>▲ Determine the proximity of existing and anticipated future projects to residential areas or sensitive individuals?<br>▲ Determine the concentration of emission sources (including anticipated future projects) to residential areas or sensitive individuals? | should have on hand or have accessible when reviewing proposed projects for potential air pollution impacts. Also contact your local air district. |
| 6. Has the local air district been contacted to obtain information on sources in the community? | See Section 7 for a discussion of public participation, information and outreach tools. |
| 7. What categories of commercial establishments are currently located in the area and does the local air district have these sources on file as being regulated or permitted? | See Appendix A for typical land use classifications and associated project categories that could emit air pollutants. Also contact your local air district. |
| 8. What categories of indirect sources such as distribution centers or warehouses are currently located in the area? | See Appendix A for typical land use classifications and associated project categories that emit air pollutants. |
| 9. What air quality monitoring data are available? | Contact your local air district. |
| 10. Have any risk assessments been performed on emission sources in the area? | Contact your local air district. |
| 11. Does the land use agency have the capability of applying a GIS spatial mapping tool that can overlay zoning, sub-development information, and other neighborhood characteristics, with air pollution and transportation data? | See Appendix B for a listing of useful information that land use agencies should have on hand or have accessible when reviewing proposed projects for potential air pollution impacts. Also contact your local air district for tools that can be used to supplement available land use agency tools. |
| 12. Based on available information, is it possible to determine if the affected community or neighborhood experiences elevated health risk due to a concentration of air pollution sources in close proximity, and if not, can the necessary information be obtained? | Contact your local air district. Also see Section 1 for recommendations on situations to avoid when siting projects where sensitive individuals would be located (sensitive sites). |
| 13. Does the community have a history of chronic complaints about air quality? | See Section 7 for a discussion of public participation, information and outreach tools. Also contact your local air district. |
| 14. Is the affected community included in the public participation process for the agency's decision? | See Section 7 for a discussion of public participation, information and outreach tools. |
| 15. Have community leaders or groups been contacted about any pre-existing or chronic community air quality concerns? | See Section 7 for a discussion of public participation, information and outreach tools. Also contact your local air district. |

- **Mitigation Approaches**

In addition to considering the suitability of the project location, opportunities for mitigation of air pollution impacts should be considered. Sometimes, a land use agency may find that selection of a different project location to avoid a health risk is not feasible. When that happens, land use agencies should consider design improvements or other strategies that would reduce the risk. Such strategies could include performance or design standards, consultation with local air districts and other agencies on appropriate actions that these agencies should, or plan to, undertake, and consultation and outreach in the affected community. Potential mitigation measures should be feasible, cost-effective solutions within the available resources and authority of implementing agencies to enforce.[12]

- **Conditional Use Permits and Performance Standards**

Some types of land uses are only allowed upon approval of a conditional use permit (also called a CUP or special use permit). A conditional use permit does not re-zone the land but specifies conditions under which a particular land use will be permitted. Such land uses could be those with potentially significant environmental impacts. Local zoning ordinances specify the uses for which a conditional use permit is required, the zones they may be allowed in, and public hearing procedures. The conditional use permit imposes special requirements to ensure that the use will not be detrimental to its surroundings.

In the context of land use planning, performance standards are requirements imposed on projects or project categories through conditional use permits to ensure compliance with general plan policies and local ordinances. These standards could apply to such project categories as distribution centers, very large gas dispensing facilities, autobody shops, dry cleaners, and metal platers. Land use agencies may wish to consider adding land use-based performance standards to zoning ordinances in existing mixed-use communities for certain air pollution project categories. Such standards would provide certainty and equitable treatment to all projects of a similar nature, and reserve the more resource intensive conditional or special use permits to projects that require a more detailed analysis. In developing project design or performance standards, land use agencies should consult with the local air district. Early and regular consultation can avoid duplication or inconsistency with local air district control requirements when considering the site-specific design and operation of a project.

[12] A land use agency has the authority to condition or deny a project based upon information collected and evaluated through the land use decision-making process. However, any denial would need to be based upon identifiable, generally applicable, articulated standards set forth in the local government's General Plan and zoning codes. One way of averting this is to conduct early and regular outreach to the community and the local air district so that community and environmental concerns can be addressed and accommodated into the project proposal.

Examples of land use-based air quality-specific performance standards include the following:

- Placing a process vent away from the direction of the local playground that is nearby or increasing the stack height so that emissions are dispersed to reduce the emissions impact on surrounding homes or schools.
- Setbacks between the project fence line and the population center.
- Limiting the hours of operation of a facility to avoid excess emissions exposure or foul odors to nearby individuals.
- An ordinance that requires fleet operators to use cleaner vehicles before project approval (if a new business), or when expanding the fleet (if an existing business); and
- Providing alternate routes for truck operations that discourage detours into residential neighborhoods.

**Outreach to Other Agencies**

When questions arise regarding the air quality impacts of projects, including potential cumulative impacts, land use agencies should consult the local air district. Land use agencies should also consider the following suggestions to avoid creating new incompatible land uses:

- Consult with the local air district to help determine if emissions from a particular project will adversely impact sensitive individuals in the area, if existing or future effective regulations or permit requirements will affect the proposed project or other sources in the vicinity of the proposed project, or if additional inspections should be required.
- Check with ARB for new information and modeling tools that can help evaluate projects seeking to site within your jurisdiction.
- Become familiar with ARB's Land Use-Air Quality Linkage Report to determine whether approaches and evaluation tools contained in the Report can be used to reduce transportation-related impacts on communities.
- Contact and collaborate with other state agencies that play a role in the land use decision-making process, e.g., the State Department of Education, the California Energy Commission, and Caltrans. These agencies have information on mitigation measures and mapping tools that could be useful in addressing local problems.

- **Information Clearinghouse**

  - Land use agencies can refer to the ARB statewide electronic information clearinghouse for information on what measures other jurisdictions are using to address comparable issues or sources.[13]

[13] This information can be accessed from ARB's website by going to: http://www.arb.ca.gov/ch/clearinghouse.htm

The next section addresses available air quality assessment tools that land use agencies can use to evaluate the potential for localized or cumulative impacts in their communities.

## 5. Available Tools to Evaluate Cumulative Air Pollution Emissions and Risk

Until recently, California has traditionally approached air pollution control from the perspective of assessing whether the pollution was regional, category-specific, or from new or existing sources. This methodology has been generally effective in reducing statewide and regional air pollution impacts and risk levels. However, such an incremental, category-by-category, source-by-source approach may not always address community health impacts from multiple sources - including mobile, industrial, and commercial facilities.

As a result of air toxics and children's health concerns over the past several years, ARB and local air districts have begun to develop new tools to evaluate and inform the public about cumulative air pollution impacts at the community level. One aspect of ARB's programs now underway is to consolidate and make accessible air toxics emissions and monitoring data by region, using modeling tools and other analytical techniques to take a preliminary look at emissions, exposure, and health risk in communities.

ARB has developed multiple tools to assist local air districts perform assessments of cumulative emissions, exposure, and risk on a neighborhood scale. These tools include:

- Regional risk maps that show trends in potential cancer risk from toxic air pollutants in southern and central California between 1990 and 2010. These maps are based on the U.S. EPA's ASPEN model. These maps provide an estimate of background levels of toxic air pollutant risk but are not detailed enough to assess individual neighborhoods or facilities.[14]

- The Community Health Air Pollution Information System (CHAPIS) is a user-friendly, Internet-based system for displaying information on emissions from sources of air pollution in an easy to use mapping format. CHAPIS contains information on air pollution emissions from selected large facilities and small businesses that emit criteria and toxic air pollutants. It also contains information on air pollution emissions from motor vehicles. When released in 2004, CHAPIS did not contain information on every source of air pollution or every air pollutant. However, ARB continues to work with local air districts to include all of the largest air pollution sources and those with the highest documented air pollution risk. Additional facilities will be added to CHAPIS as more data become available.[15]

[14] For further information on these maps, please visit ARB's website at: http://www.arb.ca.gov/toxics/cti/hlthrisk/hlthrisk.htm

[15] For further information on CHAPIS, please click on: http://www.arb.ca.gov/ch/chapis1/chapis1.htm

- The Hot Spots Analysis and Reporting Program (HARP) is a software database package that evaluates emissions from one or more facilities to determine the overall health risk posed by the facility(-ies) on the surrounding community. Proper use of HARP ensures that the risk assessment meets the latest risk assessment guidelines published by the State Office of Environmental Health Hazard Assessment (OEHHA). HARP is designed with air quality professionals in mind and is available from the ARB.

- The Urban Emissions Model (URBEMIS) is a computer program that can be used to estimate emissions associated with land development projects in California such as residential neighborhoods, shopping centers, office buildings, and construction projects. URBEMIS uses emission factors available from the ARB to estimate vehicle emissions associated with new land uses.

Local air districts, and others can use these tools to assess a new project, or plan revision. For example, these tools can be used to:

- Identify if there are multiple sources of air pollution in the community;
- Identify the major sources of air pollution in the area under consideration;
- Identify the background potential cancer risk from toxic air pollution in the area under consideration;
- Estimate the risk from a new facility and how it adds to the overall risk from other nearby facilities; and
- Provide information to decision-makers and key stakeholders on whether there may be significant issues related to cumulative emissions, exposure, and health risk due to a permitting or land use decision.

If an air agency wishes to perform a cumulative air pollution impact analysis using any of these tools, it should consult with the ARB and/or the local air district to obtain information or assistance on the data inputs and procedures necessary to operate the program. In addition, land use agencies could consult with local air districts to determine the availability of land use and air pollution data for entry into an electronic Geographical Information System (GIS) format. GIS is an easier mapping tool than the more sophisticated models described in Appendix C. GIS mapping makes it possible to superimpose land use with air pollution information so that the spatial relationship between air pollution sources, sensitive receptors, and air quality can be visually represented. Appendix C provides a general description of the impact assessment process and micro-scale, or community level modeling tools that are available to evaluate potential cumulative air pollution impacts. Modeling protocols will be accessible on ARB's website as they become available. The ARB will also provide land use agencies and local air districts with statewide regional modeling results and information regarding micro-scale modeling.

## 6. ARB Programs to Reduce Air Pollution in Communities

ARB's regulatory programs reduce air pollutant emissions through statewide strategies that improve public health in all California communities. ARB's overall program addresses motor vehicles, consumer products, air toxics, air-quality planning, research, education, enforcement, and air monitoring. Community health and environmental justice concerns are a consideration in all these programs. ARB's programs are statewide but recognize that extra efforts may be needed in some communities due to historical mixed land-use patterns, limited participation in public processes in the past, and a greater concentration of air pollution sources in some communities.

ARB's strategies are intended to result in better air quality and reduced health risk to residents throughout California. The ARB's priority is to prevent or reduce the public's exposure to air pollution, including from toxic air contaminants that pose the greatest risk, particularly to infants and children who are more vulnerable to air pollution.

In October 2003, ARB updated its statewide control strategy to reduce emissions from source categories within its regulatory authority. A primary focus of the strategy is to achieve federal and state air quality standards for ozone and particulate matter throughout California, and to reduce health risk from diesel PM. Along with local air districts, ARB will continue to address air toxics emissions from regulated sources (see Table 6-1 for a summary of ARB activities). As indicated earlier, ARB will also provide analytical tools and information to land use agencies and local air districts to help assess and mitigate cumulative air pollution impacts.

The ARB will continue to consider the adoption of or revisions to needed air toxics control measures as part of the state's ongoing air toxics assessment program.[16]

As part of its effort to reduce particulate matter and air toxics emissions from diesel PM, the ARB has developed a Diesel Risk Reduction Program[17] that lays out several strategies in a three-pronged approach to reduce emissions and their associated risk:

- Stringent emission standards for all new diesel-fueled engines;
- Aggressive reductions from in-use engines; and
- Low sulfur fuel that will reduce PM and still provide the quality of diesel fuel needed to control diesel PM.

[16] For continuing information and updates on state measures, the reader can refer to ARB's website at http://www.arb.ca.gov/toxics/toxics.htm.
[17] For a comprehensive description of the program, please refer to ARB's website at http://www.arbB.ca.gov/diesel/dieselrrp.htm.

**Table 6-1**
**ARB ACTIONS TO ADDRESS**
**CUMULATIVE AIR POLLUTION IMPACTS IN COMMUNITIES**

**Information Collection**

- Improve emission inventories, air monitoring data, and analysis tools that can help to identify areas with high cumulative air pollution impacts
- Conduct studies in coordination with OEHHA on the potential for cancer and non-cancer health effects from air pollutants emitted by specific source categories
- Establish web-based clearinghouse for local land use strategies

**Emission Reduction Approaches (2004-2006)***

- Through a public process, consider development and/or amendment of regulations and related guidance to reduce emissions, exposure, and health risk at a statewide and local level for the following sources:
  - Diesel PM sources such as stationary diesel engines, transport refrigeration units, portable diesel engines, on-road public fleets, off-road public fleets, heavy-duty diesel truck idling, harbor craft vessels, waste haulers
  - Other air toxics sources, such as formaldehyde in composite wood products, hexavalent chromium for chrome plating and chromic acid anodizing, thermal spraying, and perchloroethylene dry cleaning
- Develop technical information for the following:*
  - Distribution centers
  - Modeling tools such as HARP and CHAPIS
- Adopt rules and pollution prevention initiatives within legal authority to reduce emissions from mobile sources and fuels, and consumer products
- Develop and maintain Air Quality Handbook as a tool for use by land use agencies and local air districts to address cumulative air pollution impacts

**Other Approaches**

- Establish guidelines for use of statewide incentive funding for high priority mobile source emission reduction projects

*Because ARB will continue to review the need to adopt or revise statewide measures, the information contained in this chart will be updated on an ongoing basis.

A number of ARB's diesel risk reduction strategies have been adopted. These include measures to reduce emissions from refuse haulers, urban buses, transport refrigeration units, stationary and portable diesel engines, and idling trucks and school buses. These sources are all important from a community perspective.[18]

[18] The reader can refer to ARB's website for information on its mobile source-related programs at: http://www.arb.ca.gov/msprog/msprog.htm, as well as regulations adopted and under consideration as part of the Diesel Risk Reduction Program at: http://www.arb.ca.gov/diesel/dieselrrp.htm

The ARB will continue to evaluate the health effects of air pollutants while implementing programs with local air districts to reduce air pollution in all California communities.

Local air districts also have ambitious programs to reduce criteria pollutants and air toxics from regulated sources in their region. Many of these programs also benefit air quality in local communities as well as in the broader region. For more information on what is being done in your area to reduce cumulative air pollution impacts through air pollution control programs, you should contact your local air district.[19]

[19] Local air district contacts can be found on the inside cover to this Handbook.

## 7. Ways to Enhance Meaningful Public Participation

Community involvement is an important part of the land use process. The public is entitled to the best possible information about the air they breathe and what is being done to prevent or reduce unhealthful air pollution in their communities. In particular, information on how land use decisions can affect air pollution and public health should be made accessible to all communities, including low-income and minority communities.

Effective community participation consistently relies on a two-way flow of information – from public agencies to community members about opportunities, constraints, and impacts, and from community members back to public officials about needs, priorities, and preferences. The outreach process needed to build understanding and local neighborhood involvement requires data, methodologies, and formats tailored to the needs of the specific community. More importantly, it requires the strong collaboration of local government agencies that review and approve projects and land uses to improve the physical and environmental surroundings of the local community.

Many land use agencies, especially those in major metropolitan areas, are familiar with, and have a long-established public review process. Nevertheless, public outreach can often be improved. Active public involvement requires engaging the public in ways that do not require their previous interest in or knowledge of the land use or air pollution control requirements, and a commitment to taking action where appropriate to address the concerns that are raised.

- **Direct Community Outreach**

In conjunction with local air districts, land use agencies should consider designing an outreach program for community groups, other stakeholders, and local government agency staffs that address the problem of cumulative air pollution impacts, and the public and government role in reducing them. Such a program could consider analytical tools that assist in the preparation and presentation of information in a way that supports sensible decision-making and public involvement. Table 7-1 contains some general outreach approaches that might be considered.

**Table 7-1**
**Public Participation Approaches**

- Staff and community leadership awareness training on environmental justice programs and community-based issues
- Surveys to identify the website information needs of interested community-based organizations and other stakeholders
- Information materials on local land use and air district authorities
- Community-based councils to facilitate and invite resident participation in the planning process
- Neighborhood CEQA scoping sessions that allows for community input prior to technical analysis
- Public information materials on siting issues are under review including materials written for the affected community, and in different media that widens accessibility
- Public meetings
- Identify other opportunities to include community-based organizations in the process

To improve outreach, local land use agencies should consider the following activities:

- Hold meetings in communities affected by agency programs, policies, and projects at times and in places that encourage public participation, such as evenings and weekends at centrally located community meeting rooms, libraries, and schools.
- Assess the need for and provide translation services at public meetings.
- Hold community meetings to update residents on the results of any special air monitoring programs conducted in their neighborhood.
- Hold community meetings to discuss and evaluate the various options to address cumulative impacts in their community.
- In coordination with local air districts, make staff available to attend meetings of community organizations and neighborhood groups to listen to and, where appropriate, act upon community concerns.
- Establish a specific contact person for environmental justice issues.
- Increase student and community awareness of local government land use activities and policies through outreach opportunities.
- Make air quality and land use information available to communities in an easily understood and useful format, including fact sheets, mailings, brochures, public service announcements, and web pages, in English and other languages.
- On the local government web-site, dedicate a page or section to what the land use program is doing regarding environmental justice and cumulative environmental impacts, and, as applicable, activities conducted with local air districts such as neighborhood air monitoring studies, pollution prevention, air pollution sources in neighborhoods, and risk reduction.

- Allow, encourage, and promote community access to land use activities, including public meetings, General Plan or Community Plan updates, zoning changes, special studies, CEQA reviews, variances, etc.
- Distribute information in multiple languages, as needed, on how to contact the land use agency or local air district to obtain information and assistance regarding environmental justice programs, including how to participate in public processes.
- Create and distribute a simple, easy-to-read, and understandable public participation handbook, which may be based on the "Public Participation Guidebook" developed by ARB.

- **Other Opportunities for Meaningful Public Outreach**

  - Community-Based Planning Committees

  Neighborhood-based or community planning advisory councils could be established to invite and facilitate direct resident participation into the planning process. With the right training and technical assistance, such councils can provide valuable input and a forum for the review of proposed amendments to plans, zone changes, land use permits, and suggestions as to how best to prevent or reduce cumulative air pollution impacts in their community.

  - Regional Partnerships

  Consider creating regional coalitions of key growth-related organizations from both the private and public sectors, with corporations, communities, other jurisdictions, and government agencies. Such partnerships could facilitate agreement on common goals and win-win solutions tailored specifically for the region. With this kind of dialogue, shared vision, and collaboration, barriers can be overcome and locally acceptable sustainable solutions implemented. Over the long term, such strategies will help to bring about clean air in communities as well as regionally.

# LAND USE CLASSIFICATIONS AND ASSOCIATED FACILITY CATEGORIES THAT COULD EMIT AIR POLLUTANTS

| (1) Land Use Classifications – by Activity[i] | (2) Facility or Project Examples | (3) Key Pollutants[ii,iii] | (4) Air Pollution Permits[iv] |
|---|---|---|---|
| **COMMERCIAL/ LIGHT INDUSTRIAL: SHOPPING, BUSINESS, AND COMMERCIAL** | | | |
| ▲ Primarily retail shops and stores, office, commercial activities, and light industrial or small business | Dry cleaners; drive-through restaurants; gas dispensing facilities; auto body shops; metal plating shops; photographic processing shops; textiles; apparel and furniture upholstery; leather and leather products; appliance repair shops; mechanical assembly cleaning; printing shops | VOCs, air toxics, including diesel PM, NOx, CO, SOx | Limited; Rules for applicable equipment |
| ▲ Goods storage or handling activities, characterized by loading and unloading goods at warehouses, large storage structures, movement of goods, shipping, and trucking. | Warehousing; freight-forwarding centers; drop-off and loading areas; distribution centers | VOCs, air toxics, including diesel PM, NOx, CO, SOx | No[v] |
| **LIGHT INDUSTRIAL: RESEARCH AND DEVELOPMENT** | | | |
| ▲ Medical waste at research hospitals and labs | Incineration; surgical and medical instrument manufacturers, pharmaceutical manufacturing, biotech research facilities | Air toxics, NOx, CO, SOx | Yes |
| ▲ Electronics, electrical apparatus, components, and accessories | Computer manufacturer; integrated circuit board manufacturer; semi-conductor production | Air toxics, VOCs | Yes |
| ▲ College or university lab or research center | Medical waste incinerators; lab chemicals handling, storage and disposal | Air toxics, NOx, CO, SOx, PM10 | Yes |
| ▲ Research and development labs | Satellite manufacturer; fiber-optics manufacturer; defense contractors; space research and technology; new vehicle and fuel testing labs | Air toxics, VOCs | Yes |
| ▲ Commercial testing labs | Consumer products; chemical handling, storage and disposal | Air toxics, VOCs | Yes |

| (1) Land Use Classifications – by Activity[i] | (2) Facility or Project Examples | (3) Key Pollutants[ii,iii] | (4) Air Pollution Permits[iv] |
|---|---|---|---|
| **INDUSTRIAL: NON-ENERGY-RELATED** | | | |
| ▲ Assembly plants, manufacturing facilities, industrial machinery | Adhesives; chemical; textiles; apparel and furniture upholstery; clay, glass, and stone products production; asphalt materials; cement manufacturers, wood products; paperboard containers and boxes; metal plating; metal and canned food product fabrication; auto manufacturing; food processing; printing and publishing; drug, vitamins, and pharmaceuticals; dyes; paints; pesticides; photographic chemicals; polish and wax; consumer products; metal and mineral smelters and foundries; fiberboard; floor tile and cover; wood and metal furniture and fixtures; leather and leather products; general industrial and metalworking machinery; musical instruments; office supplies; rubber products and plastics production; saw mills; solvent recycling; shingle and siding; surface coatings | VOCs, air toxics, including diesel PM, NOx, PM, CO, SOx | Yes |
| **INDUSTRIAL: ENERGY AND UTILITIES** | | | |
| ▲ Water and sewer operations | Pumping stations; air vents; treatment | VOCs, air toxics, NOx, CO, SOx, PM10 | Yes |
| ▲ Power generation and distribution | Power plant boilers and heaters; portable diesel engines; gas turbine engines | NOx, diesel PM, NOx, CO, SOx, PM10, VOCs | Yes |
| ▲ Refinery operations | Refinery boilers and heaters; coke cracking units; valves and flanges; flares | VOCs, air toxics, including diesel PM, NOx, CO, SOx, PM10 | Yes |
| ▲ Oil and gas extraction | Oil recovery systems; uncovered wells | NOx, diesel PM, VOCs, CO, SOx, PM10 | Yes |
| ▲ Gasoline storage, transmission, and marketing | Above and below ground storage tanks; floating roof tanks; tank farms; pipelines | VOCs, air toxics, including diesel PM, NOx, CO, SOx, PM10 | Yes |
| ▲ Solid and hazardous waste treatment, storage, and disposal activities. | Landfills; methane digester systems; process recycling facility for concrete and asphalt materials | VOCs, air toxics, NOx, CO, SOx, PM10 | Yes |
| **CONSTRUCTION (NON-TRANSPORTATION)** | | | |
| | Building construction; demolition sites | PM (re-entrained road dust), asbestos, diesel PM, NOx, CO, SOx, PM10, VOCs | Limited; state and federal off-road equipment standards |

| (1) Land Use Classifications – by Activity[i] | (2) Facility or Project Examples | (3) Key Pollutants[ii,iii] | (4) Air Pollution Permits[iv] |
|---|---|---|---|
| **DEFENSE** | | | |
| | Ordnance and explosives demolition; range and testing activities; chemical production; degreasing; surface coatings; vehicle refueling; vehicle and engine operations and maintenance | VOCs, air toxics, including diesel PM, NOx, CO, SOx, PM10 | Limited; prescribed burning; equipment and solvent rules |
| **TRANSPORTATION** | | | |
| ▲ Vehicular movement | Residential area circulation systems; parking and idling at parking structures; drive-through establishments; car washes; special events; schools; shopping malls, etc. | VOCs, NOx, PM (re-entrained road dust) air toxics e.g., benzene, diesel PM, formaldehyde, acetaldehyde, 1,3 butadiene, CO, SOx, PM10 | No |
| ▲ Road construction and surfacing | Street paving and repair; new highway construction and expansion | VOCs, air toxics, including diesel PM, NOx, CO, SOx, PM10 | No |
| ▲ Trains | Railroads; switch yards; maintenance yards | VOCs, NOx, CO, SOx, PM10, air toxics, including diesel PM | Limited; Applicable state and federal MV standards, and possible equipment rules |
| ▲ Marine and port activities | Recreational sailing; commercial marine operations; hotelling operations; loading and un-loading; servicing; shipping operations; port or marina expansion; truck idling | | |
| ▲ Aircraft | Takeoff, landing, and taxiing; aircraft maintenance; ground support activities | | |
| ▲ Mass transit and school buses | Bus repair and maintenance | | |
| **NATURAL RESOURCES** | | | |
| ▲ Farming operations | Agricultural burning; diesel operated engines and heaters; small food processors; pesticide application; agricultural off-road equipment | Diesel PM, VOCs, NOx, PM10, CO, SOx, pesticides | Limited[vi]; Agricultural burning requirements, applicable state and federal mobile source standards; pesticide rules |
| ▲ Livestock and dairy operations | Dairies and feed lots | Ammonia, VOCs, PM10 | Yes[vii] |
| ▲ Logging | Off-road equipment e.g., diesel fueled chippers, brush hackers, etc. | Diesel PM, NOx, CO, SOx, PM10, VOCs | Limited; Applicable state/federal mobile source standards |
| ▲ Mining operations | Quarrying or stone cutting; mining; drilling or dredging | PM10, CO, SOx, VOCs, NOx, and asbestos in some geographical areas | Applicable equipment rules and dust controls |

| (1) Land Use Classifications – by Activity[i] | (2) Facility or Project Examples | (3) Key Pollutants[ii,iii] | (4) Air Pollution Permits[iv] |
|---|---|---|---|
| **RESIDENTIAL** | | | |
| Housing | Housing developments; retirement developments; affordable housing | Fireplace emissions (PM10, NOx, VOCs, CO, air toxics);<br>Water heater combustion (NOx, VOCs, CO) | No[vii] |
| **ACADEMIC AND INSTITUTIONAL** | | | |
| ▲ Schools, including school-related recreational activities | Schools; school yards; vocational training labs/classrooms such as auto repair/painting and aviation mechanics | Air toxics | Yes/No[viii] |
| ▲ Medical waste | Incineration | Air toxics, NOx, CO, PM10 | Yes |
| ▲ Clinics, hospitals, convalescent homes | | Air toxics | Yes |

[i] These classifications were adapted from the American Planning Association's "Land Based Classification Standards." The Standards provide a consistent model for classifying land uses based on their characteristics. The model classifies land uses by refining traditional categories into multiple dimensions, such as activities, functions, building types, site development character, and ownership constraints. Each dimension has its own set of categories and subcategories. These multiple dimensions allow users to have precise control over land-use classifications. For more information, the reader should refer to the Association's website at http://www.planning.org/LBCS/GeneralInfo/.

[ii] This column includes key criteria pollutants and air toxic contaminants that are most typically associated with the identified source categories.

Additional information on specific air toxics that are attributed to facility categories can be found in ARB's Emission Inventory Criteria and Guidelines Report for the Air Toxics Hot Spots Program (May 15, 1997). This information can be viewed at ARB's web site at http://www.arb.ca.gov/ab2588/final96/guide96.pdf.

Criteria air pollutants are those air pollutants for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Criteria pollutants include ozone (formed by the reaction of volatile organic compounds and nitrogen oxides in the presence of sunlight), particulate matter, nitrogen dioxide, sulfur dioxide, carbon monoxide, and lead.

Volatile organic compounds (VOCs) combine with nitrogen oxides to form ozone, as well as particulate matter. VOC emissions result primarily from incomplete fuel combustion and the evaporation of chemical solvents and fuels. On-road mobile sources are the largest contributors to statewide VOC emissions. Stationary sources of VOC emissions include processes that use solvents (such as dry-cleaning, degreasing, and coating operations) and petroleum-related processes (such as petroleum refining, gasoline marketing and dispensing, and oil and gas extraction). Areawide VOC sources include consumer products, pesticides, aerosols and paints, asphalt paving and roofing, and other evaporative emissions.

Nitrogen oxides (NOx) are a group of gaseous compounds of nitrogen and oxygen, many of which contribute to the formation of ozone and particulate matter. Most NOx emissions are produced by the combustion of fuels. Mobile sources make up about 80 percent of the total statewide NOx emissions. Mobile sources include on-road vehicles and trucks, aircraft, trains, ships, recreational boats, industrial and construction equipment, farm

equipment, off-road recreational vehicles, and other equipment. Stationary sources of NOx include both internal and external combustion processes in industries such as manufacturing, food processing, electric utilities, and petroleum refining. Areawide source, which include residential fuel combustion, waste burning, and fires, contribute only a small portion of the total statewide NOx emissions, but depending on the community, may contribute to a cumulative air pollution impact.

Particulate matter (PM) refers to particles small enough to be breathed into the lungs (under 10 microns in size). It is not a single substance, but a mixture of a number of highly diverse types of particles and liquid droplets. It can be formed directly, primarily as dust from vehicle travel on paved and unpaved roads, agricultural operations, construction and demolition.

Carbon monoxide (CO) is a colorless and odorless gas that is directly emitted as a by-product of combustion. The highest concentrations are generally associated with cold stagnant weather conditions that occur during winter. CO problems tend to be localized.

An Air Toxic Contaminant (air toxic) is defined as an air pollutant that may cause or contribute to an increase in mortality or in serous illness, or which may pose a present or potential hazard to human health. Similar to criteria pollutants, air toxics are emitted from stationary, areawide, and mobile sources. They contribute to elevated regional and localized risks near industrial and commercial facilities and busy roadways. The ten compounds that pose the greatest statewide risk are: acetaldehyde; benzene; 1,3-butadiene; carbon tetrachloride; diesel particulate matter (diesel PM); formaldehyde; hexavalent chromium; methylene chloride; para-dichlorobenzene; and perchloroethylene. The risk from diesel PM is by far the largest, representing about 70 percent of the known statewide cancer risk from outdoor air toxics. The exhaust from diesel-fueled engines is a complex mixture of gases, vapors, and particles, many of which are known human carcinogens. Diesel PM is emitted from both mobile and stationary sources. In California, on-road diesel-fueled vehicles contribute about 26 percent of statewide diesel PM emissions, with an additional 72 percent attributed to other mobile sources such as construction and mining equipment, agricultural equipment, and other equipment. Stationary engines in shipyards, warehouses, heavy equipment repair yards, and oil and gas production operations contribute about two percent of statewide emissions. However, when this number is disaggregated to a sub-regional scale such as neighborhoods, the risk factor can be far greater.

[iii] The level of pollution emitted is a major determinant of the significance of the impact.

[iv] Indicates whether facility activities listed in column 4 are generally subject to local air district permits to operate. This does not include regulated products such as solvents and degreasers that may be used by sources that may not require an operating permit per se, e.g., a gas station or dry cleaner.

[v] Generally speaking, warehousing or distribution centers are not subject to local air district permits. However, depending on the district, motor vehicle fleet rules may apply to trucks or off-road vehicles operated and maintained by the facility operator. Additionally, emergency generators or internal combustion engines operated on the site may require an operating permit.

[vi] Authorized by recent legislation SB700.

[vii] Local air districts do not require permits for woodburning fireplaces inside private homes. However, some local air districts and land use agencies do have rules or ordinances that require new housing developments or home re-sales to install U.S. EPA –certified stoves. Some local air districts also ban residential woodburning during weather inversions that concentrate smoke in residential areas. Likewise, home water heaters are not subject to permits; however, new heaters could be subject to emission limits that are imposed by federal or local agency regulations.

[viii] Technical training schools that conduct activities normally permitted by a local air district could be subject to an air permit.

## LAND USE-BASED REFERENCE TOOLS TO EVALUATE NEW PROJECTS FOR POTENTIAL AIR POLLUTION IMPACTS

Land use agencies generally have a variety of tools and approaches at hand, or accessible from local air districts that can be useful in performing an analysis of potential air pollution impacts associated with new projects. These tools and approaches include:

- Base map of the city or county planning area and terrain elevations.
- General Plan designations of land use (existing and proposed).
- Zoning maps.
- Land use maps that identify existing land uses, including the location of facilities that are permitted or otherwise regulated by the local air district. Land use agencies should consult with their local air district for information on regulated facilities.
- Demographic data, e.g., population location and density, distribution of population by income, distribution of population by ethnicity, and distribution of population by age. The use of population data is a normal part of the planning process. However, from an air quality perspective, socioeconomic data is useful to identify potential community health and environmental justice issues.
- Emissions, monitoring, and risk-based maps created by the ARB or local air districts that show air pollution-related health risk by community across the state.
- Location of public facilities that enhance community quality of life, including parks, community centers, and open space.
- Location of industrial and commercial facilities and other land uses that use hazardous materials, or emit air pollutants. These include chemical storage facilities, hazardous waste disposal sites, dry cleaners, large gas dispensing facilities, auto body shops, and metal plating and finishing shops.
- Location of sources or facility types that result in diesel on-road and off-road emissions, e.g., stationary diesel power generators, forklifts, cranes, construction equipment, on-road vehicle idling, and operation of transportation refrigeration units. Distribution centers, marine terminals and ports, rail yards, large industrial facilities, and facilities that handle bulk goods are all examples of complex facilities where these types of emission sources are frequently concentrated.[1] Very large facilities, such as ports, marine terminals, and airports, could be analyzed regardless of proximity to a receptor if they are within the modeling area.
- Location and zoning designations for existing and proposed schools, buildings, or outdoor areas where sensitive individuals may live or play.
- Location and density of existing and proposed residential development.
- Zoning requirements, property setbacks, traffic flow requirements, and idling restrictions for trucks, trains, yard hostlers[2], construction equipment, or school buses.
- Traffic counts (including diesel truck traffic counts), within a community to validate or augment existing regional motor vehicle trip and speed data.

[1] The ARB is currently evaluating the types of facilities that may act as complex point sources and developing methods to identify them.

[2] Yard hostler means a tractor less than 300 horsepower that is used to transfer semi-truck or tractor-trailer containers in and around storage, transfer, or distribution yards or areas and is often equipped with a hydraulic lifting fifth wheel for connection to trailer containers.

## ARB AND LOCAL AIR DISTRICT INFORMATION AND TOOLS CONCERNING CUMULATIVE AIR POLLUTION IMPACTS

It is the ARB's policy to support research and data collection activities toward the goal of reducing cumulative air pollution impacts. These efforts include updating and improving the air toxics emissions inventory, performing special air monitoring studies in specific communities, and conducting a more complete assessment of non-cancer health effects associated with air toxics and criteria pollutants.[1] This information is important because it helps us better understand links between air pollution and the health of sensitive individuals -- children, the elderly, and those with pre-existing serious health problems affected by air quality.

ARB is working with CAPCOA and OEHHA to improve air pollutant data and evaluation tools to determine when and where cumulative air pollution impacts may be a problem. The following provides additional information on this effort.

### How are emissions assessed?

Detailed information about the sources of air pollution in an area is collected and maintained by local air districts and the ARB in what is called an emission inventory. Emission inventories contain information about the nature of the business, the location, type and amount of air pollution emitted, the air pollution-producing processes, the type of air pollution control equipment, operating hours, and seasonal variations in activity. Local districts collect emission inventory data for most stationary source categories.

Local air districts collect air pollution emission information directly from facilities and businesses that are required to obtain an air pollution operating permit. Local air districts use this information to compile an emission inventory for areas within their jurisdiction. The ARB compiles a statewide emission inventory based on the information collected by the ARB and local air districts. Local air districts provide most of the stationary source emission data, and ARB provides mobile source emissions as well as some areawide emission sources such as consumer products and paints. ARB is also developing map-based tools that will display information on air pollution sources.

Criteria pollutant data have been collected since the early 1970's, and toxic pollutant inventories began to be developed in the mid-1980's.

[1] A criteria pollutant is any air pollutant for which EPA has established a National Ambient Air Quality Standard or for which California has established a State Ambient Air Quality Standard, including: carbon monoxide, lead, nitrogen oxides, ozone, particulates and sulfur oxides. Criteria pollutants are measured in each of California's air basins to determine whether the area meets or does not meet specific federal or state air quality standards. Air toxics or air toxic contaminants are listed pollutants recognized by California or EPA as posing a potential risk to health.

## How is the toxic emission inventory developed?

Emissions data for toxic air pollutants is a high priority for communities because of concerns about potential health effects. Most of ARB's air toxics data is collected through the toxic "Hot Spots" program. Local air districts collect emissions data from industrial and commercial facilities. Facilities that exceed health-based thresholds are required to report their air toxics emissions as part of the toxic "Hot Spots" program and update their emissions data every four years. Facilities are required to report their air toxics emissions data if there is an increase that would trigger the reporting threshold of the hotspots program. Air toxics emissions from motor vehicles and consumer products are estimated by the ARB. These estimates are generally regional in nature, reflecting traffic and population.

The ARB also maintains chemical speciation profiles that can be used to estimate toxics emissions when no toxic emissions data is available.

## What additional toxic emissions information is needed?

In order to assess cumulative air pollution impacts, updated information from individual facilities is needed. Even for sources where emissions data are available, additional information such as the location of emissions release points is often needed to better model cumulative impacts. In terms of motor vehicles, emissions data are currently based on traffic models that only contain major roads and freeways. Local traffic data are needed so that traffic emissions can be more accurately assigned to specific streets and roads. Local information is also needed for off-road emission sources, such as ships, trains, and construction equipment. In addition, hourly maximum emissions data are needed for assessing acute air pollution impacts.

## What work is underway?

ARB is working with CAPCOA to improve toxic emissions data, developing a community health air pollution information system to improve access to emission information, conducting neighborhood assessment studies to better understand toxic emission sources, and conducting surveys of sources of toxic pollutants.

## How is air pollution monitored?

While emissions data identify how much air pollution is going into the air, the state's air quality monitoring network measures air pollutant levels in outdoor air. The statewide air monitoring network is primarily designed to measure regional exposure to air pollutants, and consists of more than 250 air monitoring sites.

The air toxics monitoring network consists of approximately 20 permanent sites. These sites are supplemented by special monitoring studies conducted by ARB and local air districts. These sites measure approximately sixty toxic air pollutants. Diesel PM, which is the major driver of urban air toxic risk, is not monitored directly. Ten of the

60 toxic pollutants, not including diesel, account for most of the remaining potential cancer risk in California urban areas.

**What additional monitoring has been done?**

Recently, additional monitoring has been done to look at air quality at the community level. ARB's community monitoring was conducted in six communities located throughout the state. Most sites were in low-income, minority communities located near major sources of air pollution, such as refineries or freeways. The monitoring took place for a year or more in each community, and included measurements of both criteria and toxic pollutants.

**What is being learned from community monitoring?**

In some cases, the ARB or local air districts have performed air quality monitoring or modeling studies covering a particular region of the state. When available, these studies can give information about regional air pollution exposures.

The preliminary results of ARB's community monitoring are providing insights into air pollution at the community level. Urban background levels are a major contributor to the overall risk from air toxics in urban areas, and this urban background tends to mask the differences between communities. When localized elevated air pollutant levels were measured, they were usually associated with local ground-level sources of toxic pollutants. The most common source of this type was busy streets and freeways. The impact these ground-level sources had on local air quality decreased rapidly with distance from the source. Pollutant levels usually returned to urban background levels within a few hundred meters of the source.

These results indicate that tools to assess cumulative impacts must be able to account for both localized, near-source impacts, as well as regional background air pollution. The tools that ARB is developing for this purpose are air quality models.

**How can air quality modeling be used?**

While air monitoring can directly measure cumulative exposure to air pollution, it is limited because all locations cannot be monitored. To address this, air quality modeling provides the capability to estimate exposure when air monitoring is not feasible. Air quality modeling can be refined to assess local exposure, identify locations of potential hot spots, and identify the relative contribution of emission sources to exposure at specific locations. The ARB has used this type of information to develop regional cumulative risk maps that estimate the cumulative cancer air pollution risk for most of California. While these maps only show one air pollution-related health risk, it does provide a useful starting point.

**What is needed for community modeling?**

Air quality models have been developed to assess near-source impacts, but they have very exacting data requirements. These near-source models estimate the impact of local sources, but do not routinely include the contribution from regional air pollution background. To estimate cumulative air pollution exposure at a neighborhood scale, a modeling approach needs to combine features of both micro-scale and regional models.

In addition, improved methods are needed to assess near-source impacts under light and variable wind conditions, when high local concentrations are more likely to occur. A method for modeling long-term exposure to air pollutants near freeways and other high traffic areas is also needed.

**What modeling work has ARB developed?**

A key component of ARB's Community Health Program is the Neighborhood Assessment Program (NAP). As described later in this section, the NAP studies are being conducted to better understand pollution impacts at the community level. Through two such studies conducted in Barrio Logan (San Diego) and Wilmington (Los Angeles), ARB is refining community-level modeling methodologies. Regional air toxics modeling is also being performed to better understand regional air pollution background levels.

In a parallel effort, ARB is developing modeling protocols for estimating cumulative emissions, exposure, and risk from air pollution. The protocols will cover modeling approaches and uncertainties, procedures for running the models, the development of statewide risk maps, and methods for estimating health risks. The protocols are subject to an extensive peer review process prior to release.

**How are air pollution impacts on community health assessed?**

On a statewide basis, ARB's toxic air contaminant program identifies and reduces public exposure to air toxics. The focus of the program has been on reducing potential cancer risk, because monitoring results show potential urban cancer risk levels are too high. ARB has also looked for potential non-cancer risks based on health reference levels provided by OEHHA. On a regional basis, the pollutants measured in ARB's toxic monitoring network are generally below the OEHHA non-cancer reference exposure levels.

As part of its community health program, the ARB is looking at potential cancer and non-cancer risk. This could include chronic or acute health effects. If the assessment work shows elevated exposures on a localized basis, ARB will work with OEHHA to assess the health impacts.

## What tools has ARB developed to assess cumulative air pollution impacts?

ARB has developed the following tools and reports to assist land use agencies and local air districts assess and reduce cumulative emissions, exposure, and risk on a neighborhood scale.

### Statewide Risk Maps

ARB has produced regional risk maps that show the statewide trends for Southern and Central California in estimated potential cancer risk from air toxics between 1990 and 2010.[2] These maps will supplement U.S. EPA's ASPEN model and are available on the ARB's Internet site. These maps are best used to obtain an estimate of the regional background air pollution health risk and are not detailed enough to estimate the exact risk at a specific location.

ARB also has maps that focus in more detail on smaller areas that fall within the Southern and Central California regions for these same modeled years. The finest visual resolution available in the maps on this web site is two by two kilometers. These maps are not detailed enough to assess individual neighborhoods or facilities.

### Community Health Air Pollution Information System (CHAPIS)

CHAPIS is an Internet-based procedure for displaying information on emissions from sources of air pollution in an easy to use mapping format. CHAPIS uses Geographical Information System (GIS) software to deliver interactive maps over the Internet. CHAPIS relies on emission estimates reported to the ARB's emission inventory database - California Emissions Inventory Development and Reporting System, or CEIDARS.

Through CHAPIS, air district staff can quickly and easily identify pollutant sources and emissions within a specified area. CHAPIS contains information on air pollution emissions from selected large facilities and small businesses that emit criteria and toxic air pollutants. It also contains information on air pollution emissions from motor vehicle and areawide emissions. CHAPIS does not contain information on every source of air pollution or every air pollutant. It is a major long-term objective of CHAPIS to include all of the largest air pollution sources and those with the highest documented air pollution risk. CHAPIS will be updated on a periodic basis and additional facilities will be added to CHAPIS as more data becomes available.

CHAPIS is being developed in stages to assure data quality. The initial release of CHAPIS will include facilities emitting 10 or more tons per year of nitrogen oxides, sulfur dioxide, carbon monoxide, PM10, or reactive organic gases; air toxics from refineries and power plants of 50 megawatts or more; and facilities that conducted health risk

[2]ARB maintains state trends and local potential cancer risk maps that show statewide trends in potential inhalable cancer risk from air toxics between 1990 and 2010. This information can be viewed at ARB's web site at http://www.arb.ca.gov/toxics/cti/hlthrisk/hlthrisk.htm)

assessments under the California Air Toxics "Hot Spots" Information and Assessment Program.[3]

CHAPIS can be used to identify the emission contributions from mobile, area, and point sources on that community.

**"Hot Spots" Analysis and Reporting Program (HARP)**

HARP[4] is a software package available from the ARB and is designed with air quality professionals in mind. It models emissions and release data from one or more facilities to estimate the potential health risk posed by the selected facilities on the neighboring community. HARP uses the latest risk assessment guidelines published by OEHHA.

With HARP, a user can perform the following tasks:

- Create and manage facility databases;
- Perform air dispersion modeling;
- Conduct health risk analyses;
- Output data reports; and
- Output results to GIS mapping software.

HARP can model downwind concentrations of air toxics based on the calculated emissions dispersion at a single facility. HARP also has the capability of assessing the risk from multiple facilities, and for multiple locations of concern near those facilities. While HARP has the capability to assess multiple source impacts, there had been limited application of the multiple facility assessment function in the field at the time of HARP's debut in 2003. HARP can also evaluate multi-pathway, non-inhalation health risk resulting from air pollution exposure, including skin and soil exposure, and ingestion of meat and vegetables contaminated with air toxics, and other toxics that have accumulated in a mother's breast milk.

**Neighborhood Assessment Program (NAP)**

The NAP[5] has been a key component of ARB's Community Health Program. It includes the development of tools that can be used to perform assessments of cumulative air pollution impacts on a neighborhood scale. The NAP studies have been done to better understand how air pollution affects individuals at the neighborhood level. Thus far, ARB has conducted neighborhood scale assessments in Barrio Logan and Wilmington.

As part of these studies, ARB is collecting data and developing a modeling protocol that can be used to conduct cumulative air pollution impact assessments. Initially these

[3] California Health & Safety Code section 44300, et seq.
[4] More detailed information can be found on ARB's website at: http://www.arb.ca.gov/toxics/harp/harp.htm
[5] For more information on the Program, please refer to: http://www.arb.ca.gov/ch/programs/nap/nap.htm

assessments will focus on cumulative inhalation cancer health risk and chronic non-cancer impacts. The major challenge is developing modeling methods that can combine both regional and localized air pollution impacts, and identifying the critical data necessary to support these models. The objective is to develop methods and tools from these studies that can ultimately be applied to other areas of the state. In addition, the ARB plans to use these methods to replace the ASPEN regional risk maps currently posted on the ARB Internet site.

**Urban Emissions Model (URBEMIS)**

URBEMIS[6] is a computer program that can be used to estimate emissions associated with land development projects in California such as residential neighborhoods, shopping centers, office buildings, and construction projects. URBEMIS uses emission factors available from the ARB to estimate vehicle emissions associated with new land uses. URBEMIS estimates sulfur dioxide emissions from motor vehicles in addition to reactive organic gases, nitrogen oxides, carbon monoxide, and PM10.

**Land-Use Air Quality Linkage Report[7]**

This report summarizes data currently available on the relationships between land use, transportation and air quality. It also highlights strategies that can help to reduce the use of the private automobile. It also briefly summarizes two ARB-funded research projects. The first project analyzes the travel patterns of residents living in five higher density, mixed use neighborhoods in California, and compares them to travel in more auto-oriented areas. The second study correlates the relationship between travel behavior and community characteristics, such as density, mixed land uses, transit service, and accessibility for pedestrians.

[6] For more information on this model, please refer to ARB's website at http://www.arb.ca.gov/html/soft.htm.
[7] To access this report, please refer to ARB's website or click on: http://www.arb.ca.gov/ch/programs/link97.pdf

# LAND USE AND AIR QUALITY AGENCY ROLES IN THE LAND USE PROCESS

A wide variety of federal, state, and local government agencies are responsible for regulatory, planning, and siting decisions that can have an impact on air pollution. They include local land use agencies, regional councils of government, school districts, local air districts, ARB, the California Department of Transportation (Caltrans), and the Governor's Office of Planning and Research (OPR) to name a few. This Section will focus on the roles and responsibilities of local and state agencies. The role of school districts will be discussed in Appendix E.

## Local Land Use Agencies

Under the State Constitution, land use agencies have the primary authority to plan and control land use.[1] Each of California's incorporated cities and counties are required to adopt a comprehensive, long-term General Plan.[2]

The General Plan's long-term goals are implemented through zoning ordinances. These are local laws adopted by counties and cities that describe for specific areas the kinds of development that will be allowed within their boundaries.

Land use agencies are also the lead for doing environmental assessments under CEQA for new projects that may pose a significant environmental impact, or for new or revised General Plans.

## Local Agency Formation Commissions (LAFCOs)

Operating in each of California's 58 counties, LAFCOs are composed of local elected officials and public members who are responsible for coordinating changes in local governmental boundaries, conducting special studies that review ways to reorganize, simplify, and streamline governmental structures, and preparing a sphere of influence for each city and special district within each county. Each Commission's efforts are directed toward seeing that local government services are provided efficiently and economically while agricultural and open-space lands are protected. LAFCO decisions strive to balance the competing needs in California for efficient services, affordable housing, economic opportunity, and conservation of natural resources.

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[1] The legal basis for planning and land use regulation is the "police power" of the city or county to protect the public's health, safety and welfare. The California Constitution gives cities and counties the power to make and enforce all local police, sanitary and other ordinances and regulations not in conflict with general laws. State law reference: California Constitution, Article XI §7.

[2] OPR General Plan Guidelines, 2003: http://www.opr.ca.gov/planning/PDFs/General_Plan_Guidelines_2003.pdf

**Councils of Government (COG)**

COGs are organizations composed of local counties and cities that serve as a focus for the development of sound regional planning, including plans for transportation, growth management, hazardous waste management, and air quality. They can also function as the metropolitan planning organization for coordinating the region's transportation programs. COGs also prepare regional housing need allocations for updates of General Plan housing elements.

**Local Air Districts**

Under state law, air pollution control districts or air quality management districts (local air districts) are the local government agencies responsible for improving air quality and are generally the first point of contact for resolving local air pollution issues or complaints. There are 35 local air districts in California[3] that have authority and primary responsibility for regional clean air planning. Local air districts regulate stationary sources of air pollutants within their jurisdiction including but not limited to industrial and commercial facilities, power plants, construction activities, outdoor burning, and other non-mobile sources of air pollution. Some local air districts also regulate public and private motor vehicle fleet operators such as public bus systems, private shuttle and taxi services, and commercial truck depots.

- **Regional Clean Air Plans**

Local air districts are responsible for the development and adoption of clean air plans that protect the public from the harmful effects of air pollution. These plans incorporate strategies that are necessary to attain ambient air quality standards. Also included in these regional air plans are ARB and local district measures to reduce statewide emissions from mobile sources, consumer products, and industrial sources.

- **Facility-Specific Considerations**

*Permitting.* In addition to the planning function, local air districts adopt and enforce regulations, issue permits, and evaluate the potential environmental impacts of projects.

Pollution is regulated through permits and technology-based rules that limit emissions from operating units within a facility or set standards that vehicle fleet operators must meet. Permits to construct and permits to operate contain very specific requirements and conditions that tell each regulated source what it must do to limit its air pollution in compliance with local air district rules, regulations, and state law. Prior to receiving a permit, new facilities must go through a New Source Review (NSR) process that establishes air pollution control requirements for the facility. Permit conditions are typically contained in the permit to operate and specify requirements that businesses must follow; these may include limits on the amount of pollution that can be emitted, the

[3] Contact information for local air districts in California is listed in the front of this Handbook.

type of pollution control equipment that must be installed and maintained, and various record-keeping requirements.

Local air districts also notify the public about new permit applications for major new facilities, or major modifications to existing facilities that seek to locate within 1,000 feet of a school.

Local air districts can also regulate other types of sources to reduce emissions. These include regulations to reduce emissions from the following sources:

- hazardous materials in products used by industry such as paints, solvents, and de-greasers;
- agricultural and residential burning;
- leaking gasoline nozzles at service stations;
- public fleet vehicles such as sanitation trucks and school buses; and
- fugitive or uncontrolled dust at construction sites.

However, while emissions from industrial and commercial sources are typically subject to the permit authority of the local air district, sensitive sites such as a day care center, convalescent home, or playground are not ordinarily subject to an air permit. Local air district permits address the air pollutant emissions of a project but not its location.

Under the state's air toxics program, local air districts regulate air toxic emissions by adopting ARB air toxic control measures, or more stringent district-specific requirements, and by requiring individual facilities to perform a health risk assessment if emissions at the source exceed district-specific health risk thresholds[4], [5] (See the section on ARB programs for a more detailed summary of this program).

One approach by which local air districts regulate air toxics emissions is through the "Hot Spots" program.[6] The risk assessments submitted by the facilities under this

[4] Cal/EPA's Office of Environmental Health Hazard Assessment has published "A Guide to Health Risk Assessment" for lay people involved in environmental health issues, including policymakers, businesspeople, members of community groups, and others with an interest in the potential health effects of toxic chemicals. To access this information, please refer to http://www.oehha.ca.gov/pdf/HRSguide2001.pdf

[5] Section 44306 of the California Health & Safety Code defines a health risk assessment as a detailed comprehensive analysis that a polluting facility uses to evaluate and predict the dispersion of hazardous substances in the environment and the potential for exposure of human populations, and to assess and quantify both the individual and population-wide health risks associated with those levels of exposure.

[6] AB-2588 (the Air Toxics "Hot Spots" Information and Assessment Act) requires local air districts to prioritize facilities by high, intermediate, and low priority categories to determine which must perform a health risk assessment. Each district is responsible for establishing the prioritization score threshold at which facilities are required to prepare a health risk assessment. In establishing priorities for each facility, local air districts must consider the potency, toxicity, quantity, and volume of hazardous materials released from the facility, the proximity of the facility to potential receptors, and any other factors that the district determines may indicate that the facility may pose a significant risk. All facilities within the highest category must prepare a health risk assessment. In addition, each district may require facilities in the intermediate and low priority categories to also submit a health risk assessment.

**Table D-1**
**Local Sources of Air Pollution, Responsible Agencies, and Associated Regulatory Programs**

| Source | Examples | Primary Agency | Applicable Regulations |
|---|---|---|---|
| Large Stationary | Refineries, power plants, chemical facilities, certain manufacturing plants | Local air districts | Operating permit rules<br>Air Toxics "Hot Spots" Law (AB 2588)<br>Local district rules<br>Air Toxic Control Measures (ATCMs)*<br>New Source Review rules<br>Title V permit rules |
| Small Stationary | Dry cleaners, auto body shops, welders, chrome plating facilities, service stations, certain manufacturing plants | Local air districts | Operating permit conditions,<br>Air Toxics "Hot Spots" Law (AB 2588)<br>Local district rules<br>ATCMs*<br>New Source Review rules |
| Mobile (non-fleet) | Cars, trucks, buses | ARB | Emission standards<br>Cleaner-burning fuels (e.g., unleaded gasoline, low-sulfur diesel)<br>Inspection and repair programs (e.g., Smog Check) |
| Mobile Equipment | Construction equipment | ARB, U.S. EPA | ARB rules<br>U.S. EPA rules |
| Mobile (fleet) | Truck depots, school buses, taxi services | Local air districts, ARB | Local air district rules<br>ARB urban bus fleet rule |
| Areawide | Paints and consumer products such as hair spray and spray paint | Local air district, ARB | ARB rules<br>Local air district rules |

*ARB adopts ATCMs, but local air districts have the responsibility to implement and enforce these measures or more stringent ones.

program are reviewed by OEHHA and approved by the local air district. Risk assessments are available by contacting the local air district.

*Enforcement*. Local air districts also take enforcement action to ensure compliance with air quality requirements. They enforce air toxic control measures, agricultural and residential burning programs, gasoline vapor control regulations, laws that prohibit air pollution nuisances, visible emission limits, and many other requirements designed to

clean the air. Local districts use a variety of enforcement tools to ensure compliance. These include notices of violation, monetary penalties, and abatement orders. Under some circumstances, a permit may be revoked.

- **Environmental Review**

As required by the California Environmental Quality Act (CEQA), local air districts also review and comment on proposed land use plans and development projects that can have a significant effect on the environment or public health.[7]

**California Air Resources Board**

The ARB is the air pollution control agency at the state level that is responsible for the preparation of air plans required by state and federal law. In this regard, it coordinates the activities of all local air districts to ensure all statutory requirements are met and to reduce air pollution emissions for sources under its jurisdiction.

Motor vehicles are the single largest emissions source category under ARB's jurisdiction as well as the largest overall emissions source statewide. ARB also regulates emissions from other mobile equipment and engines as well as emissions from consumer products such as hair sprays, perfumes, cleaners, and aerosol paints.

Air Toxics Program

Under state law, the ARB has a critical role to play in the identification, prioritization, and control of air toxic emissions. The ARB statewide comprehensive air toxics program was established in the early 1980's. The Toxic Air Contaminant Identification and Control Act of 1983 (AB 1807, Tanner 1983) created California's program to reduce exposure to air toxics.[8] The Air Toxics "Hot Spots" Information and Assessment Act (Hot Spots program) supplements the AB 1807 program, by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

Under AB 1807, the ARB is required to use certain criteria to prioritize the identification and control of air toxics. In selecting substances for review, the ARB must consider criteria relating to emissions, exposure, and health risk, as well as persistence in the atmosphere, and ambient concentrations in the community. AB 1807 also requires the ARB to use available information gathered from the Hot Spots program when prioritizing compounds.

The ARB identifies pollutants as toxic air contaminants and adopts statewide air toxic control measures (ATCMs). Once ARB adopts an ATCM, local air districts must

[7] Section 4 of this Handbook contains more information on the CEQA process.
[8] For a general background on California's air toxics program, the reader should refer to ARB's website at http://www.arb.ca.gov/toxics/tac/appendxb.htm.

implement the measure, or adopt and implement district-specific measures that are at least as stringent as the state standard. Taken in the aggregate, these ARB programs will continue to further reduce emissions, exposure, and health risk statewide.

With regard to the land use decision-making process, ARB, in conjunction with local air districts, plays an advisory role by providing technical information on land use-related air issues.

**Other Agencies**

*Governor's Office of Planning and Research (OPR)*

In addition to serving as the Governor's advisor on land use planning, research, and liaison with local government, OPR develops and implements the state's policy on land use planning and coordinates the state's environmental justice programs. OPR updated its General Plan Guidelines in 2003 to highlight the importance of sustainable development and environmental justice policies in the planning process. OPR also advises project proponents and government agencies on CEQA provisions and operates the State Clearinghouse for environmental and federal grant documents.

*California Department of Housing and Community Development*

The Department of Housing and Community Development (HCD) administers a variety of state laws, programs and policies to preserve and expand housing opportunities, including the development of affordable housing. All local jurisdictions must update their housing elements according to a staggered statutory schedule, and are subject to certification by HCD. In their housing elements, cities and counties are required to include a land inventory which identifies and zones sites for future residential development to accommodate a mix of housing types, and to remove barriers to the development of housing.

An objective of state housing element law is to increase the overall supply and affordability of housing. Other fundamental goals include conserving existing affordable housing, improving the condition of the existing housing stock, removing regulatory barriers to housing production, expanding equal housing opportunities, and addressing the special housing needs of the state's most vulnerable residents (frail elderly, disabled, large families with children, farmworkers, and the homeless).

*Transportation Agencies*

Transportation agencies can also influence mobile source-related emissions in the land use decision-making process. Local transportation agencies work with land use agencies to develop a transportation (circulation) element for the General Plan. These local government agencies then work with other transportation-related agencies, such as the Congestion Management Agency (CMA), Metropolitan Planning Organization

(MPO), Regional Transportation Planning Agency (RTPA), and Caltrans to develop long and short range transportation plans and projects.

Caltrans is the agency responsible for setting state transportation goals and for state transportation planning, design, construction, operations and maintenance activities. Caltrans is also responsible for delivering California's multibillion-dollar state Transportation Improvement Program, a list of transportation projects that are approved for funding by the California Transportation Commission in a 4-year cycle.

When safety hazards or traffic circulation problems are identified in the existing road system, or when land use changes are proposed such as a new residential subdivision, shopping mall or manufacturing center, Caltrans and/or the local transportation agency ensure the projects meet applicable state, regional, and local goals and objectives.

Caltrans also evaluates transportation-related projects for regional air quality impacts, from the perspective of travel-related emissions as well as road congestion and increases in road capacity (new lanes).

*California Energy Commission (CEC)*

The CEC is the state's CEQA lead agency for permitting large thermal power plants (50 megawatts or greater). The CEC works closely with local air districts and other federal, state and local agencies to ensure compliance with applicable laws, ordinances, regulations and standards in the permitting, construction, operation and closure of such plants. The CEC uses an open and public review process that provides communities with outreach and multiple opportunities to participate and be heard. In addition to its comprehensive environmental impact and engineering design assessment process, the CEC also conducts an environmental justice evaluation. This evaluation involves an initial demographic screening to determine if a qualifying minority or low-income population exists in the vicinity of the proposed project. If such a population is present, staff considers possible environmental justice impacts including from associated project emissions in its technical assessments.[9]

*Department of Pesticides Regulation (DPR)*

Pesticides are industrial chemicals produced specifically for their toxicity to a target pest. They must be released into the environment to do their job. Therefore, regulation of pesticides focuses on using toxicity and other information to ensure that when pesticides are used according to their label directions, potential for harm to people and the environment is minimized. DPR imposes strict controls on use, beginning before pesticide products can be sold in California, with an extensive scientific program to ensure they can be used safely. DPR and county enforcement staff tracks the use of pesticides to ensure that pesticides are used properly. DPR collects periodic

[9] See California Energy Commission, "Environmental Performance Report," July 2001 at http://www.energy.ca.gov/reports/2001-11-20_700-01-001.PDF

measurements of any remaining amounts of pesticides in water, air, and on fresh produce. If unsafe levels are found, DPR requires changes in how pesticides are used, to reduce the possibility of harm. If this cannot be done - that is, if a pesticide cannot be used safely - use of the pesticide will be banned in California.[10]

*Federal Agencies*

Federal agencies have permit authority over activities on federal lands and certain resources, which have been the subject of congressional legislation, such as air, water quality, wildlife, and navigable waters. The U.S. Environmental Protection Agency generally oversees implementation of the federal Clean Air Act, and has broad authority for regulating certain activities such as mobile sources, air toxics sources, the disposal of toxic wastes, and the use of pesticides. The responsibility for implementing some federal regulatory programs such as those for air and water quality and toxics is delegated by management to specific state and local agencies. Although federal agencies are not subject to CEQA they must follow their own environmental process established under the National Environmental Policy Act (NEPA).

[10] For more information, the reader is encouraged to visit the Department of Pesticide Regulation web site at www.cdpr.ca.gov/docs/empm/pubs/tacmenu.htm.

## SPECIAL PROCESSES THAT APPLY TO SCHOOL SITING

The California Education Code and the California Public Resources Code place primary authority for siting public schools with the local school district, which is the 'lead agency' for purposes of CEQA. The California Education Code requires public school districts to notify the local planning agency about siting a new public school or expanding an existing school. The planning agency then reports back to the school district regarding a project's conformity with the adopted General Plan. However, school districts can overrule local zoning and land use designations for schools if they follow specified procedures. In addition, all school districts must evaluate new school sites using site selection standards established in Section 14010 of Title 5 of the California Code of Regulations. Districts seeking state funding for school site acquisition must also obtain site approval from the California Department of Education.

Before making a final decision on a school site acquisition, a school district must comply with CEQA and evaluate the proposed site acquisition/new school project for air emissions and health risks by preparing and certifying an environmental impact report or negative declaration. Both the California Education Code section 17213 and the California Public Resources Code section 21151.8 require school districts to consult with administering agencies and local air districts when preparing the environmental assessment. Such consultation is required to identify both permitted and non-permitted "facilities" that might significantly affect health at the new site. These facilities include, but are not limited to, freeways and other busy traffic corridors, large agricultural operations, and rail yards that are within one-quarter mile of the proposed school site, and that might emit hazardous air emissions, or handle hazardous or acutely hazardous materials, substances, or waste.

As part of the CEQA process and before approving a school site, the school district must make a finding that either it found none of the facilities or significant air pollution sources, or alternatively, if the school district finds that there are such facilities or sources, it must determine either that they pose no significant health risks, or that corrective actions by another governmental entity would be taken so that there would be no actual or potential endangerment to students or school workers.

In addition, if the proposed school site boundary is within 500 feet of the edge of the closest traffic lane of a freeway or traffic corridor that has specified minimum average daily traffic counts, the school district is required to determine through specified risk assessment and air dispersion modeling that neither short-term nor long term exposure poses significant heath risks to pupils.

State law changes effective January 1, 2004 (SB352, Escutia 2003, amending Education Code section 17213 and Public Resources Code section 21151.8) also provides for cases in which the school district cannot make either of those two findings and cannot find a suitable alternative site. When this occurs, the school district must adopt a statement of over-riding considerations, as part of an environmental impact

report, that the project should be approved based on the ultimate balancing of the merits.

Some school districts use a standardized assessment process to determine the environmental impacts of a proposed school site. In the assessment process, school districts can use maps and other available information to evaluate risk, including a local air district's database of permitted source emissions. School districts can also perform field surveys and record searches to identify and calculate emissions from non-permitted sources within one-quarter mile radius of a proposed site. Traffic count data and vehicular emissions data can also be obtained from Caltrans for major roadways and freeways in proximity to the proposed site to model potential emissions impacts to students and school employees. This information is available from the local COG, Caltrans, or local cities and counties for non-state maintained roads.

## GENERAL PROCESSES USED BY LAND USE AGENCIES TO ADDRESS AIR POLLUTION IMPACTS

There are several separate but related processes for addressing the air pollution impacts of land use projects. One takes place as part of the planning and zoning function. This consists of preparing and implementing goals and policies contained in county or city General Plans, community or area plans, and specific plans governing land uses such as residential, educational, commercial, industrial, and recreational activities. It also includes recommending locations for thoroughfares, parks and other public improvements.

Land use agencies also have a permitting function that includes performing environmental reviews and mitigation when projects may pose a significant environmental impact. They conduct inspections for zoning permits issued, enforce the zoning regulations and issue violations as necessary, issue zoning certificates of compliance, and check compliance when approving certificates of occupancy.

### Planning

- **General Plan**[1]

The General Plan is a local government "blueprint" of existing and future anticipated land uses for long-term future development. It is composed of the goals, policies, and general elements upon which land use decisions are based. Because the General Plan is the foundation for all local planning and development, it is an important tool for implementing policies and programs beneficial to air quality. Local governments may choose to adopt a separate air quality element into their General Plan or to integrate air quality-beneficial objectives, policies, and strategies in other elements of the Plan, such as the land use, circulation, conservation, and community design elements.

More information on General Plan elements is contained in Appendix D.

- **Community Plans**

Community or area plans are terms for plans that focus on a particular region or community within the overall general plan area. It refines the policies of the general plan as they apply to a smaller geographic area and is implemented by ordinances and other discretionary actions, such as zoning.

[1] In October 2003, OPR revised its General Plan Guidelines. An entire chapter is now devoted to a discussion of how sustainable development and environmental justice goals can be incorporated into the land use planning process. For further information, the reader is encouraged to obtain a copy of OPR's General Plan Guidelines, or refer to their website at: http://www.opr.ca.gov/planning/PDFs/General_Plan_Guidelines_2003.pdf

- **Specific Plan**

A specific plan is a hybrid that can combine policies with development regulations or zoning requirements. It is often used to address the development requirements for a single project such as urban infill or a planned community. As a result, its emphasis is on concrete standards and development criteria.

- **Zoning**

Zoning is the public regulation of the use of land. It involves the adoption of ordinances that divide a community into various districts or zones. For instance, zoning ordinances designate what projects and activities can be sited in particular locations. Each zone designates allowable uses of land within that zone, such as residential, commercial, or industrial. Zoning ordinances can address building development standards, e.g., minimum lot size, maximum building height, minimum building setback, parking, signage, density, and other allowable uses.

**Land Use Permitting**

In addition to the planning and zoning function, land use agencies issue building and business permits, and evaluate the potential environmental impacts of projects. To be approved, projects must be located in a designated zone and comply with applicable ordinances and zoning requirements.

Even if a project is sited properly in a designated zone, a land use agency may require a new source to mitigate potential localized environmental impacts to the surrounding community below what would be required by the local air district. In this case, the land use agency could condition the permit by limiting or prescribing allowable uses including operating hour restrictions, building standards and codes, property setbacks between the business property and the street or other structures, vehicle idling restrictions, or traffic diversion.

Land use agencies also evaluate the environmental impacts of proposed land use projects or activities. If a project or activity falls under CEQA, the land use agency requires an environmental review before issuing a permit to determine if there is the potential for a significant impact, and if so, to mitigate the impact or possibly deny the project.

- **Land Use Permitting Process**

In California, the authority to regulate land use is delegated to city and county governments. The local land use planning agency is the local government administrative body that typically provides information and coordinates the review of development project applications. Conditional Use Permits (CUP) typically fall within a land use agency's discretionary authority and therefore are subject to CEQA. CUPs are

intended to provide an opportunity to review the location, design, and manner of development of land uses prior to project approval. A traditional purpose of the CUP is to enable a municipality to control certain uses that could have detrimental environmental effects on the community.

The process for permitting new discretionary projects is quite elaborate, but can be broken down into five fundamental components:

- Project application
- Environmental assessment
- Consultation
- Public comment
- Public hearing and decision

Project Application

The permit process begins when the land use agency receives a project application, with a detailed project description, and support documentation. During this phase, the agency reviews the submitted application for completeness. When the agency deems the application to be complete, the permit process moves into the environmental review phase.

Environmental Assessment

If the project is discretionary and the application is accepted as complete, the project proposal or activity must undergo an environmental clearance process under CEQA and the CEQA Guidelines adopted by the California Resources Agency.[2] The purpose of the CEQA process is to inform decision-makers and the public of the potential significant environmental impacts of a project or activity, to identify measures to minimize or eliminate those impacts to the point they are no longer significant, and to discuss alternatives that will accomplish the project goals and objectives in a less environmentally harmful manner.

**What is a "Lead Agency"?**

A lead agency is the public agency that has the principal responsibility for carrying out or approving a project that is subject to CEQA. In general, the land use agency is the preferred public agency serving as lead agency because it has jurisdiction over general land uses. The lead agency is responsible for determining the appropriate environmental document, as well as its preparation.

**What is a "Responsible Agency"?**

A responsible agency is a public agency with discretionary approval authority over a portion of a CEQA project (e.g., projects requiring a permit). As a responsible agency, the agency is available to the lead agency and project proponent for early consultation on a project to apprise them of applicable rules and regulations, potential adverse impacts, alternatives, and mitigation measures, and provide guidance as needed on applicable methodologies or other related issues.

**What is a "Commenting Agency"?**

A commenting agency is any public agency that comments on a CEQA document, but is neither a lead agency nor a responsible agency. For example, a local air district, as the agency with the responsibility for comprehensive air pollution control, could review and comment on an air quality analysis in a CEQA document for a proposed distribution center, even though the project was not subject to a permit or other pollution control requirements.

[2] Projects and activities that may have a significant adverse impact on the environment are evaluated under CEQA Guidelines set forth in title 14 of the California Code of Regulations, sections 15000 et seq.

To assist the lead agency in determining whether the project or activity may have a significant effect that would require the preparation of an EIR, the land use agency may consider criteria, or thresholds of significance, to assess the potential impacts of the project, including its air quality impacts. The land use agency must consider any credible evidence in addition to the thresholds, however, in determining whether the project or activity may have a significant effect that would trigger the preparation of an EIR.

The screening criteria to determine significance is based on a variety of factors, including local, state, and federal regulations, administrative practices of other public agencies, and commonly accepted professional standards. However, the final determination of significance for individual projects is the responsibility of the lead agency. In the case of land use projects, the lead agency would be the City Council or County Board of Supervisors.

A new land use plan or project can also trigger an environmental assessment under CEQA if, among other things, it will expose sensitive sites such as schools, day care centers, hospitals, retirement homes, convalescence facilities, and residences to substantial pollutant concentrations.[3]

CEQA only applies to "discretionary projects." Discretionary means the public agency must exercise judgment and deliberation when deciding to approve or disapprove a particular project or activity, and may append specific conditions to its approval. Examples of discretionary projects include the issuance of a CUP, re-zoning a property, or widening of a public road. Projects that are not subject to the exercise of agency discretion, and can therefore be approved administratively through the application of set standards are referred to as ministerial projects. CEQA does not apply to ministerial projects.[4] Examples of typical ministerial projects include the issuance of most building permits or a business license.

Once a potential environmental impact associated with a project is identified through an environmental assessment, mitigation must be considered. A land use agency should incorporate mitigation measures that are suggested by the local air district as part of the project review process.

Consultation

Application materials are provided to various departments and agencies that may have an interest in the project (e.g., air pollution, building, police, fire, water agency, Fish and Game, etc.) for consultation and input.

[3] Readers interested in learning more about CEQA should contact OPR or visit their website at http://www.opr.ca.gov/.
[4] See California Public Resources Code section 21080(b)(1).

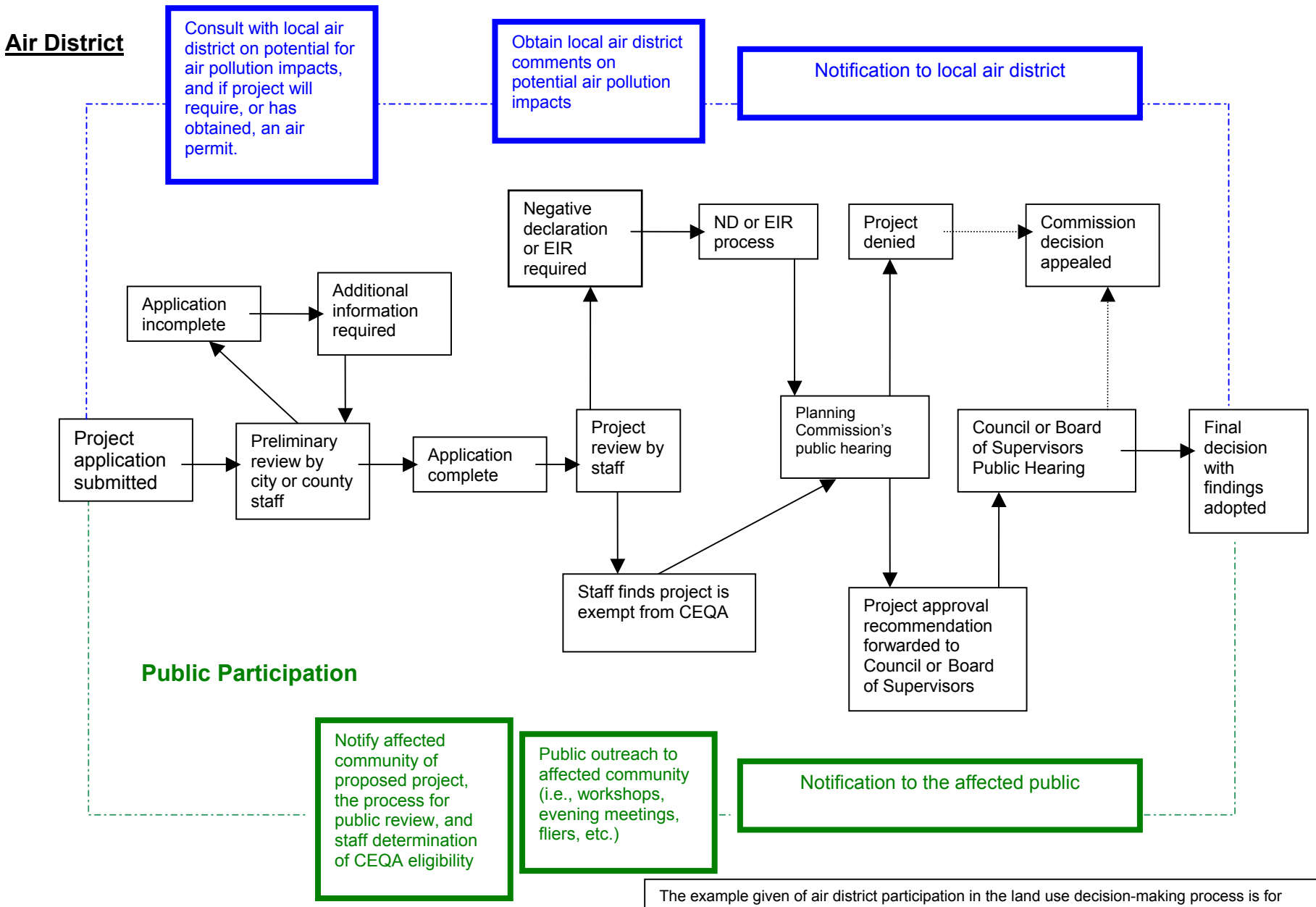
Public Comment

Following the environmental review process, the Planning Commission reviews application along with the staff's report on the project assessment and a public comment period is set and input is solicited.

Public Hearing and Decision

Permit rules vary depending on the particular permit authority in question, but the process generally involves comparing the proposed project with the land use agency standards or policies. The procedure usually leads to a public hearing, which is followed by a written decision by the agency or its designated officer. Typically, a project is approved, denied, or approved subject to specified conditions.

## USE PERMIT (DISCRETIONARY ACTION) REVIEW PROCESS*




The example given of air district participation in the land use decision-making process is for illustrative purposes only. In reality, the land use siting process involves the ongoing participation of multiple affected agencies and stakeholders throughout the process.

## GLOSSARY OF KEY AIR POLLUTION TERMS

**Air Pollution Control Board or Air Quality Management Board:** Serves as the governing board for local air districts. It consists of appointed or elected members from the public or private sector. It conducts public hearings to adopt local air pollution regulations.

**Air Pollution Control Districts or Air Quality Management Districts (local air district):** A county or regional agency with authority to regulate stationary and area sources of air pollution within a given county or region. Governed by a district air pollution control board.

**Air Pollution Control Officer (APCO):** Head of a local air pollution control or air quality management district.

**Air Toxic Control Measures (ATCM):** A control measure adopted by the ARB (Health and Safety Code section 39666 et seq.), which reduces emissions of toxic air contaminants.

**Ambient Air Quality Standards:** An air quality standard defines the maximum amount of a pollutant that can be present in the outdoor air during a specific time period without harming the public's health. Only U.S. EPA and the ARB may establish air quality standards. No other state has this authority. Air quality standards are a measure of clean air. More specifically, an air quality standard establishes the concentration at which a pollutant is known to cause adverse health effects to sensitive groups within the population, such as children and the elderly. Federal standards are referred to as National Ambient Air Quality Standards (NAAQS); state standards are referred to as California ambient air quality standards (CAAQS).

**Area-wide Sources:** Sources of air pollution that individually emit small amounts of pollution, but together add up to significant quantities of pollution. Examples include consumer products, fireplaces, road dust, and farming operations.

**Attainment vs. Nonattainment Area:** An attainment area is a geographic area that meets the National Ambient Air Quality Standards for the criteria pollutants and a non-attainment area is a geographic area that doesn't meet the NAAQS for criteria pollutants.

**Attainment Plan:** Attainment plans lay out measures and strategies to attain one or more air quality standards by a specified date.

**California Clean Air Act (CCAA):** A California law passed in 1988, which provides the basis for air quality planning and regulation independent of federal regulations. A major element of the Act is the requirement that local air districts in violation of the CAAQS

must prepare attainment plans which identify air quality problems, causes, trends, and actions to be taken to attain and maintain California's air quality standards by the earliest practicable date.

**California Environmental Quality Act (CEQA):** A California law that sets forth a process for public agencies to make informed decisions on discretionary project approvals. The process helps decision-makers determine whether any potential, significant, adverse environmental impacts are associated with a proposed project and to identify alternatives and mitigation measures that will eliminate or reduce such adverse impacts.[1]

**California Health and Safety Code:** A compilation of California laws, including state air pollution laws, enacted by the Legislature to protect the health and safety of people in California. Government agencies adopt regulations to implement specific provisions of the California Health and Safety Code.

**Clean Air Act (CAA):** The federal Clean Air Act was adopted by the United States Congress and sets forth standards, procedures, and requirements to be implemented by the U.S. Environmental Protection Agency (U.S. EPA) to protect air quality in the United States.

**Councils of Government (COGs):** There are 25 COGs in California made up of city and county elected officials. COGs are regional agencies concerned primarily with transportation planning and housing; they do not directly regulate land use.

**Criteria Air Pollutant:** An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM10 and PM2.5. The term "criteria air pollutants" derives from the requirement that the U.S. EPA and ARB must describe the characteristics and potential health and welfare effects of these pollutants. The U.S. EPA and ARB periodically review new scientific data and may propose revisions to the standards as a result.

**District Hearing Board:** Hears local air district permit appeals and issues variances and abatement orders. The local air district board appoints the members of the hearing board.

**Emission Inventory:** An estimate of the amount of pollutants emitted into the atmosphere from mobile, stationary, area-wide, and natural source categories over a specific period of time such as a day or a year.

**Environmental Impact Report (EIR):** The public document used by a governmental agency to analyze the significant environmental effects of a proposed project, to identify

[1] To track the submittal of CEQA documents to the State Clearinghouse within the Office of Planning and Research, the reader can refer to CEQAnet at http://www.ceqanet.ca.gov.

alternatives, and to disclose possible ways to reduce or avoid the possible negative environmental impacts.

**Environmental Justice:** California law defines environmental justice as the fair treatment of people of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies (California Government Code sec.65040.12(c)).

**General Plans:** A statement of policies developed by local governments, including text and diagrams setting forth objectives, principles, standards, and plan proposals for the future physical development of the city or county.

**Hazardous Air Pollutants (HAPs):** An air pollutant listed under section 112 (b) of the federal Clean Air Act as particularly hazardous to health. U.S. EPA identifies emission sources of hazardous air pollutants, and emission standards are set accordingly. In California, HAPs are referred to as toxic air contaminants.

**Land Use Agency:** Local government agency that performs functions associated with the review, approval, and enforcement of general plans and plan elements, zoning, and land use permitting. For purposes of this Handbook, a land use agency is typically a local planning department.

**Mobile Source:** Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes.

**National Ambient Air Quality Standard (NAAQS):** A limit on the level of an outdoor air pollutant established by the US EPA pursuant to the Clean Air Act. There are two types of NAAQS. Primary standards set limits to protect public health and secondary standards set limits to protect public welfare.

**Negative Declaration (ND):** When the lead agency (the agency responsible for preparing the EIR or ND) under CEQA, finds that there is no substantial evidence that a project may have a significant environmental effect, the agency will prepare a "negative declaration" instead of an EIR.

**New Source Review (NSR):** A federal Clean Air Act requirement that state implementation plans must include a permit review process, which applies to the construction and operation of new or modified stationary sources in nonattainment areas. Two major elements of NSR to reduce emissions are best available control technology requirements and emission offsets.

**Office of Planning and Research (OPR):** OPR is part of the Governor's office. OPR has a variety of functions related to local land-use planning and environmental programs. It provides General Plan Guidelines for city and county planners, and coordinates the state clearinghouse for Environmental Impact Reports.

**Ordinance:** A law adopted by a City Council or County Board of Supervisors. Ordinances usually amend, repeal or supplement the municipal code; provide zoning specifications; or appropriate money for specific purposes.

**Overriding Considerations:** A ruling made by the lead agency in the CEQA process when the lead agency finds the importance of the project to the community outweighs potential adverse environmental impacts.

**Public Comment:** An opportunity for the general public to comment on regulations and other proposals made by government agencies. You can submit written or oral comments at the public meeting or send your written comments to the agency.

**Public Hearing:** A public hearing is an opportunity to testify on a proposed action by a governing board at a public meeting. The public and the media are welcome to attend the hearing and listen to, or participate in, the proceedings.

**Public Notice:** A public notice identifies the person, business, or local government seeking approval of a specific course of action (such as a regulation). It describes the activity for which approval is being sought, and describes the location where the proposed activity or public meeting will take place.

**Public Nuisance:** A public nuisance, for the purposes of air pollution regulations, is defined as a discharge from any source whatsoever of such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property. (Health and Safety Code section 41700).

**Property Setback:** In zoning parlance, a setback is the minimum amount of space required between a lot line and a building line.

**Risk:** For cancer health effects, risk is expressed as an estimate of the increased chances of getting cancer due to facility emissions over a 70-year lifetime. This increase in risk is expressed as chances in a million (e.g.,10 chances in a million).

**Sensitive Individuals:** Refers to those segments of the population most susceptible to poor air quality (i.e., children, the elderly, and those with pre-existing serious health problems affected by air quality).

**Sensitive Sites or Sensitive Land Uses:** Land uses where sensitive individuals are most likely to spend time, including schools and schoolyards, parks and playgrounds, day care centers, nursing homes, hospitals, and residential communities.

**Setback:** An area of land separating one parcel of land from another that acts to soften or mitigate the effects of one land use on the other.

**State Implementation Plan (SIP):** A plan prepared by state and local agencies and submitted to U.S. EPA describing how each area will attain and maintain national ambient air quality standards. SIPs include the technical information about emission inventories, air quality monitoring, control measures and strategies, and enforcement mechanisms. A SIP is composed of local air quality management plans and state air quality regulations.

**Stationary Sources:** Non-mobile sources such as power plants, refineries, and manufacturing facilities.

**Toxic Air Contaminant (TAC):** An air pollutant, identified in regulation by the ARB, which may cause or contribute to an increase in deaths or in serious illness, or which may pose a present or potential hazard to human health. TACs are considered under a different regulatory process (California Health and Safety Code section 39650 et seq.) than pollutants subject to State Ambient Air Quality Standards. Health effects associated with TACs may occur at extremely low levels. It is often difficult to identify safe levels of exposure, which produce no adverse health effects.

**Urban Background:** The term is used in this Handbook to represent the ubiquitous, elevated, regional air pollution levels observed in large urban areas in California.

**Zoning ordinances:** City councils and county boards of supervisors adopts zoning ordinances that set forth land use classifications, divides the county or city into land use zones as delineated on the official zoning, maps, and set enforceable standards for future develop

# SAN GORGONIO CHAPTER

To: Albert Armijo
Interim Planning Manager

January 31, 2020

RE: Comments on the World Logistic Center's Draft Recirculated RSFEIR and changes to the RSFEIR.

The Sierra Club appreciates this opportunity to make comments on both the World Logistic Center's (WLC) Draft Recirculated RSFEIR and the changes to the RSFEIR. Each of our comments reply to both documents. We urge you to read Moreno Valley's 2010 Census and look at the number of people who are Latino and who speak Spanish as their first language. The Sierra Club continually requests that all these documents also be in Spanish to fully capture public input from those who will be directly and indirectly impacted by this massive project.

The Sierra Club also objects to the way the two different documents on which the public is to comment is mixed In with other documents as shown below:

World Logistics Downloads
Some of these files are very large, allow time to download.

**2019 Revised RFEIR Review 11-2019**

Draft Recirculated RSFEIR | Draft Recircluated RSFEIR With Tracked Changes
Technical Appendices: A-C | D1- D6 |D7-D11 | E1- E5 |E 6-1 - E- 6- 5| E 6-6 - E- 6-10 | E6-11 - E6-13 | F
**Note**: the appendices are very large and may not open through the browser. Right click on the link and save them to your local system.

**2019 Draft Recirculated Revised Sections of the Final Environmental Impact Report:** Notice of Availability

**Revised FEIR — July 2018**

Revised FEIR Notice | World Logistics Center Revised Sections of FEIR | Revised FEIR with Redlines | Revised FEIR Appendices

**Original FEIR and DEIR**

World Logistics Center Specific Plan | Notice of DEIR | Project Map | Draft EIR
Final FEIR | Tracking FEIR | Technical Appendices (~1.7 GB)

**Initiatives**
WLC Land Benefit Initiative | World Logistics Center Development Agreement Initiative | World Logistics Center Land Use and Zoning Entitlements Initiative

**Legal**
WLC Legal Information

**Notice of Determination**
Notice

Most of the average public will look at the above links and not realize that there are two documents on which to comment --- especially with one of them dated 2018 – at least that is what I think, but it is confusing. The documents need to be recirculated with very specific directions on which of all the above documents are to open for public review and comment. They also need to be removed from the others to make them stand out and very obvious.

All Figures in future documents must show where the San Jacinto Wildlife Area (SJWA) is in relation to the WLC with which it shares and almost two mile border. Figure 4.3.1 indicates the location/boundary of the Norton Younglove Reserve, Lake Perris State Recreation Area, and Box Springs Park in relation to the WLC, but like other figures doesn't indicate the location of the Fish and Wildlife's SJWA. The taxpayers have spent more than $80,000,000 on acquiring the San Jacinto Wildlife Area and the WLC's projected air pollution and Greenhouse Gas (GHG) will lead to the SJWA's

mission being compromised. The current documents do not explain how the WLC will reduce air pollution and GHG impacts to the SJWA to a level of insignificance. These documents fail to explain how all measures are being taken to further reduce the WLC health impacts to people and the resources of the SJWAS as well as the biological resources of surrounding lands.

The air pollution from more than 50,000 daily vehicle trips including more than 12,000 daily diesel truck trips will impact plant life — especially those at the San Jacinto Wildlife Area which provides habitat for many animals and also its threatened/endangered plants. These documents do not deal with the problems this project will cause to the many plant communities that surround the WLC. Many of these plants provide the habitat necessary for many animals which include us humans.

Official URL: http://dx.doi.org/10.1016/j.envpol.2008.11.049

Abstract/Summary

Vehicle exhaust emissions are a dominant feature of urban environments and are widely believed to have detrimental effects on plants. The effects of diesel exhaust emissions on 12 herbaceous species were studied with respect to growth, flower development, leaf senescence and leaf surface wax characteristics. A diesel generator was used to produce concentrations of nitrogen oxides (NOx) representative of urban conditions, in solardome chambers. Annual mean NOx concentrations ranged from 77 nl l−l to 98 nl l−1, with NO:NO2 ratios of 1.4–2.2, providing a good experimental simulation of polluted roadside environments. Pollutant exposure resulted in species-specific changes in growth and phenology, with a consistent trend for accelerated senescence and delayed flowering. Leaf surface characteristics were also affected; contact angle measurements indicated changes in surface wax structure following pollutant exposure. The study demonstrated clearly the potential for realistic levels of vehicle exhaust pollution to have direct adverse effects on urban vegetation.

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| **Item Type:** | Publication - Article |

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The study shown above requires these documents to be rewritten to significantly reduce impacts to show how the many plants will survive/thrive and not be subjected to the pollution that cause them to either reduce in number or be much less vigorous. The picture of the WLC that came with the links to the environmental documents show a forest of Palm trees that will do little to combat the pollution, GHG and reduce energy use of this project in our non-attainment area.

By being careful with the selection of trees and plants the WLC can help to reduce their harmful impact on our poor air quality. The attachment found at the top of the other attachements has the following and much more:

"We believe that phylloremediation is an environmentally friendly, cost effective way of remediation of air pollutants. The key component of this technology lies in plants. It is plants that can adsorb or absorb pollutants and plants that support microbes in biodegradation or biotransformation of pollutants"

The final sentence of the article reads as follows: "Nature has offered healthy alternatives for remediation of air pollution; we should collaborate with nature as a partner to restore nature's identity."

The Sierra Club expects to see the plant pallet to exclude all palm trees and give proof for its selection of trees and other plants to reduce pollution to the maximum extent possible. The project will have several years before you will begin planting trees and plants which will help absorb pollution caused by this massive project. The WLC needs to start working to select the best vegetation to reduce large amounts of air pollution and upgrade the list as better species become available prior to buildout. These trees cannot be allowed to be trimmed to allow more visibility and must be replaced immediately with similar trees if they die.

Having these type of trees instead of all the many palm trees shown on many depictions of the WLC will also reduce energy consumption and reduce heat gain. The final versions of both documents need to show how much energy will be saved by eliminating palm trees and replacing them with evergreen trees that become as tall as the high cube warehouses after 20 years and then after 30 years and again after 40 years of growth.

While the RFEIR points out what it considers all the current and foreseeable projects in the surrounding communities, it fails to apply them to all elements of what makes up a full EIR and therefore makes what is now before the public inadequate. Cumulative, growth inducing, direct and indirect impacts need to be fully addressed which cannot be found within the RFEIR.

Figure 12 from the revised FEIR appendices which is supposed to depict "existing sensitive receptors" fails miserably as does Figure 4.3.2. It appears that you are only concerned about the project site being the cause of the problems while not addressing the impacts from more than 12,000 toxic diesel trucks daily trips as they travel to and from the project— as well as the almost 50,000 other project daily vehicle trips. Everywhere a sound wall that is recommended as a result of this project will be impacted with car pollution drifting over the walls which causes them to be sensitive receptors and the revised new cumulative impacts must be shown on this

figure — have they been revised? Figure 26 shows many more areas of Moreno Valley with receptors — even on both side of SR-60. The Sierra Club believes even more areas must be included in updated Figures and analysis throughout the document. Full cumulative impacts need to be shown along SR-60 through Moreno Valley or the environmental documents will be inadequate. SCAQMD believes roads like SR-60 and truck routes like Redlands Blvd as well as Alessandro Blvd will impact sensitive receptors within 1,000 feet which this WLC documents fail to acknowledge, but must to protect the health of Moreno Valley residents.

As shown in the article found in the following link https://sandiego.urbdezine.com/2015/05/28/what-is-a-safe-distance-to-live-or-work-near-high-auto-emission-roads/) #1 those who live within 1,500 feet or further of major roads can be significantly affected — especially children. In fact this following link has information from EPA on what needs to be done to protect school children also needs to be applied to homes which will be similar impacted by the WLC's 24 hour 7 day per week operation. https://rems.ed.gov/docs/Mobile_docs/EPA_Reducing-Near-Road-Pollution-Schools.pdf #2

Because of all the almost 60,000 additional daily vehicle trips caused by the WLC and its growth inducing traffic many current roads will be upgraded to major roadways, even smaller roads will bring significant pollution into people's homes and yards. In the following link even the World Health Organization has concerns from particulate pollution (PM 10 and PM 2.5) caused by diesel and generated in large amounts by the WLC. (http://www.who.int/airpollution/ambient/health-impacts/en/) #3 More and more information is provided to show that proximity to diesel pollution is very unhealthy. You can be much further away than Figure 12 depicts and you can be significantly impacted. The following link shows that you can measure pollution with a mobile source. This needs to be required of the WLC and used several times each month in all the areas within a mile of the project and major vehicle routes for the life of the project. https://www.scpr.org/programs/take-two/2017/11/09/60115/the-ride-la-air-pollutiondata-gets-hyperlocal-tha/) #4 In addition there must be an onsite air quality monitoring system.

Where is the San Jacinto Wildlife Area (SJWA) on Figure 12 and Figure 4.3.2 as containing many “sensitive receptors”? There are articles (https://www.nationalgeographic.org/encyclopedia/air-pollution/ ) #5that show the impacts humans suffer from being exposed to diesel/car pollution cause similar problems with animals and in some cases plants as well as insects. The link found above reads “ Like humans, animals can suffer health effects from exposure to air pollution. Birth defects, diseases, and lower reproductive rates have all been attributed to air pollution.” (https://venta-usa.com/wildlife-pets-affected-airpollution/)#6

The previous link contains the following :“Birds are directly and indirectly affected by air pollution. they spend more time in open air and have a higher breathing rate than humans, exposing themselves to greater levels of air pollution. Studies have shown that for birds with long term exposure to pollution, there was reduced egg production and hatching, lung failure, inflammation and reduced body size.” The SJWA is shown to be among the top inland areas of North America for diversity of bird species during the Audubon Christmas bird Count. They usually report close to 150 different species with more than 20 raptors. It is a “national treasure” and people come from all over the United States and the world to bird watch at this special area which the state spent over $80,000,000 to acquire. The SJWA has threatened/endangered species which will suffer harm similar to humans because of the pollution generated by the operation of the WLC. The SJWA and the WLC will share an almost two mile border. The pollution from operating the WLC will settle on the endangered plants which will harm them. The following link explains how "Ozone molecules wind up near the Earth’s surface as part of air pollution. Ozone molecules near the ground damages lung tissues of animals and prevent plant respiration by blocking the openings in leaves where respiration occurs. Without respiration, a plant is not able to photosynthesize at a high rate and so it will not be able to grow.”
(https://www.windows2universe.org/earth/Atmosphere/wildlife_forests.html) #7
This not only impacts the plant, but those species of animals and insects which must rely on it for their survival. This also raises the question of how will the developer reimburse homeowners for plants which suffer/die as a result of the WLC’s pollution?

The same threatened/endangered plants and animals will also be harmed by the noise, light and runoff pollution from the WLC operation. Much of the noise can be eliminated with all electric equipment and vehicles. Just stating the project meets Moreno Valley standards for lighting — municipal code section 9.08.100 — does not prove it protects animals from the such pollution. This is especially true for nocturnal animals and those trying to hide from nocturnal animals. The municipal code is concerning impacts to humans and not animals—especially threatened/endangered ones.

There is no analysis of the WLC's pollution on household pets. As you can read in the article found in the following link .. "Similar to humans, pets have a negative reaction to outdoor air pollution. Multiple studies found physical signs of harm in dogs that were exposed to air pollution." (https://www.pca.state.mn.us/featured/does-air-pollution-affect-our-furry-friends) #8 The WLC's environmental documents need to include health impacts to the pets we have, such as dogs, cats, birds, and horses as well as others. Since many of them breath at a faster rate than humans they can develop problems quicker with lower levels of pollution.

Where is the analysis of the WLC and its traffic pollution impacts on the families that live on Avalon and Alicante Avenues as well as their entire neighborhood region? What roads will be improved/extended to accommodate the WLC and how will that impacted residents? The map of existing sensitive receptors is lacking the homes of many families that live within 1500 feet which shows the analysis of the project's negative impacts on those who live in Moreno Valley is inadequate and must be revised. This is especially true in light of the revised cumulative project list which will produce significant cumulative impacts.

The employees' health at the San Diego Gas facility immediately south of the WLC will be impacted by the trucks/other WLC traffic and must be highlighted on Figures 12 and 4.3.2. with an analysis of that impact. None of the WLC documents address the impacts on the work force other than some cancers. Asthma, heart attacks, strokes, bronchitis, lung disease, heart ailments, and premature deaths are only some of the health impacts caused by diesel pollution as mentioned in the following link. (https://www.edf.org/health/health-impacts-air-pollution) #9 Not only is the health of the families in all the homes within 1500 feet of the WLC

impacted, but so are the workers at the project site. Now that we have a more robust cumulative list of projects there is a need to have another analysis of health impacts on the community and workers within the WLC project or the WLC environmental documents will be inadequate. They need to also include the growth inducing impacts that will result because of the massive project.4

The claim that only 2010 or newer trucks will be allowed is also never shown to be enforced. Without an ongoing constant meaningful enforcement mechanism required which is open to public review the claim of only 2010 or newer trucks cannot be used in any analysis. Air quality and GHG analysis must recognize this reality and be completely redone. There is also a need to show how the project will enforce no project trucks on Redlands Blvd south of Eucalyptus. Without such enforcement it a bogus claim. Will the developer pay for such enforcement?

This WLC's massive Greenhouse Gas (GHG) impacts must be dealt with by the project on site using all possible methods currently available and as they become available during the building as well as the life of the project. The EPA offers the following online:

"Climate change impacts on public health and welfare The risks to public health and the environment from climate change are substantial and far-reaching. Scientists warn that carbon pollution and resulting climate change are expected to lead to more intense hurricanes and storms, heavier and more frequent flooding, increased drought, and more severe wildfires - events that can cause deaths, injuries, and billions of dollars of damage to property and the nation's infrastructure. Carbon dioxide and other greenhouse gas pollution leads to more frequent and intense heat waves that increase mortality, especially among the poor and elderly.3 Other climate change public health concerns raised in the scientific literature include anticipated increases in ground-level ozone pollution4, the potential for enhanced spread of some waterborne and pest related diseases5, and evidence for increased production or dispersion of airborne allergens. 6

Other effects of greenhouse gas pollution noted in the scientific literature include ocean acidification, sea level rise and increased storm surge, harm to agriculture and forests, species extinctions and ecosystem

damage.7 Climate change impacts in certain regions of the world (potentially leading, for example, to food scarcity, conflicts or mass migration) may exacerbate problems that raise humanitarian, trade and national security issues for the United States.8

The U.S. government's May 2014 National Climate Assessment concluded that climate change impacts are already manifesting themselves and imposing losses and costs.9 The report documents increases in extreme weather and climate events in recent decades, with resulting damage and disruption to human well-being, infrastructure, ecosystems, and agriculture, and projects continued increases in impacts across a wide range of communities, sectors, and ecosystems. Those most vulnerable to climate related health effects - such as children, the elderly, the poor, and future generations - face disproportionate risks.10 Recent studies also find that certain communities, including low income communities and some communities of color (more specifically, populations defined jointly by ethnic/racial characteristics and geographic 5 location), are disproportionately affected by certain climate-change-related impacts - including heat waves, degraded air quality, and extreme weather events - which are associated with increased deaths, illnesses, and economic challenges. Studies also find that climate change poses particular threats to the health, well-being, and ways of life of indigenous peoples in the U.S. The National Research Council (NRC) and other scientific bodies have emphasized that it is important to take initial steps to reduce greenhouse gases without delay because, once emitted, greenhouse gases persist in the atmosphere for long time periods. As the NRC explained in a recent report, The sooner that serious efforts to reduce greenhouse gas emissions proceed, the lower the risks posed by climate change, and the less pressure there will be to make larger, more rapid, and potentially more expensive reductions later."11(EPA)

> ***"Solar Energy.*** The WLC Specific Plan requires solar photovoltaic (PV) arrays to be installed on the project buildings to offset the electrical power requirements of the office portion of each proposed warehouse building (WLCSP Section 12.7, Solar Commitment)." (3-56)

Solar only for the office portions of the warehouses isn't sufficient. How will this cover high energy users like those warehouses with refrigeration? At each warehouse site there needs to be multiple EV charging stations for

cars and several need to be DC quick charging units where you can obtain more than 100 miles in less than one hour of charging. These charging stations must also have signs indicating they are available to the public. Each warehouse needs to have enough solar to supply these units with all the electricity they need.

All service yard trucks (hostlers, yard goats, etc.), pallet jacks, forklifts, and other on-site equipment used during operation shall be powered by electricity, natural gas, and/or propane. Electrical power sources shall be provided for service equipment. (3-33)

Natural gas and propane are petroleum based which will add to our air pollution and GHG. When analyzing the benefits of natural gas one must include the environmental impacts caused during extraction or the data will be inadequate. Electricity must be required for all the equipment mentioned in the paragraph found above. Enough solar with batteries must be required of each warehouse, other WLC buildings and covered parking to supply all the electricity required by this equipment.

Large trucks which travel 200 miles per day are already available by several manufacturers like Volvo in the following link:
https://www.tfltruck.com/2019/12/volvo-is-expanding-its-electric-big-rig-truck-lineup/ #10

While electric long haul big rigs are currently available on a limited basis, most experts believe they will be readily available before the planned buildout of the WLC. The following link explains that Volvo had electric trucks on southern California roadways in 2019 and will have at least 23 in 2020.
https://www.greenbiz.com/article/8-electric-truck-and-van-companies-watch-2020 #11
This same article explains that "80% of freight in the United States is transported less than 250".

"In 2018, German automaker Daimler, the largest truck maker in the world, announced its all-electric 18-wheeler: the Freightliner eCascadia.

The big rig has a 250-mile range and was designed for regional transportation and port service" (from the link found above). The article has other Daimler trucks with a 230 mile range which would also allow for port to WLC. These trucks could now be making deliveries from the ports and return without charging. The WLC must require enough solar/batteries on all buildings and parking structures to allow big rigs to run on sunshine. All solar and batteries must be required to be maintained in operation for a least 25 years. Before the WLC buildout long range electric big rigs will be available for use. The WLC needs to require them as they become easily available and require a larger percentage each year.

This plan needs to do more to significantly reduce the use of diesel Auxiliary Power Units (APU). The Sierra Club sees nothing in the environmental documents to analyze their impacts or restrict their use to three or fewer minutes. Your air quality and GHG impacts analysis is significantly inadequate without including almost every

trucker using APU's with the majority being diesel. Moreno Valley can make truck cabs very hot and APU's allow the cab to be air-conditioned as well as other benefits. The WLC must require all warehouses to install electrical hookups at all loading docks to increase the use of electric APU's. They must also be installed at all places trucks park. To help reduce the use of diesel APU's each warehouse must provide an air-conditioned, indoor facility of reasonable size for truck operators, namely a lounge equipped with vending machines, comfortable seating area, restrooms and a television. These rooms must be regularly maintained, cleaned and stocked which will result in truckers leaving their polluting diesel APU's off and instead relax in the lounge.

The WLC needs a robust bicycle path system throughout the project which totally separates the bicyclist from truck/car traffic and connects to all warehouses. They also need to connect to other City bike lanes. The warehouses need to also provide showers for the bikers to encourage more to ride long distances. Each warehouse also needs to provide bicycle lockers in sufficient numbers to meet the needs of all who want to use them. Multi-use trails must be improved by the project and all warehouses and not just set aside land for someone else to improve. These again are safer than sidewalks and encourage people to walk to and from work. These efforts again reduce our air pollution and GHG as well as consume less energy.

The WLC believes they will have buildings in 2023 which is the same year as big rig trucks are required to have 2010 or newer engines. Therefore the idea that the WLC is requiring 2010 is not going above and beyond to reduce its impacts on the Inland Empire's non-attainment air quality and GHG. Using other forms of petroleum in place of diesel for big rigs instead of electric will continue to cause degradation of our poor air quality, and increase GHG. The WLC not only needs maximum roof coverage with solar to accommodate all the above needs for electricity they also need backup batteries and locations on site for quick charging stations to meet the needs of more than 12,000 daily truck trips as well as passenger cars.

It is the Sierra Club's understanding that there is an agreement between the city of Moreno Valley/WLC interests and SCAQMD to drop litigation efforts in return for $.64 per square foot of the more than 40,000,000 sq foot WLC which would result in more than $25,000,000 during the life of the project. The Sierra Club has great confidence in SCAQMD staff that works on warehouse issues, but we do not know if they would need to recuse themselves for further review of the WLC during buildout as the project possibly moves forward. Perhaps the California Air Resources Board (CARB) staff could replace them — if that is the case. You will find below requirements which need to be part of any WLC approval and in some cases the AQMD is also usually involved. These requirements are as if this was a single building

project, but as we know this project could take up to 15 years to complete. It is because of this that each of the areas found below must be required to be updated with new information/requirements at least every three or four years and immediately if SCAQMD and/or CARB adopts new rules/requirements. These must be required if the WLC is truly going to reduce all possible impacts to our non-attainment air-quality, GHG and reduce energy consumption. In some cases the WLC surrounds family homes on three sides and others it is within less than a stones throw. The WLC truck routes go by family homes on Alessandro Blvd, Redlands Blvd (north of SR-60) and Gilman Springs Road as well as other. The WLC will impact the health these families and also all who work within the WLC. Therefore all possible measures must be adopted to reduce pollution and GHG — like others with this letter and the following:

Ensure the cleanest possible construction practices and equipment are used. This includes eliminating the idling of diesel-powered equipment, and providing the necessary infrastructure (e.g. electrical hookups) to support zero and near-zero equipment and tools.

Implement, and plan accordingly for, the necessary infrastructure to support the zero and near-zero emission technology vehicles and equipment that will be operating onsite. This includes the physical (e.g. needed footprint), energy, and fueling infrastructure for construction equipment, onsite vehicles and equipment, and medium-heavy and heavy-heavy duty trucks.

## Include contractual language in tenant lease agreements that requires tenants to use the cleanest technologies available, and to provide the necessary infrastructure to support zero-emission vehicles and equipment that will be operating on-site.

In construction contracts, include language that requires all heavy-duty trucks entering the construction site, during either the grading or building construction phases be model year 2014 or later. Starting in the year 2022, all heavy-duty haul trucks should also meet CARB's lowest optional low-NOx standard.

## Include contractual language in tenant lease agreements that requires future tenants to exclusively use zero-emission light and medium-duty delivery trucks and vans.

Include contractual language in tenant lease agreements that requires all service equipment (e.g., yard hostlers, yard equipment, forklifts, and pallet

jacks) used within the project site to be zero-emission. This equipment is widely available.

Include contractual language in tenant lease agreements that requires all heavy-duty trucks entering or on the project site to be model year 2014 or later today, expedite a transition to zero-emission vehicles, and be fully zero-emission beginning in 2030 as is strongly recommended by CARB.

In construction contracts, include language that requires all off-road equipment with a power rating below 19 kilowatts (e.g., plate compactors, pressure washers, etc.) used during project construction be battery powered.

Include contractual language in tenant lease agreements that requires all loading/unloading docks and trailer spaces be equipped with electrical hookups for trucks with transport refrigeration units (TRU) or auxiliary power units (APU). This will eliminate the amount of time that a TRU powered by a fossil-fueled internal combustion engine can operate from within the project site. Use of zero-emission all-electric plug-in TRUs, hydrogen fuel cell transport refrigeration, and cryogenic transport refrigeration are encouraged and can also be included lease agreements.[2]

Require the use of off-road diesel-powered construction equipment that meets or exceeds the CARB and U.S. Environmental Protection Agency (USEPA) Tier 4 Final off-road emissions standards or cleaner for equipment rated at 50 horsepower or greater during construction of the Proposed Project. Such equipment will be outfitted with Best Available Control Technology (BACT) devices including a CARB certified Level 3 Diesel Particulate Filter (DPFs). Level 3 DPFs are capable of achieving at least 85 percent reduction in particulate matter emissions[21]. A list of CARB verified DPFs are available on the CARB website.

To ensure that Tier 4 Final construction equipment or better would be used during the Proposed Project's construction, South Coast AQMD staff recommends that the Lead Agency include this requirement in applicable bid documents, purchase orders, and contracts. Successful contractor(s) must demonstrate the ability to supply the compliant construction equipment for use prior to any ground disturbing and construction activities. A copy of each unit's certified tier specification or model year specification and CARB or South Coast AQMD operating permit (if applicable) shall be available upon request at the time of mobilization of each applicable unit of equipment.

Additionally, the Lead Agency must require periodic reporting and provision of written construction documents by construction contractor(s) to ensure compliance, and conduct regular inspections to the maximum extent feasible to ensure

compliance. These reports and all others in this section must be made available to the public.

In the event that construction equipment cannot meet the Tier 4 Final engine certification, the Project representative or contractor must demonstrate through future study with written findings supported by substantial evidence that is approved by the Lead Agency before using other technologies/strategies. Alternative applicable strategies may include, but would not be limited to, construction equipment with Tier 4 Interim or Tier 3 emission standards that the Lead Agency has already included in the air quality modeling, reduction in the number and/or horsepower rating of construction equipment, limiting the number of daily construction haul truck trips to and from the Proposed Project, and/or limiting construction phases occurring simultaneously with the remediation activities.

Require the use of zero-emission or near-zero emission heavy-duty haul trucks during construction, such as trucks with natural gas engines that meet the California Air Resources Board's (CARB) adopted optional NOx emissions standard of 0.02 grams per brake horsepower- hour (g/bhp-hr). At a minimum, require that operators of heavy-duty haul trucks visiting the Proposed Project during construction commit to using 2014 model year[23] or newer engines that meet CARB's 2014 engine emission standards of 0.01 g/bhp-hr for particulate matter (PM) and 0.20 g/bhp-hr of NOx emissions or newer, cleaner trucks. Include analyses to evaluate and identify sufficient power available for zero emission trucks and supportive infrastructures in the Energy and Utilities and Service Systems Sections of the Final EIR, where appropriate. Require that contractor(s) maintain records of all trucks visiting the Proposed Project and make these records available to the Lead Agency upon request. The records will serve as evidence to prove that each truck called to the Proposed Project during construction meets the minimum 2010 model year engine emission standards. The Lead Agency must conduct regular inspections of the records to the maximum extent feasible and practicable to ensure compliance with this mitigation measure.

Encourage construction contractors to apply for South Coast AQMD "SOON" funds. The "SOON" program provides funds to applicable fleets for the purchase of commercially-available low-emission heavy-duty engines to achieve near-term reduction of NOx emissions from in-use off-road diesel vehicles. More information on this program can be found at South Coast AQMD's website and searching "SOON": http://www.aqmd.gov/home/programs/business/business-detail?title=off-road-diesel- engines.#12

CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized to minimize or eliminate significant adverse impacts. Since the

Proposed Project's mitigated operational NOx emissions would remain significant and unavoidable, it is recommended that the Lead Agency incorporate the following operational mitigation measures in the Final EIR to further reduce those emissions and to facilitate the 2016 AQMD's goals and timeline for reducing Basin-wide NOx emissions and attaining NAAQS for ozone. For more information on potential mitigation measures as guidance to the Lead Agency, please visit South Coast AQMD's CEQA Air Quality Handbook website[24].Require the use of zero emission (ZE) or near-zero emission (NZE) heavy-duty trucks during operation, such as trucks with natural gas engines that meet CARB's adopted optional NOx emission standard of 0.02 grams per brake horsepower-hour (g/bhp-hr). At a minimum, require that operators of heavy-duty trucks visiting the Proposed Project during operation commit to using 2010 model year[25] or newer engines that meet CARB's 2010 engine emission standards of 0.01 g/bhp-hr for particulate matter (PM) and 0.20 g/bhp-hr of NOx emissions or newer, cleaner trucks. Include analyses to evaluate and identify sufficient power available for ZE trucks and supportive infrastructure in the Energy and Utilities and Service Systems Sections of the Final EIR, where appropriate.

To monitor and ensure ZE, NZE, or 2014 model year trucks are used at the Proposed Project, the Lead Agency should require that operators maintain records of all trucks associated with the Proposed Project's operation, and make these records available to the Lead Agency upon request and public. The records will serve as evidence to prove that each truck called to the Proposed Project during operation meets the minimum 2014 model year engine emission standards. Alternatively, the Lead Agency should require periodic reporting and provision of written records by operators, and conduct regular inspections of the records to the maximum extent feasible and practicable.

Provide at least six percent of electric vehicle (EV) charging stations. Pursuant to the 2016 California Green Building Standards Code, Part 11, nonresidential projects with 201 vehicle parking spaces or more should include EV charging stations in at least six percent of all vehicle parking spaces[26] and should also include designated parking for clean air vehicles in at least eight percent of all vehicle parking spaces[27]. Since the Proposed Project includes 1,000's parking spaces[28] and 1,000's of trailer parking spaces[29], the Lead Agency should require at least six percent of all vehicle parking spaces to include EV charging stations and at least eight percent of all vehicle parking spaces to be designated for clean air vehicles. Vehicles that can operate at least partially on electricity have the ability to substantially reduce NOx emissions. It is important to make this electrical infrastructure available when the Proposed Project is built. The cost of installing electrical charging equipment onsite is significantly cheaper if completed when the project is built compared to retrofitting an existing building. Additionally, electrical panels should be appropriately sized to allow for

future expanded use. Therefore it is recommenced the Lead Agency require the WLC to provide the appropriate infrastructure to facilitate sufficient electric charging for vehicles to plug-in in the final project design.

Additionally, the Lead Agency must include analyses to evaluate and identify sufficient power available for zero emission trucks and supportive infrastructures (e.g., EV charging stations) in the Energy and Utilities and Service Systems Sections of the Final EIR..

Design the Proposed Project such that the dock doors are located as far away as feasible from the residences. This could minimize the exposure of sensitive receptors to DPM from trucks entering/exiting and idling at the Proposed Project.

Create a buffer zone of at least 500 meters (roughly 1,500 feet), which can be office space, employee parking, greenbelt, etc. between the Proposed Project and sensitive receptors (e.g., residences)..

Design the Proposed Project such that entrances and exits are such that trucks are not traversing past residences, and other sensitive receptors near the Proposed Project.

Design the Proposed Project such that any check-in point for trucks is well inside the Proposed Project site to ensure that there are no trucks queuing outside of the facility and ensure that truck traffic within the Proposed Project site is located away from the property line(s) closest to the sensitive receptors (e.g., residences).

Limit the daily number of truck trips allowed at the Proposed Project to the level that was analyzed in the Final EIR. If higher daily truck volumes are anticipated during operation than what was analyzed in the certified Final EIR, the Lead Agency must commit to re-evaluating the Proposed Project's air quality and health risks impacts through a CEQA process prior to allowing higher activity levels (CEQA Guidelines Section 15162).

Require trucks to use the truck routes that were used to analyze the air quality and HRA impacts in the Final EIR.

Have truck routes clearly marked with trailblazer signs, so that trucks will not enter residential areas that are adjacent to portions of the designated truck routes analyzed in the Final EIR.

Restrict overnight truck parking in residential areas. Establish parking within the Proposed Project where trucks can rest overnight.

Establish area(s) within the Proposed Project site for repair needs and ensure that these designated areas are away from any sensitive land uses.

Maximize the use of solar energy including solar panels. Installing the maximum possible number of solar energy arrays on the building roofs and/or on the Proposed Project site to generate solar energy for the warehouse and/or EV charging stations.

Require the use of electric landscaping equipment, such as lawn mowers and leaf blowers.

Require use of electric or alternatively fueled sweepers with HEPA filters.

Maximize the planting of trees in landscaping and parking lots. Use light colored paving materials.Utilize only Energy Star heating, cooling, and lighting devices, and appliances.

To facilitate stronger collaboration between Lead Agencies and South Coast AQMD to reduce community exposure to source-specific and cumulative air pollution impacts, South Coast AQMD adopted the *Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning*[30] in 2005. Additional guidance is available in the California Air Resources Board (CARB) *Air Quality and Land Use Handbook: A Community Health Perspective*, available at: https://www.arb.ca.gov/ch/handbook.pdf. #13 For warehouses that accommodate more than 100 trucks per day, or more than 40 trucks with operating TRUs per day, a 1,000-foot separation between sensitive land uses (e.g., residential uses)[31] and the operating warehouse is recommended. Because the Proposed Project includes operation of warehouse that would accommodate up to 640 heavy-duty truck trips per day[32], South Coast AQMD staff recommends that the Lead Agency review and consider these guidance when making local planning and land use decisions.

Implementation of the Proposed Project may require permits from South Coast AQMD. If operation of the Proposed Project will involve the use of any stationary diesel-fueled internal combustion or compression engines (i.e., generators or firefighting equipment), South Coast AQMD Rule 1470 – Requirement for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines[33] and South Coast AQMD Rule Series 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters[34], including Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters[35] and Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water

Heaters and Small Boilers and Process Heaters[36] would apply and should be discussed in the Air Quality Section of the Final EIR. Additionally, in the event that the use of three or more Stationary Emergency Standby Diesel-Fueled Internal Combustion Engines rated at greater than 50 brake horsepower (>50 bhp) is reasonably foreseeable, the Lead Agency should include a discussion on South Coast AQMD Rule 1472 – Requirement for Facilities with Multiple Stationary Emergency Standby Diesel-Fueled Internal Combustion[37]. Therefore, South Coast AQMD staff recommends that the Lead Agency consult with South Coast AQMD Permitting and Engineering staff as early as feasible to determine permit requirements and any applicable rules and regulations that should be discussed in the Final EIR for the Proposed Project. Additionally, in the event that the Proposed Project will use new stationary equipment that requires a permit from South Coast AQMD, the Lead Agency should identify South Coast AQMD as a Responsible Agency for the Proposed Project in the Final EIR. Questions on permits and applicable South Coast AQMD rules can directed to South Coast AQMD's Engineering and Permitting staff.

The World Logistic Center must take responsibility for its share of the GHG problem and not assume it is being resolved with some aspect of Cap and Trade. This must include the health of the residents and environment in the area. The WLC will prejudice Moreno Valley's current on and off efforts with its General Plan update, because it will require an Environmental Justice Element. This RFEIR is inadequate because it doesn't have an environmental justice section.

Figure 16 of the revised FEIR appendices needs to show a Figure with the WLC traffic included along with the additional cumulative and growth inducing impacts. Figure 17 uses data that is at least six years old and needs to also be updated and new analysis included throughout the document. Please keep the Sierra Club updated of all meetings and documents related to the WLC by using this email and the address found below.

Sincerely,
George Hague
Conservation Chair
Moreno Valley Group
Sierra Club
P.O. Box 1325, Moreno Valley, CA 92556-1325

in Plant Science (https://www.frontiersin.c

**REVIEW ARTICLE**

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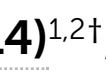
# Phylloremediation of Air Pollutants: Exploiting the Potential of Plant Leaves and Leaf-Associated Microbes


**Xiangying Wei (http://www.frontiersin.org/people/u/369714)**[1,2†], **Shiheng Lyu (http://www.frontiersin.org/people/u/356300)**[2,3†], **Ying Yu**[3], 
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Air pollution is air contaminated by anthropogenic or naturally occurring substances in high concentrations for a prolonged time, resulting in adverse effects on human comfort and health as well as on ecosystems. Major air pollutants include particulate matters (PMs), ground-level ozone ($O_3$), sulfur dioxide ($SO_2$), nitrogen dioxides ($NO_2$), and

volatile organic compounds (VOCs). During the last three decades, air has become increasingly polluted in countries like China and India due to rapid economic growth accompanied by increased energy consumption. Various policies, regulations, and technologies have been brought together for remediation of air pollution, but the air still remains polluted. In this review, we direct attention to bioremediation of air pollutants by exploiting the potentials of plant leaves and leaf-associated microbes. The aerial surfaces of plants, particularly leaves, are estimated to sum up to $4 \times 10^8$ km$^2$ on the earth and are also home for up to $10^{26}$ bacterial cells. Plant leaves are able to adsorb or absorb air pollutants, and habituated microbes on leaf surface and in leaves (endophytes) are reported to be able to biodegrade or transform pollutants into less or nontoxic molecules, but their potentials for air remediation has been largely unexplored. With advances in omics technologies, molecular mechanisms underlying plant leaves and leaf associated microbes in reduction of air pollutants will be deeply examined, which will provide theoretical bases for developing leaf-based remediation technologies or phylloremediation for mitigating pollutants in the air.

## Introduction

Air pollution is referred to as the presence of harmful or poisonous substances in the earth's atmosphere, which cause adverse effects on human health and on the ecosystem. Major air pollutants include particulate matters (PMs), nitrogen oxides ($NO_2$), sulfur dioxide ($SO_2$), ground-level ozone ($O_3$), and volatile organic compounds (VOCs) (Archibald et al., 2017). Various effects of some common air pollutants on human comfort and health are presented in Table 1, ranging from respiratory illness, cardiovascular disease to bladder and lung cancer (Kampa and Castanas, 2008).

TABLE 1

(https://www.frontiersin.org/files/Articles/270745/fpls-08-01318-HTML/image_m/fpls-08-01318-t001.jpg)

**Table 1**. Major air pollutants and their effects on human comfort and health.

The world has experienced unprecedented urban growth during the last three decades. Urban population is expected to increase at 2.3% per year in developing countries from 2000 to 2030 (Brockherhoff, 2000; United Nations, 2000, 2004; UNFPA, 2004). Urbanization is often associated with rapid economic growth. For example, China's urbanization grew from 17.92% in 1978 to 52.57% in 2012, and China's gross domestic products (GDPs) increased from 454.6 billion Chinese Yuan in 1980 to 51,894.2 billion Yuan in 2012 (Zhao and Wang, 2015). The increased economic growth has been accompanied with elevated energy consumption. China's energy

consumption, primarily fossil fuels like coal, increased from 602.75 million tons in 1980 to 3,617.32 million tons in 2012 (Zhao and Wang, 2015). The increased combustion of fossil fuels with relatively low combustion efficiency along with weak emission control measures have resulted in drastic increases in air pollutants, such as PMs, $SO_2$, $NO_2$, $O_3$, and VOCs. Per unit of GDPs in 2006, China emitted 6–33 times more pollutants than the United States (US). As a result, air quality has become a major focus of environmental policy in China. India experiences similar situations as China. Urbanization coupled with rapid economic development in India increased energy consumption and also air pollution in some megacities (Gurjar et al., 2016). For example, $PM_{10}$ in Delhi was almost 10 times of the maximum $PM_{10}$ limit at 198 μg $m^{-3}$ in 2011 (Rizwan et al., 2013). Concentrations of major pollutants in the air of some selected cities are present in Table 2.

**TABLE 2**

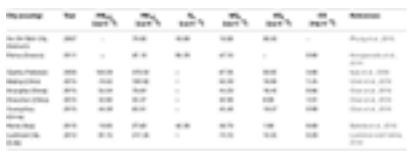

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**Table 2**. Concentrations of some major air pollutants in the air of selected cities.

The World Health Organization (WHO) air quality guidelines stated that the mean limits for annual exposure to $PM_{2.5}$ (particle diameters at 2.5 μm or less) and $PM_{10}$ (particle diameter at 10 μm or less) are 10 μg $m^{-3}$ and 25 μg $m^{-3}$, respectively; and the limits for 24-h exposure are 25 μg $m^{-3}$ and 50 μg $m^{-3}$, respectively. The limit for 8-h exposure to $O_3$ is 100 μg $m^{-3}$. Annual mean for $NO_2$ is 40 μg $m^{-3}$ or 200 μg $m^{-3}$ for 1 h, and 24-h exposure to $SO_2$ is 20 μg $m^{-3}$ or 500 μg $m^{-3}$ for 10 min (WHO, 2006). The results presented in Table 2 suggest that residents in some of the listed cities were exposed to air contamination far beyond the limits set by WHO. PMs have become the most pressing environmental problems in China and India. For example, during the first quarter of 2013, China experienced extremely severe and persistent haze pollution that directly affected about 1.3 million $km^2$ and about 800 million people (Huang et al., 2014). Of which daily average concentrations of $PM_{2.5}$ measured at 74 major cities exceeded the Chinese pollution standard of 75 μg $m^{-3}$, which is approximately twice that of the US EPA (United States Environmental Protection Agency) standard of 35 μg $m^{-3}$, for 69% of days in January, with a record-breaking daily concentration of 772 μg $m^{-3}$ (Huang et al., 2014).

Recent studies from the International Agency for Research on Cancer showed that there were 223,000 deaths in 2010 due to air pollution-resultant lung cancer worldwide, and air pollution has become the most widespread environmental carcinogen (International Agency for Research on Cancer, 2013). The WHO reported that around 7 million people died of air pollution exposure directly or indirectly in 2012. This data was more than double previous estimates and confirmed that air pollution has become a substantial burden to human health and is the world's largest single environmental health risk (WHO, 2014). Additionally, air pollution also harms animals, plants, and ecological resources including water and soils (Vallero, 2014; Duan et al., 2017).

## Measures for Reducing Air Pollution

To reduce air pollution, the first step is to eliminate or reduce anthropogenic-caused emissions. The second step is to remediate existing pollutants. Different strategies, policies, and models for air pollution abatement have been proposed or implemented (Macpherson et al., 2017). For example, the Chinese government has imposed restrictions on major pollution sources including vehicles, power plants, transport, and industry sectors (Liu et al., 2016) and promulgated the "Atmospheric Pollution Prevention and Control Action Plan" in September 2013, which was intended to reduce $PM_{2.5}$ by 25% by 2017 relative to 2012 levels (Huang et al., 2014). Science-based technologies have been developed for control of air pollutants, such as diesel particulate filters (Tsai et al., 2011) and activated carbon filtering as adsorbent for xylene and $NO_2$ (Guo et al., 2001). Catalytic oxidization and chemisorption methods have been used for indoor formaldehyde removal (Pei and Zhang, 2011; Wang et al., 2013). Photocatalysis as one of the most promising technologies has been used for eliminating VOCs (Huang et al., 2016).

Air pollutants can also be mitigated through biological means, commonly referred to as biological remediation or bioremediation. It is the use of organisms to assimilate, degrade or transform hazardous substances into less toxic or non toxic ones (Mueller et al., 1996). Plants have been used for remediation of pollutants from air, soils, and water, which has been termed as phytoremediation (Cunningham et al., 1995; Salt et al., 1995; Huang et al., 1997). Microbes such as bacteria and fungi are also capable of biodegrading or biotransforming pollutants into non toxic and less toxic substances, which is known as microbial biodegradation (Ward et al., 1980; Ma et al., 2016). Microbes as heterotrophs occur nearly everywhere, including plant roots and shoots. Both roots and shoots have been reported to be able to remediate air pollutants (Weyens et al., 2015; Gawronski et al., 2017), but little credit has been given to microbe activity.

Plant shoots or the above-ground organs of plants colonized by a variety of bacteria, yeasts, and fungi are known as phyllosphere (Last, 1955). However, most scientific work on phyllosphere microbiology has been focused on leaves (Lindow and Brandl, 2003). This review is intended to explore the potential of plant leaves and leaf-associated microbes in bioremediation of air pollutants, or simply known as phylloremediation. Phylloremediation was first coined by Sandhu et al. (2007), who demonstrated that surface-sterilized leaves took up phenol, and leaves with habiated microbes or a inoculated bacterium were able to biodegrade signficantly more phenol than leaves alone. Previous reports also documented that both plant leaves and leaf-associated microbes mitiagted air pollutants, such as azalea leaves and the leaf-associated *Pseudomonas putida* in reducing VOCs (De Kempeneer et al., 2004), leaves of yellow lupine plants along with endophytic *Burkholderia cepacia* for toluene reduction (Barac et al., 2004), and poplar leaves and the leaf-associated *Methylobacterium* sp. decreased xenobiotic compounds (Van Aken et al., 2004). Phyllo originated from Greek word of phullon, meaning leaf. Thus, phylloremediation should be defined as a natural process of bioremediation of air pollutants through leaves and leaf-associated microbes, not the microbes alone.

## Plant Leaves and Phyllosphere

Leaves are the primary photosynthetic organs with distinctive upper surface (adaxial) and lower surface (abaxial) (Figure 1). The upper surface has a layer (<0.1–10 μm) of waxy cover called cuticle (Kirkwood, 1999). Wax contents and compositions frequently differ among plant species. The primary function of cuticle is to prevent evaporation of water from leaf surfaces, and it is also the first barrier for the penetration of xenobiotics. The leaf surface is filled with trichomes, which are epidermal outgrowths in various forms. Trichomes play roles in mechanical defense because of their physical properties and also in biochemical defense due to the secretion of secondary metabolites (Tian et al., 2017). Epidermis cells are directly underneath the cuticle layer in which stomata often occur. Xylem and phloem are situated within the veins of leaves as the plant vascular system, which are connected from root tips to leaf edges. There is a layer of compactly arranged cells around the vein called bundle sheath regulating substance circle around the xylem and the phloem. Xylem transports water and nutrients from roots to shoots, and phloem transports assimilated products from source and sink tissues. Under the epidermis, there are mesophyll cells in two layers: column-like palisade cells and loosely packed spongy cells. The air spaces among the spongy cells promote gas exchange, and photosynthesis takes place in chloroplasts packed in the mesophyll cells. The underside of leaves also has a layer of epidermal cells where most stomata are located. There are two guard cells surround the stomata, and stomatal pore opening and closure is regulated by changes in the turgor pressure of the guard cells. Stomata regulate the flow of gases in and out of leaves and also able to adsorb or absorb other chemicals.

**FIGURE 1**

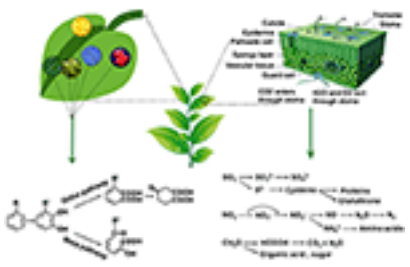

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**Figure 1**. A schematic illustration of phyllosphere. The middle panel represent an aerial part of a plant. Right panel shows a magnified schematic cross section of a leaf where leaf surface and trichomes can retain particulate matter (PMs) and stomata adsorb or absorb PMs as well as how leaves can assimilate $SO_2$, $NO_2$, and $CH_2O$ (formaldehyde) to simple organic compounds, amino acids, or proteins. The left panel depict a magnified leaf surface with bacteria, which can biodegrade or transform volatile organic compounds to less toxic or nontoxic ones like benzene and its derivatives that can be degraded through Ortho pathway or Meta pathway.

Leaves also play pivotal roles in supporting phyllosphere microbes (Bringel and Couee, 2015). The phyllosphere is estimated to have area up to $4 \times 10^8$ $km^2$ on the earth and is the home for up to $10^{26}$ bacterial cells (Kembel et al., 2014). Phyllosphere bacterial communities are generally dominated by Proteobacteria, such as *Methylobacterium* and *Sphingomonas*. *Beijerinckia, Azotobacter, Klebsiella*, and Cyanobacteria like *Nostoc, Scytonema*, and *Stigonema* also reside in the phyllosphere (Vacher et al., 2016). Population of γ-Proteobacteria such as *Pseudomonas* could be high as well (Delmotte et al., 2009; Fierer et al., 2011; Bodenhausen et al., 2013; Kembel et al., 2014). Dominant fungi in the phyllosphere include Ascomycota, of which the most common genera are *Aureobasidium, Cladosporium*, and *Taphrina* (Coince et al., 2013; Kembel and Mueller 2014). Basidiomycetous yeasts belonging to the genera *Cryptoccoccus* and

*Sporobolomyces* are also abundant in phyllosphere (Cordier et al., 2012; Ottesen et al., 2013). The microbes can be epiphytic by living on the surface of plant organs and/or endophytic occurring within plant tissues without causing apparent disease.

Plant species significantly influence the composition of a phyllosphere community (Whipps et al., 2008). In a study of 56 different tree species, Redford et al. (2010) reported that different species harbor distinct microbial communities in phyllosphere. This principle was also confirmed for trees in temperate and tropical climates and for Mediterranean perennials (Lambais et al., 2006; Kim et al., 2012; Vokou et al., 2012; Kembel et al., 2014; Laforest-Lapointe et al., 2016). Using high-throughput sequencing technology, Kembel and Mueller (2014) studied fungal communities on leaves of 51 tree species in a lowland tropical rainforest in Panama and reported that fungal communities on leaves were dominated by the phyla Ascomycota, which accounted for 79% of all sequences, followed by Basidiomycota (11%) and Chytridiomycota (5%). More than half of the variation in fungal community composition could be explained by plant species differences. Leaf chemistry and morphology as well as plant growth status and mortality were closely related to fungal community structure (Kembel and Mueller, 2014). These results may suggest that different tree species host different fungal communities. Additionally, microbial compositions within plant species may differ due to geographic locations (Finkel et al., 2012; Qvit-Raz et al., 2012; Rastogi et al., 2012). The differences could be caused by climatic variation (Finkel et al., 2011) or due to the limited dispersal of the colonizing taxa (Finkel et al., 2012; Qvit-Raz et al., 2012). Furthermore, phyllosphere microbial community may differ between urban and non-urban locations (Jumpponen and Jones, 2010) and also differ by seasons (Redford and Fierer, 2009).

## Roles of Leaves and Phyllosphere Microbes in Air Remediation

The close association between plant species and specific microbial communities in the phyllosphere suggests their adaptation and coevolutionary relationships. Recent studies show that leaf bacterial diversity mediates plant diversity and ecosystem function relationships (Laforest-Lapointe et al., 2017). We hypothesize that a long-lasting exposure of leaves and leaf-associated microbes to air pollutants could result in plants or microbes individually or coordinately developing mechansims for adapting to the polluted substances. Such mechanisms may include leaf adsorption or absorption and pollutant assimilation as well as microbial biodegradation, transformation or metabolic assimilation of the substances. The coordination between leaves and micriobes could be synergistic or antagonistic. Table 3 presents plant-supported microbes that are able to biodegrade or biotransform air pollutants, primarily organic compounds. However, information regarding phyllospere microbes in remediation of PMs, $SO_2$, $NO_2$, and $O_3$ is scarce, suggesting relatively limited research has been devoted to microbial roles. Thus, the current knowledge on phylloremediation of PM, $SO_2$, $NO_2$, and $O_3$ is mostly come from plants.

TABLE 3

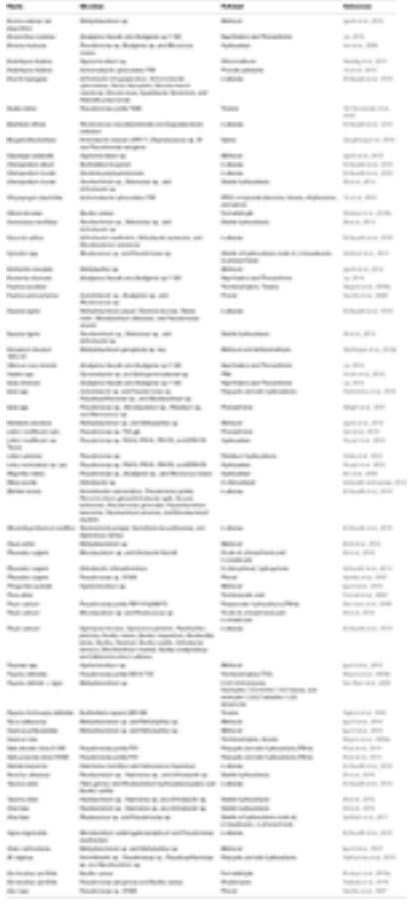

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**Table 3**. Plant-supported microbes that are able to biodegrade or biotransform air pollutants.

## Remediation of PMs

As mentioned above, PMs have become the most dangerous pollutants in some countries. Chemical species of PMs, derived from the available data over China included $SO_4^{2-}$, $NO_3^-$, $NH_4^+$ $NH_4^+$, organic carbon, and elemental carbon, which were in a range of 2.2–60.9, 0.1–35.6, 0.1–29.8, 1.5–102.3, 0.2–37.0 μg $cm^{-3}$ in $PM_{2.5}$, and 1.6–104.6, 0.5–46.6, 0.2–31.0, 1.7–98.7, and 0.3–26.8 μg $cm^{-3}$ in $PM_{10}$, respectively (Zhou et al., 2016). $PM_{2.5}$ is the major component of $PM_{10}$, accounting for 65%. PMs are also composed of microorganisms. In a study of PMs in Jeddah, Saudi Arabia (Alghamdi et al., 2014), the average concentrations of $PM_{10}$ and $PM_{2.5}$ were 159.9 and 60 μg $cm^{-3}$, respectively and the concentrations of $O_3$, $SO_2$, and $NO_2$ averaged 35.73, 38.1, and 52.5 μg $cm^{-3}$, respectively. Microbial loads were higher in $PM_{10}$ than $PM_{2.5}$. *Aspergillus fumigatus* and *Aspergillus niger* were the common fungal species associated with PMs. Microbes were also found in PMs in Austria (Haas et al., 2013), including fungi from genera *Aspergillus, Cladosporium*, and *Penicillium* and aerobic mesophilic bacteria. Using metagenomic methods, Cao et al. (2014) identified 1,315 distinct bacterial and archaeal species from 14 PM samples collected from Beijing, China. The most abundant phyla were Actinobacteria, Proteobacteria, Chloroflexi, Firmicutes, Bacteroidetes, and Euryarchaeota. Among them, an unclassified bacterium in the nitrogen fixing, filamentous bacteria genus Frankia was the most abundant, and the most abundant classified bacterial species appeared to be *Geodermatophilus obscures*. The abundance of airborne bacteria was reported to be in a range from $10^4$ to $10^6$ cells $m^{-3}$ depending on environmental conditions (Bowers et al., 2011), and materials of biological origin might account for up to 25% of the atmospheric aerosol (Jaenicke, 2005). Ammonia oxidizing archaea (AOA), ammonia oxidizing bacteria (AOB), and complete ammonia oxidizers (Comammox) were identified in $PM_{2.5}$ collected from the Beijing-Tianjin-Heibei megalopolis, China (Gao et al., 2016). Of which *Nitrosopumilus* subcluster 5.2 was the most dominant AOA, *Nitrosospira multiformis* and *Nitrosomonas aestuarii* were the most dominant AOB, and the presence of Comammox was revealed by the occurrence of *Candidatus* Nitrospira inopinata. The mean cell numbers of AOA, AOB, and *Ca*. N. inopinata were $2.82 \times 10^4$, $4.65 \times 10^3$, and $1.15 \times 10^3$ cell $m^{-3}$, respectively. The

average maximum nitrification rate of $PM_{2.5}$ was 0.14 μg ($NH4^+$-N) [$m^3$ air h]$^{-1}$ (Gao et al., 2016). AOA might account for most of the ammonia oxidation, followed by Comammox, while AOB were responsible for a small part of ammonia oxidation. The assay of nitrification activity was performed in laboratory conditions (Gao et al., 2016). However, the nitrification potential of such bacteria in PMs after being deposited on leaf surfaces is unknown. We hypothesize that the nitrification process could be more active once such PM-containing bacteria settled on leaves. Further investigation on nitrification of PM-associated bacteria in the phyllosphere could provide insight into how the phyllosphere could potentially act as manufactories in the nitrification of ammonia.

The current literature regarding phylloremediation of PMs has been primarily focused on plant leaves. Plant canopy is a sink for PMs. This is due to the fact that leaves are in the air and they span more than $4 \times 10^8$ $km^2$ on a global scale, which is about 78.4% of the total surface area of the earth; leaves thus physically act as a natural carrier for PMs. Leaves differ greatly in surface structure and metabolic secreted substances as well as microbial composition. The amount of surface waxes and compositions show different capacity to retain and embrace PMs. Sbø et al. (2012) studied leaves of 22 trees and 25 shrubs in accumulation of PMs in Norway and Poland and found that PM accumulation differed by 10 and 15 folds depending on plant species in the two locations and also positive correlations occurred among PM accumulation, leaf wax contents, and leaf hair density. Thirteen woody species were examined by Popek et al. (2013) during a 3-year period, and total amount of PMs captured by leaves ranged from 7.5 mg $cm^{-2}$ by *Catalpa bignonioides* to 32 mg $cm^{-2}$ by *Syringa meyeri*. Leaf wax contents were significantly correlated with the amount of PMs on leaves. Among the PMs captured, 60% was washable by water, and 40% could be washed by chloroform only, suggesting that the PMs were embraced in waxes. Using two photon excitation microscopy (TPEM), Terzaghi et al. (2013) investigated leaves of stone pine (*Pinus pinea*), cornel (*Cornus mas*), and maple (*Acer pseudoplatanus*) in capture and encapsulation of PMs. The authors found that particles ranging from 0.2 to 70.4 μm were visualized on leaves, of which $PM_{2.6}$ was the dominant size across plant species. Particle less than 10.6 μm were encapsulated in the cuticle. Plant species differed in particle retention and encapsulation, which were attributed to leaf characteristics, cuticle chemical composition and structure.

Leaf physical characteristics such as leaf shape, hairs or trichomes, and stomata significantly affect PM accumulation. Needle leaves were reported to accumulate more $PM_{2.5}$ than broad leaves (Terzaghi et al., 2013; Chen et al., 2017). The effectiveness was attributed to the higher capture efficiency and higher Stoke's numbers of needles compared to those of broad leaves (Beckett et al., 2000). Additionally, small individual leaf area and abundant wax layer also contribute to the effectiveness (Chen et al., 2017). Leaf trichomes have been shown to increase $PM_{2.5}$ accumulation. The trichome density was positively correlated with amount of $PM_{2.5}$ accumulated on leaves, and plant species with abundant hairs, such as *Catalpa speciosa, Broussonetia papyrifera*, and *Ulmus pumila* were able to retain more $PM_{2.5}$ than those with fewer hairs (Chen et al., 2017). The adaxial surface of leaves accumulated more PMs than the abaxial leaf surface (Baldacchini et al., 2017), which is probably due to the fact that the abaxial surface in general has few trichomes and less rough surface. Stomata may play some roles in accumulation of PMs. The length of stomata ranges from 10 to 80 μm and densities varies from 5 to 1,000 $mm^{-2}$ depending on plant species and

environmental conditions (Hetherington and Woodward, 2003). Stomatal pore areas range from 46 to 125 $\mu m^2$ (Peschel et al., 2003; Dow et al., 2014), thus stomata could retain or adsorb either $PM_{2.5}$ or $PM_{10}$. A study of PM deposition on leaves of five evergreen species in Beijing, China showed that PM diameter up to 2 μm was in the stomatal cavity (Song et al., 2015). Rai (2016) studied the effects of PMs on 12 common roadside plant species and found that stomatal sizes were reduced due to air dust deposition, but plant growth was not affected, suggesting the potential of plants in adsorbing air pollutants.

Growing evidence has suggested that plant leaves are able to capture PMs and act as biofilters. On average, the upper leaf surface of 11 plant species intercepted 1,531 particles per $mm^{-2}$ (Wang et al., 2006). Needles of *Pinus sylvestris* accumulated 18,000 mineral particles per $mm^2$ (Teper, 2009). Upper leaves of *Hedera helix* captured about 17,000 particles per $mm^2$ (Ottele et al., 2010). Trees removed 1,261 tons of air pollutants in Beijing, of which 772 tons were $PM_{10}$(Yang et al., 2005). In New Zealand, urban trees removed 1,320 tons of particular matter annually due to the existence of woodlands in Auckland (Cavanagh and Clemons, 2006). Nowak et al. (2014) showed trees within cities removed fine particles from the atmosphere and consequently improved air quality and human health. Tree effects on $PM_{2.5}$ concentrations and human health are modeled for 10 U.S. cities. The total amount of $PM_{2.5}$ removed by trees varied from 4.7 tons in Syracuse to 64.5 tons in Atlanta in the U.S annually. All the reported removal of PMs is attributed to plant leaves. It is unknown at this time if phyllosphere microbes could break down the PMs on leaves and if mineral elements released from the broken PMs could become plant nutrients. Considering the fact that the microbes can biodegrade a wide range of substances including petroleum, we hypothesize that some microbes should be able to break down PM. Future research in this regard will be conducted, and identified microbes could be used for PM reduction.

## Remediation of $SO_2$

Sulfur dioxide ($SO_2$) was among the first air pollutants identified to harm human health and ecosystems. The combustion of fossil fuels has substantially increased $SO_2$ in the air. China has contributed to about one-fourth of global $SO_2$ emission since 1990 (Zhang et al., 2013). The emission of $SO_2$ from Guangdong province totaled 1,177 Gg in 2007, of which 97% was emitted by power plants and industries (Lu et al., 2010). $SO_2$ can be oxidized photochemically or catalytically to sulfur trioxide ($SO_3$) and sulfate ($SO_4^{2-}$ $SO_4^{2-}$) in the air (Bufalini, 1971). With the presence of water, $SO_3$ is converted rapidly to sulfuric acid ($H_2SO_4$), which is commonly known as acid rain. While in sulfur assimilation, $SO_4^{2-}$ $SO_4^{2-}$ is reduced to organic sulfhydryl groups (R-SH) by sulfate-reducing bacteria, fungi, and plants. Sulfur oxidizing bacteria such as *Beggiatoa* and *Paracoccus* are able to oxidize reduced sulfur compounds like $H_2S$ to inorganic sulfur, and thiosulfate to form sulfuric acid (Pokoma and Zabranska, 2015). Sulfate reducing bacteria like *Archaeoglobus* and *Desulfotomaculum* can convert sulfur compounds to hydrogen sulfide ($H_2S$). Oxidation of $H_2S$ produces elemental sulfur ($S^0$), which is completed by the photosynthetic green and purple sulfur bacteria and some chemolithothrophs. Further oxidation of elemental sulfur produces sulfate. Sulfate is assimilated through the sulfate activation pathway, which is consisted of three reactions: the synthesis of adenosine 5′-phosphorylation of (APS), the hydrolysis of GTp, and the 3′-phosphorylation of APS to produce 3′-phosphoadenosine 5′-phosphosulfate (PAPS)

(Sun et al., 2005). In *Mycobacterium tuberculosis*, the entire sulfate activation pathway is organized into a single complex (Sun et al., 2005). Additionally, sulfate reducing bacteria have been shown to use hydrocarbons in pure cultures, which can be used for bioremediation of benzene, toluene, ethylbenzene, and xylene in contaminated soils (Muyzer and Stams, 2008). Such bacteria may also colonize leaf surfaces and could be used for remediation of air pollutants.

Plant leaves absorb $SO_2$ via stomata. At apoplastic pH, it is hydrated and oxidized successively to sulfite and sulfate, both of which can inhibit photosynthesis and energy metabolism if they accumulate to a high concentration. Such inhibition can cause $SO_2$ toxicity. Symptoms include interveinal chlorosis and necrosis in broad-leaved species, and chlorotic spots and brown tips in pine conifers (Rennenberg, 1984). Until the 1970s, $SO_2$ was considered to be a key contributor of acid rain causing forest dieback (Bloem et al., 2015). Interestingly, when the Clean Air Acts came into action in the 1980s, the reduction in atmosphere $SO_2$ resulted in sulfur (S) deficiency in crops, particularly *Brassica* species. The S deficiency was responsible for the increased incidence of disease caused by *Pyrenopeziza brassicae* (Bloem et al., 2015). The explanation is that plants could become injured in a $SO_2$ concentration range from 131 to 1,310 μg $m^{-3}$; plants, however, can rapidly assimilate $SO_2$ and $H_2S$ into reduced sulfur pools such as cysteine and sulfates as illustrated in Figure 1. A recent transcriptome analysis of *Arabidopsis* responses to $SO_2$ showed that plant adaptation to $SO_2$ evokes a comprehensive reprogramming of metabolic pathways including NO and reactive oxygen species (ROS) signaling molecules, and also plant defense response pathways (Zhao and Yi, 2014). The importance of this study revealed that plant responses to $SO_2$ stress is at the transcription level with initial activation of cross tolerance and followed by sulfur assimilation pathways. Cysteine metabolism in particular is associated with the network of plant stress responses, thus improving plant growth in soils where sulfur supply is limited (Bloem et al., 2015). It has been shown that an atmospheric level of 79 ng $m^{-3}$ $SO_2$ could contribute to 10–40% of leaf sulfur assimilation (De Kok et al., 2007; Zhao et al., 2008). Elevated $SO_2$ concentrations around natural $CO_2$ springs have been documented to enhance accumulation of sulfur metabolites and proteins in surrounding vegetation (Rennenberg, 1984). Therefore, plants can be selected for growing in $SO_2$ polluted environments (Chung et al., 2010). In 2000, about 42.62 Mg of $SO_2$ was removed from the atmosphere by urban trees in Guangzhou, China (Zhang et al., 2013). Additionally, S metabolism can be genetically engineered for improving plant resistance to $SO_2$. Transgenic tobacco plants overexpressing cysteine synthase or serine acetyltransferase gene were highly tolerant to $SO_2$ and sulfite (Noji et al., 2001).

## Remediation of $NO_x$

There are several oxides of nitrogen (N) in the atmosphere: nitrogen dioxide ($NO_2$), nitric oxide (NO), nitrous oxide ($N_2O$), nitrogen trioxide ($N_2O_3$), and nitrogen trioxide ($N_2O_5$). Among them, the USEPA regulates $NO_2$ only because it is the most prevalent form of $NO_x$ generated anthropogenically (USEPA, 1999). $NO_2$ also participates in the formation of ozone ($O_3$) and NO. $NO_x$ emissions in China increased rapidly from 11.0 Mt in 1995 to 26.1 Mt in 2010. Power plants, industry, and transportation were major sources of $NO_x$ emissions, accounting for 28.4, 34.0, and 25.4% of the total $NO_x$ emissions in 2010, respectively (Zhou et al., 2013). The total $NO_x$ emissions in China are projected to increase 36% based on the 2010 value by 2030.

A group of bacteria like *Azotobacter* and *Rhizobium* and fungi such as mycorrhizas are capable of fixing atmospheric N. *Cyanobacteria* are able of using a variety of inorganic and organic sources of combined N, like nitrate, nitrite, ammonium, urea or some amino acids. These microbes are often associated with plant roots. Nitrifying bacteria including species from the genera *Nitrosomonas, Nitrosococcus, Nitrobacter*, and *Nitrococcus* oxidize ammonia to hydroxylamine, and nitrite oxidoreductase oxidizes nitrite to nitrate. Nitrifying bacteria thrive in soils, lakes, rivers, and streams with high inputs and outputs of sewage, wastewater and freshwater because of high ammonia content. Phyllosphere diazotrophic bacteria, like *Beijerinckia, Azotobacter*, and *Klebsiella* and also Cyanobacteria, such as *Nostoc, Scytonema*, and *Stigonema* can use atmospheric dinitrogen ($N_2$) as a source of nitrogen (Whipps et al., 2008). $N_2$ is fixed by the nitrogenase enzyme encoded by *nif* genes, and the gene *nifH* has been widely used for analysis of their community structure (Fürnkranz et al., 2008; Rico et al., 2014). The abundance of $N_2$-fixing bacteria was also reported to improve drought tolerance, suggesting their adaptability to plants grown in different environmental conditions (Rico et al., 2014).

Plants absorb gaseous $NO_2$ more rapidly than NO because $NO_2$ reacts rapidly with water while NO is almost insoluble. The uptake of $NO_2$ per unit leaf area was reported to be nearly three times that of NO when the two gases occurred in the same concentration (Law and Mansfield, 1982). As a result, $NO_2$ has been considered to be more toxic than NO. Visible symptoms resulting from $NO_2$ exposure are relatively large, irregular brown or black spots. However, phytotoxicity of $NO_2$ is rare and much less than $SO_2$ and $O_3$. This is due to the fact that $NO_x$ are plant nutrients. When NO and $NO_2$ are absorbed and dissolved in the extracellular solution of leaves, they form nitrate ($NO_3$) and $NO_2$ in equal amounts and proton ($H^+$). $NO_3$ is then utilized by plants in the same way as it is absorbed from roots and used as a nitrogen source for synthesizing amino acids and proteins (Figure 1). Foliar absorption of $NO_2$ varies widely depending on plant species. Morikawa et al. (1998) studied 217 herbaceous and woody species in uptake of $NO_2$ and found that plant species differed by 657 folds in $NO_2$ uptake and assimilation. The most efficient woody plants included *Eucalyptus viminalis, Populus nigra, Magnolia kob*u, and *Robinia pseudoacacia*, and the most herbaceous plants include *Erechtites hieracifolia, Crassocephalum crepidioides*, and *Nicotiana tabacum* (Morikawa et al., 1998).

Nitrogen dioxide could be a plant signal molecule that improves plant growth. Morikawa et al. (2004) reported that about one-third of $NO_2$-derived N absorbed by leaves was converted into a previously unknown Kjeldahl-unrecoverable organic nitrogen, which comprise a novel heterocyclic Δ2 1,2,3 thiadiazoline derivative and nitroso- and nitro-organic compounds (Miyawaki et al., 2004; Morikawa et al., 2005). These results indicate that $NO_2$ is not only known as a pollutant or a supplemental source of N, but also acts as an airborne reactive nitrogen species signal (Morikawa et al., 2004, 2005). This is in agreement with the reports that endogenously produced $NO_x$ such as NO act as a vital plant signal (Wendehenne et al., 2001; Neill et al., 2003). To further analyze atmospheric NOx effects on plants, Morikawa et al. (2003) determined if plants could use $NO_2$ as a fertilizer and concomitantly reduce $NO_2$ concentrations. The authors found that application of 282 μg $m^{-3}$ $NO_2$, equivalent to the heavily polluted urban air, to plants for 10 weeks almost doubled the biomass, total leaf area, the contents of carbon (C), N, S, phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg) as well as free amino acid contents and crude proteins (Morikawa et al., 2003). The mass spectrometric analysis of the $^{15}N/^{14}N$ ratio

showed that N derived from $NO_2$ comprised less than 3% of total plant N, meaning that the contribution of $NO_2$-N to total N was relatively low. These results imply that $NO_2$ could be a multifunctional signal to stimulate plant growth, nutrient uptake, and metabolism (Takahashi et al., 2005).

## Remediation of $O_3$

Anthropogenic $O_3$ is primarily generated from the reaction of atmospheric $O_2$ with ground-state O (3P) radicals that result from the photolytic dissociation of ambient $NO_2$. Thus, the presence of NO and $NO_2$ in the lower atmosphere is closely linked with ground-level of $O_3$. In China, $O_3$ levels increased at a rate of 2.2 μg $m^{-3}$ per year from 2001 to 2006. Average $O_3$ concentrations in Beijing varied from 45 to 96.2 μg $m^{-3}$ depending on locations (Wan et al., 2014). In Shanghai, 1-h average concentration of $O_3$ was 54.2 μg $m^{-3}$. $O_3$ level increased during spring, reached the peak in late spring and early summer, and then decreased in autumn and finally dropped in winter. The highest monthly average $O_3$ concentration (82.2 μg $m^{-3}$) in June was 2.7 times greater than the lowest level (30.4 μg $m^{-3}$) recorded in December (Zhao et al., 2015).

Ozone is considered an effective antimicrobial agent against some bacteria and fungi (Sharma and Hudson, 2008). There have been no reports on microbial-mediated $O_3$ reduction. However, in a study of $O_3$ effects on phyllosphere fungal populations, Fenn et al. (1989) found that a chronic exposure of mature Valencia orange trees (*Citrus sinensis*) to $O_3$ or $SO_2$ for 4 years decreased populations of phyllosphere fungi. In a same experiment conducted by the authors, a short-term fumigation of $O_3$ to giant sequoia (*Sequoiadendron giganteum*) and California black oak (*Quercus kelloggii*) did not significantly affect the numbers of phyllospere fungi. Plant absorption of $O_3$ is mainly through stomata, $O_3$ is easily dissolved in water and reacts with apoplastic structures and plasma membranes to form reactive oxygen species (ROS), such as $O_2^-$ $O_2^-$ , $H_2O_2$, and OH radical. The $O_3$ or ROS can disturb cell membrane integrity and attack sulfhydryl (SH) groups or ring amino acids of protein, thus causing phytotoxicity. Injury symptoms include white, yellow or brown flecks on the upper surface of leaves. The threshold concentrations that cause a 10% reduction in yield are 80μg $m^{-3}$ for sensitive crops and 150 μg $m^{-3}$ for the most resistant crops. Adaptation of plants to $O_3$ stress has resulted in plants developing mechanisms against $O_3$ toxicity. First, $O_3$ can be removed from the air by chemical reactions with reactive compounds emitted by vegetation, particularly monoterpenes (Di Carlo et al., 2004). Second, semi-volatile organic compounds, such as different diterpenoids exuded by trichomes on leaves are an efficient $O_3$ sink (Jud et al., 2016). Tobacco leaves can secret diterpenoid cis-abienol, which acts as a powerful chemical protection shield against stomatal $O_3$ uptake by depleting $O_3$ at the leaf surface. As a result, $O_3$ flux through the open stomata is strongly reduced (Jud et al., 2016). As to $O_3$ absorbed by leaves, an oxidative burst occurs as the initial reaction to $O_3$, followed by activation of several signaling cascade and plant antioxidant systems including ascorbate-glutathione cycle and antioxidant enzymes to alleviate the oxidative burden resulting from $O_3$ exposure (Vainonen and Kangasjarvi, 2015).

## Remediation of VOCs

VOCs are organic chemicals that have a low boiling point and a high vapor pressure at room temperature causing large numbers of molecules to evaporate into the surrounding air. VOCs are numerous and ubiquitous including naturally occurring and anthropogenic chemical compounds. VOCs participate in atmospheric photochemical reactions contributing to $O_3$ formation and also play a role in formation of secondary organic aerosols, which are found in PMs. The strong odor emitted by many plants consists of green leaf volatiles, a subset of VOCs called biogenic VOCs, which emit exclusively from plant leaves, the stomata in particular. Major species of biogenic VOCs include isoprene, terpenes, and alkanes.

Anthropogenic VOCs include large groups of organic chemicals, such as formaldehyde, polycyclic aromatic hydrocarbons (PAHs), and BTX (benzenes, toluene, and xylenes). The most significant sources of formaldehyde are engineered wood products made of adhesives that contain urea-formaldehyde (UF) resins. BTX come from painting and coating materials used for interior decoration and refurbishment. Motor-vehicle exhausts, tobacco smoke, and heating also contribute to the presence of VOCs. A great concern over VOCs has been indoor air quality. Indoor formaldehyde in recently renovated homes ranged from 0.14 to 0.61 mg $m^{-3}$, and benzene, toluene, and xylenes were 124.0, 258.9, and 189.7 μg $m^{-3}$, respectively (Hao et al., 2014). The formaldehyde concentration is 65–100% higher than indoor air quality standards of China. Formaldehyde and BTX as main indoor VOCs contribute to the so-called “sick building syndrome” (Brown et al., 1994; Wieslander et al., 1996; Wargocki et al., 2000; Berg et al., 2014). This review regarding VOCs is thus emphasized on indoor air quality.

As early as in the 1970s, NASA (U.S. National Aeronautics and Space Administration) conducted research on the use of foliage plants for remediation of air quality in space shuttles. Foliage plants are those with attractive foliage and/or flowers that are able to survive and grow indoors (Chen et al., 2005). Results showed that foliage plants removed nearly 87% of air pollutants from sealed chambers within 24 h (Wolverton et al., 1984, 1989; Cruz et al., 2014a). For example, each plant of peace lily (*Spathiphyllum* spp. ‘Mauna Loa’) removed 16 mg of formaldehyde, 27 mg of trichloroethylen, and 41 mg of benzene from sealed chambers after a 24-h exposure to the respective chemical. Generally, plants absorb gaseous pollutants via leaf stomata. Some of the VOCs are recognized as xenobiotics by plants, and they are detoxified through xenobiotic metabolism, involving oxidoreductase or hydrolases, bioconjugation with sugars, amino acids, organic acids, or peptides, and then removed from the cytoplasm for deposition in vacuoles (Edwards et al., 2011). In addition to plant leaves, rhizosphere microbes also contribute to reduction of VOCs under interior environments (Llewellyn and Dixon, 2011). Using a dynamic chamber technique, Xu et al. (2011) investigated formaldehyde removal by potted foliage plants and found that formaldehyde removal was attributed not only to the formaldehyde dehydrogenase activities of plant leaves but also to the absorption and metabolism by microorganisms in the rhizosphere. Such bacteria have been isolated from soils, water, and different tissues of plants in polluted environments. Many pure cultures of bacteria, including various strains of *P. putida*, have been evaluated for biodegradation of air pollutants. Some fungi strains are also able to use volatile aromatic hydrocarbons as sole source of carbon and catalyze degradation reactions (Prenafeta-Boldú et al., 2001; Kennes and Veiga, 2004; Jin et al., 2006). Here we mainly discuss phylloremediation of formaldehyde, benzene, toluene, and xylene as well as phenols and PAHS.

## Formaldehyde

Formaldehyde is a colorless, flammable gas or liquid that has pungent and suffocating odor. It poses a significant danger to human health due to its high reactivity with proteins and DNA, thus formaldehyde is known to be a human carcinogen. Plants can directly absorb formaldehyde and transform it to organic acids, sugars or $CO_2$ and $H_2O$ (Figure 1). Giese et al. (1994) exposed shoots of *Chlorophytum comosum* to 8.5 mg $m^{-3}$ gaseous [$^{14}C$]-formaldehyde over 24 h and found that about 88% of the recovered radioactivity was associated with plant metabolites as $^{14}C$, which had been incorporated into organic acids, amino acids, free sugars, lipids, and cell wall components. Formaldehyde responsive genes were identified from golden pothos (*Epipremnum aureum*) (Tada et al., 2010). Glutathione (GSH)-dependent formaldehyde dehydrogenase (FADH) and formate dehydrogenase (FDH) can detoxify formaldehyde to formate and further to carbon dioxide (Tada and Kidu, 2011). A wide range of foliage plants have been documented to be able to remove formaldehyde. Kim et al. (2010) exposed 86 species of foliage plants individually to 2 μl $L^{-1}$ formaldehyde in sealed chambers and found that formaldehyde removed per $cm^2$ leaf area in 5 h ranged from 0.1 to 6.64 mg $m^{-3}$, depending on plant species. The most efficient species in removal of formaldehyde include *Osmunda japonica, Selaginella tamariscina, Davallia mariesii*, and *Polypodium formosanum*. Surprisingly, these efficient plants belong to pteridophytes, commonly known as ferns and fern allies. Why this group of plants is more efficient than the other foliage plants in formaldehyde removal deserves further investigation.

Formaldehyde can also be assimilated as a carbon source by bacteria (Vorholt, 2002). Such assimilation occurs in *Methylobacterium extorquens* through the reactions of the serine cycle (Smejkalova et al., 2010), in *Bacillus methanolicus* through the RuMP cycle (Kato et al., 2006), and in *Pichia pastoris* through the xylulose monophosphate cycle (Lüers et al., 1998). Some fungi also assimilate formaldehyde. Yu et al. (2015) isolated a fungal strain (*Aspergillus sydowii* HUA), which was able to grow in the presence of formaldehyde up to 2,400 mg $l^{-1}$ and the specific activity of formaldehyde dehydrogenase and formate dehydrogenase were as high as 5.02 and 1.06 U $mg^{-1}$, respectively, suggesting that this fungal isolate could have great potential for removing formaldehyde. Some of the bacteria and fungi used to colonize roots can also colonize leaves and could be used for phylloremediation of formaldehyde in the air (Khaksar et al., 2016a).

## BTX

BTX refers to benzene, toluene, and three xylene isomers [ortho– (or o–), meta– (or m–), and para– (or p–)], which are major components of gasoline. Due to their low water solubility and acute toxicity and genotoxicity, BTX components have been classified as priority pollutants by the USEPA (Eriksson et al., 1998). Plants leaves can absorb BTX mainly through stomata, which are converted to phenol or pyrocatechol, and subsequently to muconic acid and fumaric acid (Ugrekhelidze et al., 1997). Foliage plants, such as *Dracaena deremensis* and *Spathiphyllum* spp. have been documented to remove BTX indoors (Wolverton et al., 1984, 1989; Wood et al., 2006; Mosaddegh et al., 2014). Liu et al. (2007) fumigated 73 plant species with 478.5 μg $m^{-3}$ benzene gas and found that 23 of the 73 species showed inability to reduce fumigated benzene, the rest varied in benzene reduction, ranging from 0.1 to 80%. The most efficient plant species were *Crassula portulacea, Hydrangea macrophylla*, and *Cymbidium* 'Golden Elf'. Foliage plants that

are effective in removal of toluene include *H. helix, Philodendron* spp., *Schefflera elegantisima*, and *Sansevieria* spp. (Kim et al., 2011; Sriprapat et al., 2013; Cruz et al., 2014b). The wax of *Sansevieria trifasciata* and *S. hyacinthoides* is rich in hexadecanoic acid, which could pay an important role in absorption of toluene (Sriprapat et al., 2013). Sriprapat et al. (2014) also evaluated plant absorption of xylene. The tested 15 plant species were able to remove xylene with removal efficiency ranging from 59.1 to 88.2%, of which *Zamioculcas zamiifolia* was the most efficient species.

Bacteria including some strains of *Rhodococcus rhodochrous* (Deeb and Alvarez-Cohen, 1999), *Alcaligenes xylosoxidans* (Yeom and Yoo, 2002), and *P. putida* (Alagappan and Cowan, 2003) and also fungal cultures of *Cladophialophora* sp. (Prenafeta-Boldú et al., 2002) are able to degrade BTX (Figure 1). Many *Pseudomonas* species are leaf colonists and some are plant pathogens (Dulla et al., 2005). BTX are actual growth substrates for a number of organisms, such as *P. putida* (Inoue et al., 1991). In a study of bioremediation of airborne toluene, De Kempeneer et al. (2004) found that the time required for 95% reduction of the initial toluene concentration of 339 mg $m^{-3}$ was 75 h by *Azalea indica* plants along. Such reduction by the plants inoculated with *P. putida* TVA8 under the identical conditions was only 27 h. Subsequent additions of toluene further increased the removal efficiency of plants inoculated with the bacterial strain, but the toluene-removal rate was comparably low in plants without inoculation. Hence, inoculation of the leaf surface with *P. putida* TVA8 was considered to be essential for rapid removal of toluene. These results clearly demonstrated the importance of both plant leaves and leaf-associated microbes in phylloremediation of indoor air pollutants. The genetics and biochemistry of strains F1 and mt-2 of *P. putida* have been intensively studied (Harayama and Rekik, 1990; Horn et al., 1991; Timmis et al., 1994; Aemprapa and Williams, 1998). Such information could be important for exploring these strains for effective removal of air pollutants.

## Air Borne Phenols and Polycyclic Aromatic Hydrocarbon (PAHs)

Air borne phenols are a class of chemical compounds containing a hydroxyl group bonded directly to an aromatic hydrocarbon group, whereas PAHs are hydrocarbon comprising only carbon and hydrogen with multiple aromatic rings. Phenol and PAHs are major air pollutants in urban areas, and some PAHs have been considered carcinogenic. It has been reported that *Bacillus cereus* can degrade phenol via meta-cleavage pathway (Banerjee and Ghoshal, 2010). *Pseudomonas* sp. CF600 can mineralize phenol on bean and maize leaves by dmp catabolic pathway (Sandhu et al., 2007). Sandhu et al. (2007) directly measured phenol degradation by natural phyllosphere communities. Leaves were collected from trees growing in an area that was known to have high concentrations of VOCs. Unsterilized and surface-sterilized leaves were then exposed to radiolabeled phenol in closed chambers for 24 h and the amount of phenol degradation was compared. The phenol degradation by the non-sterilized leaves was significantly greater than the degradation by the sterilized leaves, indicating that degradation of VOCs was enhanced by the presence of the phyllosphere communities. This work indicates that plant leaves can accumulate phenols, which may be subsequently available for bacteria in the phyllosphere for degradation.

Plant leaves can absorb atmospheric PAHs. A study on deciduous forest in Southern Ontario, Canada, confirmed that amounts of phenanthrene, anthracene, and pyrene were reduced within and above the forest canopy during bud break in early spring (Choi et al., 2008). Plant species differ in removal of PAHs, the differences could be attributed to specific morphological and chemical constitutions of plants as well as leaf-associated microbes. Phyllosphere bacteria on 10 ornamental plant species were studied based on their diversity and activity toward the removal of PAHs (Yutthammo et al., 2010). The phyllosphere hosted diverse bacterial species including *Acinetobacter, Pseudomonas, Pseudoxanthomonas, Mycobacterium*, and unculturable ones, of which PAH degrading bacteria accounted for about 1–10% of the total heterotrophic phyllosphere populations depending on plant species. The analysis of bacterial community structures using PCR and denaturing gradient gel electrophoresis showed that each plant species had distinct band patterns, suggesting that the bacterial communities are closely associated with leaf morphology and chemical characteristics of ornamental plant species. Furthermore, branches of fresh leaves of selected plant species were evaluated in sealed chambers for removal of a mixture of PAHs (acenaphthene, acenaphthylene, fluorene, and phenanthrene). Bacteria on unsterilized leaves of all tested plants showed an enhanced removal of phenanthrene. Bacteria on leaves of *Wrightia religiosa* in particular were able to reduce all the tested PAHs (Yutthammo et al., 2010). Therefore, phyllosphere bacteria on ornamental plants may play an important role in natural attenuation of airborne PAHs and plant species differ in supporting microbes in PAH removal.

## Development of Phylloremediation Technologies

This review has documented that plant leaves and leaf-associated microbes individually can reduce air pollution and the combination of the two generally exhibits enhanced remediation of air pollutants. Since air pollution never before has become such an urgent problem in countries like China and India, now is the time to seriously consider all options for reducing the pollutants. Phylloremediation is a natural and environmentally friendly way of bioremediation of air contaminants. Our proposal for developing phylloremediation technologies is outlined in Figure 2, which includes (1) selection and evaluation of appropriate plant species and microorganisms that are tolerant to pollution and able to remove one or more air pollutants; (2) testing and analysis of the compatibility of plant leaf surfaces with isolated microbes for synergetic interactions in reduction of pollutants in laboratories, in simulated indoor environments, and in outdoor settings; (3) analysis of experimental data and development of phylloremediation technologies; and (4) implementation of the technologies for remediation of air in both indoor and outdoor environments.

FIGURE 2

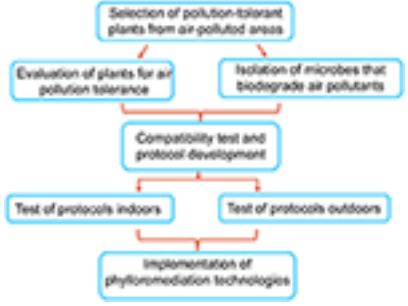


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**Figure 2**. A general outline for developing phylloremediation technologies. Plants species and microbes should be selected from air polluted areas. Selected plants should be evaluated for their ability to adsorb or absorb air pollutants, and concurrently microbes are screened for biodegradation or biotransformation of pollutants. The selected plants and microbes are tested for synergistic effects on the reduction of particular air pollutants. Based on the test results, specific plant-microbe combinations that can remove one or more air pollutants are identified, and protocols are formulated for evaluating their effectiveness in removal pollutants indoors and outdoors. Effective protocols will be developed into phylloremediation technologies for use in reducing air pollutants.

## Plant Selection

Plants should be selected from four categories: (1) trees, (2) shrubs or small tress, and (3) ground cover plants for use in outdoor environments as well as (4) foliage plants for indoor environments. Trees are referred to as perennial plants with elongated stems or trunks, supporting branches and leaves. Shrubs (or small trees) are those small to medium-sized woody plants that grow under some degree of shaded conditions. Ground covers are any plants that can grow over an area of ground and they can grow below the shrub layer including turfgrass and other woody and herbaceous selections. Foliage plants are those which can grow and survive indoors for interior decoration.

Plant species not only differ greatly in adsorption, absorption, and assimilation of air pollutants but also vary significantly in pollution tolerance. Air pollution tolerance index has been used for evaluation of plants specie in response of pollutants (Singh et al., 1991). Information generated by the index is useful, but the index may require revision for better reflecting the ability of plants in tolerance of air pollutants. An initial large-scale evaluation of plants from the four categories should be conducted for identifying candidate species that are able to tolerate PMs, $O_2$, $SO_2$, $NO_x$, and VOCs individually or collectively and can also substantially retain or assimilate these pollutants. Plants should also tolerate abiotic stresses, such as drought, heat, and cold, and biotic stresses like plant pathogens. Leaves of plants should be able to support one or more selected microbes. Trees should have a relatively fast growth rate. Needle-leaved plants should be particularly considered. As mentioned before, needles are rich in waxes for capturing PMs, and they are also used as as passive bio-samplers to determine polybrominated diphenyl ethers (Ratola et al., 2011). Broad-leaved plants should have more hairs or trichomes and more stomata with a large canopy. Leaf water and nutritional contents, leaf cuticular wax composition, hairs or trichomes, and surface physical characteristics should be suitable for microbial colonization. Shrubs and ground cover plants should have similar leaf physical and chemical properties but be able to tolerate slight shade. For foliage plants, they should substantially tolerate shade and can survive and grow under indoor low-light conditions.

Plant species possessing the aforementioned traits should be selected from particular regions where plants survive and thrive under heavily polluted environments. The rationale is that plants that are able to grow in the polluted environments may develop mechanisms for adaptation to the stressful conditions. Thus, some regions of China and India could be ideal locations for initial

selection of plant species. Plants have been documented to tolerate multiple stresses, which include induced cross tolerances and the ability of particular variants to resist multiple distinct stresses. Reactive oxygen species are key molecular signals produced in response to multiple stresses, which are aimed at the maintenance of cellular equilibrium (Perez and Brown, 2014). Glutathione-S-transferase (GST) genes play an important role in the maintenance of ROS equilibrium. Salicylic acid, jasmonic acid, and ROS interplay in the transcriptional control of multiple stresses. Additionally, omics technologies should be used for identifying molecular mechanisms in regulation of plant responses to multiple stresses. Such information, particularly transcriptional factors, key regulatory genes or enzymes should be incorporated into the plant selection processes.

Genetic engineering is an option for improving plants to remediate air pollutants (Abhilash et al., 2009). Genes listed in Table 4 can be used for generating transgenic plants. Cysteine synthase is a key enzyme to utilize $H_2S$ and $SO_2$ as a sulfur source to synthesize cysteine. Overexpression of cysteine synthase in rice was shown to enhance sulfur assimilation upon exposure to a high level of $H_2S$ (Yamaguchi et al., 2006). Nitrite reductase catalyzes the six-electron reduction of nitrite to ammonium. Transgenic *Arabidopsis* plants bearing chimeric spinach *NiR* gene enhanced nitrite reductase activity and $NO_2$ assimilation (Takahashi and Morikawa, 2001). Cytochrome P450 2E1 has strong and specific capacity of decomposing organic pollutants in animal bodies. Transgenic tobacco plants overexpressing *CYP2E1* gene showed increased ability to detoxify broad classes of pollutants such as chlorinated solvents and aromatic hydrocarbons (James et al., 2008). Unlike tobacco, poplar (*Populus tremula* × *Populus alba*) plants are a fast-growing tree species with large canopies. Poplar plants overexpressing a mammal *CYP2E1* exhibited increased metabolism and enhanced removal of organic pollutants from hydroponic solution and the air (Doty et al., 2007). Some genes from microbes can also be used for engineering transgenic plants for phylloremediation. The ribulose monophosphate (RuMP) pathway is one of the formaldehyde-fixation pathways found in microorganisms (Orita et al., 2006). The key enzymes of this pathway are 3-hexulose-6-phosphate synthase (HPS), which fixes formaldehyde to D-ribulose 5-phosphate (Ru5P) to produce D-arabino-3-hexulose 6-phosphate (Hu6P) and 6-phospho-3-hexuloisomerase (PHI), and then converts Hu6P to fructose 6-phosphate (F6P) (Orita et al., 2006; Chen et al., 2010). Co-expression of HPS and PHI in tobacco plants resulted in 20% reduction of formaldehyde compared to the control plants (Chen et al., 2010). In another study, a chlorocatechol 1,2-dioxygenase gene (*tfdC*) derived from the bacteria *Plesiomonas* was introduced into *Arabidopsis thaliana* (Liao et al., 2006). Transgenic plants showed enhanced tolerances to catechol, an aromatic ring. Transgenic plants were also able to remove a large amount of catechol from their media and highly efficient in convertion of catechol to cis, cis-muconic acid, suggesting that degradative genes derived from microbes can be used to produce transgenic plants for bioremediation of aromatic pollutants in the environment (Liao et al., 2006).

**TABLE 4**

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**Table 4**. Genes from different sources have been demonstrated to be able to remediate air pollutants in transgenic plants.

Selected plants should be evaluated in controlled environmental chambers to measure their capacity for tolerance and also assimilation of air pollutants. Seedlings could be exposed to particular pollutants or a mixture of pollutants in different concentrations and durations. Plant responses to the exposures could quickly evaluated based on stomatal conductance, net photosynthetic rate, the maximum quantum efficiency of photosystem II using the new LI-COR6800. Their morphological appearance, i.e., leaf greenness, leaf size, and plant height and canopy dimension compared to control treatments should be evaluated. The ability of plants to remove pollutants should be tested using GC-MS. For evaluation of plant responses to PM, in addition to the mentioned plant characteristics, leaf morphology, particularly leaf surface characters should be examined under microscopes and stomatal size and density recorded. If needed, isotopic labeling techniques could be used to track the fate of particular compounds. The evaluation results once analyzed and compared, plants that tolerate stresses and are able to adsorb or absorb or assimilate pollutants could be identified from each type of plants for subsequent compatiablity tests with selected microbes.

## Microbe Selection

Cultivable bacteria only account for a small fraction of the total diversity in the phyllosphere, which has greatly hampered the use of some valuable microbes. New approaches, such as the use of improved culture and advanced devices (i-Chip), co-culture with other bacteria, recreating the environment in the laboratory, and combining these approaches with microcultivation should be employed to convert more uncultivable bacteria into cultured isolates in the laboratory (Nichols et al., 2010; Stewart, 2012; Müller and Ruppel, 2014). Similar to plant selection, initial microbial selection could be carried out in areas where plants have been contaminated by air pollutants. In coordination with plant selection, microbes could be isolated from leaves of plants identified in plant selection. This is because the pollutants may exert selective pressures to phyllosphere microbial diversity. For example, bacterial communities hosted by *Platanus* × *acerifolia* leaves from different locations of Milan (Italy) were analyzed by high throughput sequencing. The results showed that biodiversity of bacterial communities decreased but hydrocarbon-degrading populations increased along the growing season, which suggest that air contaminants might play an important role in the selection of phyllospheric populations in urban areas (Gandolfi et al., 2017).

A particular attention should be given to endophytic microbes. There are about 300,000 plant species on the earth; each plant could host one or more endophytes (Petrini, 1991; Strobel and Daisy, 2003). Endophytes are resided inside plant tissues and generally have no harmful effects on plants. Endophytic bacteria that colonize leaves could be particularly desirable as they could not be washed away by precipitation. Recent advances in endophyte-assisted remediation have

been reviewed (Khan and Doty, 2011; Stepniewska and Kuzniar, 2013; Ijaz et al., 2016; Syranidou et al., 2016). Endophytic *B. cereus* ZQN5 isolated from natural *Zamioculcas zamiifolia* leaves enhanced ethylbenzene removal rate on sterile *Z. zamiifolia* (Toabaita et al., 2016). Microbes could also be isolated from the rhizosphere of plants contaminated by air pollutants as more endophytism occurs in roots (Ijaz et al., 2016). Some of leaf endophytes could be initially established in roots and subsequently transported to shoots. Khaksar et al. (2016a) reported that some microbes isolated from roots can also colonize leaf surfaces. An endophytic strain of *B. cereus* ERBP from roots of *Clitoria ternatea* was able to colonize the leaf surface of *Z. zamifolia*. During a 20-d fumigation with formaldehyde, the inoculation of ERBP did not interfere with the natural shoot endophytic community of *Z. zamiifolia*. ERBP inoculated *Z. zamiifolia* exhibited a significantly higher formaldehyde removal efficiency when compared to the non-inoculated plants.

Microbes, once identified and cultured, could be engineered to improve phylloremediation capacity (Table 5). A pTOM toluene-degradation plasmid from *B. cepacia* G4 was introduced into *Bacillus cepacia* L.S.2.4, a natural endophyte from yellow lupine (*Lupinus arboreus*; Barac et al., 2004). After the engineered bacteria were inoculated into aseptic lupine seedlings, the recombinant endophytics degraded 50–70% more toluene and provided much more protection against the phytotoxic effects of toluene than that obtained from soil bacteria (Barac et al., 2004). Horizontal genes can transfer among plant-associated endophytic bacteria in plants. Poplar was inoculated with the yellow lupine endophyte *B. cepacia* VM1468, which contains the pTOM-Bu61 plasmid coding for constitutively expressed toluene degradation (Taghavi et al., 2005). Inoculated plant growth was enhanced in the presence of toluene, and the amount of toluene release via evapotranspiration was also reduced. Although no inoculated strains were detected in the endophytic community, there was horizontal gene transfer of pTOM-Bu61 to different members of the endogenous endophytic community (Taghavi et al., 2005). The TCE-degrading strain *P. putida* W619-TCE also can be engineered via horizontal gene transfer in poplar plants (Weyens et al., 2009b).

**TABLE 5**

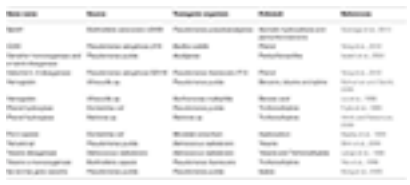

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**Table 5**. Genes from microbes have been demonstrated to be able to remediate pollutants in transgenic microbes.

Efforts on microbe selection should also be placed on the identification of microbes that could remediate PM, $SO_2$, $NO_2$, and $O_3$. As mentioned above, a group of microbes can assimilate $SO_2$ and $NO_2$, further research should explore those microbes for effective assimilation of the two pollutants. Thus far, it appears that no information is available regarding microbial remediation of

PM and $O_3$, which may not be the case in the nature. Extensive research should be conducted to determine if nature has offered microbes that can break down PMs and can also biodegrade or biotransform $O_3$.

Selected microbes could be domesticated by growing them in different cultures varying in pH, carbon source, temperature, and $O_2$ to identify appropriate culture media and conditions for maximizing their growth. Morphological characterization and internal transcribed spacer rDNA analysis should be conducted to determine their phylogenetic relationships with other microbes. Their ability to biodegrade particular or a group of air pollutants should be evaluated in the laboratory. Microbial characteristics including their utilization of organic compounds, decomposition rate of pollutants, adaptability, competition, and growth rate should be recorded and analyzed. Competitive strains that show promise in bioremediation should be identified. A series of bacterial and filamentous fungal genomes have been sequenced recently. More than hundreds of bacterial and fungal transcriptomic and proteomic datasets are available. With the advent of increasingly sophisticated bioinformatics and genetic manipulation tools, mechanisms underlying the biodegradation or transformation of pollutants by the isolated microbes could be elucidated. This information, in turn, will significantly improve our understanding of the microbes and provide us with molecular bases for manipulation of the microbes for enhancing phylloremediation.

## Evaluation of the Compatibility between Plant Leaves and Microbes

Plants selected from the four categories should be inoculated with selected microbes to determine the compatibility of each selected microbe with each selected plant species. The test could begin first in laboratory settings using entire leaves in designated chambers or utilizing young seedlings in relative large growth chambers to evaluate if inoculated microbes could grow on leaf surfaces and if the specific inoculation affects plant growth. Compatible combinations would be exposed to pollutants at different concentrations and durations to determine the potential for pollutant reduction. A microbe that is compatible with one plant species may not be compatible with another. For example, *B. cereus* ERBP isolated from roots of *C. ternatea* was compatible with the leaf surface of *Z. zamifolia* but not with the leaf surface of *Euphorbia milii*. ERBP-colonized *Z. zamifolia* grew well and showed high efficiency in removal of formaldehyde, but ERBP-colonized *E. milii* were less effective in removal formaldehyde and the plants exhibited stress symptom (Khaksar et al., 2016a). Laboratory evaluation will generate a large number of plant-microbe combinations that are specifically effective in removal of a particular pollutant or a particular group of pollutants. Bacteria would be propagated using bioreactors and corresponding plants would be propagated through either cuttings or tissue culture. The plants would be transplanted into greenhouses or specific regions with air pollution for testing the effectiveness of the combinations in real-world situations.

Plants and microbe combinations that pass the real-world test will be investigated using the next-generation sequencing (NGS) technologies (metagenomics, metatranscriptomics, metaproteomics, and metabolomics) and the rapid evolution of SIP (Stable isotope probing) for identifying molecular mechanisms underlying microbial and plant interactions in facilitation of phylloremediation. The compatibility evaluation and molecular analysis would ultimately result in

the development of protocols for culturing microbes and producing corresponding plants. Some protocols will be catered to trees, others used for shrubs or small trees. Some would be effective for improving groundcover plants, and some will be used for indoor foliage plants. Effectiveness of each protocol in remediation of particular or general pollutants would be determined using the model described by Nowak et al. (2006). If the test is to be conducted in a large scale, satellite image acquisition and analysis should be used. The analysis of the data will finally validate the protocols, i.e., particular plants can be inoculated with a specific group of microbes for use in remediation of a particular pollutant or a mixture of pollutants.

## Implementation of Phylloremediation Technologies

The protocols will be implemented for phylloremediation. We propose three types of plantscape: (1) manufactory plantscape, (2) urban plantscape, and (3) interior plantscape. The plantscape for manufactories and cities should have three levels of greening: the sky with trees, the ground with groundcover plants, and shrubs in between. Additionally, climber plants can be used to build green walls and small trees and shrubs as well as groundcovers can be used to build green roofs. For interior plantscape, each room should have a minimum of one potted foliage plant. Foliage plants can also be used to install green walls in interior environments for enhance remediation of indoor air pollutants.

The implementation of phylloremediation technologies should also take landscape design concepts into consideration, resulting greenbelts, green parks, green walls that fulfill roles not only for air remediation but also for recreation. Depending on the occurrence of pollutants and the scale and degree of the overall pollution, relevant protocols to the particular situations would be implemented. The remediation efficiency could be monitored over time using specific models in connection with satellite imagine data to determine how much of individual pollutants have been removed.

# Conclusion

Air pollution is real, and it is adversely affecting human comfort and health and jeopardizing the ecosystem. The causes are multidimensional including increased population, urbanization, and industrialization accompanied with increased energy consumption and economic growth along with weak regulation, deforestation, and climate change. A recent article published by Cai et al. (2017) suggested that circulation changes including the weakening of the East Asia winter monsoon induced by global greenhouse gas emission contribute to the increased frequency and persistence of the haze weather conditions in Beijing, China. This claim could be true. The fact is that air pollutants released anthropogenically has caused the global warming. Our attention nevertheless should focus on how to control the emissions and how to remediate the pollutants. Although rhizosphere (roots and root associated microbes) contributes greatly to remediation of air pollutants, in this review, we specifically discuss phylloremediation. The role of plant leaves and leaf-associated microbes in remediation of air pollutants has not been well explored. Using the Urban Forest Effects Model, Yang et al. (2005) studied the influence of the urban forest on air quality in Beijing, China and found that the 2.4 million trees in the central part of Beijing removed

1,261.4 tons of pollutants from the air in 2002, of which 720 tons were PM. Nowak et al. (2014) has shown that computer simulations with local environmental data reveal that trees and forests in the contiguous US removed 17.4 million tons (t) of air pollution in 2010, with human health effects valued at 6.8 billion US dollars. Such forest-aided remediation might have avoided more than 850 incidences of human mortality and 670,000 incidences of acute respiratory problems.

We believe that phylloremediation is an environmentally friendly, cost effective way of remediation of air pollutants. The key component of this technology lies in plants. It is plants that can adsorb or absorb pollutants and plants that support microbes in biodegradation or biotransformation of pollutants. To develop phylloremediation technologies, some basic questions should be addressed: (1) Anatomical, physiological, biochemical and molecular mechanisms underlying plant responses to each pollutant should be investigated. Previous research has documented plant responses to pollutants such as $NO_x$, $SO_2$, $O_3$, and VOCs, but the research was largely intended to identify how plants were injured. We need to exploit why many plants are tolerant to the pollutants, what are the underling mechanisms, and how can we manipulate the mechanisms for increased tolerance and for use in phylloremediation. There is little information regarding plant responses to PM. Do plants simply adsorb PM? What are the fates of stomatal absorbed PM? (2) Phyllosphere microbes are still largely a mystery and many are not culturable. Methods for collection, identification, and cultivation should be developed. Some microbes isolated from the rhizosphere can also be used for leaf colonization. Mechanisms for biodegradation and transformation of pollutants have been mentioned in this review. However, we still do not know if there are microbes that can remediate PM and $O_3$. An important question that should be immediately addressed is the roles of microbes within the PM. Do the microbes become active once settled on leaves? Do they have the ability to break down the PM? With the advances of omics, these questions will be answered, and new strains with high efficiency in breaking down pollutants are expected to be isolated and utilized. (3) A large scale and intensive test for the compatibility among identified plants and identified microbes should be carried out. Specific plant-microbe groups or combinations that can effectively reduce one or more pollutants should be identified, tested, and confirmed in real-world situations and corresponding protocols for using each combination should developed. (4) New methods for analyzing dynamic changes of air pollutants in the atmosphere should be developed and standardized for monitoring the effectiveness of the phyllosphere technologies. (5) Research and development of phyllosphere technologies is a multidisciplinary project requiring collaboration among researchers with different academic backgrounds at regional, national, and international levels. Nature has offered healthy alternatives for remediation of air pollution; we should collaborate with nature as a partner to restore nature's identity.

## Author Contributions

All authors contributed to the acquisition and interpretation of available literature and the conception of the work. JC, SL, and XW wrote the manuscript, and all authors reviewed and revised the manuscript and approved this final version. XW and SL contributed equally to this work.

## Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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**IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA**
**FOURTH APPELLATE DISTRICT, DIVISION TWO**

| | |
|---|---|
| **ALBERT THOMAS PAULEK, et al.,**<br><br>Plaintiffs and Respondents,<br>**v.**<br><br>**MORENO VALLEY COMMUNITY SERVICES DISTRICT,** et al.**,**<br><br>Defendants and Appellants.<br><br>**HF PROPERTIES, et al.,**<br><br>Real Parties in Interest and Appellants. | Case No. E071184<br>(Riverside Cty. Super. Ct. No. RIC1510967 MF, RIC1511279, RIC1511327, RIC1511421, & RIC1511195) |
| **LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, et al.,**<br><br>Plaintiffs and Appellants,<br>**v.**<br><br>**MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.**,<br><br>Defendants and Respondents.<br><br>**HF PROPERTIES, et al.,**<br><br>Real Parties in Interest and Respondents. | (Riverside Cty. Super. Ct. No. RIC 1511279 & RIC1511327) |

Riverside County Superior Court
The Honorable Sharon J. Waters, Judge

# BRIEF OF AMICI CURIAE THE ATTORNEY GENERAL AND THE CALIFORNIA AIR RESOURCES BOARD IN SUPPORT OF PLAINTIFFS AND RESPONDENTS ALBERT THOMAS PAULEK, ET AL. AND PLAINTIFFS AND APPELLANTS LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, ET AL.

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## INTRODUCTION

The massive World Logistics Center (Project) will cause approximately 70,000 daily truck trips transporting goods from the ports of Long Beach and Los Angeles to Moreno Valley. (AR 003039, 058605–06.) These vehicle trips will emit hundreds of thousands of metric tons of greenhouse gas (GHG) emissions every year over the life of the Project. (AR 002729.) These GHG emissions, along with emissions from electricity needed to power the more than 40-million-square-foot project, will add to the existing climate pollutant problem, accumulating in the atmosphere and persisting for decades or longer.

Rather than analyzing and mitigating the Project's emissions, lead agency Respondents Moreno Valley Community Services District, *et al.* (Respondents) shirk their responsibility as a local government to address climate change. They improperly rely on CARB's statewide Cap-and-Trade climate program (Cap-and-Trade Program), which does not impose any regulatory requirements on this Project, as an excuse not to analyze and mitigate the Project's climate change impacts. Respondents improperly ignore roughly 95% of the GHG emissions from the Project (AR 002718–19), disregarding the significance of those emissions, avoiding their duty to adopt all feasible mitigation measures, and failing to properly disclose their responsibility for this pollution to the public.

Respondents' approach mischaracterizes the way state climate policies work and violates the California Environmental Quality Act (CEQA). CEQA directs that Respondents take "all action necessary" to protect the environment, recognizing the importance of local action driven through "meaningful" consideration of environmental impacts. (See Pub. Resources Code, §§ 21000, 21001, 21002, 21002.1.) CEQA does not allow Respondents to waive their CEQA obligations by pointing to a regulation that does not bind them (Cal. Code Regs., tit. 14, § 15000 et seq. (CEQA

Guidelines), § 15064.4), and Respondents wholly misconstrue the regulatory scheme they seek to use.

Although Respondents claim their approach is consistent with state climate policy, it is not. (See Plaintiffs/Appellants' Supplemental Request Regarding Judicial Notice, Exhibit 1, California Air Resources Board, California's 2017 Climate Change Scoping Plan (Nov. 2017) (2017 Scoping Plan) at pp. 19 ["Local actions are critical for implementation of California's ambitious climate agenda"], 97–99 [more extensive discussion about the need for local action to achieve California's climate goals]; see also Health & Saf. Code, §§ 38502, subd. (h) [identifying competing priorities to balance in emissions reductions], 38592 [nothing in this division relieves any person, entity, or agency of compliance with other law], 38690 [identifying overlapping automobile emissions policy].) Respondents' approach has been repudiated by CARB, the Attorney General's Office, and the Natural Resources Agency, as contrary to critical state climate goals. The state has long—and expressly—relied on a portfolio of climate change measures, including significant efforts by local governments, to address emissions that result from their land use decisions.

Respondents rely on the Cap-and-Trade Program to excuse their obligation to make better land use decisions. Cap-and-Trade is not intended as a stand-alone climate policy; instead, it assumes steady efforts to reduce emissions across the state. While Cap-and-Trade has an important role to play in limiting emissions from entities like power plants and refineries, the Program does not cover a host of other sources, including warehouses. Although the Program creates financial and legal obligations on fuel suppliers and electricity generators that may ultimately supply this Project, the Project experiences neither the direct legal requirements of the Program nor the full economic costs associated with its additional emissions. If projects were allowed to evade responsibility in

this way, they would steadily increase Cap-and-Trade Program costs upstream, while locking the state into ever-more expensive and inappropriate high-emitting development patterns. This is a recipe for failure in achieving the state's climate goals. To avoid this scenario, the state relies on local governments to limit emissions from new development projects. Emissions from such projects are the responsibility of local governments and should be mitigated through the proper application of CEQA. Eliminating this crucial piece of the state's portfolio approach undermines the state's climate goals.

We have arrived at a crossroads for the future of GHG analysis under CEQA. If Respondents prevail, this case could singlehandedly undo the will of the Legislature by excusing essentially all projects from the obligation to consider GHG impacts from vehicle trips and energy use. This Court should reject Respondents' argument and confirm that all lead agencies must do their part if we are to meet the state's long-term climate stabilization objective.

## STATEMENT OF INTERESTS

### I. INTEREST OF THE ATTORNEY GENERAL

California has already begun to experience significant adverse impacts from climate change such as "more frequent, more catastrophic and more costly" wildfires, drought, "coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution." (2017 Scoping Plan at p. ES2.) As California's chief law enforcement officer, the Attorney General has the independent power and duty to protect the interest of all of California's current and future residents in a clean, health, and safe environment. (See Cal. Const., art. V, § 13; Gov. Code, §§ 12511, 12600–12612; *D'Amico v. Bd. of Medical Examiners* (1974) 11 Cal.3d 1, 15.)

Upholding this duty, the Attorney General has actively encouraged lead agencies to fulfill their CEQA responsibilities as they relate to climate change for well over a decade. (See, e.g., *Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 3 Cal.5th 497 (*SANDAG*) at p. 519 ["nothing we say today invites regional planners to 'shirk their responsibilities' under CEQA"]; *City of Long Beach v. City of Los Angeles* (2018) 19 Cal.App.5th 465; *People v. County of San Bernardino* (San Bernardino County 2007) No. CIVSS0700329.)

The World Logistics Center, like every large development project, has the potential to either facilitate or hinder the state's achievement of its climate goals. Here, Respondents' unsupported approach to analyzing the Project's GHG emissions has the potential to seriously undermine the overall effort to meet the state's science-based GHG reduction goals for the transportation and land use sectors and to disproportionately affect environmental justice communities.[1] Given these significant interests, the Attorney General submits this amicus brief in support of Appellants,[2] in compliance with rule 8.200(c)(7) of the California Rules of Court in his independent capacity and on behalf of the California Air Resources Board (CARB).

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[1] The Attorney General opposed this methodology in a comment letter it submitted on the revised sections of the Final EIR for this Project (Revised Final EIR or RFEIR). (Letter re: Revised Sections of the Final Environmental Impact Report for the World Logistics Center Project, Sept. 7, 2018, at: <https://oag.ca.gov/sites/all/files/agweb/pdfs/environment/comments-revised-sections-feir.pdf?>.) The Revised Final EIR is not at issue in this litigation, but it includes the original EIR's same flawed GHG analysis.

[2] This brief is submitted in support of Plaintiffs and Respondents Albert Thomas Paulek, et al. and Plaintiffs and Appellants Laborers International Union of North America, Local 1184, et al.

## II. INTEREST OF THE CALIFORNIA AIR RESOURCES BOARD

CARB has a strong interest in participating in this case as amicus curiae. CARB is charged with protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change. As creator and administrator of the Cap-and-Trade Program, and as the lead agency on the Scoping Plan setting out many of the state's climate policies, CARB is an expert on how the Cap-and-Trade Program was designed to function and interact with other state laws and programs as part of California's portfolio approach to addressing GHG emissions. In their briefing, Respondents misrepresent CARB as effectively endorsing the EIR's approach to GHG analysis. (Combined Respondents' and Cross-Appellants' Opening Brief at pp. 17, 36–38, 47–48, 56, 63.) But CARB has repeatedly made clear it does *not* support Respondents' approach.[3] As explained more fully below, Respondents' arguments regarding GHG analysis are contrary to the construction given to applicable regulations by CARB, and by the Natural Resources Agency, agencies charged with interpreting and enforcing the programs at issue.

# BACKGROUND

## I. LEGAL BACKGROUND REGARDING CALIFORNIA'S EFFORTS TO COMBAT CLIMATE CHANGE

In 2006, recognizing the importance of combatting climate change and furthering the objectives of Executive Order S-3-05, the Legislature enacted the Global Warming Solutions Act of 2006, commonly known as

[3] CARB also explained this approach when it formally opposed the GHG analysis Respondents rely on here through its comments on the RFEIR for this Project. (Letter re: World Logistics Center Revised Final Environmental Impact Report, Sept. 7, 2018, at: <https://ww3.arb.ca.gov/toxics/ttdceqalist/logisticsfeir.pdf?_ga=2.236813640.855160185.1575908432-1460774677.1564163003>.)

AB 32. (Health & Saf. Code, § 38500, et seq.) AB 32 mandates that, by 2020, California must reduce its total statewide annual GHG emissions to the level they were in 1990, and to 40 percent below that level by 2030. (Health & Saf. Code, §§ 38550, 38566.) This mandate putts the state on a trajectory of significant and continuous GHG emissions reductions through 2050, in order to stabilize the atmospheric levels of GHGs and reduce the risk of dangerous climate change.

Under AB 32, the Legislature tasked CARB with preparing a guidance planning document, known as the Scoping Plan that, while not binding, set out the state's views based on extensive environmental and economic analyses on how policies may be effectively implemented so that California will meet the its ambitious GHG reduction goals. (See Health & Saf. Code, §§ 38561 et seq.) The Scoping Plan emphasizes the need for a multi-pronged emissions reduction approach that can be carried out by many entities and reflects the state's position that it is necessary to reduce emissions at the source and through reductions in demand for energy. (2017 Scoping Plan, pp. 12, 19, 28).

The Scoping Plan includes a suite of regulations, measures, and policies designed to operate together to reduce GHG emissions. The Cap-and-Trade Program is one such policy. Entities that are directly subject to the Cap-and-Trade Program—like power plants, factories, refineries, and electricity generators and importers—must purchase and surrender compliance instruments (e.g., allowances) for their emissions. (See Cal. Code Regs., tit. 17, § 95812.) Downstream emitters such as cars and trucks, much less warehouses that such cars and trucks drive to, are not covered entities under Cap-and-Trade and have no such obligation to purchase or surrender allowances. The existence of the Program, in other words, does not obviate the need for action at other levels of the economy. On the contrary: If sources like the long-lasting development project in this

case build without regard to their emissions, they will increase overall state emissions and hence increase pressure and costs within the Cap-and-Trade Program.

To address the wide range of GHG emissions sources that are not directly controlled through the Cap-and-Trade Program, the state relies on other policies[4]—many of which require collaboration between the state and local governments. Agencies large and small across the state (including, crucially, cities and counties) are responsible for ensuring that proposed new land use plans, transportation projects, and development projects are consistent with evolving scientific knowledge and state regulatory schemes; CEQA is a critical tool for implementing these obligations.[5] (See *SANDAG*, *supra*, 3 Cal.5th at p. 519; see also CEQA Guidelines, § 15064.4, subd. (b).)

The Scoping Plan makes clear that the Cap-and-Trade Program was *not* designed to replace local governments' long-term planning obligations, but rather designed to work in concert with those policies to achieve the

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[4] See, e.g., Health & Saf. Code, §§ 38561, subd. (e) (requiring CARB to consider "the relative contribution of each source or source category to statewide greenhouse gas emissions"), 43018.5, subd. (a) (requiring CARB to "adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles").

[5] For example, CARB provides regional emission reduction targets for local jurisdictions' land use and transportation planning obligations under Senate Bill (SB) 375. (See Health & Saf. Code, § 65080, subd. (b)(2)(A) [known as "The Sustainable Communities and Climate Protection Act"].) CARB also works with regional air pollution control districts and air quality management districts to address emission sources that have both local and global effect, including methane from landfills and hydrofluorocarbons (HFCs), as well as to support state- and federally-mandated permitting of certain industrial sources of GHG emissions. (See California Air Resources Board, California's 2017 Climate Change Scoping Plan (Nov. 2017) pp. 3, 104 <https://ww3.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf >.)

state's goals. (2017 Scoping Plan at p. 102 ["California's future climate strategy will require increased focus on integrated land use planning"].)

Recent state reports have shown that California's vehicular GHG emissions continue to increase year after year, and CARB has emphasized the need for local action. (See California Air Resources Board, 2018 Progress Report: California's Sustainable Communities and Climate Protection Act (November 2018) at 4.) These increasing emissions demonstrate the crucial need for *more* complementary local action—not less—to ensure the state meets its GHG targets in cost-effective ways.

In light of the state's GHG reduction policies, and CEQA's focus on embedding environmental considerations in local decision-making, the Supreme Court has emphasized that careful CEQA analysis of GHG impacts will be required going forward, as lead agencies must "stay in step" with the evolving science and law related to the state's long-term climate objectives in order to carry out their duties under CEQA. (*SANDAG*, *supra*, 3 Cal.5th at p. 519.)

## II. OVERVIEW OF THE GHG ANALYSIS IN RESPONDENTS' EIR

Mischaracterizing the collaborative efforts required to combat climate change and the role of the Cap-and-Trade Program, Respondents' EIR takes a very unusual and troubling approach to addressing the Project's GHG-related impacts.[6] Respondents divide the Project's GHG emissions into two categories, which the EIR terms "capped" and "uncapped." (AR 002719.) What the EIR deems "uncapped" emissions constitute only about 4.6% of the Project's emissions. (*Ibid*.) The "uncapped" category includes comparatively minor landfill emissions caused by waste generated at the

[6] The Attorney General and CARB only address Respondents' inappropriate use of the Cap-and-Trade Program in the GHG analysis of the EIR. This amicus brief is not intended to and should not be construed as an exhaustive discussion of the EIR's compliance with CEQA.

Project and the use of refrigerants at the Project. (*Ibid.*) For these emissions, the EIR follows the approach that would be expected under CEQA: the City of Moreno Valley, in its discretion, designated a significance threshold (in this case, 10,000 metric tons of GHG emissions as recommended by the South Coast Air Quality Management District), compared the "uncapped" emissions to that threshold, and required feasible mitigation measures to ensure those emissions fall below that threshold. (AR 002719, AR 002729.)

What the EIR terms "capped" emissions, however, constitute the remaining 95.4% of the Project's predicted emissions. (AR 002719.) Those include emissions caused by mobile sources (namely, diesel trucks), as well as natural gas and electricity use at the Project. (*Ibid.*) For these emissions, the EIR deviates dramatically from standard CEQA methodology. The EIR asserts these emissions are "covered" by Cap-and-Trade and therefore wholly exempt from any further CEQA analysis or mitigation. (AR 002723.) The EIR does *not* compare the Project's "capped" emissions to the 10,000 metric ton threshold. (AR 002725.) Indeed, after mitigation measures are applied to the Project, the "capped" emissions remain nearly 40 times greater than the significance threshold. (AR 002729.) In forgoing any attempt to decrease the Project's true total emissions to a less-than-significant level, Respondents fail to consider further mitigation measures that could have made this Project more compatible with the state's climate goals. As described below, this approach is unlawful.

**ARGUMENT**

Respondents avoid disclosing and addressing mitigation for thousands of tons of GHG emissions each year pursuant to the misguided theory that those emissions are addressed by Cap-and-Trade. This argument is founded on misunderstandings of both the Cap-and-Trade Program and

CEQA—both of which require different industries and projects to take responsibility for their own impacts, rather than rely on others for mitigation. Most fundamentally, warehouse projects like the Project are not subject to Cap-and-Trade. Respondents therefore cannot accurately assert that "compliance" with Cap-and-Trade provides any legal basis to avoid analyzing and adequately mitigating the majority of the Project's emissions.

The CEQA Guidelines allow projects to consider regulations "[with] which the project complies" for purposes of considering significance of GHG emissions. (See CEQA Guidelines, § 15064.4, subd. (b)(3).) However, that consideration does not apply here and Respondents' approach, which in effect relies on other entities to undertake Respondents' CEQA mitigation, not only violates both CEQA's legal requirements and public disclosure and mitigation purposes, but also undermines the state climate objectives Cap-and-Trade is intended to further. Cap-and-Trade is designed to act in tandem with—not in spite of—critical tools like local land use planning to reduce GHG emissions. If allowed for Respondents and adopted by other local jurisdictions, such abdication by local governments would dramatically hinder the state's ability to achieve its legislatively mandated long-term climate stabilization objectives and forgo pollution reduction co-benefits from GHG mitigation measures that are vital for environmental justice communities.

The Resources Agency agrees with CARB that "to demonstrate consistency with an existing GHG reduction plan, a lead agency would have to show that the plan actually addresses the emissions that would result from the project." (See California Natural Resources Agency, Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97 (2009),

<http://resources.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf>, at p. 27.)

## I. WAREHOUSE AND LOGISTICS PROJECTS ARE NOT REGULATED BY CAP-AND-TRADE AND THEIR EMISSIONS MUST STILL BE MITIGATED BY LOCAL GOVERNMENTS

Warehouse and logistics complexes are not regulated by Cap-and-Trade. The Cap-and-Trade Program thus provides no legal or policy basis for Respondents to avoid their obligation to evaluate and mitigate GHG emissions. Cap-and-Trade applies "an aggregate greenhouse gas allowance budget [to] *covered entities* and provides a trading mechanism for" such allowances. (Cal. Code Regs., tit. 17, § 95801 (emphasis added).) Respondents seek to use Cap-and-Trade to zero-out and excuse the application of feasible mitigation measures to over 95% of all GHG emissions from the Project. Cap-and-Trade applies only to expressly identified entities ("covered entities") such as cement producers, petroleum refiners, electricity generators, natural gas suppliers, fuel importers, and liquid petroleum gas suppliers. (Cal. Code Regs., tit. 17, § 95811.) Warehouse and logistics complexes are *not* covered entities. Cap-and-Trade compliance instruments do not factor in *whatsoever* because this Project is not covered by Cap-and-Trade.

The mere fact that warehouse and logistics complexes are in the chain of commerce with covered entities does not transform them into covered entities themselves. As an example, although the operator of a refinery that produces gasoline in California is subject to Cap-and-Trade, (Cal. Code Regs., tit. 17, § 95811, subd. (e)(1)), entities downstream from that refinery in the chain of commerce are not. The refinery itself may have compliance obligations under the Cap-and-Trade Program, which can be met by reducing the refinery's own GHG emissions or surrendering allowances, but the gas station that resells the gas, the truck drivers who purchase it, and

the warehouses to which the trucks drive do not have compliance obligations. Under the state's portfolio approach, while the refinery may have met some or all of its climate obligations via Cap-and-Trade, the downstream entities have not. Because warehouses receive no set price or regulatory signals from Cap-and-Trade, they are not being directly incentivized to reduce emissions. Instead, other components of the state's portfolio address those emissions. Nothing in Cap-and-Trade explicitly or impliedly repealed the use of other measures to address climate change; they were designed to work together. (See, e.g., 2017 Scoping Plan at p. 28.) Local governments must responsibly plan new development to further the state's climate goals.

## II. ALLOWING RESPONDENTS' UNTENABLE APPROACH TO GHG ANALYSIS WOULD HAVE SIGNIFICANT, NEGATIVE STATEWIDE CONSEQUENCES

If Respondents' approach to GHG analysis is endorsed, other lead agencies will undoubtedly follow this approach, and emissions from the transportation and land use sectors will be largely omitted from analysis and mitigation under CEQA. Widespread adoption of this approach would: (1) place the entire burden of California's well-established, long-term land-use related GHG reduction goals on Cap-and-Trade, thereby straining the program beyond its intended purpose and (2) expose already burdened communities in the state to greater amounts of GHG emissions and co-pollutants that accompany GHG emissions, such as diesel particulate matter and nitrogen oxides.

### A. Respondents' GHG analysis undermines California's GHG reduction goals

As explained above, the Cap-and-Trade Program is just one part of a suite of complementary measures designed to achieve California's ambitious GHG reduction and climate stabilization objectives. Cap-and-

Trade provides no legal basis for Respondents to avoid local governments' obligations as lead agencies under CEQA to evaluate and mitigate GHG emissions from a project that the Cap-and-Trade Program does not even cover.

While any one policy may be insufficient or at risk of circumvention, the suite of policies work in concert toward the state's goals.[7,8] This overlap is by design, and makes the suite of policies more resilient to changed circumstances, enforcement problems, and legal challenges. The upstream Cap-and-Trade Program thus works in tandem with downstream choices, including planning choices, to ensure both that total emissions decline and that projects throughout the state are designed to avoid putting undue upstream pressure on emissions or control costs. Weakening one policy because another policy might address it runs contrary to this approach.

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[7] See 2017 Scoping Plan, *supra*, pp. ES7–8, 10, 22, 97; cf. Elinor Ostrom, A Polycentric Approach for Coping with Climate Change (2014) 15 Annals Econ. & Fin. 97, 123 <https://perma.cc/YSF4-B7N8> (Nobel laureate describing an ideal policy approach to climate change as "Complex, Multi-Level Systems to Cope with a Complex, Multi-Level Problem"); Amir Bazaz, et al., Global Covenant of Mayors, Summary for Urban Policymakers: What the IPCC Special Report on Global Warming of 1.5.°C Means for Cities (Dec. 2018) pp. 22–23 <https://perma.cc/R37B-3WDD> (identifying interaction between sources of governance and importance of incentives beyond financial consequences at the community level).

[8] Complementary measures are also important in light of the risk to any one measure posed by litigation. Private parties and the federal government have challenged California's GHG reduction policies, including aspects of the Cap-and-Trade Program. California's GHG vehicle emissions regulatory authority is currently also under challenge. The wisdom of the portfolio approach endorsed by the Scoping Plan is to ensure that the state's efforts continue via many channels, rather than relying on any one potentially challenged measure.

If other lead agencies adopt Respondents' approach to GHG analysis under CEQA, their development projects would produce millions of metric tons of GHG emissions that would go unmitigated through what amounts to an unauthorized categorical exemption from CEQA. The economic analyses and feasibility of achieving the state's legislatively mandated goals in the Scoping Plan account for all policies working in tandem. If any one policy fails to deliver reductions, this would put strain on the Cap-and-Trade Program to deliver more reductions than anticipated and at higher costs.

Respondents' failure to account for the significance of the Project's GHG emissions from transportation is particularly troubling in light of the fact that the transportation sector accounts for over 35% of the state's total GHG emissions and these emissions continue to rise. (2017 Scoping Plan, *supra*, pp. ES1, 11 [charts of emissions by source]; see also California Air Resources Board, 2018 Progress Report: California's Sustainable Communities and Climate Protection Act (November 2018) at 4.) As the California Supreme Court noted, "transportation emissions are affected by the location and density of residential and commercial development, the Scoping Plan does not propose statewide regulation of land use planning but *relies instead on local governments*." (*Center for Biological Diversity v. Department of Fish and Wildlife* (2015) 62 Cal.4th 204, 230; emphasis added.) Local governments thus play a unique role in decreasing GHG emissions from the transportation sector.

Respondents contend that because statewide emissions are capped under the Cap-and-Trade Program, the amount of emissions from "capped" sources will be the same with or without their Project, but this claim ignores both their obligations under CEQA to disclose and mitigate their emissions and the intended design of the Cap-and-Trade Program. (See

Combined Respondents' and Cross-Appellants' Opening Brief at pp. 48–49.)

Cap-and-Trade is not a program designed to reduce emissions from local government actions, or land use; instead, it was designed on the assumption that local actors would simultaneously work to reduce emissions within their spheres. Cap-and-Trade alone was designed to account for less than 40% of the total emissions reductions needed to achieve California's 2030 climate goals, and on the explicit assumption that local design choices would continue to reduce overall emissions (and hence economy-wide costs in the Cap-and-Trade Program). (2017 Scoping Plan at p. 28.) Indeed, relying entirely on the Cap-and-Trade Program to address land use would produce a mismatch that would strain the Program by functionally increasing demand for emissions reductions as unregulated entities displace their obligations onto the Program rather than taking action themselves, raising compliance costs for covered entities across all sectors and all consumers across the state at all income levels. California's portfolio approach was designed to meet AB 32's requirement that "greenhouse gas emissions reduction activities . . . adopted and implemented by [CARB] are complementary, nonduplicative, and can be implemented in an efficient and cost-effective manner." (Cal. Health & Saf. Code, § 38561.) By taking a portfolio approach, the state has recognized that taking GHG action in specific sectors ensures that we achieve our broader climate and energy demand reduction goals. (See 2017 Scoping Plan at pp. 2, 24, 100 [describing Governor Brown's five key climate change strategy "pillars"].) Ultimately, cost increases could make the Cap-and-Trade Program less effective as a key part of the suite of California's climate policies.

In sum, Respondents' position is fundamentally inconsistent with the state's approach to climate change, and so disregards significant emissions

that should properly be addressed under CEQA, not an unrelated emissions program like Cap-and-Trade. Moreover, Respondents' approach would allow similar emissions from other projects that would follow its lead. (See Part III(A), *infra*.) The majority of land use projects are, like this Project, not covered by the Cap-and-Trade Program. Freight alone is an enormous industry; over 1.5 billion tons of freight were moved in California during 2015. (*Id*. at p. 73.) And other types of projects such as residential developments or agricultural enterprises may seek to invoke precedent created by this case. Thus, even if the Project standing alone does not excessively strain the Cap-and-Trade system, the collective weight of new projects failing to address GHG emissions in the CEQA process would.

### B. Respondents' GHG analysis prevents co-pollutant reduction measures necessary to protect California's environmental justice communities

Permitting massive land development projects without requiring the necessary mitigation measures to decrease project emissions will also harm California's environmental justice communities—those already suffering from the worst environmental pollution in the state. The census tract the Project will be built in is ranked in the 75th to 80th percentile of census tracts in California in terms of greatest pollution burden indicators and health and vulnerability factors for population characteristic indicators. (CalEnviroScreen 3.0 for Census Tract 6065042624, Office of Environmental Health Hazard Assessment, last visited November 27, 2019 <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>.) Even without the Project, residents of this census tract already experience ozone, the main ingredient of smog, at a rate higher than 98% of the rest of California. (*Ibid.*) Relatedly, these residents also experience cardiovascular disease, which can result from exposure to air pollution, at a rate higher than 95% of the state. (*Ibid.*)

Considering additional mitigation properly may have resulted in additional zero-emissions technologies used for the Project, including, perhaps, from its trucks, as many commenters recommended. If such measures are not considered from this Project and other future projects like it are not mitigated, Moreno Valley and communities throughout the state will likely continue to suffer from worse air pollution. (See Nicky Sheats, *Achieving Emissions Reductions for Environmental Justice Communities Through Climate Change Mitigation Policy* (2017) 41 WM. & MARY ENVTL. L. & POL'Y REV. 377, 387 ["[E]ven without the intentional maximization of co-pollutant reduction, there should be incidental co-pollutant reductions as GHGs are being reduced [which] should improve the health of local communities."]; see also Scoping Plan at p. 74 ["Air pollution from tailpipe emissions contributes to respiratory ailments, cardiovascular disease, and early death, with disproportionate impacts on vulnerable populations such as children, the elderly, those with existing health conditions . . . , low income communities, and communities of color."].)

## III. RESPONDENTS' EIR VIOLATES CEQA

As explained above, the EIR's approach to GHG analysis misrepresents the Cap-and-Trade Program and the Project's place in that scheme. As a result, the EIR takes an unsupportable approach to evaluating the significance of GHG emissions from the Project. Contrary to CEQA's focus on information disclosure and local responsibility for mitigation, the EIR ignores the vast majority of the Project's emissions, and, in a misleading analysis, compares only a small fraction of the Project's emissions to the applicable significance threshold. This flawed analysis leads the EIR to conclude that the impact from GHG emissions would be mitigated to a less-than-significant level, misleading the public and shirking mitigation responsibilities. Even if the Cap-and-Trade Program directly

applied to the Project's emissions (it does not since, as explained above, this Project is not a covered entity under the Program), this method of evaluating a project's significance *after* taking into account purported "mitigation" or impact-reducing components is not allowed by CEQA. As a result of its flawed analysis, the EIR fails to adopt all feasible mitigation measures and subverts CEQA's important political function of ensuring informed decision making and informed public participation.

The EIR's approach to GHG analysis fails on multiple levels. Perhaps most critically, in addition to pointing to "compliance" with a regulation that simply does not cover the Project to excuse mitigation, the EIR focuses on a single significance consideration while ignoring other evidence showing potentially significant impacts. CEQA does not allow clearly significant GHG impacts to be overlooked, even if a lead agency believes those impacts are considered less than significant under one particular metric. (See, e.g., *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 274 [citizens' personal observations about the significance of noise impacts on their community constituted substantial evidence that the impact may be significant and should be assessed in an EIR, even though the noise levels did not exceed general planning standards]; accord *SANDAG*, *supra*, 3 Cal.5th at p. 515 ["An adequate description of adverse environmental effects is necessary to inform the critical discussion of mitigation measures and project alternatives at the core of the EIR"].) This failure to address potentially significant impacts not only minimizes the Project's significant impacts, but also warps the evaluation of whether the Project's contribution to GHG emissions is a cumulatively considerable impact. (CEQA Guidelines, § 15064.) The cumulative effect of dozens of similar warehouse projects in the Moreno Valley area could—and almost certainly will—be significant.

### A. The EIR improperly applies CEQA Guidelines Section 15064.4 to determine the significance of the Project's GHG emissions.

The Resources Agency, the state's expert on CEQA, has rejected the approach of using purported "compliance" with an inapplicable program to mitigate emissions. (Final Statement of Reasons for the CEQA Guidelines Amendments (2018) at p. 27 ["a subdivision project could not demonstrate 'consistency' with [CARB's] Early Action Measures because those measures do not address emissions resulting from a typical housing subdivision"].)

The EIR misapplies CEQA Guidelines section 15064.4, which offers multiple factors a lead agency should consider in assessing the significance of impacts from GHG emissions. That Guideline provides, in pertinent part:

> (b) A lead agency should consider the following factors, *among others,* when assessing the significance of impacts from greenhouse gas emissions on the environment:
>
> (1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
>
> (2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
>
> (3) The extent to which *the project complies* with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a *particular project* are still cumulatively considerable notwithstanding compliance with the adopted

> regulations or requirements, an EIR must be prepared for the project.[9]

(CEQA Guidelines, § 15064.4, subd. (b), italics added.)

As reflected in subdivision (b)(3), compliance with "regulations or requirements adopted to implement a statewide, regional, or local plan" can factor into the assessment of GHG significance, but only when *the project complies* with those regulations or requirements. Yet, the EIR relies upon subsection (b)(3) to claim that emissions for which upstream suppliers surrendered allowances need not be analyzed and mitigated under CEQA. This approach excuses all of the Project's transportation- and electricity-related emissions, thus requiring analysis and mitigation of only a tiny fraction of the Project's emissions.

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[9] The 2018 update to the CEQA Guidelines added the following language:

(b) In determining the significance of a project's greenhouse gas emissions, the lead agency should focus its analysis on the reasonably foreseeable incremental contribution of the project's emissions to the effects of climate change. The agency's analysis should consider a timeframe that is appropriate for the project. The agency's analysis also must reasonably reflect evolving scientific knowledge and state regulatory schemes.

(b)(3) . . . In determining the significance of impacts, the lead agency may consider a project's consistency with the State's long-term climate goals or strategies, provided that substantial evidence supports the agency's analysis of how those goals or strategies address the project's incremental contribution to climate change.

(c) A lead agency may use a model or methodology to estimate greenhouse gas emissions resulting from a project. The lead agency has discretion to select the model or methodology it considers most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change. The lead agency must support its selection of a model or methodology with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use.

Respondents' application of subdivision (b)(3) to this Project is wrong. Because the Project is not a covered entity under the Cap-and-Trade Program, subsection (b)(3) is inapplicable, as the project cannot "comply" with Cap-and-Trade at all. Moreover, as discussed above, such "compliance" would undermine Cap-and-Trade's purposes if adopted as a CEQA approach, not serve the environmental goals both AB 32 and CEQA set out to deliver.

### B. The EIR failed to apply the SCAQMD's GHG emissions threshold to *all* of the Projects' GHG emissions.

The EIR takes an impermissible approach of applying the Cap-and-Trade Program to ostensibly reduce the Project's emissions significantly, then comparing only that reduced quantity to the bright-line significance threshold. This approach is not supported in law.[10]

CEQA requires lead agencies to "make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." (CEQA Guidelines, § 15064.4.) CEQA then provides that the lead agency must consider "whether *the project emissions* exceed a threshold of significance the lead agency determines applies to the project." (*Id.* at subd. (b)(2).) As explained in the EIR, a potentially appropriate

[10] The EIR also attempts to justify excluding "capped emissions" from its significance analysis by referencing two seemingly cherry-picked 2013 mitigated negative declarations from other lead agencies, and one 2014 guidance document from the San Joaquin Valley Air Pollution Control District (SJVAPCD). (EIR 4.7-33.) The EIR does not explain why it chose to follow the methodology allegedly used in two obscure mitigated negative declarations and in a policy document from an air district in a different air basin, rather than following traditional CEQA GHG analysis and mitigation principles. These irrelevant, project-specific documents do not constitute substantial evidence supporting Respondents' argument.

significance threshold in this case is the South Coast Air Quality Management District's (SCAQMD) SCAQMD's 10,000 metric ton limit.[11] (EIR at p. 4.7-32.)

The problem here is that the EIR does not compare the Project's total GHG emissions against this 10,000 metric ton threshold, and then mitigate those emissions to below that threshold to the extent feasible. Instead, the EIR simply subtracts from the total any GHG emissions it deems to be "capped," and compares only the few "non-capped" emissions to the bright-line threshold. Because the EIR only compares a small fraction of the Project's GHG emissions to the applicable bright-line significance threshold, it only requires relatively minor mitigation measures to reduce the Project's emissions to what the EIR considers "less than significant." (EIR at pp. 1-55–57.)

Respondents' approach improperly applies so-called "mitigation" (the Cap-and-Trade Program) *before* comparing GHG emissions to the significance threshold. By combining impacts and mitigation analyses, it is unclear how the purported mitigation reduces impacts. This approach was rejected in *Lotus v. Dept. of Transportation* (2014) 223 Cal.App.4th 645, where the court stated:

> The failure of the EIR to separately identify and analyze the significance of the impacts . . . before proposing mitigation measures is not merely a harmless procedural failing. . . . [T]his shortcutting of CEQA requirements subverts the purposes of CEQA by omitting material necessary to informed decisionmaking and informed public participation. It precludes both identification of potential

[11] It is worth noting that the Scoping Plans are not binding as to any particular CEQA methodology, or as to land use planning generally, and do not require use of any particular significance threshold. They are guidance documents; individual land use authorities can and do depart from particular suggestions in them if they have appropriate reasons to do so. The issue in this case, however, is that the Cap-and-Trade program does *not* provide such an appropriate reason.

> environmental consequences arising from the project and also thoughtful analysis of the sufficiency of measures to mitigate those consequences. The deficiency cannot be considered harmless.

(*Id.* at p. 658.)

Furthermore, if the full scope of the GHG emissions attributable to the Project were compared to the applicable bright line threshold, the emissions, as mitigated, would still be substantially over the threshold—and would therefore require consideration of additional mitigation measures. (See EIR, pp. 4.7-35–36.)

Applying appropriate mitigation measures to reduce the so-called "capped" emissions would not "result in double counting and double mitigating emissions that are already mitigated through cap-and-trade" as Respondents assert. (Combined Respondents' and Cross-Appellants' Opening Brief at p. 57.) Gesturing towards Cap-and-Trade regulated entities is not proper mitigation because Cap-and-Trade does not apply to this Project in any way, and the Project itself has ample mitigation opportunities onsite. To mitigate this Project's GHG emissions, Respondents would have to address emissions from mobile sources, which account for over 70% of the Project's total emissions (which again are nearly 40 times greater than the significance threshold). (AR002729.) To reduce these emissions, fewer trucks could drive from the Project to the Ports of Long Beach and Los Angeles every day, the Project could be built closer to the ports, the Project could require more zero emission vehicles be used or provide charging equipment or incentives to encourage their use, or any number of other meaningful mitigation measures. But Cap-and-Trade does not require any of this. Such measures are instead included by local governments in local land use projects to ensure approved project impacts fall below significance thresholds. By never counting the "capped" emissions toward the significance threshold, there is *no* counting and *no*

project-level mitigation of hundreds of thousands of tons of yearly GHG emissions from this Project.

### C. Respondents fail to consider the long-term GHG impacts of the Project.

The Supreme Court has made clear that an EIR should consider a project's long-term GHG impacts, and should address whether the project as a whole is in accord with the state's climate goals. (*Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 3 Cal.5th 497 (*SANDAG*) at p. 515.)[12] The state's climate change goals extend beyond 2030. (See, e.g., Executive Order S-03-05 [established a statewide target of reducing GHG emissions to 80 percent below 1990 levels by 2050].) Because the Project is expected to operate for decades into the future, Respondents must account for emissions beyond 2030. But Respondents fail to account for emissions beyond that point—despite the fact that the Project's full operation will not start until *five years later*, in 2035. (EIR at p. 4.3-61.) Respondents present no substantial evidence that any of the Project's post-buildout operational emissions are mitigated by the Cap-and-Trade Program. (See, e.g., EIR, pp. 4.7-36–37 [stating, without citation, that "[s]ome of the project's GHG emissions are subject to the requirements of the AB 32 Cap and Trade Program and will have a GHG allocation based on current GHG emissions levels"].) This is not an adequate CEQA analysis. (See *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884, 904 [EIR must contain substantial evidence that mitigation measures will reduce associated impacts to less-

[12] The parties in *AIR v. Kern* did not have the opportunity to brief the significance of *SANDAG* because the California Supreme Court filed its opinion in *SANDAG* over a month after the close of briefing in *AIR v. Kern*. It appears to amici that this is the first case at the California Court of Appeal where parties have had the opportunity to address both *SANDAG* and *AIR v. Kern* in their briefs.

than-significant-levels, such as by requiring compliance with applicable regulatory standards and preparation of site-specific studies]; Cal. Code Regs. tit. 14, § 15370, subd. (d) ["mitigation" includes "[r]educing or eliminating the impact over time by preservation and maintenance operations during the life of the action"].)

**D. Reliance on *AIR v. Kern County* is improper.**

Respondents incorrectly claim the Fifth Appellate District's decision in *Association of Irritated Residents v. Kern County Bd. of Supervisors* (2017) 17 Cal.App.5th 708 (*AIR*) upheld the use of the same GHG methodology as Respondents attempt to use here. (Combined Respondents' and Cross-Appellants' Opening Brief at p. 53.) Respondents' use of the Cap-and-Trade Program here goes far beyond what was sanctioned in *AIR.* In *AIR*, the project being evaluated under CEQA was a refinery, a *covered entity* under Cap-and-Trade. The court held a lead agency was authorized "to determine that a project's greenhouse gas emissions will have a less than significant effect on the environment based on *the project's* compliance with the cap-and-trade program." (*Id.* at p. 718; italics added.) Regardless of whether or not *AIR* was rightly decided, *here*, the question is much simpler and different from the question before the court in *AIR*. Here, it is undisputed that the Project is *not* a covered entity required to comply with the Cap-and-Trade Program. (Cal. Code Regs., tit. 17, § 95811.) Accordingly, this Court need only decide if projects that are *not* covered entities under Cap-and-Trade are nonetheless allowed to use the program to ignore significant GHG emissions they cause. The answer to that question is no.

Respondents argue the distinction between covered and non-covered entities is "a distinction without a difference." (Combined Respondents' and Cross-Appellants' Opening Brief at p. 63.) Respondents are incorrect.

This distinction is crucial under CEQA and vital to the success of California's ambitious climate policies.

From a CEQA perspective, the distinction is important because CEQA Guidelines section 15064.4, subdivision (b)(3) instructs lead agencies to consider the extent to which *a project* complies with GHG regulations or requirements. It is thus inappropriate for entities downstream in the chain of commerce from a covered entity to rely upon compliance with the Cap-and-Trade Program as a basis for avoiding analysis of project-related emissions.

From a policy perspective, as described above, the distinction is crucial because projects that are not subject to the Cap-and-Trade Program do not have the same direct incentives to reduce their GHG emissions as covered facilities, and Cap-and-Trade alone is not designed to achieve California's ambitious climate goals. The distinction between covered and not-covered entities is thus crucial to the portfolio of climate change measures the state is relying on to protect our citizens going forward.

### E. Respondents' GHG analysis obfuscates the climate change impacts of this Project, undermining CEQA's public disclosure purpose.

By failing to comply with CEQA Guidelines Section 15064.4, failing to compare all of the Project's emissions to the GHG emissions threshold, and failing to consider the long-term GHG impacts of the Project, Respondents' analysis undermines the informational purpose of CEQA. The purpose of an EIR "is to inform the public generally of the environmental impact of a proposed project." (Cal. Code Regs. tit. 14, § 15003, subd. (c).)

CEQA prohibits public agencies from approving or carrying out a project that will have significant effects on the environment unless the agency makes "findings" demonstrating either that it made changes to the

project to avoid or mitigate those significant impacts, or that certain overriding considerations outweigh the impact. (Pub. Resources Code, § 21081.) Without a full and accurate disclosure of the Project's impacts, Respondents erroneously concluded that the GHG impact would be less-than-significant, and thereby avoided making the subsequent findings that would inform the public whether the Project's significant impacts are unavoidable and/or justified. Additionally, Respondents' approach hinders the public's ability to submit informed comments during the EIR's public comment period—aside from addressing the *lack* of analysis—because the public is not provided with, and thus cannot evaluate, complete information or proper CEQA analysis.

## CONCLUSION

California is striving on all fronts to meet its ambitious, long-term GHG reduction objectives; the health of its citizens and the environment depend on it. But this Court's approval of Respondents' approach to GHG analysis and mitigation would treat the Cap-and-Trade Program as the sole remedy to limit GHG emissions from land-use projects, placing unnecessary strain on Cap-and-Trade's cost-effectiveness and seriously undermining the state's critical climate change efforts. Amici respectfully request this Court reject the trial court's holding and find in favor of Appellants as to GHG analysis.

Dated: January 10, 2020

Respectfully submitted,

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## CERTIFICATE OF COMPLIANCE

I certify that the attached Brief of Amici Curiae the Attorney General and the California Air Resources Board in Support of Plaintiffs and Respondents Albert Thomas Paulek, *et al*. and Plaintiffs and Appellants Laborers International Union of North America, Local 1184, *et al*. uses a 13 point Times New Roman font and contains 7,647 words.

Dated: January 10, 2020

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**DECLARATION OF ELECTRONIC SERVICE VIA TRUEFILING**

Case Name: **PAULEK, ET AL., V. MORENO VALLEY COMMUNITY SERVICES DISTRICT, ET AL., California Court of Appeal, Fourth Appellate District, (Amicus Brief)**
No.: **E071184**

I declare:

I am employed in the Office of the Attorney General, which is the office of a member of the California State Bar, at which member's direction this service is made. I am 18 years of age or older and not a party to this matter. I am familiar with the business practice at the Office of the Attorney General. Correspondence that is submitted electronically is transmitted using the TrueFiling electronic filing system. Participants who are registered with TrueFiling will be served electronically.

On January 10, 2020, I electronically served the attached:

**BRIEF OF AMICI CURIAE THE ATTORNEY GENERAL AND THE CALIFORNIA AIR RESOURCES BOARD IN SUPPORT OF PLAINTIFFS AND RESPONDENTS ALBERT THOMAS PAULEK, ET AL. AND PLAINTIFFS AND APPELLANTS LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, ET AL.**

by transmitting a true copy via this Court's TrueFiling system to the parties as follows:

**SEE ATTACHED SERVICE LIST**

I declare under penalty of perjury under the laws of the State of California the foregoing is true and correct and that this declaration was executed on January 10, 2020, at Sacramento, California.

| PAULA CORRAL | /s/ Paula Corral |
|---|---|
| Declarant | Signature |

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**Case No. E071184**

**IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA FOURTH APPELLATE DISTRICT, DIVISION TWO**

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ALBERT THOMAS PAULEK, et al.,
Plaintiffs and Respondents,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants

---

HF PROPERTIES, et al.,
Real Parties in Interest and Appellants

---

LABORERS' INTERNATIONAL UNION NORTH AMERICA LOCAL 1184,
Plaintiffs and Appellants,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Respondents

---

HF PROPERTIES, et al.,
Real Parties in Interest and Respondents

---

Appeal from the Superior Court of California
Hon. Sharon J. Waters, Judge, Case Nos. RIC1510967 MF, RIC1511279, RIC1511327, RIC1511421 & RIC1511195

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# PROPOSED BRIEF OF CALIFORNIA CEQA AND CLIMATE POLICY EXPERTS IN SUPPORT OF PLAINTIFFS/ APPELLANTS

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## AMICI CURIAE BRIEF

### I. Introduction

The World Logistics Center complex (the "Project"), the 40 million square foot warehouse development at the heart of this dispute, will impact the environment for decades. The resolution of this case may have an even larger footprint, answering important questions about the California Environmental Quality Act ("CEQA") and its relationship to the state's climate laws. The EIR's analysis, if endorsed, would have dire consequences for California's ability to meet its greenhouse gas ("GHG") reduction goals and would upend settled CEQA precedent about the role state-level regulation should play in assessing the significance of project impacts.

The City of Moreno Valley; HF Properties, Inc.; Sunnymead Properties; Theodore Property Partners; 13451 Theodore, LLC; and HL Property Partners (collectively, "Respondents") are asking this Court to endorse a novel approach to assessing the significance of a project's GHG emissions under CEQA. Although the Project is not regulated under California's cap-and-trade program—and, moreover, although nearly all of the emissions at issue in this case will be emitted after 2030, the sunset date of cap and trade—the Project's EIR relies on that program to write off an overwhelming majority of the Project's lifetime GHG emissions. The Project is estimated to draw 70,000 truck trips

per day at full buildout, yet the EIR declines to consider as significant ***any*** mobile source emissions associated with the Project.

Respondents' rationale for this outcome misconstrues the state's climate program, and its relationship to CEQA, by treating cap and trade as California's one-and-done policy for controlling certain greenhouse gas emissions. The EIR's analysis breaks Project emissions into "capped" emissions, which are regulated by cap and trade, and "uncapped" emissions. Because cap and trade requires "upstream" fuel suppliers and electricity generators to surrender compliance instruments while applying a declining emissions cap over time, the EIR takes the position that "downstream" emissions from mobile sources and electricity use associated with the Project are "capped," are already "mitigated" by the program, and need not be considered by the lead agency when assessing significance. (Resp. Br. at 35-36.) Asking the Project to address these emissions itself, according to the Respondents, would be "double counting," (Resp. Br. at 57) because state-level regulation already takes care of them in the most efficacious way. (Resp. Br. at 35.)

But that is not the case. California has never adopted a one-and-done approach to controlling capped emissions; in fact, the opposite is true. The state has ***not*** determined that the cap-and-trade program alone "is the most effective, efficient way to

reduce GHG emissions." (Resp. Br. at 35.) Instead, the program is designed to work together with other, coordinating and overlapping state-level emission reduction regulations and policies—including, *inter alia,* land use policies, transportation fuel policies, and CEQA. Cap and trade was never intended to be the sole, or even the main, driver of California's GHG reductions. Given its design, it cannot bear that load alone, for reasons discussed in this brief. The Project actually burdens the cap-and-trade program, and failing to reduce that burden using the robust tools that CEQA provides would create significant difficulties for California in controlling emissions, especially from the critically important transportation sector.

CEQA does not permit this result. While the CEQA Guidelines allow lead agencies to consider a project's compliance with a GHG-reducing regulation when assessing significance of project emissions, that consideration marks the beginning of the inquiry, not a *de facto* conclusion that emissions are not significant. For "capped" emissions, however, the EIR simply identifies the cap-and-trade program and ends its assessment there. It provides no analysis showing that the Project's own emissions will be reduced or mitigated by cap and trade. (In fact, it could not make that showing; the cap-and-trade program does not mitigate project-specific emissions, particularly at the Project's scale.) It does not explain how the Project would

guarantee compliance with cap and trade, given that it is unregulated by the law. And it fails to assess whether Project GHG emissions are significant even in light of compliance with the cap-and-trade regulation. In other words, the EIR assumes that the existence of a state-level regulation relieves the lead agency of the requirement to assess the significance of an individual project's impacts. This misapprehends the CEQA Guideline, which allows consideration of the state-level regulation, but does not make it dispositive. It is also wholly inconsistent with CEQA's focus on project-level impacts, and its requirement to demonstrate, both from a significance and a mitigation standpoint, that impacts are addressed. Approving such an approach would undermine the objectives of CEQA, not just in this case, but in any case where a state-level regulatory regime intersects with project impacts.

CEQA is, at its core, a public disclosure and mitigation statute. It is designed to ensure that decisionmakers and community members fully understand the significance of a project's environmental impacts in time to reduce those impacts through, among other tools, changes in project design and adoption of project-specific mitigation measures. Instead, the EIR here obscures the Project's GHG impacts by representing that most of the Project's emissions need not even be considered in weighing significance, claiming that they are "mitigated" by a

state-level program without providing any analysis or evidence showing that to be true.

The on-the-ground consequences of the EIR's misguided approach are real and illustrative. If this Project's mobile source emissions were identified as significant, Project proponents and the lead agency would be obligated to consider and adopt Project-specific mitigation measures to reduce mobile source emissions. Local decisionmakers might even decide to reject the proposal altogether once its full significance is understood. These decisions would be made before Project approval, when design changes can be most effectively implemented. By contrast, cap and trade alone cannot effectively mitigate the Project's mobile source emissions. The entities with fuel-related compliance obligations under cap and trade are third-party, distant-in-time fuel suppliers who cannot exercise control over Project design or operations. In other words, the EIR's analysis lays the burden for reducing the Project's mobile source emissions solely at the feet of a program that has very limited tools for carrying it. Writ large, this approach would undercut California's ability to meet its climate targets.

Because cap and trade does not apply to most of the Project's GHG emissions, and because the EIR's assessment of the significance of the Project's GHG emissions contradicts settled CEQA principles and misrepresents the function of the

cap-and-trade program, *amici* urge the Court of Appeal to reverse the trial court's decision.

## II. Discussion

At the heart of the EIR's GHG analysis lies Respondents' argument that the cap-and-trade program "mitigates" a majority of the Project's emissions and that, accordingly, those emissions should not be considered against the GHG emission significance threshold. (See Resp. Br. at 35 ["Far from 'brushing aside' or 'ignoring' the emissions…the City accounted for them and mitigated them…"].) Respondents go so far as to suggest that assessing these emissions at the project level would be "double counting." (Resp. Br. at 57). In fact, the cap-and-trade program does not cover the time frame of the vast majority of Project GHG emissions and does not apply to warehouse projects at all. Respondents' characterization additionally misstates the CEQA Guidelines, misapprehends the nature of the cap-and-trade program, and is inconsistent with CEQA's purposes.

### A. The EIR's GHG Impact Analysis Fails Because The Project Cannot Demonstrate "Compl[iance] With Regulations Or Requirements Adopted To Implement A Statewide, Regional, Or Local Plan For The Reduction or Mitigation Of Greenhouse Gas Emissions."

The CEQA Guidelines explain that, when determining the significance of a project's GHG emissions impacts, a lead agency may consider:

> The ***extent to which*** the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions (see, e.g., section 15183.5(b)). Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. (CEQA Guidelines, § 15064.4, subd. (b)(3) [emphasis added].)

However, the EIR simply concludes that the Project complies with cap and trade—assuming that is sufficient to mitigate the majority of the Project's emissions for the purposes of assessing the significance of the Project's GHG impacts—without ever evaluating "the extent to which the [P]roject complies" with the program. If the extent of the Project's compliance had been analyzed, it would necessarily have been found wanting. First, the cap-and-trade regulation will sunset long before the bulk of Project emissions occur. Second, cap and

trade does not cover emissions from out-of-state fuels, which may be burned by Project traffic.

**1. The cap-and-trade program will expire by operation of statute before most Project emissions occur.**

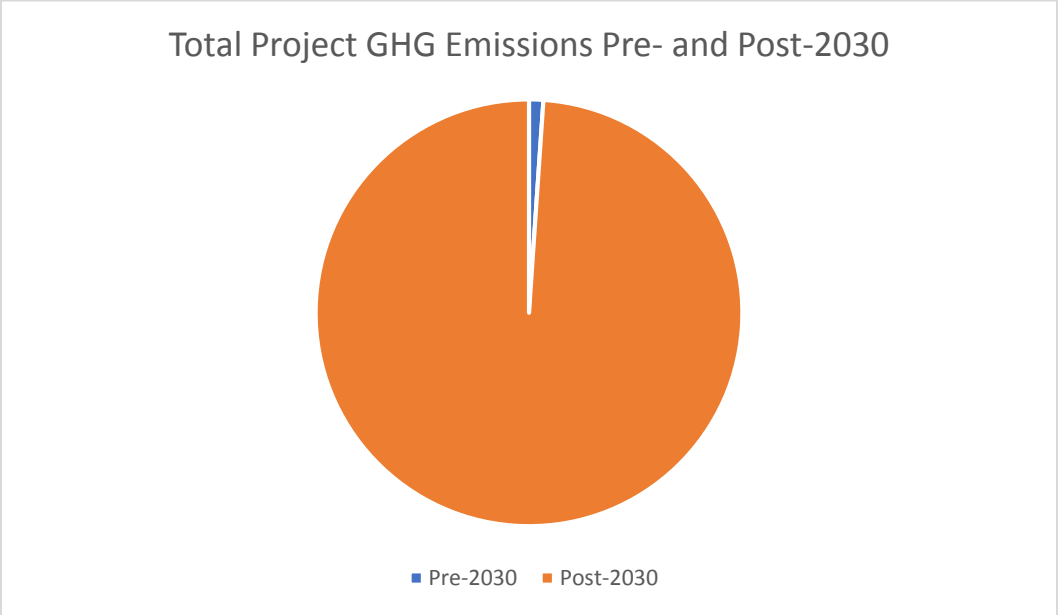
Critically, the cap-and-trade program is set to expire well before the Project is fully built out, and thus before most Project emissions occur. The EIR is clear that the Project will not be operational until 2035, ***five years after*** the cap-and-trade regulation sunsets by automatic operation of statute. (Cal. Health & Safety Code, § 38562, subd. (h).) This means that the majority of the Project's lifetime GHG emissions are not, in fact, capped at all. The cap-and-trade program therefore cannot be used as a reason to disregard those emissions.

In 2017, the California Legislature passed Assembly Bill 398, which reauthorized the cap-and-trade program, initially set to expire in 2020, for an additional decade. (Cal. Health & Safety Code § 38562; see California Legislative Analyst's Office, Cap-and-Trade Extension: Issues for Legislative Oversight ("LAO Cap-and-Trade Extension Report") (Dec. 2017) at 1.) This legislation specifically provides that the law authorizing the cap-and-trade program "shall remain in effect only until January 1, 2031, and as of that date is repealed, unless a later enacted statute which is enacted before that date, deletes or extends that

date." (Cal. Health & Safety Code § 38562, subd. (h).) Thus, unless the Legislature again affirmatively acts to extend the cap-and-trade program, it cannot continue beyond 2030. If the Legislature does nothing, cap and trade will no longer exist in ten years.

The vast majority of the Project's emissions, including nearly all of the emissions that the EIR labels as "capped," will occur after the expiration of cap and trade. Prior to 2035, the EIR estimates that the Project will emit a total of about 222,000 MT $CO_2e$ of construction-related GHGs. Nearly 40 percent of those emissions, or about 86,000 MT $CO_2e$, will occur after cap and trade expires in 2030. But even total construction emissions are dwarfed by the approximately 412,000 MT $CO_2e$ of ***annual*** emissions the Project will produce at full buildout. As demonstrated by the chart below, pre-2030 emissions represent only about 1 percent of total Project GHG emissions assuming a

30-year life for the Project at buildout.




In fact, just one year of Project GHG emissions after 2035 will exceed all Project GHG emissions before that date—and is more than triple the amount of pre-2030 construction emissions. None of the post-2030 emissions will be covered by the cap-and-trade program, unless the California Legislature enacts a change in state statute.

Respondents have tried to deflect from this fact, arguing that it would be "wrong…not to apply current law because it might change sometime in the future." (Resp. Br. at 68.) But it is Respondents who are asking this Court to assume the law might change. With no change at all, it is clear that cap and trade expires and will not apply to the gross majority of Project GHG emissions. And the Court should be wary of Respondents'

speculative approach: cap and trade reauthorization is by no means a certainty. The process to extend cap and trade beyond 2020 was politically fraught, requiring a two-thirds majority vote of the Legislature for reauthorization and inciting battles over the program's efficacy and role in addressing local sources of pollution. Just as it was prior to the original 2020 sunset date, cap and trade reauthorization to extend the program beyond 2030 may be an arduous political process, with no guarantee that the program will continue at all, or in its current form. (See, e.g., Georgina Gustin, INSIDE CLIMATE NEWS, California's New Cap-and-Trade Plan Heads for a Vote—With Tradeoffs (Jul. 15, 2017); Christopher Cadelago and Taryn Luna, SACRAMENTO BEE, California's climate change vote delayed until Monday (Jul. 12, 2017) [noting that then-Governor Jerry Brown expressed concern that a two-thirds majority would be needed to pass extension legislation and that such a threshold could not be met].)

Simply put, the Project cannot "comply" with cap and trade when cap and trade no longer exists. The EIR contains no analysis to explain why these emissions should not be considered significant in light of cap and trade's expiration, and the Court should reject Respondents' arguments and overturn the District Court's decision for this reason alone.

**2. Cap and trade does not cover emissions from out-of-state fuels.**

The EIR also fails to assess the extent to which mobile source emissions will necessarily be covered by the cap-and-trade program, instead assuming that all mobile source emissions are "capped". However, the cap-and-trade program is not designed to cover all mobile source emissions in California. Instead, the program requires fuel suppliers to surrender compliance mechanisms equivalent to the amount of $CO_2e$ released from the burning of the fuels they sell ***in California***. (17 Cal. Code Regs. § 95811.) In other words, if a mobile source enters California from another state or country—Nevada, Arizona, New Mexico, Utah, or even Mexico—to travel to the Project, burning fuel that it purchased outside of California, cap and trade does not cover those emissions. A typical 18-wheel diesel truck can travel between 1260 to 2250 miles on a tank of gas, so the Project may very well attract traffic from mobile sources that purchase fuel outside California's borders.

But the EIR does not include these emissions among its assessment of "uncapped" emissions, or make any attempt to quantify the amount of mobile source emissions that will result from the burning of out-of-state fuels. Accordingly, the EIR fails to assess the extent of the Project's compliance with cap and trade and fails to meet its burden to demonstrate that these emissions should be considered insignificant. This lack of

analysis is further evidence of the EIR's misapprehension of the cap-and-trade program. All mobile source emissions are not equal under cap and trade; the EIR improperly failed to take this distinction into account.

### B. The EIR's Approach Cannot Satisfy The Purpose Of A GHG Impact Analysis Under CEQA.

Even if cap and trade were not set to expire in 2030, and even if all mobile source emissions caused by the Project were the result of burning fuels purchased in California, the EIR's analysis would still be invalid under CEQA. The EIR is premised on a fundamental mischaracterization of the cap-and-trade program, one that is reiterated numerous times in Respondents' brief. (See, e.g., Resp. Br. at 35 ["The State has made the policy determination that Cap-and-Trade is the most effective, efficient way to reduce GHG emissions…the City accounted for [GHG emissions] and mitigated them in precisely the way that the authoritative California agency has determined to be the optimal way to achieve the State's emission-reduction goals."], 36 ["CARB…made it clear that it intended to have greenhouse gas emissions accounted for, and mitigated, at the producer level…"], 48 ["CARB made perfectly clear its decision that the mitigation of certain greenhouse gas emissions statewide at the production level was the most efficient, cost-effective way to implement AB 32's mandate."], 57 ["Appellants' preferred approach…would

result in double counting and double mitigating emissions that are already mitigated through cap-and-trade."].)

The EIR's misrepresentation of cap and trade is twofold. First, at the core of the analysis is the erroneous assertion that under California law, cap and trade is the primary (even sole) regulation responsible for reducing or avoiding GHG emissions from mobile sources and electricity generation, eliminating the need for overlapping regulation of projects that induce emissions from those sectors. Second, the EIR incorrectly presumes that the cap-and-trade program will mitigate ***project-level*** emissions, without any analysis to support that conclusion. These two missteps result in a GHG analysis that improperly suggests to decisionmakers and the public that the great majority of the Project's GHG emissions—including ***all*** of the mobile source emissions generated by the Project—do not need to be addressed at the project level because they are already reduced or avoided by operation of a state regulation. This is misinformation with serious consequences: it undermines CEQA's role as a transparency and public disclosure tool, and it opens the floodgates for lead agencies to make future land use decisions that will severely compromise California's ability to meet its GHG reduction targets.

### 1. How cap and trade works: The basics.

To assist the Court in its review of this case, we offer here a brief history of the implementation of the legislation that authorized the California Air Resources Board ("CARB") to create the cap-and-trade program, AB 32, as well as an explanation of how the cap-and-trade program works in practice.

AB 32, passed by the Legislature in 2006, was a broad piece of legislation that codified an ambitious GHG emission reduction mandate: It requires California to reduce its statewide GHG emissions back to 1990 levels by the year 2020. (Cal. Health & Safety Code § 38550.) The legislation directed CARB to develop a scoping plan of state-level policies that would lead to the achievement of that goal, and authorized CARB to enact regulations that would implement the policies set forth in the scoping plan. (Cal. Health & Safety Code § 38561, subd. (a).) CARB's first Scoping Plan set forth "a comprehensive array of emissions reduction approaches and tools" to meet the 2020 goal, which included a number of overlapping, complementary policies such as the state's Renewable Portfolio Standard (aimed at increasing generation of electricity from renewable sources), the Low Carbon Fuel Standard (aimed at reducing greenhouse gas emissions from transportation fuels), land use and transportation policies (aimed at reducing emissions from transportation), the expansion of energy efficiency programs (aimed at reducing

emissions from electricity usage), and cap and trade (aimed at pricing greenhouse gas emissions from certain sectors, ultimately to include both electricity generation and transportation fuels). (California Air Resources Board, Climate Change Scoping Plan: A Framework for Change (Dec. 2008) at ES-3-ES-4.) Notably, many of these policies targeted emissions from the same sectors. No single one of these policies was intended to meet the 2020 goal itself, but, working in concert, they were designed to achieve the target.

Since the adoption of the original Scoping Plan, the Legislature has codified additional GHG reduction mandates, including reaching at least 40 percent below 1990 levels by 2030 and net zero emissions from electricity generation by 2045. (Cal. Health & Safety Code § 38566; Cal. Pub. Util. Code § 454.53, subd. (a).) Before leaving office, Governor Brown signed an executive order directing the state to achieve a carbon neutral economy by 2045. (Executive Order B-55-18 to Achieve Carbon Neutrality [establishing a goal "to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter."].) These new targets are designed to make California's emission reduction progress more consistent with evolving science demonstrating that the most severe impacts of climate change could be somewhat alleviated if global temperature rise is contained to

less than 1.5 degrees Celsius. (California Air Resources Board, California's 2017 Climate Change Scoping Plan ("2017 Scoping Plan Update") (Nov. 2017) at ES3; Intergovernmental Panel on Climate Change, Global Warming of 1.5ºC: Summary for Policymakers (Oct. 2018) at 7, 9-12.) The Scoping Plan has been updated as well, and continues to rely on a broad range of policies, including land use and transportation policies, fuels-related policies, energy efficiency policies, and renewable energy policies, to achieve newer targets. (See 2017 Scoping Plan Update at ES4, 1.) CARB has consistently indicated in the Scoping Plan and otherwise that achievement of the state's emission reduction goals is not possible without a commitment to this wide range of policies; no one policy or regulation will be enough to achieve the statewide goals. (See, e.g., 2008 Scoping Plan at 15 ["Reducing greenhouse gas emissions from the wide variety of sources can best be accomplished through a cap-and-trade program along with a mix of complementary strategies that combine market-based regulatory approaches, other regulations, voluntary measures, fees, policies, and programs."]; 2017 Scoping Plan Update at ES4 ["The Plan underscores that there is no single solution but rather a balanced mix of strategies to achieve the GHG target."].)

As part of AB 32, CARB was given the authority—but not, as Respondents suggest, the mandate—to establish a market-

based emission credit trading mechanism. (Cal. Health & Safety Code § 38570, subd. (a) ["The state board ***may*** include in the regulations adopted pursuant to Section 38562 the use of market-based compliance mechanisms to comply with the regulations."] [emphasis added].) CARB elected to create the cap-and-trade system alongside the other emission reduction policies set forth in the Scoping Plan. (California Air Resources Board, California's Cap-and-Trade Program Final Statement of Reasons ("2011 FSOR") (Oct. 2011) at 156 ["This market-based program is… designed to work in concert with…standards for cleaner vehicles, low-carbon fuels, renewable electricity, and energy efficiency."].) From the outset, CARB viewed the cap-and-trade program as just one of multiple regulatory efforts aimed at achieving GHG emission reductions from covered sectors. Indeed, other state-level policies—not cap and trade—were intended to do the bulk of heavy lifting on GHG reductions. (See 2008 Scoping Plan at 22.)

The cap-and-trade program was initially set to expire by operation of statute in 2020. As discussed above, extension legislation passed and the program now sunsets in 2030, five years before the Project will reach full buildout. (Cal. Health & Safety Code § 38562, subd. (h).) Under the cap-and-trade program, covered entities, such as electricity generators, industrial sources, and fuel suppliers, are required to surrender

compliance mechanisms to CARB equal to the amount of their in-state emissions in a given compliance period. (See 17 Cal. Code Regs. §§ 95850, 95855, 95856.) Warehouses are not among the covered entities. Covered entities can comply with the program's requirements in three ways: (1) by reducing their emissions; (2) by obtaining allowances, with each allowance essentially serving as a permit to emit one ton of $CO_2e$; and/or (3) by obtaining offsets, which are generated by certified emission reduction projects from sources that aren't covered by cap and trade, like forestry projects. (See, e.g., 17 Cal. Code Regs. §§ 95820, 95970, 95990, 95991.)

In the context of fuel emissions and electricity generation emissions, as Respondents concede, compliance obligations rest with the fuel supplier or the electricity generator, rather than with the end user of the fuel or electricity. (17 Cal. Code Regs. § 95811.) Where, as here, a project results in increased mobile source emissions, the project itself doesn't bear compliance responsibility when drivers burn fuel to get to the project. Instead, compliance mechanisms for the portion of the fuel that is supplied in-state—as discussed above, out-of-state supply is not covered by the cap—would be surrendered by the suppliers of the fuels those drivers have put in their cars or trucks.

Under the program, the number of total allowances available is capped, and the aggregate statewide cap declines

over time. Emissions from any given project or any covered sector, however, need not decline—and may even rise year over year. This is in part because entities that hold excess allowances may sell those allowances to entities that need them to come into compliance. (See 17 Cal. Code Regs. §§ 95920, 95921.) A significant portion of allowances are allocated for free to certain entities, and CARB holds quarterly allowance auctions of most of the remaining allowances, subject to a price floor. (17 Cal. Code Regs. §§ 95910-95915.)

The higher the demand for allowances, the higher allowance prices climb, creating a price signal that should reduce statewide emissions and help keep emissions below the cap. However, there is a limit to how high allowance prices can rise—and this limit, if reached, can function to create a "hole" in the cap. A small portion of allowances is allocated to a special reserve, the APCR, and those allowances are made available at higher prices once certain trigger levels are hit, creating a "soft" price ceiling that is intended to create market stability rather than accurately price GHG emissions commensurate with the harms they cause. (California Air Resources Board, Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Final Statement of Reasons ("2017 FSOR") (Aug. 2017) at 504 [explaining that the APCR price was designed "looking at the cost of abatement; as opposed

to the Social Cost of Carbon, which looks instead at a cost range related to damages caused by emissions."].) As part of the cap-and-trade extension legislation, CARB was directed to set a "hard" price ceiling, which will allow ***unlimited*** new allowances to be sold at the ceiling price. (Cal. Health & Safety Code § 38562, subd. (c)(2).)

This is a key point: If capped emissions don't decline sufficiently quickly, allowance prices may rise and hit CARB's "hard" price ceiling, triggering the sale of unlimited new allowances. (See Severin Borenstein et al., Expecting the Unexpected: Emissions Uncertainty and Environmental Market Design ("Borenstein Cap and Trade Report") (Aug. 2019) at 2-3 [explaining that the combination of uncertainty surrounding "business as usual" emissions and price-inelastic emissions abatement supply make prices at the ceiling one of the most likely cap and trade outcomes].) Depending on how long allowance prices sit at the ceiling and how many allowances are sold at that price, this could undermine or even negate the statewide cap on emissions. Thus, each of CARB's overlapping and complementary programs that reduces emissions from capped sectors plays an important role in keeping allowance prices down, emissions below the cap, and the cap-and-trade program functioning well. If left to bend California's emissions trajectory downward to the 2030 statewide limit through

allowance prices alone, cap and trade would likely not succeed. And because the existence of the "hard" price ceiling effectively removes the program's cap for emissions between years 2021 and 2030, Respondents' fundamental premise—that the existence of the cap means the Project's mobile source emissions must necessarily be mitigated—also fails.

Another important feature of the cap-and-trade program is the ability to bank allowances. While the cap represents the maximum number of emissions from allowances that are issued in any given year, emissions can, and do, sometimes fall below that maximum, and unused emissions allowances may be carried forward to a subsequent year when they can be used for compliance. (17 Cal. Code Regs. § 95922.) Conversely, real world emissions can exceed the number of emissions allowances issued in a given year, if unused allowances from a previous year are available to meet compliance obligations. (See LAO Cap-and-Trade Extension Report at 9.) In other words, while CARB plans to make fewer allowances available on the market each year, that does not necessarily mean that capped emissions will decrease year to year, because of banking of older allowances (and because of the price ceiling mechanisms described above). Allowance banking is, again, a price stabilizing mechanism for the cap-and-trade market—but it also creates the possibility that annual emissions targets, like California's 2030 target, may not be met

because compliance with the cap-and-trade program will be achieved through the use of banked allowances. (See LAO Cap-and-Trade Extension Report at 9 [explaining that due to banked credits, the Legislative Analyst's Office "found this general result—2030 emissions significantly higher than the annual target—under a couple different scenarios we analyzed."]; 2011 FSOR at 165.)

Lastly, it is important to note that CARB can adjust the annual statewide cap either upward or downward. (See Cal. Health & Safety Code § 38562, subd. (c)(2); LAO Cap-and-Trade Extension Report at 9, 14 [identifying cap adjustment as an area for legislative oversight].) This means, for example, that if complementary policies are doing an especially good job of controlling capped emissions and the state's emissions trajectory is declining faster than anticipated, the state can "capture" those gains. There is no sense in which the state's current cap is its emissions destiny.

**2. Cap and trade was designed to work together with other laws, like CEQA, that reduce emissions from transportation—and it would be overburdened to the breaking point if asked to work alone.**

Respondents argue that "the EIR and the City Council reasonably concluded that the impacts of the capped emissions have already been addressed by the cap-and-trade program, which ensures consistency with statewide greenhouse gas emissions reduction goals." (Resp. Br. at 56.) But this misapprehends the nature of the cap-and-trade program and its place among a large stable of state-level GHG regulations that are collectively intended to push California toward its ambitious GHG reduction targets. Cap and trade is not, and was never intended to be, the one regulation that guarantees compliance with statewide GHG emission reduction goals, and accordingly, even compliance with the program cannot *de facto* lead to a conclusion that a project's GHG impacts have been adequately mitigated.

If this Court were to adopt the EIR's approach, effectively releasing lead agencies from the requirement to mitigate transportation emissions at the project level and at the stage of project design and approval, emissions from developments like the Project would rise significantly as compared with the contrary case. The cap-and-trade market would have to absorb

that additional pressure. Respondents are, in essence, asking the Court to force other market sectors—heavy industry, fuel suppliers, electricity generators, and the like—to bear the weight of reducing emissions created by the development sector. That is not cap and trade's purpose or design.

Indeed, the cap-and-trade program is a minority contributor to GHG emissions reductions, and California cannot reach its looming GHG reduction mandates with cap and trade alone. Both the original Scoping Plan and the two subsequent Scoping Plan updates, as well as CARB's Final Statements of Reasons for the cap-and-trade and cap-and-trade extension regulations, are clear that CARB has never intended the program to be the sole mechanism through which statewide GHG reduction goals are met, even as to capped emissions. (See, e.g., 2011 FSOR at 138 [CARB "is pursuing both direct command-and-control regulations, such as, but not limited to, the low carbon fuel standard, advanced clean car regulation, stationary refrigeration regulation, and a market-based cap-and-trade regulation to reduce GHG emissions."]; 2017 FSOR at 1022 [explaining that in certain sectors, pressure from other programs causes GHG emissions reductions, meaning "the cap decline factor is not needed as an incentive to reduce GHG emissions."].) CARB has explained that cap and trade "is used to supplement, rather than replace, direct regulation approaches. It is also

designed to work in concert with other measures…" (2011 FSOR at 156.)

This fact is widely recognized even beyond CARB, especially in the context of land use decisions and transportation emissions. (See, e.g., California Air Resources Board, First Scoping Plan Update, Appendix D1 [California Air Pollution Control Officers Association's and Other Regional Efforts to Implement Climate Protection Strategies] (Feb. 10, 2014) at D1-2.) For example, the California Air Pollution Control Officers Association ("CAPCOA") explains "it is clear that state actions alone won't be sufficient [to meet coming statewide reduction goals]. State policy is most effective with the support, engagement, and complementary actions of regional and local efforts." (*Id.*) CAPCOA specifically points to mobile source emissions reductions as an area where state-level action must be supplemented by regional and local governments "through land use planning, both on a project-level basis and in integrated, long term blueprints…" and explains that state-level efforts to reduce mobile source emissions are undercut by regional and local decisions that do not prioritize GHG emissions reductions. (*Id.*) Indeed, the California Legislature re-authorized cap and trade in 2017 knowing that the program would continue to work alongside other complementary statutes and regulations designed to reduce transportation sector GHG emissions, such as SB 375—

comprehensive legislation designed to achieve emissions reductions from mobile sources using local land use and transportation planning tools—and the Low Carbon Fuel Standard. (See, e.g., Cal. Gov. Code §§ 14522.1, 14522.2, 65080.) The Legislature did not consider such overlapping measures to constitute "double counting" of mobile source emissions, but instead concluded that they were necessary to provide needed redundancy in light of the complex problem presented by transportation emissions.

CARB has consistently analyzed the percentage of necessary reductions it expects to be achieved by the cap and by other complementary measures, including the Low Carbon Fuel Standard, the Renewable Portfolio Standard, and regional land use and transportation measures; cap-and-trade does not account for even a majority of the needed GHG emissions reductions in those assessments. (See, e.g., 2017 Scoping Plan Update at 28.) CARB expects cap and trade to account for less than a third of the emissions reductions needed to meet California's 2020 target, and less than 40 percent of the emissions reductions needed to meet the 2030 target. (2008 Scoping Plan at 22; 2017 Scoping Plan Update at 26, 28.) Because other state-level, regional, and local policies are themselves effective at reducing GHG emissions, cap and trade allowance prices have historically remained low, auctioning for less than half of Social Cost of

Carbon estimates that many states use. (Borenstein Cap and Trade Report at 3, 23-24; see 2017 FSOR at 504 [allowance prices are not intended to reflect the Social Cost of Carbon].)] This means that, far from accurately reflecting the price to reduce or avoid the full amount of GHG emissions from covered sectors needed to meet statewide goals, as Respondents suggest (Resp. Br. at 57), cap-and-trade allowance prices understate those costs and the program itself simply serves as one program among many. In short, whatever the merits of cap and trade as a partial driver for GHG emissions reductions, it cannot be considered full mitigation for the cumulative impacts of carbon emissions, which is what the EIR proposes.

And because of the "hard" price ceiling the Legislature has directed CARB to create, it is critical that other emission reduction programs continue to take a laboring oar in reducing emissions from capped sectors. Otherwise, allowance prices could skyrocket as the system bears a burden it was never designed to hold. (Borenstein Cap-and-Trade Report at 23-24 [explaining that without complementary policies, the probability of very high allowance prices "more than triples" and could result in price ranges "likely to be politically unacceptable."].) As discussed *supra*, a result of skyrocketing allowance prices could be to undermine the cap, with unlimited allowances available for sale at the ceiling price.

In sum, the existence of the cap-and-trade program does not displace the need to use other state-level, regional, and local policies—including thoughtful land use decisionmaking through the CEQA process—to control emissions from capped sectors. To the contrary, cap and trade works well only if complementary policies are employed, too. Because it acts in concert with other policies to meet statewide goals, cap and trade cannot be relied upon alone as evidence that project-level emissions have been "mitigated" and are not significant. In fact, such an approach would overburden the cap-and-trade market and make it challenging for California to meet its emissions reduction targets. And for those same reasons, the EIR's approach is inadequate for CEQA purposes: The mere existence of the program cannot guarantee that the Project's emissions are addressed, and the EIR's lack of analysis to show that they are renders the document insufficient under CEQA.

**3. Cap and trade will not ensure that Project-level emissions are reduced.**

Cap and trade sets an economy-wide emissions cap that is not project- or sector-specific. This means that while the overall cap declines over time, emissions from an individual project need not, and often do not, decline. Even emissions from an entire sector may not decline in any given compliance period, as long as there are adequate allowances on the market to allow all covered

entities to meet their compliance obligations. Respondents say this doesn't matter; because the overall cap declines over time, this must mean that somewhere, someone is "mitigating" mobile source emissions in a way that allows California to achieve its climate targets. Their view is that because the statewide cap exists, it doesn't matter whether there are project-level efforts to reduce emissions; in aggregate, emissions will be reduced enough by operation of the cap.

In reality, though, the need for simultaneous project-level efforts to reduce emissions remains strong, for all of the reasons discussed *supra*. This is especially true with respect to the Project's transportation emissions, which make up the bulk of the emissions at issue in this case. Transportation emissions from the Project, and from similar development proposals around the state, will not be adequately controlled by cap and trade alone because significant mechanisms for reducing transportation sector emissions, like changing local land use patterns and making mass transit improvements, are out of the hands of fuel suppliers—who are the only covered entities with compliance obligations for transportation fuels under the cap. The success of California's climate policies depends, in part, on local and regional land use authorities and project developers working to reduce project-level GHG emissions throughout the design, approval, and operational phases of proposed projects.

Traditional CEQA mitigation tools, as applied to GHG impacts, are critical in these efforts, especially for a project that results in the creation of 70,000 truck trips per day that would otherwise not occur. The upshot of the EIR's approach is to leave meaningful, project-specific mitigation measures that would reduce transportation emissions on the table.

This is particularly troubling because accelerating reductions in transportation sector emissions is critical to achieving the statewide climate goals. In the worst-case scenario, overburdening the cap-and-trade system in this way could destabilize the market entirely, reducing even cap and trade's economy-wide efficacy as mobile source emissions associated with the development sector continue to rise.

**4. The EIR's GHG analysis undermines CEQA's purpose and role.**

Because it misrepresents the nature of the cap-and-trade program, the ability of the Project to ensure compliance with cap and trade, and the potential for mitigation of Project GHG emissions through cap and trade, the EIR's GHG analysis is inconsistent with CEQA's "fundamental goal": to ensure the public and decisionmakers are fully informed about a project's possible significant environmental impacts. (See *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439, 447.) The Project's EIR cannot serve its

proper purpose as an "environmental 'alarm bell'" when it dramatically understates the extent of the Project's GHG impacts, and, in turn, the amount and type of mitigation that would be required to address them. (See *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810; see also Cal. Pub. Res. Code § 21061 [the purpose of an EIR is to provide "detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."].)

The EIR's analysis is misleading in two significant ways. First, the EIR improperly concludes, without any supporting analysis, that the existence of the cap-and-trade program means Project emissions are necessarily less than significant. Second, the EIR plays fast and loose with the term "mitigation," suggesting that Project emissions are "mitigated" for CEQA purposes when they are not, with serious adverse consequences for both this case and the ability of California to meet its GHG reduction targets.

**a. The existence of state-level regulation does not obviate the need for a robust significance analysis under CEQA.**

Respondents contend that the mere existence of the cap-and-trade program is enough to conclude that GHG impacts from

"capped" sources associated with the Project are not significant. But the EIR contains no analysis to support this conclusion. CEQA does not permit such a logical leap.

CEQA is designed to assess the significance of project-level impacts and ensure mitigation of those impacts. (See Cal. Pub. Res. Code §§ 21002; 21081.) Even though the cap-and-trade program may reduce economy-wide GHG emissions, it has no nexus to the Project's impacts: GHG emissions from the Project will not necessarily decline as a result of the operation of cap and trade and may even increase despite the existence of the program. Equally as important from a CEQA perspective, the Project has no control over whether the entities responsible for the "capped" emissions associated with the Project will actually meet the requirements of the law. The cap-and-trade program applies to a variety of covered entities in the industrial, electricity generation, and fuel production sectors. (17 Cal. Code Regs. § 95811.) Those entities are subject to compliance obligations under the law and must accordingly surrender compliance instruments to the state. (*Id*. at §§ 95811, 95850-95859.) But the Project is not among them: warehouses are not covered entities under cap and trade. (*Id*. at § 95811.) Respondents attempt to downplay the significance of this fact in their brief, calling the line between projects directly covered by cap and trade and those not covered at all, but which may draw

"downstream" emissions, "a distinction without a difference." (Resp. Br. at 63.) To the contrary, the distinction is key, not just for this case but for its CEQA implications more generally. Unlike a refinery, which itself must submit compliance mechanisms under cap and trade and can therefore guarantee that its emissions are being mitigated through the program, the Project has no compliance obligation, and no way to ensure that those who do have such obligations meet them. Without any way to ensure or demonstrate compliance—and without any attempt to explain how it ***could*** demonstrate compliance—the Project cannot fairly be said to meet its CEQA obligations. (See Cal. Nat. Res. Agency, Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines, OAL Notice File No. Z-2018-0116-12 (Nov. 2018) ("Nov. 2018 Guidelines FSOR") at 95 ["…it is only those plans and regulations that are enforceable against a particular project that a lead agency should consider."][discussing a lead agency's assessment of consistency with a plan or regulation for purposes of a GHG impact significance analysis].)

Setting aside the fact that the Project cannot itself ensure compliance with cap and trade, the EIR is required to present evidence demonstrating that compliance with an existing regulation or plan will, in fact, render emissions less than significant, and is also required to consider evidence that, despite

compliance with the regulation or plan, emissions will still rise to the level of significance. (See CEQA Guidelines §§ 15064, 15604.4; Cal. Nat. Res. Agency, Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97 ["SB 97 FSOR"] (Dec. 2009) at 27, 98.) The Project's EIR did neither here.

"Compliance with the law is not enough to support a finding of no significant impact under the CEQA." (*Californians for Alternatives to Toxics v. Department of Food & Agriculture* (2005) 136 Cal.App.4th 1, 17 [citing *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 881-882.].) Courts have consistently found that EIRs must do more than simply recite the existence of a state-level regulation or program when considering the significance of environmental impacts. (*Id.*; see also *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715 ("*SCOPE*").)

For example, in *Californians for Alternatives to Toxics v. Department of Food & Agriculture*, the State Department of Food and Agriculture ("DFA") developed a plan to address diseased grapes in vineyards, including vegetation removal and the use of pesticides. (*Californians for Alternatives to Toxics*, 136 Cal.App.4th 1, 9.) In concluding that the application of pesticides

would not cause an environmental impact, DFA relied on the existence of state and federal pesticide regulations and licensing and worker safety regulations. (*Id*. at 10.) The agency concluded that consistency with these regulatory schemes was sufficient to determine that impacts would be reduced to less than significant. (*Id*. at 17.) The court disagreed, finding that "DFA repeatedly deferred to the [state] regulatory scheme instead of analyzing environmental consequences of pesticide use and therefore fell short of its duty under CEQA to meaningfully consider the issues raised by the proposed project." (*Id*. at 16.) The EIR contained no analysis of the risks of utilizing particular pesticides or of their possible environmental or human health impacts. (*Id*. at 18.) While the existing state law was designed to regulate pesticide administration, the EIR contained no evidence to demonstrate that compliance with the program would not result in adverse environmental effects, and accordingly, the EIR's "conclusory statements [did] not fit the CEQA bill." (*Id*. at 17.)

Similarly, in *SCOPE*, an EIR improperly relied on the State Water Project's allocation of water deliveries to conclude that the project in question would not create significant water supply impacts, without analyzing the state program's application to the project in practice. (*SCOPE*, 106 Cal.App.4th 715, 720-721.) The EIR instead made "no attempt to calculate or even discuss the differences between entitlement and actual supply." (*Id*. at 722.)

Nor did the EIR give any suggestion that the operation of the program could not "be taken at face value," even though in reality, it was unclear whether the project's water supply impacts would truly be ameliorated by the program. (*Id*. at 723.) The end result, concluded the court, was that decisionmakers and the public could not arrive at a meaningful understanding of the project's impacts. (*Id*. at 722.)

And specifically in the context of GHG impacts analysis, the California Supreme Court has explained that mere reliance on and extrapolation from a state-level plan to project impacts is not enough; substantial evidence must support a conclusion that GHG impacts are not significant. (*Center for Biological Diversity v. Department of Fish & Wildlife* (2015) 62 Cal.4th 204 ("*Newhall Ranch*").) In *Newhall Ranch*, the project's EIR referred to CARB's statewide Scoping Plan and its determination that statewide emissions would need to drop roughly 29 percent below "business as usual" levels in order to achieve California's GHG reduction targets. (*Newhall Ranch*, 62 Cal.4th at 218.) Finding that the project's own emissions would fall 31 percent below a hypothetical "business as usual" scenario, the EIR concluded that the project would not impede progress towards California's climate goals and that its impacts were accordingly less than significant. (*Id*.) The Supreme Court rejected this analysis, explaining that even though the EIR could look to consistency

with the Scoping Plan as a measure for determining the significance of project emissions, it did not contain adequate analysis explaining how the project's own GHG emissions reductions would be consistent with meeting the statewide reduction goal. (*Id*. at 225.) In other words, the EIR could not just conclude that a reduction in project emissions consistent with the state-level plan would necessarily result in less than significant GHG impacts; it had to support that conclusion with substantial evidence in the record. (*Id*. at 226-227.)

So too in this case. Just as in *Californians for Alternatives to Toxics* and *SCOPE* the EIR simply points to the existence of a state scheme—in this case, cap and trade—and declares the Project's GHG impacts insignificant. But the existence of, and potential compliance with, a regulation is "a starting point for a lead agency's analysis," not an automatic pass to skip a meaningful significance analysis. (Nov. 2018 Guidelines FSOR at 95.) Critically, the lead agency must consider whether "a project may still have a significant impact despite compliance with the regulation." (SB 97 FSOR at 98.) Thus, the EIR was required to demonstrate, first, that the Project would comply with the regulation, and next, that compliance with the regulation would, in actuality, render Project impacts less than significant. The EIR never explains how "capped" Project emissions could or would be reduced to less than significant. It offers no suggestion

for how the Project would ensure that fuel suppliers or electricity generators actually comply with the cap-and-trade regulation. Nor does it acknowledge the additional stress on the cap-and-trade system of declining to minimize the great majority of the Project's emissions, instead laying responsibility for reductions at the feet of fuel suppliers, who have no ability to control project design or operations. And it never explains that cap and trade does not require reduction or avoidance of the Project's specific emissions at all. "In the absence of substantial evidence to support the EIR's no-significance finding…the EIR's readers have no way of knowing whether the project's likely greenhouse gas impacts will indeed be significant, and, if so, what mitigation measures will be required to reduce them." (*Newhall Ranch*, 62 Cal.4th at 227.)

Respondents argue that the holding in *Association of Irritated Residents v. Kern County Board of Supervisors* (2017) 17 Cal.App.5th 708 ("*AIR*") is an endorsement of the EIR's approach. But *AIR* did not hold "that a threshold of significance for CEQA purposes could consider only greenhouse gas emissions not covered by the cap-and-trade program." (Resp. Br. at 37.) Instead, in *AIR*, the Fifth District Court of Appeal concluded that the project, a refinery that itself was subject to compliance obligations under the cap-and-trade program, could rely on its compliance with the program to demonstrate that certain of its

GHG emissions—notably, ***not*** its mobile source emissions—would be less than significant. (*AIR*, 17 Cal.App.5th at 742-744.) The fact that the *AIR* project had compliance obligations and could, in practice, ensure its own compliance with the cap-and-trade regulation is a critical distinction.

But to the extent that *AIR* held emissions for which the *AIR* project itself held no compliance obligation, like electricity generation emissions, could be treated as less than significant under cap and trade because other "upstream" entities have compliance obligations under cap and trade, that conclusion was incorrect, and this Court should decline to adopt that approach. As explained above, treating such emissions as necessarily less than significant, without more analysis, ignores the realities of the cap-and-trade program and understates the Project's GHG impacts. It also incorrectly places the burden of mitigating the Project's GHG emissions on entities that cannot control them and have no real obligation to reduce or avoid them.

Allowing the EIR to declare "capped" GHG emissions less than significant under these circumstances would have serious implications for California climate policy and for the administration of CEQA. It would lead to ill-informed land use decisions that overburden our state-level regulatory programs and make compliance with our upcoming GHG reduction targets all the more challenging. It would also undercut CEQA's

fundamental role as a public disclosure and transparency statute by allowing lead agencies to rely on the existence of a state-level regulation, without more, to justify a conclusion that project-level impacts are less than significant. A holding of that nature would have consequences not just in the realm of climate policy, but any time a state-level regulatory program intersects with project-level impacts. It would also be inconsistent with past precedent explaining the role state-level regulation should play to inform significance determinations. (See, e.g., *Californians for Alternatives to Toxics*, 136 Cal.App.4th at 17; *SCOPE*, 106 Cal.App.4th at 720-722.)

The CEQA Guidelines only allow that a lead agency may consider ***the extent of a project's compliance*** with an applicable GHG mitigation regulation when assessing significance of project emissions, but the mere existence of the regulation alone is not enough to remove project emissions from a significance calculus. Because the Project cannot ensure compliance with cap and trade, and because even if it could, compliance with the program is not conclusive evidence that the Project's GHG impacts are less than significant, the EIR was required to analyze the significance of the so-called "capped" emissions it discounted. (CEQA Guidelines, § 15064.4, subd. (b)(3); SB 97 FSOR at 98.) Its failure to do so renders the EIR

inadequate. (*Newhall Ranch*, 62 Cal.4th at 226-227; *Californians for Alternatives to Toxics*, 136 Cal.App.4th at 17.)

**b. Project emissions are not "mitigated" as required by CEQA.**

Respondents' brief repeatedly states that cap and trade will "mitigate" the Project's GHG emissions. (See, e.g., Resp. Br. at 35, 49, 57.) This terminology conflates the concept of mitigation of GHG emissions—meaning the reduction or avoidance of GHG emissions—with the concept of mitigation under CEQA, which requires that steps be taken to reduce project-specific environmental impacts. Eliding the two concepts, Respondents suggest that "the source of mitigation for greenhouse gases from fuel combustion—whether at the project level or the fuel supplier level—is irrelevant…" (Resp. Br. at 49.) But from a CEQA perspective, that statement is untrue.

As the California Natural Resources Agency, one of the state agencies responsible for updating the CEQA Guidelines, has explained, "to demonstrate consistency with an existing GHG reduction plan, a lead agency would have to show that the plan actually addresses the emissions that would result from the project." (SB 97 FSOR at 27.) This is consistent with the well-settled CEQA principle that mitigation of project impacts must be fully enforceable and implemented as a condition of project development. (See, e.g., Cal. Pub. Res. Code § 21081.6, subd. (b);

CEQA Guidelines § 15126.4, subd. (a)(1)(D); *Environmental Council of Sacramento v. City of Sacramento* (2006) 142 Cal.App.4th 1018, 1035; *Federation of Hillside & Canyon Associations v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1260-1261.) Even Respondents acknowledge that mitigation of Project emissions has to be "enforceable and verifiable." (Resp. Br. at 49.)

Where mitigation is speculative and vague, it is inadequate under CEQA. (See *California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 197-198; *Lincoln Place Tenants Assn. v. City of Los Angeles* (2007) 155 Cal.App.4th 425, 445 [mitigation must be feasible and enforceable].) Traditionally, CEQA mitigation occurs at the project level, and the adequacy of mitigation is subject to a project-by-project analysis. (See *California Native Plant Society v. County of El Dorado* (2009) 170 Cal.App.4th 1026, 1053; *Environmental Council of Sacramento*, 142 Cal.App.4th at 1024-1028.) Where mitigation is untethered to project-specific mitigation measures themselves, like in the case of in-lieu fee programs that allow a developer to pay into a fund to mitigate project impacts, CEQA still requires the proposed mitigation to be "sufficiently tied to the actual mitigation of the impacts." (*Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 140-141 [specific traffic improvement projects funded by

mitigation fees were in place and would actually reduce traffic impacts caused by the project]; see also *California Clean Energy Committee*, 225 Cal.App.4th at 197-199 [fee program to support fair share plans was impermissibly speculative mitigation and EIR did not adequately explain how it would address project impacts]; *California Native Plant Society*, 170 Cal.App.4th at 1056 [payment of a mitigation fee alone was not enough to ensure that project-level impacts would be mitigated to insignificance]; *Anderson First Coalition v. City of Anderson* (2005) 130 Cal.App.4th 1173, 1188.)

Here, the EIR makes no attempt to tie the supposed cap-and-trade "mitigation" to mitigation of Project-specific GHG emissions—because it cannot. As discussed *supra* in Section II.B.3, the cap-and-trade program imposes an economy-wide cap, and as such provides no way to track or account for how the Project's own emissions would be reduced or avoided, if at all. And there is no way for the lead agency or the Project to enforce cap and trade against the fuel suppliers or electricity generators that hold compliance obligations under the regulation, or for them to verify that an adequate number of compliance mechanisms have been surrendered to cover the Project's emissions. This feature makes the cap-and-trade "mitigation" Respondents propose even more speculative than in-lieu fee programs: in the case of in-lieu fees, projects at least pay into fee

programs, but in this case, the Project has no relation to or involvement with the cap-and-trade program at all.

It also exemplifies the misleading nature of the EIR's GHG impacts analysis. The EIR suggests that the Project's own emissions will be reduced or avoided by operation of the cap-and-trade program such that decisionmakers and the public need not be concerned about the hundreds of thousands of metric tons of new GHG emissions the Project will produce ***every single year*** after it is built out. In reality, the Project will severely compromise Moreno Valley's ability to meet long-term climate goals. To illustrate, the City of Moreno Valley's own Energy Efficiency and Climate Action Strategy explains that to meet AB 32 targets, the City will have to implement local emission reduction policies. (City of Moreno Valley, Energy Efficiency and Climate Action Strategy ("Climate Action Strategy") (Oct. 2012) at 4 ["For California to reach its greenhouse gas reduction goals, communities must address how they grow."], 6 ["the City would still need to supplement the statewide measures with the implementation of local reduction policies" to meet its 2020 target].) To achieve compliance with AB 32, the City set a 2020 target of about 779,790 metric tons of $CO_2e$. (Climate Action Strategy at 6 [stating an emissions reduction target of 15 percent below 2010 emissions to meet 2020 mandate].) Assuming the City is able to meet its target and hold steady to that reduction

through Project buildout, the first year of Project emissions after buildout would result in total City emissions of 171,003 metric tons $CO_2e$ ***above*** 2010 levels—rather than the 15 percent ***below*** 2010 levels that the City has committed to—totally erasing the City's progress toward its climate goal. All told, the Project alone would cause a nearly 40 percent jump in the City's emissions over and above its 2020 target. What's more, this analysis understates the Project's emissions impact relative to the City's climate goals because the City has not yet revised its Climate Action Strategy to meet 2030 reduction targets, which are even more ambitious. In other words, to stay on track to meet statewide climate mandates, the City would have to find some way to reduce ***more than one-third*** of its total annual emissions to accommodate the Project's emissions. Fuel suppliers cannot guarantee these reductions; it is the City and the Project that are "uniquely capable of addressing [these] emissions…" (Climate Action Strategy at 4.)

But the EIR does not contemplate Project-specific mitigation measures, having written off the bulk of those emissions before even comparing Project emissions to the Air District significance threshold. The EIR suggests that over 90 percent of the Project's GHG emissions will be mitigated by somebody else, but that is not, and in practicality cannot be, the case. Without properly acknowledging and attempting to

mitigate these emissions, the EIR cannot serve its proper purpose as an "informational document." (See Cal. Pub. Res. Code § 21061; Cal. Pub. Res. Code §§ 21002, 21081 [requiring mitigation of a project's significant environmental impacts].)

## III. Conclusion

The EIR's analysis of the Project's GHG impacts misapprehends the cap-and-trade program and misinforms the public and decisionmakers about the true significance of the Project's emissions. The case for reversing the lower court decision on these facts strikes us as particularly strong, given the post-2030 timing of Project's emissions and the flimsy relationship of the Project to cap-and-trade compliance obligations. But beyond that, the cap-and-trade program was never intended to be California's sole mechanism for reducing emissions from capped sectors and should not be forced to bear that weight. The EIR's analysis, if endorsed, would have dire consequences for California's ability to meet its climate goals and would upend settled CEQA precedent about the role state-level regulation should play in assessing the significance of project impacts. We respectfully urge the Court to reject the EIR's approach and find the GHG impacts analysis inadequate.

Dated: December 26, 2019

By:_____

Cara A. Horowitz
Julia E. Stein

Counsel for *Amici*
California CEQA and
Climate Policy Experts

## CERTIFICATE OF COMPLIANCE

(California Rules of Court 8.204(c)(1))

Counsel of Record hereby certifies that pursuant to Rule 8.204(c)(1) of the California Rules of Court, the enclosed brief of a*mici curiae* California CEQA and Climate Policy Experts is produced using 13-point Roman type including footnotes and contains approximately 9,945 words, which is less than the total words permitted by the rules of court. Counsel relies on the word count of the Microsoft Word computer program used to prepare this brief.

Dated: December 26, 2019

By:_____

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**PROOF OF SERVICE**

ALBERT THOMAS PAULEK, et al.,
Plaintiffs and Respondents,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants;

LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, et al.,
Plaintiffs and Appellants,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants;

I am employed in the County of Los Angeles, State of California. I am over the age of eighteen and am not a party to the within action; my business address is 385 Charles E. Young Drive, Los Angeles, California 90095. On December 26, 2019, I served true copies of the following document(s) described as:

**PROPOSED AMICI CURIAE BRIEF OF CALIFORNIA CEQA AND CLIMATE POLICY EXPERTS**

on the parties in this action as follows:

**SEE ATTACHED SERVICE LIST**

**BY ELECTRONIC SERVICE:** I caused a copy of the document described above to be sent via TrueFiling's electronic service system to the persons at the email addresses listed below. I did not receive, within a reasonable time after the transmission, any electronic message or other indication that the transmission was unsuccessful.

**BY U.S. MAIL:** I caused a copy of the document described above to be mailed via U.S. postal service to the Superior Court in this case, at the following address: Riverside County Superior Court, 4050 Main Street, Riverside, California 92501.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on December 26, 2019, at Miami, Florida.

_____

Cara A. Horowitz

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# Moreno Valley ignored environmental law when it OK'd World Logistics Center, California Attorney General says

## Xavier Becerra and the California Air Resources Board accuse the city of 'side-stepping' responsibility to regulate emissions from proposed warehouse project


The area where the World Logistics Center is proposed to be built is seen from Cactus Ave. looking north to the 60 Freeway in August 2015. The Skechers warehouse is in the background. (File photo by Kurt Miller, The Press-Enterprise, SCNG)

By Beau Yarbrough | byarbrough@scng.com | The Press-Enterprise
PUBLISHED: January 10, 2020 at 11:56 am | UPDATED: January 10, 2020 at 12:56 pm

California Attorney General Xavier Becerra says the Moreno Valley City Council illegally disregarded California environmental law in 2015 when it approved a massive complex of warehouses that could ultimately cover a tenth of the city.

"California is already suffering from the onerous effects of climate change — including wildfires, droughts, and harmful air pollution," Becerra is quoted as saying in a news release. "We have a responsibility to our communities, particularly those that are disproportionately affected by pollution, to make sure all feasible mitigation measures are taken to reduce greenhouse gas emissions in projects like the World Logistics Center."

City officials and representatives of Highland Fairview, the World Logistics Center's developer, could not be immediately reached Friday morning, Jan. 10.

Becerra filed an amicus — or "friend of the court" — brief with the Fourth District Court of Appeal on Friday, writing that city officials have inaccurately said the logistics center falls under the California Air Resources Board's Cap-and-Trade program.

The program, referred to as "emissions trading" by the Environmental Protection Agency, limits the pollution companies can produce and allows companies below that limit to sell credits to companies over the limit. The system is intended to create incentives for companies to emit less pollution than the cap and to do so quickly enough that they can economically benefit by selling the credits to companies that are slower to comply.

But the environmental impacts of warehouses and logistics centers must be regulated by local governments, rather than by the state air quality board's cap and trade system, according to Becerra.

"Local governments like Moreno Valley must do their part as regulators if we are going to safeguard the well-being of residents and meet California's long-term climate change goals," he said in Friday's press release.

By saying the center's emissions were covered under the Cap-and-Trade program, Moreno Valley failed to consider more than 95% of the greenhouse gases — as required by the California Environmental Quality Act — that could be emitted by 40 million square feet of warehouses on 2,610 acres, Becerra alleged.

The American Lung Association gives Riverside County an F grade for both ozone and particle pollution and says that 38,245 children and 142,916 adults in the county suffer from asthma. In a 2019 report, the association ranks Riverside County as the second-most ozone-polluted county in the United States.

# Related links

- Mega-warehouse plan would hit entire region's traffic
- Planners OK World Logistics Center mega-warehouse
- Moreno Valley OKs megawarehouse on 3-2 vote (UPDATE)
- Benzeevi 'humbled' after World Logistics Center win
- All you need to know about the World Logistics Center
- World Logistics Center developer owes Moreno Valley $180,402 in legal fees
- Gov. Brown vetoes bill that would have closed loophole in the California Environmental Quality Act
- Judge voids environmental study for Moreno Valley's World Logistics Center

- Court voids Moreno Valley's agreement for World Logistics Center, in what foes call a setback for the project
- World Logistics Center developer outspent by builder, marijuana businesses in Moreno Valley elections
- California Supreme Court won't review World Logistics Center ruling on environment
- California cities, counties would have to report incentives to warehouses and job details under Riverside assemblyman's bill
- No more Theodore: Street, 60 Freeway signs in Moreno Valley will bear warehouse name

Highland Fairview representatives have said the logistics center would create 20,000 permanent jobs, but an environmental report said the center would also generate 68,721 daily vehicle trips, including more than 14,000 truck trips.

"Large distribution centers with heavy truck traffic must take responsibility for the greenhouse gas emissions and smog-forming exhaust they generate," California Air Resources Board Chair Mary D. Nichols is quoted as saying in Becerra's news release. "They cannot hide behind legal fictions to ignore the need to protect public health and the environment."

According to the attorney general's office, the center is expected lead to more 385,000 metric tons of greenhouse gases to be released into the atmosphere each year — almost 40 times what the South Coast Air Quality Management District considers to be significant greenhouse gas emissions.

"The message for this developer – and others contemplating this illegal ploy – is clear: Distribution centers need to move towards zero-emission trucks and cargo equipment," Nichols said in the release. "They can't duck their responsibility to the community where they are located, or pass on the costs of their pollution in the form of unhealthy air and poor health."

In the brief, Becerra argues that Moreno Valley's greenhouse-gas analysis of the World Logistics Center violates the state's environmental law by improperly saying the center's greenhouse gas emissions would be covered by the air board's Cap-and-Trade program, which uses the free market to offset greenhouse gas emissions.

This is not likely to be the last time the attorney general weighs in on air quality issues: In 2018, his office established a Bureau of Environmental Justice at the California Department of Justice.

*Staff writer David Downey contributed to this report.*

*This is a developing story. Check back for updates.*

# Attachment N

## Additional Documentation
## Attachment to Comment 2-F3

ESA

**Case No. E071184**

**IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA FOURTH APPELLATE DISTRICT, DIVISION TWO**

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ALBERT THOMAS PAULEK, et al.,
Plaintiffs and Respondents,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants

---

HF PROPERTIES, et al.,
Real Parties in Interest and Appellants

---

LABORERS' INTERNATIONAL UNION NORTH AMERICA LOCAL 1184,
Plaintiffs and Appellants,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Respondents

---

HF PROPERTIES, et al.,
Real Parties in Interest and Respondents

---

Appeal from the Superior Court of California
Hon. Sharon J. Waters, Judge, Case Nos. RIC1510967 MF, RIC1511279, RIC1511327, RIC1511421 & RIC1511195

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# PROPOSED BRIEF OF CALIFORNIA CEQA AND CLIMATE POLICY EXPERTS IN SUPPORT OF PLAINTIFFS/ APPELLANTS

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## AMICI CURIAE BRIEF

### I. Introduction

The World Logistics Center complex (the "Project"), the 40 million square foot warehouse development at the heart of this dispute, will impact the environment for decades. The resolution of this case may have an even larger footprint, answering important questions about the California Environmental Quality Act ("CEQA") and its relationship to the state's climate laws. The EIR's analysis, if endorsed, would have dire consequences for California's ability to meet its greenhouse gas ("GHG") reduction goals and would upend settled CEQA precedent about the role state-level regulation should play in assessing the significance of project impacts.

The City of Moreno Valley; HF Properties, Inc.; Sunnymead Properties; Theodore Property Partners; 13451 Theodore, LLC; and HL Property Partners (collectively, "Respondents") are asking this Court to endorse a novel approach to assessing the significance of a project's GHG emissions under CEQA. Although the Project is not regulated under California's cap-and-trade program—and, moreover, although nearly all of the emissions at issue in this case will be emitted after 2030, the sunset date of cap and trade—the Project's EIR relies on that program to write off an overwhelming majority of the Project's lifetime GHG emissions. The Project is estimated to draw 70,000 truck trips

per day at full buildout, yet the EIR declines to consider as significant ***any*** mobile source emissions associated with the Project.

Respondents' rationale for this outcome misconstrues the state's climate program, and its relationship to CEQA, by treating cap and trade as California's one-and-done policy for controlling certain greenhouse gas emissions. The EIR's analysis breaks Project emissions into "capped" emissions, which are regulated by cap and trade, and "uncapped" emissions. Because cap and trade requires "upstream" fuel suppliers and electricity generators to surrender compliance instruments while applying a declining emissions cap over time, the EIR takes the position that "downstream" emissions from mobile sources and electricity use associated with the Project are "capped," are already "mitigated" by the program, and need not be considered by the lead agency when assessing significance. (Resp. Br. at 35-36.) Asking the Project to address these emissions itself, according to the Respondents, would be "double counting," (Resp. Br. at 57) because state-level regulation already takes care of them in the most efficacious way. (Resp. Br. at 35.)

But that is not the case. California has never adopted a one-and-done approach to controlling capped emissions; in fact, the opposite is true. The state has ***not*** determined that the cap-and-trade program alone "is the most effective, efficient way to

reduce GHG emissions." (Resp. Br. at 35.) Instead, the program is designed to work together with other, coordinating and overlapping state-level emission reduction regulations and policies—including, *inter alia,* land use policies, transportation fuel policies, and CEQA. Cap and trade was never intended to be the sole, or even the main, driver of California's GHG reductions. Given its design, it cannot bear that load alone, for reasons discussed in this brief. The Project actually burdens the cap-and-trade program, and failing to reduce that burden using the robust tools that CEQA provides would create significant difficulties for California in controlling emissions, especially from the critically important transportation sector.

CEQA does not permit this result. While the CEQA Guidelines allow lead agencies to consider a project's compliance with a GHG-reducing regulation when assessing significance of project emissions, that consideration marks the beginning of the inquiry, not a *de facto* conclusion that emissions are not significant. For "capped" emissions, however, the EIR simply identifies the cap-and-trade program and ends its assessment there. It provides no analysis showing that the Project's own emissions will be reduced or mitigated by cap and trade. (In fact, it could not make that showing; the cap-and-trade program does not mitigate project-specific emissions, particularly at the Project's scale.) It does not explain how the Project would

guarantee compliance with cap and trade, given that it is unregulated by the law. And it fails to assess whether Project GHG emissions are significant even in light of compliance with the cap-and-trade regulation. In other words, the EIR assumes that the existence of a state-level regulation relieves the lead agency of the requirement to assess the significance of an individual project's impacts. This misapprehends the CEQA Guideline, which allows consideration of the state-level regulation, but does not make it dispositive. It is also wholly inconsistent with CEQA's focus on project-level impacts, and its requirement to demonstrate, both from a significance and a mitigation standpoint, that impacts are addressed. Approving such an approach would undermine the objectives of CEQA, not just in this case, but in any case where a state-level regulatory regime intersects with project impacts.

CEQA is, at its core, a public disclosure and mitigation statute. It is designed to ensure that decisionmakers and community members fully understand the significance of a project's environmental impacts in time to reduce those impacts through, among other tools, changes in project design and adoption of project-specific mitigation measures. Instead, the EIR here obscures the Project's GHG impacts by representing that most of the Project's emissions need not even be considered in weighing significance, claiming that they are "mitigated" by a

state-level program without providing any analysis or evidence showing that to be true.

The on-the-ground consequences of the EIR's misguided approach are real and illustrative. If this Project's mobile source emissions were identified as significant, Project proponents and the lead agency would be obligated to consider and adopt Project-specific mitigation measures to reduce mobile source emissions. Local decisionmakers might even decide to reject the proposal altogether once its full significance is understood. These decisions would be made before Project approval, when design changes can be most effectively implemented. By contrast, cap and trade alone cannot effectively mitigate the Project's mobile source emissions. The entities with fuel-related compliance obligations under cap and trade are third-party, distant-in-time fuel suppliers who cannot exercise control over Project design or operations. In other words, the EIR's analysis lays the burden for reducing the Project's mobile source emissions solely at the feet of a program that has very limited tools for carrying it. Writ large, this approach would undercut California's ability to meet its climate targets.

Because cap and trade does not apply to most of the Project's GHG emissions, and because the EIR's assessment of the significance of the Project's GHG emissions contradicts settled CEQA principles and misrepresents the function of the

cap-and-trade program, *amici* urge the Court of Appeal to reverse the trial court's decision.

## II. Discussion

At the heart of the EIR's GHG analysis lies Respondents' argument that the cap-and-trade program "mitigates" a majority of the Project's emissions and that, accordingly, those emissions should not be considered against the GHG emission significance threshold. (See Resp. Br. at 35 ["Far from 'brushing aside' or 'ignoring' the emissions…the City accounted for them and mitigated them…"].) Respondents go so far as to suggest that assessing these emissions at the project level would be "double counting." (Resp. Br. at 57). In fact, the cap-and-trade program does not cover the time frame of the vast majority of Project GHG emissions and does not apply to warehouse projects at all. Respondents' characterization additionally misstates the CEQA Guidelines, misapprehends the nature of the cap-and-trade program, and is inconsistent with CEQA's purposes.

### A. The EIR's GHG Impact Analysis Fails Because The Project Cannot Demonstrate "Compl[iance] With Regulations Or Requirements Adopted To Implement A Statewide, Regional, Or Local Plan For The Reduction or Mitigation Of Greenhouse Gas Emissions."

The CEQA Guidelines explain that, when determining the significance of a project's GHG emissions impacts, a lead agency may consider:

> The ***extent to which*** the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions (see, e.g., section 15183.5(b)). Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. (CEQA Guidelines, § 15064.4, subd. (b)(3) [emphasis added].)

However, the EIR simply concludes that the Project complies with cap and trade—assuming that is sufficient to mitigate the majority of the Project's emissions for the purposes of assessing the significance of the Project's GHG impacts—without ever evaluating "the extent to which the [P]roject complies" with the program. If the extent of the Project's compliance had been analyzed, it would necessarily have been found wanting. First, the cap-and-trade regulation will sunset long before the bulk of Project emissions occur. Second, cap and

trade does not cover emissions from out-of-state fuels, which may be burned by Project traffic.

**1. The cap-and-trade program will expire by operation of statute before most Project emissions occur.**

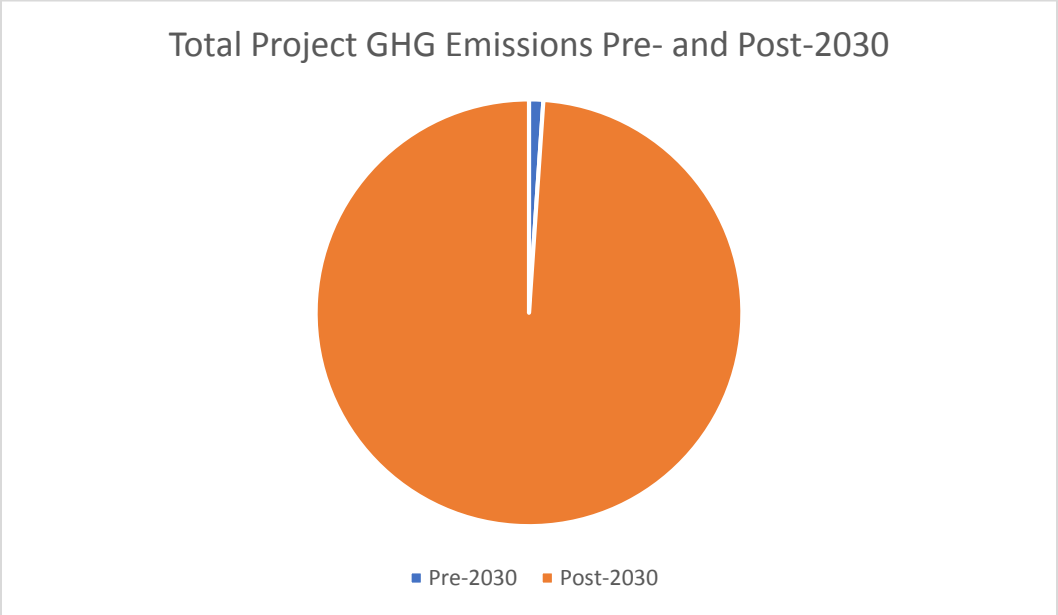
Critically, the cap-and-trade program is set to expire well before the Project is fully built out, and thus before most Project emissions occur. The EIR is clear that the Project will not be operational until 2035, ***five years after*** the cap-and-trade regulation sunsets by automatic operation of statute. (Cal. Health & Safety Code, § 38562, subd. (h).) This means that the majority of the Project's lifetime GHG emissions are not, in fact, capped at all. The cap-and-trade program therefore cannot be used as a reason to disregard those emissions.

In 2017, the California Legislature passed Assembly Bill 398, which reauthorized the cap-and-trade program, initially set to expire in 2020, for an additional decade. (Cal. Health & Safety Code § 38562; see California Legislative Analyst's Office, Cap-and-Trade Extension: Issues for Legislative Oversight ("LAO Cap-and-Trade Extension Report") (Dec. 2017) at 1.) This legislation specifically provides that the law authorizing the cap-and-trade program "shall remain in effect only until January 1, 2031, and as of that date is repealed, unless a later enacted statute which is enacted before that date, deletes or extends that

date." (Cal. Health & Safety Code § 38562, subd. (h).) Thus, unless the Legislature again affirmatively acts to extend the cap-and-trade program, it cannot continue beyond 2030. If the Legislature does nothing, cap and trade will no longer exist in ten years.

The vast majority of the Project's emissions, including nearly all of the emissions that the EIR labels as "capped," will occur after the expiration of cap and trade. Prior to 2035, the EIR estimates that the Project will emit a total of about 222,000 MT $CO_2e$ of construction-related GHGs. Nearly 40 percent of those emissions, or about 86,000 MT $CO_2e$, will occur after cap and trade expires in 2030. But even total construction emissions are dwarfed by the approximately 412,000 MT $CO_2e$ of ***annual*** emissions the Project will produce at full buildout. As demonstrated by the chart below, pre-2030 emissions represent only about 1 percent of total Project GHG emissions assuming a

30-year life for the Project at buildout.




In fact, just one year of Project GHG emissions after 2035 will exceed all Project GHG emissions before that date—and is more than triple the amount of pre-2030 construction emissions. None of the post-2030 emissions will be covered by the cap-and-trade program, unless the California Legislature enacts a change in state statute.

Respondents have tried to deflect from this fact, arguing that it would be "wrong…not to apply current law because it might change sometime in the future." (Resp. Br. at 68.) But it is Respondents who are asking this Court to assume the law might change. With no change at all, it is clear that cap and trade expires and will not apply to the gross majority of Project GHG emissions. And the Court should be wary of Respondents'

speculative approach: cap and trade reauthorization is by no means a certainty. The process to extend cap and trade beyond 2020 was politically fraught, requiring a two-thirds majority vote of the Legislature for reauthorization and inciting battles over the program's efficacy and role in addressing local sources of pollution. Just as it was prior to the original 2020 sunset date, cap and trade reauthorization to extend the program beyond 2030 may be an arduous political process, with no guarantee that the program will continue at all, or in its current form. (See, e.g., Georgina Gustin, INSIDE CLIMATE NEWS, California's New Cap-and-Trade Plan Heads for a Vote—With Tradeoffs (Jul. 15, 2017); Christopher Cadelago and Taryn Luna, SACRAMENTO BEE, California's climate change vote delayed until Monday (Jul. 12, 2017) [noting that then-Governor Jerry Brown expressed concern that a two-thirds majority would be needed to pass extension legislation and that such a threshold could not be met].)

Simply put, the Project cannot "comply" with cap and trade when cap and trade no longer exists. The EIR contains no analysis to explain why these emissions should not be considered significant in light of cap and trade's expiration, and the Court should reject Respondents' arguments and overturn the District Court's decision for this reason alone.

**2. Cap and trade does not cover emissions from out-of-state fuels.**

The EIR also fails to assess the extent to which mobile source emissions will necessarily be covered by the cap-and-trade program, instead assuming that all mobile source emissions are "capped". However, the cap-and-trade program is not designed to cover all mobile source emissions in California. Instead, the program requires fuel suppliers to surrender compliance mechanisms equivalent to the amount of $CO_2e$ released from the burning of the fuels they sell ***in California***. (17 Cal. Code Regs. § 95811.) In other words, if a mobile source enters California from another state or country—Nevada, Arizona, New Mexico, Utah, or even Mexico—to travel to the Project, burning fuel that it purchased outside of California, cap and trade does not cover those emissions. A typical 18-wheel diesel truck can travel between 1260 to 2250 miles on a tank of gas, so the Project may very well attract traffic from mobile sources that purchase fuel outside California's borders.

But the EIR does not include these emissions among its assessment of "uncapped" emissions, or make any attempt to quantify the amount of mobile source emissions that will result from the burning of out-of-state fuels. Accordingly, the EIR fails to assess the extent of the Project's compliance with cap and trade and fails to meet its burden to demonstrate that these emissions should be considered insignificant. This lack of

analysis is further evidence of the EIR's misapprehension of the cap-and-trade program. All mobile source emissions are not equal under cap and trade; the EIR improperly failed to take this distinction into account.

### B. The EIR's Approach Cannot Satisfy The Purpose Of A GHG Impact Analysis Under CEQA.

Even if cap and trade were not set to expire in 2030, and even if all mobile source emissions caused by the Project were the result of burning fuels purchased in California, the EIR's analysis would still be invalid under CEQA. The EIR is premised on a fundamental mischaracterization of the cap-and-trade program, one that is reiterated numerous times in Respondents' brief. (See, e.g., Resp. Br. at 35 ["The State has made the policy determination that Cap-and-Trade is the most effective, efficient way to reduce GHG emissions…the City accounted for [GHG emissions] and mitigated them in precisely the way that the authoritative California agency has determined to be the optimal way to achieve the State's emission-reduction goals."], 36 ["CARB…made it clear that it intended to have greenhouse gas emissions accounted for, and mitigated, at the producer level…"], 48 ["CARB made perfectly clear its decision that the mitigation of certain greenhouse gas emissions statewide at the production level was the most efficient, cost-effective way to implement AB 32's mandate."], 57 ["Appellants' preferred approach…would

result in double counting and double mitigating emissions that are already mitigated through cap-and-trade."].)

The EIR's misrepresentation of cap and trade is twofold. First, at the core of the analysis is the erroneous assertion that under California law, cap and trade is the primary (even sole) regulation responsible for reducing or avoiding GHG emissions from mobile sources and electricity generation, eliminating the need for overlapping regulation of projects that induce emissions from those sectors. Second, the EIR incorrectly presumes that the cap-and-trade program will mitigate ***project-level*** emissions, without any analysis to support that conclusion. These two missteps result in a GHG analysis that improperly suggests to decisionmakers and the public that the great majority of the Project's GHG emissions—including ***all*** of the mobile source emissions generated by the Project—do not need to be addressed at the project level because they are already reduced or avoided by operation of a state regulation. This is misinformation with serious consequences: it undermines CEQA's role as a transparency and public disclosure tool, and it opens the floodgates for lead agencies to make future land use decisions that will severely compromise California's ability to meet its GHG reduction targets.

### 1. How cap and trade works: The basics.

To assist the Court in its review of this case, we offer here a brief history of the implementation of the legislation that authorized the California Air Resources Board ("CARB") to create the cap-and-trade program, AB 32, as well as an explanation of how the cap-and-trade program works in practice.

AB 32, passed by the Legislature in 2006, was a broad piece of legislation that codified an ambitious GHG emission reduction mandate: It requires California to reduce its statewide GHG emissions back to 1990 levels by the year 2020. (Cal. Health & Safety Code § 38550.) The legislation directed CARB to develop a scoping plan of state-level policies that would lead to the achievement of that goal, and authorized CARB to enact regulations that would implement the policies set forth in the scoping plan. (Cal. Health & Safety Code § 38561, subd. (a).) CARB's first Scoping Plan set forth "a comprehensive array of emissions reduction approaches and tools" to meet the 2020 goal, which included a number of overlapping, complementary policies such as the state's Renewable Portfolio Standard (aimed at increasing generation of electricity from renewable sources), the Low Carbon Fuel Standard (aimed at reducing greenhouse gas emissions from transportation fuels), land use and transportation policies (aimed at reducing emissions from transportation), the expansion of energy efficiency programs (aimed at reducing

emissions from electricity usage), and cap and trade (aimed at pricing greenhouse gas emissions from certain sectors, ultimately to include both electricity generation and transportation fuels). (California Air Resources Board, Climate Change Scoping Plan: A Framework for Change (Dec. 2008) at ES-3-ES-4.) Notably, many of these policies targeted emissions from the same sectors. No single one of these policies was intended to meet the 2020 goal itself, but, working in concert, they were designed to achieve the target.

Since the adoption of the original Scoping Plan, the Legislature has codified additional GHG reduction mandates, including reaching at least 40 percent below 1990 levels by 2030 and net zero emissions from electricity generation by 2045. (Cal. Health & Safety Code § 38566; Cal. Pub. Util. Code § 454.53, subd. (a).) Before leaving office, Governor Brown signed an executive order directing the state to achieve a carbon neutral economy by 2045. (Executive Order B-55-18 to Achieve Carbon Neutrality [establishing a goal "to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter."].) These new targets are designed to make California's emission reduction progress more consistent with evolving science demonstrating that the most severe impacts of climate change could be somewhat alleviated if global temperature rise is contained to

less than 1.5 degrees Celsius. (California Air Resources Board, California's 2017 Climate Change Scoping Plan ("2017 Scoping Plan Update") (Nov. 2017) at ES3; Intergovernmental Panel on Climate Change, Global Warming of 1.5ºC: Summary for Policymakers (Oct. 2018) at 7, 9-12.) The Scoping Plan has been updated as well, and continues to rely on a broad range of policies, including land use and transportation policies, fuels-related policies, energy efficiency policies, and renewable energy policies, to achieve newer targets. (See 2017 Scoping Plan Update at ES4, 1.) CARB has consistently indicated in the Scoping Plan and otherwise that achievement of the state's emission reduction goals is not possible without a commitment to this wide range of policies; no one policy or regulation will be enough to achieve the statewide goals. (See, e.g., 2008 Scoping Plan at 15 ["Reducing greenhouse gas emissions from the wide variety of sources can best be accomplished through a cap-and-trade program along with a mix of complementary strategies that combine market-based regulatory approaches, other regulations, voluntary measures, fees, policies, and programs."]; 2017 Scoping Plan Update at ES4 ["The Plan underscores that there is no single solution but rather a balanced mix of strategies to achieve the GHG target."].)

As part of AB 32, CARB was given the authority—but not, as Respondents suggest, the mandate—to establish a market-

based emission credit trading mechanism. (Cal. Health & Safety Code § 38570, subd. (a) ["The state board ***may*** include in the regulations adopted pursuant to Section 38562 the use of market-based compliance mechanisms to comply with the regulations."] [emphasis added].) CARB elected to create the cap-and-trade system alongside the other emission reduction policies set forth in the Scoping Plan. (California Air Resources Board, California's Cap-and-Trade Program Final Statement of Reasons ("2011 FSOR") (Oct. 2011) at 156 ["This market-based program is… designed to work in concert with…standards for cleaner vehicles, low-carbon fuels, renewable electricity, and energy efficiency."].) From the outset, CARB viewed the cap-and-trade program as just one of multiple regulatory efforts aimed at achieving GHG emission reductions from covered sectors. Indeed, other state-level policies—not cap and trade—were intended to do the bulk of heavy lifting on GHG reductions. (See 2008 Scoping Plan at 22.)

The cap-and-trade program was initially set to expire by operation of statute in 2020. As discussed above, extension legislation passed and the program now sunsets in 2030, five years before the Project will reach full buildout. (Cal. Health & Safety Code § 38562, subd. (h).) Under the cap-and-trade program, covered entities, such as electricity generators, industrial sources, and fuel suppliers, are required to surrender

compliance mechanisms to CARB equal to the amount of their in-state emissions in a given compliance period. (See 17 Cal. Code Regs. §§ 95850, 95855, 95856.) Warehouses are not among the covered entities. Covered entities can comply with the program's requirements in three ways: (1) by reducing their emissions; (2) by obtaining allowances, with each allowance essentially serving as a permit to emit one ton of $CO_2e$; and/or (3) by obtaining offsets, which are generated by certified emission reduction projects from sources that aren't covered by cap and trade, like forestry projects. (See, e.g., 17 Cal. Code Regs. §§ 95820, 95970, 95990, 95991.)

In the context of fuel emissions and electricity generation emissions, as Respondents concede, compliance obligations rest with the fuel supplier or the electricity generator, rather than with the end user of the fuel or electricity. (17 Cal. Code Regs. § 95811.) Where, as here, a project results in increased mobile source emissions, the project itself doesn't bear compliance responsibility when drivers burn fuel to get to the project. Instead, compliance mechanisms for the portion of the fuel that is supplied in-state—as discussed above, out-of-state supply is not covered by the cap—would be surrendered by the suppliers of the fuels those drivers have put in their cars or trucks.

Under the program, the number of total allowances available is capped, and the aggregate statewide cap declines

over time. Emissions from any given project or any covered sector, however, need not decline—and may even rise year over year. This is in part because entities that hold excess allowances may sell those allowances to entities that need them to come into compliance. (See 17 Cal. Code Regs. §§ 95920, 95921.) A significant portion of allowances are allocated for free to certain entities, and CARB holds quarterly allowance auctions of most of the remaining allowances, subject to a price floor. (17 Cal. Code Regs. §§ 95910-95915.)

The higher the demand for allowances, the higher allowance prices climb, creating a price signal that should reduce statewide emissions and help keep emissions below the cap. However, there is a limit to how high allowance prices can rise—and this limit, if reached, can function to create a "hole" in the cap. A small portion of allowances is allocated to a special reserve, the APCR, and those allowances are made available at higher prices once certain trigger levels are hit, creating a "soft" price ceiling that is intended to create market stability rather than accurately price GHG emissions commensurate with the harms they cause. (California Air Resources Board, Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Final Statement of Reasons ("2017 FSOR") (Aug. 2017) at 504 [explaining that the APCR price was designed "looking at the cost of abatement; as opposed

to the Social Cost of Carbon, which looks instead at a cost range related to damages caused by emissions."].) As part of the cap-and-trade extension legislation, CARB was directed to set a "hard" price ceiling, which will allow ***unlimited*** new allowances to be sold at the ceiling price. (Cal. Health & Safety Code § 38562, subd. (c)(2).)

This is a key point: If capped emissions don't decline sufficiently quickly, allowance prices may rise and hit CARB's "hard" price ceiling, triggering the sale of unlimited new allowances. (See Severin Borenstein et al., Expecting the Unexpected: Emissions Uncertainty and Environmental Market Design ("Borenstein Cap and Trade Report") (Aug. 2019) at 2-3 [explaining that the combination of uncertainty surrounding "business as usual" emissions and price-inelastic emissions abatement supply make prices at the ceiling one of the most likely cap and trade outcomes].) Depending on how long allowance prices sit at the ceiling and how many allowances are sold at that price, this could undermine or even negate the statewide cap on emissions. Thus, each of CARB's overlapping and complementary programs that reduces emissions from capped sectors plays an important role in keeping allowance prices down, emissions below the cap, and the cap-and-trade program functioning well. If left to bend California's emissions trajectory downward to the 2030 statewide limit through

allowance prices alone, cap and trade would likely not succeed. And because the existence of the "hard" price ceiling effectively removes the program's cap for emissions between years 2021 and 2030, Respondents' fundamental premise—that the existence of the cap means the Project's mobile source emissions must necessarily be mitigated—also fails.

Another important feature of the cap-and-trade program is the ability to bank allowances. While the cap represents the maximum number of emissions from allowances that are issued in any given year, emissions can, and do, sometimes fall below that maximum, and unused emissions allowances may be carried forward to a subsequent year when they can be used for compliance. (17 Cal. Code Regs. § 95922.) Conversely, real world emissions can exceed the number of emissions allowances issued in a given year, if unused allowances from a previous year are available to meet compliance obligations. (See LAO Cap-and-Trade Extension Report at 9.) In other words, while CARB plans to make fewer allowances available on the market each year, that does not necessarily mean that capped emissions will decrease year to year, because of banking of older allowances (and because of the price ceiling mechanisms described above). Allowance banking is, again, a price stabilizing mechanism for the cap-and-trade market—but it also creates the possibility that annual emissions targets, like California's 2030 target, may not be met

because compliance with the cap-and-trade program will be achieved through the use of banked allowances. (See LAO Cap-and-Trade Extension Report at 9 [explaining that due to banked credits, the Legislative Analyst's Office "found this general result—2030 emissions significantly higher than the annual target—under a couple different scenarios we analyzed."]; 2011 FSOR at 165.)

Lastly, it is important to note that CARB can adjust the annual statewide cap either upward or downward. (See Cal. Health & Safety Code § 38562, subd. (c)(2); LAO Cap-and-Trade Extension Report at 9, 14 [identifying cap adjustment as an area for legislative oversight].) This means, for example, that if complementary policies are doing an especially good job of controlling capped emissions and the state's emissions trajectory is declining faster than anticipated, the state can "capture" those gains. There is no sense in which the state's current cap is its emissions destiny.

**2. Cap and trade was designed to work together with other laws, like CEQA, that reduce emissions from transportation—and it would be overburdened to the breaking point if asked to work alone.**

Respondents argue that "the EIR and the City Council reasonably concluded that the impacts of the capped emissions have already been addressed by the cap-and-trade program, which ensures consistency with statewide greenhouse gas emissions reduction goals." (Resp. Br. at 56.) But this misapprehends the nature of the cap-and-trade program and its place among a large stable of state-level GHG regulations that are collectively intended to push California toward its ambitious GHG reduction targets. Cap and trade is not, and was never intended to be, the one regulation that guarantees compliance with statewide GHG emission reduction goals, and accordingly, even compliance with the program cannot *de facto* lead to a conclusion that a project's GHG impacts have been adequately mitigated.

If this Court were to adopt the EIR's approach, effectively releasing lead agencies from the requirement to mitigate transportation emissions at the project level and at the stage of project design and approval, emissions from developments like the Project would rise significantly as compared with the contrary case. The cap-and-trade market would have to absorb

that additional pressure. Respondents are, in essence, asking the Court to force other market sectors—heavy industry, fuel suppliers, electricity generators, and the like—to bear the weight of reducing emissions created by the development sector. That is not cap and trade's purpose or design.

Indeed, the cap-and-trade program is a minority contributor to GHG emissions reductions, and California cannot reach its looming GHG reduction mandates with cap and trade alone. Both the original Scoping Plan and the two subsequent Scoping Plan updates, as well as CARB's Final Statements of Reasons for the cap-and-trade and cap-and-trade extension regulations, are clear that CARB has never intended the program to be the sole mechanism through which statewide GHG reduction goals are met, even as to capped emissions. (See, e.g., 2011 FSOR at 138 [CARB "is pursuing both direct command-and-control regulations, such as, but not limited to, the low carbon fuel standard, advanced clean car regulation, stationary refrigeration regulation, and a market-based cap-and-trade regulation to reduce GHG emissions."]; 2017 FSOR at 1022 [explaining that in certain sectors, pressure from other programs causes GHG emissions reductions, meaning "the cap decline factor is not needed as an incentive to reduce GHG emissions."].) CARB has explained that cap and trade "is used to supplement, rather than replace, direct regulation approaches. It is also

designed to work in concert with other measures…" (2011 FSOR at 156.)

This fact is widely recognized even beyond CARB, especially in the context of land use decisions and transportation emissions. (See, e.g., California Air Resources Board, First Scoping Plan Update, Appendix D1 [California Air Pollution Control Officers Association's and Other Regional Efforts to Implement Climate Protection Strategies] (Feb. 10, 2014) at D1-2.) For example, the California Air Pollution Control Officers Association ("CAPCOA") explains "it is clear that state actions alone won't be sufficient [to meet coming statewide reduction goals]. State policy is most effective with the support, engagement, and complementary actions of regional and local efforts." (*Id.*) CAPCOA specifically points to mobile source emissions reductions as an area where state-level action must be supplemented by regional and local governments "through land use planning, both on a project-level basis and in integrated, long term blueprints…" and explains that state-level efforts to reduce mobile source emissions are undercut by regional and local decisions that do not prioritize GHG emissions reductions. (*Id.*) Indeed, the California Legislature re-authorized cap and trade in 2017 knowing that the program would continue to work alongside other complementary statutes and regulations designed to reduce transportation sector GHG emissions, such as SB 375—

comprehensive legislation designed to achieve emissions reductions from mobile sources using local land use and transportation planning tools—and the Low Carbon Fuel Standard. (See, e.g., Cal. Gov. Code §§ 14522.1, 14522.2, 65080.) The Legislature did not consider such overlapping measures to constitute "double counting" of mobile source emissions, but instead concluded that they were necessary to provide needed redundancy in light of the complex problem presented by transportation emissions.

CARB has consistently analyzed the percentage of necessary reductions it expects to be achieved by the cap and by other complementary measures, including the Low Carbon Fuel Standard, the Renewable Portfolio Standard, and regional land use and transportation measures; cap-and-trade does not account for even a majority of the needed GHG emissions reductions in those assessments. (See, e.g., 2017 Scoping Plan Update at 28.) CARB expects cap and trade to account for less than a third of the emissions reductions needed to meet California's 2020 target, and less than 40 percent of the emissions reductions needed to meet the 2030 target. (2008 Scoping Plan at 22; 2017 Scoping Plan Update at 26, 28.) Because other state-level, regional, and local policies are themselves effective at reducing GHG emissions, cap and trade allowance prices have historically remained low, auctioning for less than half of Social Cost of

Carbon estimates that many states use. (Borenstein Cap and Trade Report at 3, 23-24; see 2017 FSOR at 504 [allowance prices are not intended to reflect the Social Cost of Carbon].)] This means that, far from accurately reflecting the price to reduce or avoid the full amount of GHG emissions from covered sectors needed to meet statewide goals, as Respondents suggest (Resp. Br. at 57), cap-and-trade allowance prices understate those costs and the program itself simply serves as one program among many. In short, whatever the merits of cap and trade as a partial driver for GHG emissions reductions, it cannot be considered full mitigation for the cumulative impacts of carbon emissions, which is what the EIR proposes.

And because of the "hard" price ceiling the Legislature has directed CARB to create, it is critical that other emission reduction programs continue to take a laboring oar in reducing emissions from capped sectors. Otherwise, allowance prices could skyrocket as the system bears a burden it was never designed to hold. (Borenstein Cap-and-Trade Report at 23-24 [explaining that without complementary policies, the probability of very high allowance prices "more than triples" and could result in price ranges "likely to be politically unacceptable."].) As discussed *supra*, a result of skyrocketing allowance prices could be to undermine the cap, with unlimited allowances available for sale at the ceiling price.

In sum, the existence of the cap-and-trade program does not displace the need to use other state-level, regional, and local policies—including thoughtful land use decisionmaking through the CEQA process—to control emissions from capped sectors. To the contrary, cap and trade works well only if complementary policies are employed, too. Because it acts in concert with other policies to meet statewide goals, cap and trade cannot be relied upon alone as evidence that project-level emissions have been "mitigated" and are not significant. In fact, such an approach would overburden the cap-and-trade market and make it challenging for California to meet its emissions reduction targets. And for those same reasons, the EIR's approach is inadequate for CEQA purposes: The mere existence of the program cannot guarantee that the Project's emissions are addressed, and the EIR's lack of analysis to show that they are renders the document insufficient under CEQA.

### 3. Cap and trade will not ensure that Project-level emissions are reduced.

Cap and trade sets an economy-wide emissions cap that is not project- or sector-specific. This means that while the overall cap declines over time, emissions from an individual project need not, and often do not, decline. Even emissions from an entire sector may not decline in any given compliance period, as long as there are adequate allowances on the market to allow all covered

entities to meet their compliance obligations. Respondents say this doesn't matter; because the overall cap declines over time, this must mean that somewhere, someone is "mitigating" mobile source emissions in a way that allows California to achieve its climate targets. Their view is that because the statewide cap exists, it doesn't matter whether there are project-level efforts to reduce emissions; in aggregate, emissions will be reduced enough by operation of the cap.

In reality, though, the need for simultaneous project-level efforts to reduce emissions remains strong, for all of the reasons discussed *supra*. This is especially true with respect to the Project's transportation emissions, which make up the bulk of the emissions at issue in this case. Transportation emissions from the Project, and from similar development proposals around the state, will not be adequately controlled by cap and trade alone because significant mechanisms for reducing transportation sector emissions, like changing local land use patterns and making mass transit improvements, are out of the hands of fuel suppliers—who are the only covered entities with compliance obligations for transportation fuels under the cap. The success of California's climate policies depends, in part, on local and regional land use authorities and project developers working to reduce project-level GHG emissions throughout the design, approval, and operational phases of proposed projects.

Traditional CEQA mitigation tools, as applied to GHG impacts, are critical in these efforts, especially for a project that results in the creation of 70,000 truck trips per day that would otherwise not occur. The upshot of the EIR's approach is to leave meaningful, project-specific mitigation measures that would reduce transportation emissions on the table.

This is particularly troubling because accelerating reductions in transportation sector emissions is critical to achieving the statewide climate goals. In the worst-case scenario, overburdening the cap-and-trade system in this way could destabilize the market entirely, reducing even cap and trade's economy-wide efficacy as mobile source emissions associated with the development sector continue to rise.

**4. The EIR's GHG analysis undermines CEQA's purpose and role.**

Because it misrepresents the nature of the cap-and-trade program, the ability of the Project to ensure compliance with cap and trade, and the potential for mitigation of Project GHG emissions through cap and trade, the EIR's GHG analysis is inconsistent with CEQA's "fundamental goal": to ensure the public and decisionmakers are fully informed about a project's possible significant environmental impacts. (See *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439, 447.) The Project's EIR cannot serve its

proper purpose as an "environmental 'alarm bell'" when it dramatically understates the extent of the Project's GHG impacts, and, in turn, the amount and type of mitigation that would be required to address them. (See *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810; see also Cal. Pub. Res. Code § 21061 [the purpose of an EIR is to provide "detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."].)

The EIR's analysis is misleading in two significant ways. First, the EIR improperly concludes, without any supporting analysis, that the existence of the cap-and-trade program means Project emissions are necessarily less than significant. Second, the EIR plays fast and loose with the term "mitigation," suggesting that Project emissions are "mitigated" for CEQA purposes when they are not, with serious adverse consequences for both this case and the ability of California to meet its GHG reduction targets.

**a. The existence of state-level regulation does not obviate the need for a robust significance analysis under CEQA.**

Respondents contend that the mere existence of the cap-and-trade program is enough to conclude that GHG impacts from

"capped" sources associated with the Project are not significant. But the EIR contains no analysis to support this conclusion. CEQA does not permit such a logical leap.

CEQA is designed to assess the significance of project-level impacts and ensure mitigation of those impacts. (See Cal. Pub. Res. Code §§ 21002; 21081.) Even though the cap-and-trade program may reduce economy-wide GHG emissions, it has no nexus to the Project's impacts: GHG emissions from the Project will not necessarily decline as a result of the operation of cap and trade and may even increase despite the existence of the program. Equally as important from a CEQA perspective, the Project has no control over whether the entities responsible for the "capped" emissions associated with the Project will actually meet the requirements of the law. The cap-and-trade program applies to a variety of covered entities in the industrial, electricity generation, and fuel production sectors. (17 Cal. Code Regs. § 95811.) Those entities are subject to compliance obligations under the law and must accordingly surrender compliance instruments to the state. (*Id*. at §§ 95811, 95850-95859.) But the Project is not among them: warehouses are not covered entities under cap and trade. (*Id*. at § 95811.) Respondents attempt to downplay the significance of this fact in their brief, calling the line between projects directly covered by cap and trade and those not covered at all, but which may draw

"downstream" emissions, "a distinction without a difference." (Resp. Br. at 63.) To the contrary, the distinction is key, not just for this case but for its CEQA implications more generally. Unlike a refinery, which itself must submit compliance mechanisms under cap and trade and can therefore guarantee that its emissions are being mitigated through the program, the Project has no compliance obligation, and no way to ensure that those who do have such obligations meet them. Without any way to ensure or demonstrate compliance—and without any attempt to explain how it ***could*** demonstrate compliance—the Project cannot fairly be said to meet its CEQA obligations. (See Cal. Nat. Res. Agency, Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines, OAL Notice File No. Z-2018-0116-12 (Nov. 2018) ("Nov. 2018 Guidelines FSOR") at 95 ["…it is only those plans and regulations that are enforceable against a particular project that a lead agency should consider."][discussing a lead agency's assessment of consistency with a plan or regulation for purposes of a GHG impact significance analysis].)

Setting aside the fact that the Project cannot itself ensure compliance with cap and trade, the EIR is required to present evidence demonstrating that compliance with an existing regulation or plan will, in fact, render emissions less than significant, and is also required to consider evidence that, despite

compliance with the regulation or plan, emissions will still rise to the level of significance. (See CEQA Guidelines §§ 15064, 15604.4; Cal. Nat. Res. Agency, Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97 ["SB 97 FSOR"] (Dec. 2009) at 27, 98.) The Project's EIR did neither here.

"Compliance with the law is not enough to support a finding of no significant impact under the CEQA." (*Californians for Alternatives to Toxics v. Department of Food & Agriculture* (2005) 136 Cal.App.4th 1, 17 [citing *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 881-882.].) Courts have consistently found that EIRs must do more than simply recite the existence of a state-level regulation or program when considering the significance of environmental impacts. (*Id.*; see also *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715 ("*SCOPE*").)

For example, in *Californians for Alternatives to Toxics v. Department of Food & Agriculture*, the State Department of Food and Agriculture ("DFA") developed a plan to address diseased grapes in vineyards, including vegetation removal and the use of pesticides. (*Californians for Alternatives to Toxics*, 136 Cal.App.4th 1, 9.) In concluding that the application of pesticides

would not cause an environmental impact, DFA relied on the existence of state and federal pesticide regulations and licensing and worker safety regulations. (*Id*. at 10.) The agency concluded that consistency with these regulatory schemes was sufficient to determine that impacts would be reduced to less than significant. (*Id*. at 17.) The court disagreed, finding that "DFA repeatedly deferred to the [state] regulatory scheme instead of analyzing environmental consequences of pesticide use and therefore fell short of its duty under CEQA to meaningfully consider the issues raised by the proposed project." (*Id*. at 16.) The EIR contained no analysis of the risks of utilizing particular pesticides or of their possible environmental or human health impacts. (*Id*. at 18.) While the existing state law was designed to regulate pesticide administration, the EIR contained no evidence to demonstrate that compliance with the program would not result in adverse environmental effects, and accordingly, the EIR's "conclusory statements [did] not fit the CEQA bill." (*Id*. at 17.)

Similarly, in *SCOPE*, an EIR improperly relied on the State Water Project's allocation of water deliveries to conclude that the project in question would not create significant water supply impacts, without analyzing the state program's application to the project in practice. (*SCOPE*, 106 Cal.App.4th 715, 720-721.) The EIR instead made "no attempt to calculate or even discuss the differences between entitlement and actual supply." (*Id*. at 722.)

Nor did the EIR give any suggestion that the operation of the program could not "be taken at face value," even though in reality, it was unclear whether the project's water supply impacts would truly be ameliorated by the program. (*Id*. at 723.) The end result, concluded the court, was that decisionmakers and the public could not arrive at a meaningful understanding of the project's impacts. (*Id*. at 722.)

And specifically in the context of GHG impacts analysis, the California Supreme Court has explained that mere reliance on and extrapolation from a state-level plan to project impacts is not enough; substantial evidence must support a conclusion that GHG impacts are not significant. (*Center for Biological Diversity v. Department of Fish & Wildlife* (2015) 62 Cal.4th 204 ("*Newhall Ranch*").) In *Newhall Ranch*, the project's EIR referred to CARB's statewide Scoping Plan and its determination that statewide emissions would need to drop roughly 29 percent below "business as usual" levels in order to achieve California's GHG reduction targets. (*Newhall Ranch*, 62 Cal.4th at 218.) Finding that the project's own emissions would fall 31 percent below a hypothetical "business as usual" scenario, the EIR concluded that the project would not impede progress towards California's climate goals and that its impacts were accordingly less than significant. (*Id*.) The Supreme Court rejected this analysis, explaining that even though the EIR could look to consistency

with the Scoping Plan as a measure for determining the significance of project emissions, it did not contain adequate analysis explaining how the project's own GHG emissions reductions would be consistent with meeting the statewide reduction goal. (*Id*. at 225.) In other words, the EIR could not just conclude that a reduction in project emissions consistent with the state-level plan would necessarily result in less than significant GHG impacts; it had to support that conclusion with substantial evidence in the record. (*Id*. at 226-227.)

So too in this case. Just as in *Californians for Alternatives to Toxics* and *SCOPE* the EIR simply points to the existence of a state scheme—in this case, cap and trade—and declares the Project's GHG impacts insignificant. But the existence of, and potential compliance with, a regulation is "a starting point for a lead agency's analysis," not an automatic pass to skip a meaningful significance analysis. (Nov. 2018 Guidelines FSOR at 95.) Critically, the lead agency must consider whether "a project may still have a significant impact despite compliance with the regulation." (SB 97 FSOR at 98.) Thus, the EIR was required to demonstrate, first, that the Project would comply with the regulation, and next, that compliance with the regulation would, in actuality, render Project impacts less than significant. The EIR never explains how "capped" Project emissions could or would be reduced to less than significant. It offers no suggestion

for how the Project would ensure that fuel suppliers or electricity generators actually comply with the cap-and-trade regulation. Nor does it acknowledge the additional stress on the cap-and-trade system of declining to minimize the great majority of the Project's emissions, instead laying responsibility for reductions at the feet of fuel suppliers, who have no ability to control project design or operations. And it never explains that cap and trade does not require reduction or avoidance of the Project's specific emissions at all. "In the absence of substantial evidence to support the EIR's no-significance finding…the EIR's readers have no way of knowing whether the project's likely greenhouse gas impacts will indeed be significant, and, if so, what mitigation measures will be required to reduce them." (*Newhall Ranch*, 62 Cal.4th at 227.)

Respondents argue that the holding in *Association of Irritated Residents v. Kern County Board of Supervisors* (2017) 17 Cal.App.5th 708 ("*AIR*") is an endorsement of the EIR's approach. But *AIR* did not hold "that a threshold of significance for CEQA purposes could consider only greenhouse gas emissions not covered by the cap-and-trade program." (Resp. Br. at 37.) Instead, in *AIR*, the Fifth District Court of Appeal concluded that the project, a refinery that itself was subject to compliance obligations under the cap-and-trade program, could rely on its compliance with the program to demonstrate that certain of its

GHG emissions—notably, ***not*** its mobile source emissions—would be less than significant. (*AIR*, 17 Cal.App.5th at 742-744.) The fact that the *AIR* project had compliance obligations and could, in practice, ensure its own compliance with the cap-and-trade regulation is a critical distinction.

But to the extent that *AIR* held emissions for which the *AIR* project itself held no compliance obligation, like electricity generation emissions, could be treated as less than significant under cap and trade because other "upstream" entities have compliance obligations under cap and trade, that conclusion was incorrect, and this Court should decline to adopt that approach. As explained above, treating such emissions as necessarily less than significant, without more analysis, ignores the realities of the cap-and-trade program and understates the Project's GHG impacts. It also incorrectly places the burden of mitigating the Project's GHG emissions on entities that cannot control them and have no real obligation to reduce or avoid them.

Allowing the EIR to declare "capped" GHG emissions less than significant under these circumstances would have serious implications for California climate policy and for the administration of CEQA. It would lead to ill-informed land use decisions that overburden our state-level regulatory programs and make compliance with our upcoming GHG reduction targets all the more challenging. It would also undercut CEQA's

fundamental role as a public disclosure and transparency statute by allowing lead agencies to rely on the existence of a state-level regulation, without more, to justify a conclusion that project-level impacts are less than significant. A holding of that nature would have consequences not just in the realm of climate policy, but any time a state-level regulatory program intersects with project-level impacts. It would also be inconsistent with past precedent explaining the role state-level regulation should play to inform significance determinations. (See, e.g., *Californians for Alternatives to Toxics*, 136 Cal.App.4th at 17; *SCOPE*, 106 Cal.App.4th at 720-722.)

The CEQA Guidelines only allow that a lead agency may consider ***the extent of a project's compliance*** with an applicable GHG mitigation regulation when assessing significance of project emissions, but the mere existence of the regulation alone is not enough to remove project emissions from a significance calculus. Because the Project cannot ensure compliance with cap and trade, and because even if it could, compliance with the program is not conclusive evidence that the Project's GHG impacts are less than significant, the EIR was required to analyze the significance of the so-called "capped" emissions it discounted. (CEQA Guidelines, § 15064.4, subd. (b)(3); SB 97 FSOR at 98.) Its failure to do so renders the EIR

inadequate. (*Newhall Ranch*, 62 Cal.4th at 226-227; *Californians for Alternatives to Toxics*, 136 Cal.App.4th at 17.)

**b. Project emissions are not "mitigated" as required by CEQA.**

Respondents' brief repeatedly states that cap and trade will "mitigate" the Project's GHG emissions. (See, e.g., Resp. Br. at 35, 49, 57.) This terminology conflates the concept of mitigation of GHG emissions—meaning the reduction or avoidance of GHG emissions—with the concept of mitigation under CEQA, which requires that steps be taken to reduce project-specific environmental impacts. Eliding the two concepts, Respondents suggest that "the source of mitigation for greenhouse gases from fuel combustion—whether at the project level or the fuel supplier level—is irrelevant…" (Resp. Br. at 49.) But from a CEQA perspective, that statement is untrue.

As the California Natural Resources Agency, one of the state agencies responsible for updating the CEQA Guidelines, has explained, "to demonstrate consistency with an existing GHG reduction plan, a lead agency would have to show that the plan actually addresses the emissions that would result from the project." (SB 97 FSOR at 27.) This is consistent with the well-settled CEQA principle that mitigation of project impacts must be fully enforceable and implemented as a condition of project development. (See, e.g., Cal. Pub. Res. Code § 21081.6, subd. (b);

CEQA Guidelines § 15126.4, subd. (a)(1)(D); *Environmental Council of Sacramento v. City of Sacramento* (2006) 142 Cal.App.4th 1018, 1035; *Federation of Hillside & Canyon Associations v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1260-1261.) Even Respondents acknowledge that mitigation of Project emissions has to be "enforceable and verifiable." (Resp. Br. at 49.)

Where mitigation is speculative and vague, it is inadequate under CEQA. (See *California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 197-198; *Lincoln Place Tenants Assn. v. City of Los Angeles* (2007) 155 Cal.App.4th 425, 445 [mitigation must be feasible and enforceable].) Traditionally, CEQA mitigation occurs at the project level, and the adequacy of mitigation is subject to a project-by-project analysis. (See *California Native Plant Society v. County of El Dorado* (2009) 170 Cal.App.4th 1026, 1053; *Environmental Council of Sacramento*, 142 Cal.App.4th at 1024-1028.) Where mitigation is untethered to project-specific mitigation measures themselves, like in the case of in-lieu fee programs that allow a developer to pay into a fund to mitigate project impacts, CEQA still requires the proposed mitigation to be "sufficiently tied to the actual mitigation of the impacts." (*Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 140-141 [specific traffic improvement projects funded by

mitigation fees were in place and would actually reduce traffic impacts caused by the project]; see also *California Clean Energy Committee*, 225 Cal.App.4th at 197-199 [fee program to support fair share plans was impermissibly speculative mitigation and EIR did not adequately explain how it would address project impacts]; *California Native Plant Society*, 170 Cal.App.4th at 1056 [payment of a mitigation fee alone was not enough to ensure that project-level impacts would be mitigated to insignificance]; *Anderson First Coalition v. City of Anderson* (2005) 130 Cal.App.4th 1173, 1188.)

Here, the EIR makes no attempt to tie the supposed cap-and-trade "mitigation" to mitigation of Project-specific GHG emissions—because it cannot. As discussed *supra* in Section II.B.3, the cap-and-trade program imposes an economy-wide cap, and as such provides no way to track or account for how the Project's own emissions would be reduced or avoided, if at all. And there is no way for the lead agency or the Project to enforce cap and trade against the fuel suppliers or electricity generators that hold compliance obligations under the regulation, or for them to verify that an adequate number of compliance mechanisms have been surrendered to cover the Project's emissions. This feature makes the cap-and-trade "mitigation" Respondents propose even more speculative than in-lieu fee programs: in the case of in-lieu fees, projects at least pay into fee

programs, but in this case, the Project has no relation to or involvement with the cap-and-trade program at all.

It also exemplifies the misleading nature of the EIR's GHG impacts analysis. The EIR suggests that the Project's own emissions will be reduced or avoided by operation of the cap-and-trade program such that decisionmakers and the public need not be concerned about the hundreds of thousands of metric tons of new GHG emissions the Project will produce ***every single year*** after it is built out. In reality, the Project will severely compromise Moreno Valley's ability to meet long-term climate goals. To illustrate, the City of Moreno Valley's own Energy Efficiency and Climate Action Strategy explains that to meet AB 32 targets, the City will have to implement local emission reduction policies. (City of Moreno Valley, Energy Efficiency and Climate Action Strategy ("Climate Action Strategy") (Oct. 2012) at 4 ["For California to reach its greenhouse gas reduction goals, communities must address how they grow."], 6 ["the City would still need to supplement the statewide measures with the implementation of local reduction policies" to meet its 2020 target].) To achieve compliance with AB 32, the City set a 2020 target of about 779,790 metric tons of $CO_2e$. (Climate Action Strategy at 6 [stating an emissions reduction target of 15 percent below 2010 emissions to meet 2020 mandate].) Assuming the City is able to meet its target and hold steady to that reduction

through Project buildout, the first year of Project emissions after buildout would result in total City emissions of 171,003 metric tons $CO_2e$ ***above*** 2010 levels—rather than the 15 percent ***below*** 2010 levels that the City has committed to—totally erasing the City's progress toward its climate goal. All told, the Project alone would cause a nearly 40 percent jump in the City's emissions over and above its 2020 target. What's more, this analysis understates the Project's emissions impact relative to the City's climate goals because the City has not yet revised its Climate Action Strategy to meet 2030 reduction targets, which are even more ambitious. In other words, to stay on track to meet statewide climate mandates, the City would have to find some way to reduce ***more than one-third*** of its total annual emissions to accommodate the Project's emissions. Fuel suppliers cannot guarantee these reductions; it is the City and the Project that are "uniquely capable of addressing [these] emissions…" (Climate Action Strategy at 4.)

But the EIR does not contemplate Project-specific mitigation measures, having written off the bulk of those emissions before even comparing Project emissions to the Air District significance threshold. The EIR suggests that over 90 percent of the Project's GHG emissions will be mitigated by somebody else, but that is not, and in practicality cannot be, the case. Without properly acknowledging and attempting to

mitigate these emissions, the EIR cannot serve its proper purpose as an "informational document." (See Cal. Pub. Res. Code § 21061; Cal. Pub. Res. Code §§ 21002, 21081 [requiring mitigation of a project's significant environmental impacts].)

## III. Conclusion

The EIR's analysis of the Project's GHG impacts misapprehends the cap-and-trade program and misinforms the public and decisionmakers about the true significance of the Project's emissions. The case for reversing the lower court decision on these facts strikes us as particularly strong, given the post-2030 timing of Project's emissions and the flimsy relationship of the Project to cap-and-trade compliance obligations. But beyond that, the cap-and-trade program was never intended to be California's sole mechanism for reducing emissions from capped sectors and should not be forced to bear that weight. The EIR's analysis, if endorsed, would have dire consequences for California's ability to meet its climate goals and would upend settled CEQA precedent about the role state-level regulation should play in assessing the significance of project impacts. We respectfully urge the Court to reject the EIR's approach and find the GHG impacts analysis inadequate.

Dated: December 26, 2019

By:_____

Cara A. Horowitz
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Counsel for *Amici*
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## CERTIFICATE OF COMPLIANCE

(California Rules of Court 8.204(c)(1))

Counsel of Record hereby certifies that pursuant to Rule 8.204(c)(1) of the California Rules of Court, the enclosed brief of a*mici curiae* California CEQA and Climate Policy Experts is produced using 13-point Roman type including footnotes and contains approximately 9,945 words, which is less than the total words permitted by the rules of court. Counsel relies on the word count of the Microsoft Word computer program used to prepare this brief.

Dated: December 26, 2019

By:_____

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**PROOF OF SERVICE**

ALBERT THOMAS PAULEK, et al.,
Plaintiffs and Respondents,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants;

LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, et al.,
Plaintiffs and Appellants,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants;

I am employed in the County of Los Angeles, State of California. I am over the age of eighteen and am not a party to the within action; my business address is 385 Charles E. Young Drive, Los Angeles, California 90095. On December 26, 2019, I served true copies of the following document(s) described as:

**PROPOSED AMICI CURIAE BRIEF OF CALIFORNIA CEQA AND CLIMATE POLICY EXPERTS**

on the parties in this action as follows:

**SEE ATTACHED SERVICE LIST**

**BY ELECTRONIC SERVICE:** I caused a copy of the document described above to be sent via TrueFiling's electronic service system to the persons at the email addresses listed below. I did not receive, within a reasonable time after the transmission, any electronic message or other indication that the transmission was unsuccessful.

**BY U.S. MAIL:** I caused a copy of the document described above to be mailed via U.S. postal service to the Superior Court in this case, at the following address: Riverside County Superior Court, 4050 Main Street, Riverside, California 92501.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on December 26, 2019, at Miami, Florida.

_____

Cara A. Horowitz

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**IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA**
**FOURTH APPELLATE DISTRICT, DIVISION TWO**

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| **ALBERT THOMAS PAULEK, et al.,**<br><br>Plaintiffs and Respondents,<br>**v.**<br><br>**MORENO VALLEY COMMUNITY SERVICES DISTRICT,** et al.**,**<br><br>Defendants and Appellants.<br><br>**HF PROPERTIES, et al.,**<br><br>Real Parties in Interest and Appellants. | Case No. E071184<br>(Riverside Cty. Super. Ct. No. RIC1510967 MF, RIC1511279, RIC1511327, RIC1511421, & RIC1511195) |
| **LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, et al.,**<br><br>Plaintiffs and Appellants,<br>**v.**<br><br>**MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.**,<br><br>Defendants and Respondents.<br><br>**HF PROPERTIES, et al.,**<br><br>Real Parties in Interest and Respondents. | (Riverside Cty. Super. Ct. No. RIC 1511279 & RIC1511327) |

Riverside County Superior Court
The Honorable Sharon J. Waters, Judge

# BRIEF OF AMICI CURIAE THE ATTORNEY GENERAL AND THE CALIFORNIA AIR RESOURCES BOARD IN SUPPORT OF PLAINTIFFS AND RESPONDENTS ALBERT THOMAS PAULEK, ET AL. AND PLAINTIFFS AND APPELLANTS LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, ET AL.

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## INTRODUCTION

The massive World Logistics Center (Project) will cause approximately 70,000 daily truck trips transporting goods from the ports of Long Beach and Los Angeles to Moreno Valley. (AR 003039, 058605–06.) These vehicle trips will emit hundreds of thousands of metric tons of greenhouse gas (GHG) emissions every year over the life of the Project. (AR 002729.) These GHG emissions, along with emissions from electricity needed to power the more than 40-million-square-foot project, will add to the existing climate pollutant problem, accumulating in the atmosphere and persisting for decades or longer.

Rather than analyzing and mitigating the Project's emissions, lead agency Respondents Moreno Valley Community Services District, *et al.* (Respondents) shirk their responsibility as a local government to address climate change. They improperly rely on CARB's statewide Cap-and-Trade climate program (Cap-and-Trade Program), which does not impose any regulatory requirements on this Project, as an excuse not to analyze and mitigate the Project's climate change impacts. Respondents improperly ignore roughly 95% of the GHG emissions from the Project (AR 002718–19), disregarding the significance of those emissions, avoiding their duty to adopt all feasible mitigation measures, and failing to properly disclose their responsibility for this pollution to the public.

Respondents' approach mischaracterizes the way state climate policies work and violates the California Environmental Quality Act (CEQA). CEQA directs that Respondents take "all action necessary" to protect the environment, recognizing the importance of local action driven through "meaningful" consideration of environmental impacts. (See Pub. Resources Code, §§ 21000, 21001, 21002, 21002.1.) CEQA does not allow Respondents to waive their CEQA obligations by pointing to a regulation that does not bind them (Cal. Code Regs., tit. 14, § 15000 et seq. (CEQA

Guidelines), § 15064.4), and Respondents wholly misconstrue the regulatory scheme they seek to use.

Although Respondents claim their approach is consistent with state climate policy, it is not. (See Plaintiffs/Appellants' Supplemental Request Regarding Judicial Notice, Exhibit 1, California Air Resources Board, California's 2017 Climate Change Scoping Plan (Nov. 2017) (2017 Scoping Plan) at pp. 19 ["Local actions are critical for implementation of California's ambitious climate agenda"], 97–99 [more extensive discussion about the need for local action to achieve California's climate goals]; see also Health & Saf. Code, §§ 38502, subd. (h) [identifying competing priorities to balance in emissions reductions], 38592 [nothing in this division relieves any person, entity, or agency of compliance with other law], 38690 [identifying overlapping automobile emissions policy].) Respondents' approach has been repudiated by CARB, the Attorney General's Office, and the Natural Resources Agency, as contrary to critical state climate goals. The state has long—and expressly—relied on a portfolio of climate change measures, including significant efforts by local governments, to address emissions that result from their land use decisions.

Respondents rely on the Cap-and-Trade Program to excuse their obligation to make better land use decisions. Cap-and-Trade is not intended as a stand-alone climate policy; instead, it assumes steady efforts to reduce emissions across the state. While Cap-and-Trade has an important role to play in limiting emissions from entities like power plants and refineries, the Program does not cover a host of other sources, including warehouses. Although the Program creates financial and legal obligations on fuel suppliers and electricity generators that may ultimately supply this Project, the Project experiences neither the direct legal requirements of the Program nor the full economic costs associated with its additional emissions. If projects were allowed to evade responsibility in

this way, they would steadily increase Cap-and-Trade Program costs upstream, while locking the state into ever-more expensive and inappropriate high-emitting development patterns. This is a recipe for failure in achieving the state's climate goals. To avoid this scenario, the state relies on local governments to limit emissions from new development projects. Emissions from such projects are the responsibility of local governments and should be mitigated through the proper application of CEQA. Eliminating this crucial piece of the state's portfolio approach undermines the state's climate goals.

We have arrived at a crossroads for the future of GHG analysis under CEQA. If Respondents prevail, this case could singlehandedly undo the will of the Legislature by excusing essentially all projects from the obligation to consider GHG impacts from vehicle trips and energy use. This Court should reject Respondents' argument and confirm that all lead agencies must do their part if we are to meet the state's long-term climate stabilization objective.

## STATEMENT OF INTERESTS

### I. INTEREST OF THE ATTORNEY GENERAL

California has already begun to experience significant adverse impacts from climate change such as "more frequent, more catastrophic and more costly" wildfires, drought, "coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution." (2017 Scoping Plan at p. ES2.) As California's chief law enforcement officer, the Attorney General has the independent power and duty to protect the interest of all of California's current and future residents in a clean, health, and safe environment. (See Cal. Const., art. V, § 13; Gov. Code, §§ 12511, 12600–12612; *D'Amico v. Bd. of Medical Examiners* (1974) 11 Cal.3d 1, 15.)

Upholding this duty, the Attorney General has actively encouraged lead agencies to fulfill their CEQA responsibilities as they relate to climate change for well over a decade. (See, e.g., *Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 3 Cal.5th 497 (*SANDAG*) at p. 519 ["nothing we say today invites regional planners to 'shirk their responsibilities' under CEQA"]; *City of Long Beach v. City of Los Angeles* (2018) 19 Cal.App.5th 465; *People v. County of San Bernardino* (San Bernardino County 2007) No. CIVSS0700329.)

The World Logistics Center, like every large development project, has the potential to either facilitate or hinder the state's achievement of its climate goals. Here, Respondents' unsupported approach to analyzing the Project's GHG emissions has the potential to seriously undermine the overall effort to meet the state's science-based GHG reduction goals for the transportation and land use sectors and to disproportionately affect environmental justice communities.[1] Given these significant interests, the Attorney General submits this amicus brief in support of Appellants,[2] in compliance with rule 8.200(c)(7) of the California Rules of Court in his independent capacity and on behalf of the California Air Resources Board (CARB).

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[1] The Attorney General opposed this methodology in a comment letter it submitted on the revised sections of the Final EIR for this Project (Revised Final EIR or RFEIR). (Letter re: Revised Sections of the Final Environmental Impact Report for the World Logistics Center Project, Sept. 7, 2018, at: <https://oag.ca.gov/sites/all/files/agweb/pdfs/environment/comments-revised-sections-feir.pdf?>.) The Revised Final EIR is not at issue in this litigation, but it includes the original EIR's same flawed GHG analysis.

[2] This brief is submitted in support of Plaintiffs and Respondents Albert Thomas Paulek, et al. and Plaintiffs and Appellants Laborers International Union of North America, Local 1184, et al.

## II. INTEREST OF THE CALIFORNIA AIR RESOURCES BOARD

CARB has a strong interest in participating in this case as amicus curiae. CARB is charged with protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change. As creator and administrator of the Cap-and-Trade Program, and as the lead agency on the Scoping Plan setting out many of the state's climate policies, CARB is an expert on how the Cap-and-Trade Program was designed to function and interact with other state laws and programs as part of California's portfolio approach to addressing GHG emissions. In their briefing, Respondents misrepresent CARB as effectively endorsing the EIR's approach to GHG analysis. (Combined Respondents' and Cross-Appellants' Opening Brief at pp. 17, 36–38, 47–48, 56, 63.) But CARB has repeatedly made clear it does *not* support Respondents' approach.[3] As explained more fully below, Respondents' arguments regarding GHG analysis are contrary to the construction given to applicable regulations by CARB, and by the Natural Resources Agency, agencies charged with interpreting and enforcing the programs at issue.

# BACKGROUND

## I. LEGAL BACKGROUND REGARDING CALIFORNIA'S EFFORTS TO COMBAT CLIMATE CHANGE

In 2006, recognizing the importance of combatting climate change and furthering the objectives of Executive Order S-3-05, the Legislature enacted the Global Warming Solutions Act of 2006, commonly known as

[3] CARB also explained this approach when it formally opposed the GHG analysis Respondents rely on here through its comments on the RFEIR for this Project. (Letter re: World Logistics Center Revised Final Environmental Impact Report, Sept. 7, 2018, at: <https://ww3.arb.ca.gov/toxics/ttdceqalist/logisticsfeir.pdf?_ga=2.236813640.855160185.1575908432-1460774677.1564163003>.)

AB 32. (Health & Saf. Code, § 38500, et seq.) AB 32 mandates that, by 2020, California must reduce its total statewide annual GHG emissions to the level they were in 1990, and to 40 percent below that level by 2030. (Health & Saf. Code, §§ 38550, 38566.) This mandate putts the state on a trajectory of significant and continuous GHG emissions reductions through 2050, in order to stabilize the atmospheric levels of GHGs and reduce the risk of dangerous climate change.

Under AB 32, the Legislature tasked CARB with preparing a guidance planning document, known as the Scoping Plan that, while not binding, set out the state's views based on extensive environmental and economic analyses on how policies may be effectively implemented so that California will meet the its ambitious GHG reduction goals. (See Health & Saf. Code, §§ 38561 et seq.) The Scoping Plan emphasizes the need for a multi-pronged emissions reduction approach that can be carried out by many entities and reflects the state's position that it is necessary to reduce emissions at the source and through reductions in demand for energy. (2017 Scoping Plan, pp. 12, 19, 28).

The Scoping Plan includes a suite of regulations, measures, and policies designed to operate together to reduce GHG emissions. The Cap-and-Trade Program is one such policy. Entities that are directly subject to the Cap-and-Trade Program—like power plants, factories, refineries, and electricity generators and importers—must purchase and surrender compliance instruments (e.g., allowances) for their emissions. (See Cal. Code Regs., tit. 17, § 95812.) Downstream emitters such as cars and trucks, much less warehouses that such cars and trucks drive to, are not covered entities under Cap-and-Trade and have no such obligation to purchase or surrender allowances. The existence of the Program, in other words, does not obviate the need for action at other levels of the economy. On the contrary: If sources like the long-lasting development project in this

case build without regard to their emissions, they will increase overall state emissions and hence increase pressure and costs within the Cap-and-Trade Program.

To address the wide range of GHG emissions sources that are not directly controlled through the Cap-and-Trade Program, the state relies on other policies[4]—many of which require collaboration between the state and local governments. Agencies large and small across the state (including, crucially, cities and counties) are responsible for ensuring that proposed new land use plans, transportation projects, and development projects are consistent with evolving scientific knowledge and state regulatory schemes; CEQA is a critical tool for implementing these obligations.[5] (See *SANDAG*, *supra*, 3 Cal.5th at p. 519; see also CEQA Guidelines, § 15064.4, subd. (b).)

The Scoping Plan makes clear that the Cap-and-Trade Program was *not* designed to replace local governments' long-term planning obligations, but rather designed to work in concert with those policies to achieve the

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[4] See, e.g., Health & Saf. Code, §§ 38561, subd. (e) (requiring CARB to consider "the relative contribution of each source or source category to statewide greenhouse gas emissions"), 43018.5, subd. (a) (requiring CARB to "adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles").

[5] For example, CARB provides regional emission reduction targets for local jurisdictions' land use and transportation planning obligations under Senate Bill (SB) 375. (See Health & Saf. Code, § 65080, subd. (b)(2)(A) [known as "The Sustainable Communities and Climate Protection Act"].) CARB also works with regional air pollution control districts and air quality management districts to address emission sources that have both local and global effect, including methane from landfills and hydrofluorocarbons (HFCs), as well as to support state- and federally-mandated permitting of certain industrial sources of GHG emissions. (See California Air Resources Board, California's 2017 Climate Change Scoping Plan (Nov. 2017) pp. 3, 104 <https://ww3.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf >.)

state's goals. (2017 Scoping Plan at p. 102 ["California's future climate strategy will require increased focus on integrated land use planning"].)

Recent state reports have shown that California's vehicular GHG emissions continue to increase year after year, and CARB has emphasized the need for local action. (See California Air Resources Board, 2018 Progress Report: California's Sustainable Communities and Climate Protection Act (November 2018) at 4.) These increasing emissions demonstrate the crucial need for *more* complementary local action—not less—to ensure the state meets its GHG targets in cost-effective ways.

In light of the state's GHG reduction policies, and CEQA's focus on embedding environmental considerations in local decision-making, the Supreme Court has emphasized that careful CEQA analysis of GHG impacts will be required going forward, as lead agencies must "stay in step" with the evolving science and law related to the state's long-term climate objectives in order to carry out their duties under CEQA. (*SANDAG*, *supra*, 3 Cal.5th at p. 519.)

## II. OVERVIEW OF THE GHG ANALYSIS IN RESPONDENTS' EIR

Mischaracterizing the collaborative efforts required to combat climate change and the role of the Cap-and-Trade Program, Respondents' EIR takes a very unusual and troubling approach to addressing the Project's GHG-related impacts.[6] Respondents divide the Project's GHG emissions into two categories, which the EIR terms "capped" and "uncapped." (AR 002719.) What the EIR deems "uncapped" emissions constitute only about 4.6% of the Project's emissions. (*Ibid*.) The "uncapped" category includes comparatively minor landfill emissions caused by waste generated at the

[6] The Attorney General and CARB only address Respondents' inappropriate use of the Cap-and-Trade Program in the GHG analysis of the EIR. This amicus brief is not intended to and should not be construed as an exhaustive discussion of the EIR's compliance with CEQA.

Project and the use of refrigerants at the Project. (*Ibid.*) For these emissions, the EIR follows the approach that would be expected under CEQA: the City of Moreno Valley, in its discretion, designated a significance threshold (in this case, 10,000 metric tons of GHG emissions as recommended by the South Coast Air Quality Management District), compared the "uncapped" emissions to that threshold, and required feasible mitigation measures to ensure those emissions fall below that threshold. (AR 002719, AR 002729.)

What the EIR terms "capped" emissions, however, constitute the remaining 95.4% of the Project's predicted emissions. (AR 002719.) Those include emissions caused by mobile sources (namely, diesel trucks), as well as natural gas and electricity use at the Project. (*Ibid.*) For these emissions, the EIR deviates dramatically from standard CEQA methodology. The EIR asserts these emissions are "covered" by Cap-and-Trade and therefore wholly exempt from any further CEQA analysis or mitigation. (AR 002723.) The EIR does *not* compare the Project's "capped" emissions to the 10,000 metric ton threshold. (AR 002725.) Indeed, after mitigation measures are applied to the Project, the "capped" emissions remain nearly 40 times greater than the significance threshold. (AR 002729.) In forgoing any attempt to decrease the Project's true total emissions to a less-than-significant level, Respondents fail to consider further mitigation measures that could have made this Project more compatible with the state's climate goals. As described below, this approach is unlawful.

**ARGUMENT**

Respondents avoid disclosing and addressing mitigation for thousands of tons of GHG emissions each year pursuant to the misguided theory that those emissions are addressed by Cap-and-Trade. This argument is founded on misunderstandings of both the Cap-and-Trade Program and

CEQA—both of which require different industries and projects to take responsibility for their own impacts, rather than rely on others for mitigation. Most fundamentally, warehouse projects like the Project are not subject to Cap-and-Trade. Respondents therefore cannot accurately assert that "compliance" with Cap-and-Trade provides any legal basis to avoid analyzing and adequately mitigating the majority of the Project's emissions.

The CEQA Guidelines allow projects to consider regulations "[with] which the project complies" for purposes of considering significance of GHG emissions. (See CEQA Guidelines, § 15064.4, subd. (b)(3).) However, that consideration does not apply here and Respondents' approach, which in effect relies on other entities to undertake Respondents' CEQA mitigation, not only violates both CEQA's legal requirements and public disclosure and mitigation purposes, but also undermines the state climate objectives Cap-and-Trade is intended to further. Cap-and-Trade is designed to act in tandem with—not in spite of—critical tools like local land use planning to reduce GHG emissions. If allowed for Respondents and adopted by other local jurisdictions, such abdication by local governments would dramatically hinder the state's ability to achieve its legislatively mandated long-term climate stabilization objectives and forgo pollution reduction co-benefits from GHG mitigation measures that are vital for environmental justice communities.

The Resources Agency agrees with CARB that "to demonstrate consistency with an existing GHG reduction plan, a lead agency would have to show that the plan actually addresses the emissions that would result from the project." (See California Natural Resources Agency, Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97 (2009),

<http://resources.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf>, at p. 27.)

## I. WAREHOUSE AND LOGISTICS PROJECTS ARE NOT REGULATED BY CAP-AND-TRADE AND THEIR EMISSIONS MUST STILL BE MITIGATED BY LOCAL GOVERNMENTS

Warehouse and logistics complexes are not regulated by Cap-and-Trade. The Cap-and-Trade Program thus provides no legal or policy basis for Respondents to avoid their obligation to evaluate and mitigate GHG emissions. Cap-and-Trade applies "an aggregate greenhouse gas allowance budget [to] *covered entities* and provides a trading mechanism for" such allowances. (Cal. Code Regs., tit. 17, § 95801 (emphasis added).) Respondents seek to use Cap-and-Trade to zero-out and excuse the application of feasible mitigation measures to over 95% of all GHG emissions from the Project. Cap-and-Trade applies only to expressly identified entities ("covered entities") such as cement producers, petroleum refiners, electricity generators, natural gas suppliers, fuel importers, and liquid petroleum gas suppliers. (Cal. Code Regs., tit. 17, § 95811.) Warehouse and logistics complexes are *not* covered entities. Cap-and-Trade compliance instruments do not factor in *whatsoever* because this Project is not covered by Cap-and-Trade.

The mere fact that warehouse and logistics complexes are in the chain of commerce with covered entities does not transform them into covered entities themselves. As an example, although the operator of a refinery that produces gasoline in California is subject to Cap-and-Trade, (Cal. Code Regs., tit. 17, § 95811, subd. (e)(1)), entities downstream from that refinery in the chain of commerce are not. The refinery itself may have compliance obligations under the Cap-and-Trade Program, which can be met by reducing the refinery's own GHG emissions or surrendering allowances, but the gas station that resells the gas, the truck drivers who purchase it, and

the warehouses to which the trucks drive do not have compliance obligations. Under the state's portfolio approach, while the refinery may have met some or all of its climate obligations via Cap-and-Trade, the downstream entities have not. Because warehouses receive no set price or regulatory signals from Cap-and-Trade, they are not being directly incentivized to reduce emissions. Instead, other components of the state's portfolio address those emissions. Nothing in Cap-and-Trade explicitly or impliedly repealed the use of other measures to address climate change; they were designed to work together. (See, e.g., 2017 Scoping Plan at p. 28.) Local governments must responsibly plan new development to further the state's climate goals.

## II. ALLOWING RESPONDENTS' UNTENABLE APPROACH TO GHG ANALYSIS WOULD HAVE SIGNIFICANT, NEGATIVE STATEWIDE CONSEQUENCES

If Respondents' approach to GHG analysis is endorsed, other lead agencies will undoubtedly follow this approach, and emissions from the transportation and land use sectors will be largely omitted from analysis and mitigation under CEQA. Widespread adoption of this approach would: (1) place the entire burden of California's well-established, long-term land-use related GHG reduction goals on Cap-and-Trade, thereby straining the program beyond its intended purpose and (2) expose already burdened communities in the state to greater amounts of GHG emissions and co-pollutants that accompany GHG emissions, such as diesel particulate matter and nitrogen oxides.

### A. Respondents' GHG analysis undermines California's GHG reduction goals

As explained above, the Cap-and-Trade Program is just one part of a suite of complementary measures designed to achieve California's ambitious GHG reduction and climate stabilization objectives. Cap-and-

Trade provides no legal basis for Respondents to avoid local governments' obligations as lead agencies under CEQA to evaluate and mitigate GHG emissions from a project that the Cap-and-Trade Program does not even cover.

While any one policy may be insufficient or at risk of circumvention, the suite of policies work in concert toward the state's goals.[7,8] This overlap is by design, and makes the suite of policies more resilient to changed circumstances, enforcement problems, and legal challenges. The upstream Cap-and-Trade Program thus works in tandem with downstream choices, including planning choices, to ensure both that total emissions decline and that projects throughout the state are designed to avoid putting undue upstream pressure on emissions or control costs. Weakening one policy because another policy might address it runs contrary to this approach.

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[7] See 2017 Scoping Plan, *supra*, pp. ES7–8, 10, 22, 97; cf. Elinor Ostrom, A Polycentric Approach for Coping with Climate Change (2014) 15 Annals Econ. & Fin. 97, 123 <https://perma.cc/YSF4-B7N8> (Nobel laureate describing an ideal policy approach to climate change as "Complex, Multi-Level Systems to Cope with a Complex, Multi-Level Problem"); Amir Bazaz, et al., Global Covenant of Mayors, Summary for Urban Policymakers: What the IPCC Special Report on Global Warming of 1.5.°C Means for Cities (Dec. 2018) pp. 22–23 <https://perma.cc/R37B-3WDD> (identifying interaction between sources of governance and importance of incentives beyond financial consequences at the community level).

[8] Complementary measures are also important in light of the risk to any one measure posed by litigation. Private parties and the federal government have challenged California's GHG reduction policies, including aspects of the Cap-and-Trade Program. California's GHG vehicle emissions regulatory authority is currently also under challenge. The wisdom of the portfolio approach endorsed by the Scoping Plan is to ensure that the state's efforts continue via many channels, rather than relying on any one potentially challenged measure.

If other lead agencies adopt Respondents' approach to GHG analysis under CEQA, their development projects would produce millions of metric tons of GHG emissions that would go unmitigated through what amounts to an unauthorized categorical exemption from CEQA. The economic analyses and feasibility of achieving the state's legislatively mandated goals in the Scoping Plan account for all policies working in tandem. If any one policy fails to deliver reductions, this would put strain on the Cap-and-Trade Program to deliver more reductions than anticipated and at higher costs.

Respondents' failure to account for the significance of the Project's GHG emissions from transportation is particularly troubling in light of the fact that the transportation sector accounts for over 35% of the state's total GHG emissions and these emissions continue to rise. (2017 Scoping Plan, *supra*, pp. ES1, 11 [charts of emissions by source]; see also California Air Resources Board, 2018 Progress Report: California's Sustainable Communities and Climate Protection Act (November 2018) at 4.) As the California Supreme Court noted, "transportation emissions are affected by the location and density of residential and commercial development, the Scoping Plan does not propose statewide regulation of land use planning but *relies instead on local governments*." (*Center for Biological Diversity v. Department of Fish and Wildlife* (2015) 62 Cal.4th 204, 230; emphasis added.) Local governments thus play a unique role in decreasing GHG emissions from the transportation sector.

Respondents contend that because statewide emissions are capped under the Cap-and-Trade Program, the amount of emissions from "capped" sources will be the same with or without their Project, but this claim ignores both their obligations under CEQA to disclose and mitigate their emissions and the intended design of the Cap-and-Trade Program. (See

Combined Respondents' and Cross-Appellants' Opening Brief at pp. 48–49.)

Cap-and-Trade is not a program designed to reduce emissions from local government actions, or land use; instead, it was designed on the assumption that local actors would simultaneously work to reduce emissions within their spheres. Cap-and-Trade alone was designed to account for less than 40% of the total emissions reductions needed to achieve California's 2030 climate goals, and on the explicit assumption that local design choices would continue to reduce overall emissions (and hence economy-wide costs in the Cap-and-Trade Program). (2017 Scoping Plan at p. 28.) Indeed, relying entirely on the Cap-and-Trade Program to address land use would produce a mismatch that would strain the Program by functionally increasing demand for emissions reductions as unregulated entities displace their obligations onto the Program rather than taking action themselves, raising compliance costs for covered entities across all sectors and all consumers across the state at all income levels. California's portfolio approach was designed to meet AB 32's requirement that "greenhouse gas emissions reduction activities . . . adopted and implemented by [CARB] are complementary, nonduplicative, and can be implemented in an efficient and cost-effective manner." (Cal. Health & Saf. Code, § 38561.) By taking a portfolio approach, the state has recognized that taking GHG action in specific sectors ensures that we achieve our broader climate and energy demand reduction goals. (See 2017 Scoping Plan at pp. 2, 24, 100 [describing Governor Brown's five key climate change strategy "pillars"].) Ultimately, cost increases could make the Cap-and-Trade Program less effective as a key part of the suite of California's climate policies.

In sum, Respondents' position is fundamentally inconsistent with the state's approach to climate change, and so disregards significant emissions

that should properly be addressed under CEQA, not an unrelated emissions program like Cap-and-Trade. Moreover, Respondents' approach would allow similar emissions from other projects that would follow its lead. (See Part III(A), *infra*.) The majority of land use projects are, like this Project, not covered by the Cap-and-Trade Program. Freight alone is an enormous industry; over 1.5 billion tons of freight were moved in California during 2015. (*Id*. at p. 73.) And other types of projects such as residential developments or agricultural enterprises may seek to invoke precedent created by this case. Thus, even if the Project standing alone does not excessively strain the Cap-and-Trade system, the collective weight of new projects failing to address GHG emissions in the CEQA process would.

### B. Respondents' GHG analysis prevents co-pollutant reduction measures necessary to protect California's environmental justice communities

Permitting massive land development projects without requiring the necessary mitigation measures to decrease project emissions will also harm California's environmental justice communities—those already suffering from the worst environmental pollution in the state. The census tract the Project will be built in is ranked in the 75th to 80th percentile of census tracts in California in terms of greatest pollution burden indicators and health and vulnerability factors for population characteristic indicators. (CalEnviroScreen 3.0 for Census Tract 6065042624, Office of Environmental Health Hazard Assessment, last visited November 27, 2019 <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>.) Even without the Project, residents of this census tract already experience ozone, the main ingredient of smog, at a rate higher than 98% of the rest of California. (*Ibid.*) Relatedly, these residents also experience cardiovascular disease, which can result from exposure to air pollution, at a rate higher than 95% of the state. (*Ibid.*)

Considering additional mitigation properly may have resulted in additional zero-emissions technologies used for the Project, including, perhaps, from its trucks, as many commenters recommended. If such measures are not considered from this Project and other future projects like it are not mitigated, Moreno Valley and communities throughout the state will likely continue to suffer from worse air pollution. (See Nicky Sheats, *Achieving Emissions Reductions for Environmental Justice Communities Through Climate Change Mitigation Policy* (2017) 41 WM. & MARY ENVTL. L. & POL'Y REV. 377, 387 ["[E]ven without the intentional maximization of co-pollutant reduction, there should be incidental co-pollutant reductions as GHGs are being reduced [which] should improve the health of local communities."]; see also Scoping Plan at p. 74 ["Air pollution from tailpipe emissions contributes to respiratory ailments, cardiovascular disease, and early death, with disproportionate impacts on vulnerable populations such as children, the elderly, those with existing health conditions . . . , low income communities, and communities of color."].)

## III. RESPONDENTS' EIR VIOLATES CEQA

As explained above, the EIR's approach to GHG analysis misrepresents the Cap-and-Trade Program and the Project's place in that scheme. As a result, the EIR takes an unsupportable approach to evaluating the significance of GHG emissions from the Project. Contrary to CEQA's focus on information disclosure and local responsibility for mitigation, the EIR ignores the vast majority of the Project's emissions, and, in a misleading analysis, compares only a small fraction of the Project's emissions to the applicable significance threshold. This flawed analysis leads the EIR to conclude that the impact from GHG emissions would be mitigated to a less-than-significant level, misleading the public and shirking mitigation responsibilities. Even if the Cap-and-Trade Program directly

applied to the Project's emissions (it does not since, as explained above, this Project is not a covered entity under the Program), this method of evaluating a project's significance *after* taking into account purported "mitigation" or impact-reducing components is not allowed by CEQA. As a result of its flawed analysis, the EIR fails to adopt all feasible mitigation measures and subverts CEQA's important political function of ensuring informed decision making and informed public participation.

The EIR's approach to GHG analysis fails on multiple levels. Perhaps most critically, in addition to pointing to "compliance" with a regulation that simply does not cover the Project to excuse mitigation, the EIR focuses on a single significance consideration while ignoring other evidence showing potentially significant impacts. CEQA does not allow clearly significant GHG impacts to be overlooked, even if a lead agency believes those impacts are considered less than significant under one particular metric. (See, e.g., *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 274 [citizens' personal observations about the significance of noise impacts on their community constituted substantial evidence that the impact may be significant and should be assessed in an EIR, even though the noise levels did not exceed general planning standards]; accord *SANDAG*, *supra*, 3 Cal.5th at p. 515 ["An adequate description of adverse environmental effects is necessary to inform the critical discussion of mitigation measures and project alternatives at the core of the EIR"].) This failure to address potentially significant impacts not only minimizes the Project's significant impacts, but also warps the evaluation of whether the Project's contribution to GHG emissions is a cumulatively considerable impact. (CEQA Guidelines, § 15064.) The cumulative effect of dozens of similar warehouse projects in the Moreno Valley area could—and almost certainly will—be significant.

### A. The EIR improperly applies CEQA Guidelines Section 15064.4 to determine the significance of the Project's GHG emissions.

The Resources Agency, the state's expert on CEQA, has rejected the approach of using purported "compliance" with an inapplicable program to mitigate emissions. (Final Statement of Reasons for the CEQA Guidelines Amendments (2018) at p. 27 ["a subdivision project could not demonstrate 'consistency' with [CARB's] Early Action Measures because those measures do not address emissions resulting from a typical housing subdivision"].)

The EIR misapplies CEQA Guidelines section 15064.4, which offers multiple factors a lead agency should consider in assessing the significance of impacts from GHG emissions. That Guideline provides, in pertinent part:

> (b) A lead agency should consider the following factors, *among others,* when assessing the significance of impacts from greenhouse gas emissions on the environment:
>
> (1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
>
> (2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
>
> (3) The extent to which *the project complies* with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a *particular project* are still cumulatively considerable notwithstanding compliance with the adopted

> regulations or requirements, an EIR must be prepared for the project.[9]

(CEQA Guidelines, § 15064.4, subd. (b), italics added.)

As reflected in subdivision (b)(3), compliance with "regulations or requirements adopted to implement a statewide, regional, or local plan" can factor into the assessment of GHG significance, but only when *the project complies* with those regulations or requirements. Yet, the EIR relies upon subsection (b)(3) to claim that emissions for which upstream suppliers surrendered allowances need not be analyzed and mitigated under CEQA. This approach excuses all of the Project's transportation- and electricity-related emissions, thus requiring analysis and mitigation of only a tiny fraction of the Project's emissions.

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[9] The 2018 update to the CEQA Guidelines added the following language:

(b) In determining the significance of a project's greenhouse gas emissions, the lead agency should focus its analysis on the reasonably foreseeable incremental contribution of the project's emissions to the effects of climate change. The agency's analysis should consider a timeframe that is appropriate for the project. The agency's analysis also must reasonably reflect evolving scientific knowledge and state regulatory schemes.

(b)(3) . . . In determining the significance of impacts, the lead agency may consider a project's consistency with the State's long-term climate goals or strategies, provided that substantial evidence supports the agency's analysis of how those goals or strategies address the project's incremental contribution to climate change.

(c) A lead agency may use a model or methodology to estimate greenhouse gas emissions resulting from a project. The lead agency has discretion to select the model or methodology it considers most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change. The lead agency must support its selection of a model or methodology with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use.

Respondents' application of subdivision (b)(3) to this Project is wrong. Because the Project is not a covered entity under the Cap-and-Trade Program, subsection (b)(3) is inapplicable, as the project cannot "comply" with Cap-and-Trade at all. Moreover, as discussed above, such "compliance" would undermine Cap-and-Trade's purposes if adopted as a CEQA approach, not serve the environmental goals both AB 32 and CEQA set out to deliver.

### B. The EIR failed to apply the SCAQMD's GHG emissions threshold to *all* of the Projects' GHG emissions.

The EIR takes an impermissible approach of applying the Cap-and-Trade Program to ostensibly reduce the Project's emissions significantly, then comparing only that reduced quantity to the bright-line significance threshold. This approach is not supported in law.[10]

CEQA requires lead agencies to "make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." (CEQA Guidelines, § 15064.4.) CEQA then provides that the lead agency must consider "whether *the project emissions* exceed a threshold of significance the lead agency determines applies to the project." (*Id.* at subd. (b)(2).) As explained in the EIR, a potentially appropriate

[10] The EIR also attempts to justify excluding "capped emissions" from its significance analysis by referencing two seemingly cherry-picked 2013 mitigated negative declarations from other lead agencies, and one 2014 guidance document from the San Joaquin Valley Air Pollution Control District (SJVAPCD). (EIR 4.7-33.) The EIR does not explain why it chose to follow the methodology allegedly used in two obscure mitigated negative declarations and in a policy document from an air district in a different air basin, rather than following traditional CEQA GHG analysis and mitigation principles. These irrelevant, project-specific documents do not constitute substantial evidence supporting Respondents' argument.

significance threshold in this case is the South Coast Air Quality Management District's (SCAQMD) SCAQMD's 10,000 metric ton limit.[11] (EIR at p. 4.7-32.)

The problem here is that the EIR does not compare the Project's total GHG emissions against this 10,000 metric ton threshold, and then mitigate those emissions to below that threshold to the extent feasible. Instead, the EIR simply subtracts from the total any GHG emissions it deems to be "capped," and compares only the few "non-capped" emissions to the bright-line threshold. Because the EIR only compares a small fraction of the Project's GHG emissions to the applicable bright-line significance threshold, it only requires relatively minor mitigation measures to reduce the Project's emissions to what the EIR considers "less than significant." (EIR at pp. 1-55–57.)

Respondents' approach improperly applies so-called "mitigation" (the Cap-and-Trade Program) *before* comparing GHG emissions to the significance threshold. By combining impacts and mitigation analyses, it is unclear how the purported mitigation reduces impacts. This approach was rejected in *Lotus v. Dept. of Transportation* (2014) 223 Cal.App.4th 645, where the court stated:

> The failure of the EIR to separately identify and analyze the significance of the impacts . . . before proposing mitigation measures is not merely a harmless procedural failing. . . . [T]his shortcutting of CEQA requirements subverts the purposes of CEQA by omitting material necessary to informed decisionmaking and informed public participation. It precludes both identification of potential

[11] It is worth noting that the Scoping Plans are not binding as to any particular CEQA methodology, or as to land use planning generally, and do not require use of any particular significance threshold. They are guidance documents; individual land use authorities can and do depart from particular suggestions in them if they have appropriate reasons to do so. The issue in this case, however, is that the Cap-and-Trade program does *not* provide such an appropriate reason.

> environmental consequences arising from the project and also thoughtful analysis of the sufficiency of measures to mitigate those consequences. The deficiency cannot be considered harmless.

(*Id.* at p. 658.)

Furthermore, if the full scope of the GHG emissions attributable to the Project were compared to the applicable bright line threshold, the emissions, as mitigated, would still be substantially over the threshold—and would therefore require consideration of additional mitigation measures. (See EIR, pp. 4.7-35–36.)

Applying appropriate mitigation measures to reduce the so-called "capped" emissions would not "result in double counting and double mitigating emissions that are already mitigated through cap-and-trade" as Respondents assert. (Combined Respondents' and Cross-Appellants' Opening Brief at p. 57.) Gesturing towards Cap-and-Trade regulated entities is not proper mitigation because Cap-and-Trade does not apply to this Project in any way, and the Project itself has ample mitigation opportunities onsite. To mitigate this Project's GHG emissions, Respondents would have to address emissions from mobile sources, which account for over 70% of the Project's total emissions (which again are nearly 40 times greater than the significance threshold). (AR002729.) To reduce these emissions, fewer trucks could drive from the Project to the Ports of Long Beach and Los Angeles every day, the Project could be built closer to the ports, the Project could require more zero emission vehicles be used or provide charging equipment or incentives to encourage their use, or any number of other meaningful mitigation measures. But Cap-and-Trade does not require any of this. Such measures are instead included by local governments in local land use projects to ensure approved project impacts fall below significance thresholds. By never counting the "capped" emissions toward the significance threshold, there is *no* counting and *no*

project-level mitigation of hundreds of thousands of tons of yearly GHG emissions from this Project.

### C. Respondents fail to consider the long-term GHG impacts of the Project.

The Supreme Court has made clear that an EIR should consider a project's long-term GHG impacts, and should address whether the project as a whole is in accord with the state's climate goals. (*Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 3 Cal.5th 497 (*SANDAG*) at p. 515.)[12] The state's climate change goals extend beyond 2030. (See, e.g., Executive Order S-03-05 [established a statewide target of reducing GHG emissions to 80 percent below 1990 levels by 2050].) Because the Project is expected to operate for decades into the future, Respondents must account for emissions beyond 2030. But Respondents fail to account for emissions beyond that point—despite the fact that the Project's full operation will not start until *five years later*, in 2035. (EIR at p. 4.3-61.) Respondents present no substantial evidence that any of the Project's post-buildout operational emissions are mitigated by the Cap-and-Trade Program. (See, e.g., EIR, pp. 4.7-36–37 [stating, without citation, that "[s]ome of the project's GHG emissions are subject to the requirements of the AB 32 Cap and Trade Program and will have a GHG allocation based on current GHG emissions levels"].) This is not an adequate CEQA analysis. (See *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884, 904 [EIR must contain substantial evidence that mitigation measures will reduce associated impacts to less-

[12] The parties in *AIR v. Kern* did not have the opportunity to brief the significance of *SANDAG* because the California Supreme Court filed its opinion in *SANDAG* over a month after the close of briefing in *AIR v. Kern*. It appears to amici that this is the first case at the California Court of Appeal where parties have had the opportunity to address both *SANDAG* and *AIR v. Kern* in their briefs.

than-significant-levels, such as by requiring compliance with applicable regulatory standards and preparation of site-specific studies]; Cal. Code Regs. tit. 14, § 15370, subd. (d) ["mitigation" includes "[r]educing or eliminating the impact over time by preservation and maintenance operations during the life of the action"].)

**D. Reliance on *AIR v. Kern County* is improper.**

Respondents incorrectly claim the Fifth Appellate District's decision in *Association of Irritated Residents v. Kern County Bd. of Supervisors* (2017) 17 Cal.App.5th 708 (*AIR*) upheld the use of the same GHG methodology as Respondents attempt to use here. (Combined Respondents' and Cross-Appellants' Opening Brief at p. 53.) Respondents' use of the Cap-and-Trade Program here goes far beyond what was sanctioned in *AIR.* In *AIR*, the project being evaluated under CEQA was a refinery, a *covered entity* under Cap-and-Trade. The court held a lead agency was authorized "to determine that a project's greenhouse gas emissions will have a less than significant effect on the environment based on *the project's* compliance with the cap-and-trade program." (*Id.* at p. 718; italics added.) Regardless of whether or not *AIR* was rightly decided, *here*, the question is much simpler and different from the question before the court in *AIR*. Here, it is undisputed that the Project is *not* a covered entity required to comply with the Cap-and-Trade Program. (Cal. Code Regs., tit. 17, § 95811.) Accordingly, this Court need only decide if projects that are *not* covered entities under Cap-and-Trade are nonetheless allowed to use the program to ignore significant GHG emissions they cause. The answer to that question is no.

Respondents argue the distinction between covered and non-covered entities is "a distinction without a difference." (Combined Respondents' and Cross-Appellants' Opening Brief at p. 63.) Respondents are incorrect.

This distinction is crucial under CEQA and vital to the success of California's ambitious climate policies.

From a CEQA perspective, the distinction is important because CEQA Guidelines section 15064.4, subdivision (b)(3) instructs lead agencies to consider the extent to which *a project* complies with GHG regulations or requirements. It is thus inappropriate for entities downstream in the chain of commerce from a covered entity to rely upon compliance with the Cap-and-Trade Program as a basis for avoiding analysis of project-related emissions.

From a policy perspective, as described above, the distinction is crucial because projects that are not subject to the Cap-and-Trade Program do not have the same direct incentives to reduce their GHG emissions as covered facilities, and Cap-and-Trade alone is not designed to achieve California's ambitious climate goals. The distinction between covered and not-covered entities is thus crucial to the portfolio of climate change measures the state is relying on to protect our citizens going forward.

### E. Respondents' GHG analysis obfuscates the climate change impacts of this Project, undermining CEQA's public disclosure purpose.

By failing to comply with CEQA Guidelines Section 15064.4, failing to compare all of the Project's emissions to the GHG emissions threshold, and failing to consider the long-term GHG impacts of the Project, Respondents' analysis undermines the informational purpose of CEQA. The purpose of an EIR "is to inform the public generally of the environmental impact of a proposed project." (Cal. Code Regs. tit. 14, § 15003, subd. (c).)

CEQA prohibits public agencies from approving or carrying out a project that will have significant effects on the environment unless the agency makes "findings" demonstrating either that it made changes to the

project to avoid or mitigate those significant impacts, or that certain overriding considerations outweigh the impact. (Pub. Resources Code, § 21081.) Without a full and accurate disclosure of the Project's impacts, Respondents erroneously concluded that the GHG impact would be less-than-significant, and thereby avoided making the subsequent findings that would inform the public whether the Project's significant impacts are unavoidable and/or justified. Additionally, Respondents' approach hinders the public's ability to submit informed comments during the EIR's public comment period—aside from addressing the *lack* of analysis—because the public is not provided with, and thus cannot evaluate, complete information or proper CEQA analysis.

## CONCLUSION

California is striving on all fronts to meet its ambitious, long-term GHG reduction objectives; the health of its citizens and the environment depend on it. But this Court's approval of Respondents' approach to GHG analysis and mitigation would treat the Cap-and-Trade Program as the sole remedy to limit GHG emissions from land-use projects, placing unnecessary strain on Cap-and-Trade's cost-effectiveness and seriously undermining the state's critical climate change efforts. Amici respectfully request this Court reject the trial court's holding and find in favor of Appellants as to GHG analysis.

Dated: January 10, 2020

Respectfully submitted,

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## CERTIFICATE OF COMPLIANCE

I certify that the attached Brief of Amici Curiae the Attorney General and the California Air Resources Board in Support of Plaintiffs and Respondents Albert Thomas Paulek, *et al*. and Plaintiffs and Appellants Laborers International Union of North America, Local 1184, *et al*. uses a 13 point Times New Roman font and contains 7,647 words.

Dated: January 10, 2020

XAVIER BECERRA
Attorney General of California

/s/ Gwynne B. Hunter

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**DECLARATION OF ELECTRONIC SERVICE VIA TRUEFILING**

Case Name: **PAULEK, ET AL., V. MORENO VALLEY COMMUNITY SERVICES DISTRICT, ET AL., California Court of Appeal, Fourth Appellate District, (Amicus Brief)**
No.: **E071184**

I declare:

I am employed in the Office of the Attorney General, which is the office of a member of the California State Bar, at which member's direction this service is made. I am 18 years of age or older and not a party to this matter. I am familiar with the business practice at the Office of the Attorney General. Correspondence that is submitted electronically is transmitted using the TrueFiling electronic filing system. Participants who are registered with TrueFiling will be served electronically.

On January 10, 2020, I electronically served the attached:

**BRIEF OF AMICI CURIAE THE ATTORNEY GENERAL AND THE CALIFORNIA AIR RESOURCES BOARD IN SUPPORT OF PLAINTIFFS AND RESPONDENTS ALBERT THOMAS PAULEK, ET AL. AND PLAINTIFFS AND APPELLANTS LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, ET AL.**

by transmitting a true copy via this Court's TrueFiling system to the parties as follows:

**SEE ATTACHED SERVICE LIST**

I declare under penalty of perjury under the laws of the State of California the foregoing is true and correct and that this declaration was executed on January 10, 2020, at Sacramento, California.

| PAULA CORRAL | /s/ Paula Corral |
|---|---|
| Declarant | Signature |

SA2019105249

**SERVICE LIST**

**TRUEFILING SERVICE LIST**

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# Attachment O

## Additional Documentation
## Attachment to Comment 2-F4

ESA

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IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF RIVERSIDE

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|---|---|
| ALBERT THOMAS PAULEK; FRIENDS OF THE NORTHERN SAN JACINTO VALLEY, et al.,<br><br>Petitioners/Plaintiffs,<br>v.<br><br>CITY OF MORENO VALLEY, a municipal corporation; MORENO VALLEY COMMUNITY SERVICES DISTRICT, a dependent special district of the City of Moreno Valley; and DOES 1-20 inclusive,<br><br>Respondents/Defendants,<br><br>HIGHLAND FAIRVIEW; HIGHLAND FAIRVIEW OPERATING COMPANY, a Delaware general partnership; HF PROPERTIES, a California general partnership; SUNNYMEAD PROPERTIES, a Delaware general partnership; 13451 THEODORE LLC, a California limited liability company; and DOES 21-40 inclusive<br><br>Real Parties in Interest. | Case No: RIC 1510967 [MF]<br><br>Consolidated with<br>Case No. RIC 1511118<br>Case No. RIC 1511195<br>Case No. RIC 1511213<br>Case No. RIC 1511279<br>Case No. RIC 1511327<br>Case No. RIC 1511421<br><br>(California Environmental Quality Act)<br><br>Dep't: 10<br>Judge: Hon. Sharon J. Waters<br><br>**NOTICE OF ENTRY OF JUDGMENT AND PEREMPTORY WRIT OF MANDATE** |

TO THE COURT, ALL PARTIES, AND THEIR COUNSEL OF RECORD:

PLEASE TAKE NOTICE THAT on June 7, 2018, the Honorable Judge Sharon J. Waters presiding, the Court entered Judgment Granting the Petitions for A Peremptory Writ of Mandate in the above-referenced consolidated cases. The judgment is attached to this notice as Exhibit 1. Further, on June 12, 2018, the Court issued the Peremptory Writ of Mandate, which is attached to this notice as Exhibit 2.

Date: June 25, 2018

EARTHJUSTICE

ADRIANO L. MARTINEZ
OSCAR ESPINO-PADRON
Attorneys for Petitioners Center for Community Action and Environmental Justice, Center for Biological Diversity, Coalition for Clean Air, Sierra Club, and San Bernardino *Valley* Audubon Society

# EXHIBIT 1

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IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF RIVERSIDE

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|---|---|
| ALBERT THOMAS PAULEK; FRIENDS OF THE NORTHERN SAN JACINTO VALLEY, et al.,<br><br>Petitioners/Plaintiffs,<br>v.<br><br>CITY OF MORENO VALLEY, a municipal corporation; MORENO VALLEY COMMUNITY SERVICES DISTRICT, a dependent special district of the City of Moreno Valley; and DOES 1-20 inclusive,<br><br>Respondents/Defendants,<br><br>HIGHLAND FAIRVIEW; HIGHLAND FAIRVIEW OPERATING COMPANY, a Delaware general partnership; HF PROPERTIES, a California general partnership; SUNNYMEAD PROPERTIES, a Delaware general partnership; 13451 THEODORE LLC, a California limited liability company; and DOES 21-40 inclusive<br><br>Real Parties in Interest. | Case No: RIC 1510967 [MF]<br><br>Consolidated with<br>Case No. RIC 1511118<br>Case No. RIC 1511195<br>Case No. RIC 1511213<br>Case No. RIC 1511279<br>Case No. RIC 1511327<br>Case No. RIC 1511421<br><br>(California Environmental Quality Act)<br><br>Dep't: 10<br>Judge: Hon. Sharon J. Waters<br><br>~~[PROPOSED]~~ **JUDGMENT GRANTING PETITIONS FOR A PEREMPTORY WRIT OF MANDATE** |

On January 22, 2018, this Court, Honorable Judge Sharon Waters presiding, heard the above-captioned matter in Department 10. The following counsel appeared at the hearing: Adriano L. Martinez and Oscar Espino-Padron appeared on behalf of petitioners Center for Community Action and Environmental Justice, Center for Biological Diversity, Coalition for Clean Air, Sierra Club, and San Bernardino Valley Audubon Society; Abigail Smith appeared on behalf of petitioner Residents for a Livable Moreno Valley; Susan Nash appeared on behalf of petitioners Albert Thomas Paulek and Friends of the Northern San Jacinto Valley; Richard T. Drury appeared on behalf of petitioner Laborers International Union; and Craig Collins appeared on behalf of petitioner SoCal Environmental Justice Alliance (collectively "Petitioners"). Further, Kenneth Bley appeared on behalf of real parties in interest, HF Properties, Sunnymead Properties, Theodore Properties Partners, HL Property Partners, and 13451 Theodore LLC (collectively "Real Parties In Interest"); and Martin Koczanowicz appeared on behalf of respondents, City of Moreno Valley and Moreno Valley Community Services District (collectively "Respondents").

After hearing argument on the matter, the Court took the case under submission. The Court having reviewed the record of proceedings in this matter, the briefs submitted by all parties, and the oral argument of all counsel, on February 8, 2018, this Court issued a Ruling on Peremptory Writ of Mandate. The Ruling is attached hereto as Exhibit A and incorporated into this judgment by reference. In accordance with this Court's decision,

IT IS ORDERED and ADJUDGED that:

1. Judgment be entered in favor of Petitioners in this proceeding.
2. A peremptory writ of mandate directed to Respondents issue under seal of this Court, ordering Respondents to comply with this Court's February 8, 2018, Ruling and to vacate remaining approvals made in August 2015, as enumerated in the peremptory writ of mandate.
3. Respondents are required to file a return on the writ within 120 days following service of writ. This Court retains jurisdiction for all purposes, including over return to writ and to issue any orders necessary to ensure compliance with this judgment and writ.
4. Petitioners are the prevailing parties and may seek to recover costs incurred in litigating this case and file a motion(s) to recover attorneys' fees.

IT IS SO ORDERED.

Date: June 7, 2018

SUPERIOR COURT JUDGE

# EXHIBIT A

**SUPERIOR COURT OF CALIFORNIA, COUNTY OF RIVERSIDE**

| TITLE: | DATE & DEPT: | NUMBER: |
|---|---|---|
| PAULEK, et al. vs. CITY OF MORENO VALLEY | 02/08/18 D10 | RIC1510967 |
| COUNSEL: None present | REPORTER: None | FILED SUPERIOR COURT OF CALIFORNIA COUNTY OF RIVERSIDE FEB - 8 2018 L. Hall |
| PROCEEDING: RULING ON PEREMPTORY WRIT OF MANDATE | | |

The Court grants the petition, in part, as follows.



I. **Energy Impacts: The FEIR must provide a comparison of feasible, cost-effective renewable energy technologies in the Energy Impacts analysis.**

Petitioners argue that the City's response indicating that a comparison of feasible renewable energy technologies is "unnecessary" and its references to mitigation measures addressing other issues (i.e. GHG emissions) was a failure to provide adequate energy conservation analysis. The Court agrees.

"[C]ompressing the analysis of impacts and mitigation measures into a single issue ... disregards the requirements of CEQA." (*Lotus v. Department of Transportation* (2014) 223 Cal.App.4th 645, 656-657.) Additionally, analysis of and mitigation for GHG emissions is not a substitute for energy conservation analysis and mitigation. The City failed to conduct "a good faith reasoned analysis" of cost-effective renewable energy in the FEIR. (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 442.

II. **Biological Impacts: The FEIR should remove all references to and consideration of the 910 acres of SJWA and MSHCP lands as a "buffer zone" or "CDFW Conservation Buffer Area" in the Biological Resources and Habitat Impacts**

**analysis.**

Petitioners assert that the use of the term "CDFW Conservation Buffer Area" distorts CEQA analysis of the impacts of the Project on biological resources and habitat on adjacent San Jacinto Wildlife Area (SJWA) and Riverside County Multiple Species Habitat Conservation Plan (MSHCP) lands because it is not actually a buffer area. Petitioners assert that this "false labeling" is repeated numerous times in the EIR, and gives the false impression that the area can be considered mitigation of significant impacts on biological resources and habitat. The Court agrees.

All references to "CDFW Conservation Buffer Area" should be removed and the potential environmental impacts on biological resources and habitats should be re-analyzed without any consideration of said buffer area.

**III. Noise Impacts: The FEIR must provide an analysis of construction noise over ambient levels; provide adequate analysis on construction noise impacts on nearby homes; address the inadequacy of mitigation measures, which fail to include performance standards or ways to reduce construction noise.**

*Analysis of Construction Noise Increases over Ambient Levels*

Petitioners assert that in the FEIR, construction noise was only evaluated based on exceedances of Municipal Code levels. Respondents do not establish otherwise. The record does not show that respondents analyzed increases over ambient levels or considered mitigation to address those concerns. This is required.

*Construction Noise Impacts on Nearby Homes*

Petitioners also argue that the FEIR fails to disclose how severe noise impacts from construction will be on homes that are 50 feet or less from construction. Respondents have not

cited to the record showing where this specific issue was discussed, other than the comment that it is "highly unlikely" that construction noise would occur within 50 feet of a residence because it is "highly unlikely" that a grader or other noise generator will be parked for an hour at that distance. Further analysis in the FEIR is required.

*Mitigation Measures*

Respondents acknowledge that the FEIR concluded impacts from construction noise would remain significant and unavoidable to residences near the development. They acknowledge that given the potential for construction noise on a 24/7 basis over nine years, mitigation is required.

An EIR is required to describe feasible mitigation measures that effectively minimize the project's significant impacts. (CEQA Guidelines §15126.4(a).) In general, courts defer to an agency's assessment of how effective mitigation measures are. (*Sacramento Old City Association v. City Council* (1991) 229 Cal.App.3d 1011, 1027.) Petitioners take issue with the fact that of three mitigation measures that were proposed (4.12.6.1D; 4.12.6.1E; 4.12.6.1F), only one was implemented, and the other two are merely alternatives. As discussed above, the FEIR failed to analyze construction noise impacts on residences closer than 50-feet from the construction site. As a result, it is not clear how severe the noise impacts would be on those residences. Presuming the impacts are severe, it follows that all feasible mitigation measures should be utilized. Currently, the FEIR only adopted the mitigation measure that prevents grading within 2,800 feet of residences at night. The court finds that further analysis of mitigation measures is required.

*Deferred Mitigation for Construction Noise Impacts*

Petitioners argue that the EIR improperly deferred mitigation for construction noise impacts. Specifically, they argue that MM 4.12.6.1A and MM 4.12.6.1F only require preparation of a Noise Reduction Compliance Plan and taking measurements, without performance standards or ways to reduce construction noise impacts. In response, Respondents assert that the applicable regulatory standards are the City of Moreno Valley's Municipal Code. Petitioners correctly argue that the subject mitigation measures do not require compliance with the Municipal Code.

**IV. Agricultural Impacts: The FEIR and the resolution certifying the FEIR require clarification as to whether loss of locally important farmlands will have a significant direct or cumulative impact on agriculture and, if significant, the FEIR must either explain how proposed mitigation will reduced the impact or why other mitigation is not feasible.**

The FEIR states that in addition to the FMMP designations, Riverside County has classified certain land in the County as "Locally Important Farmland." This is the category into which the remaining land (2,201 acres) falls. The FEIR provides that the County uses several factors to define "Locally Important Farmland." The FEIR provides that none of those factors support maintaining the remaining land as farmland.

However, as Petitioners note, the City made a finding in its Resolution certifying the FEIR that there would be permanent loss of the 2,201 acres of locally important farmland when the land was converted to nonagricultural uses, and "[t]herefore, the Project will cause significant impacts." Its further finding that implementation of MM 4.2.6.1A "reduces the impact to less than significant level" is without support. MM 4.2.6.1A only applies to the 25 acres of unique

farmland. Thus, there is no mitigation discussed or adopted for the loss of 2,201 acres of local important farmland. As a result, the FEIR fails on this issue.

V. **Cumulative Impacts: The FEIR should include consideration of recently constructed and proposed large warehouse projects in the summary-of-projections method, and should analyze whether individually insignificant impacts may be cumulatively significant.**

*Summary of Projections Method*

A city may choose to analyze cumulative impacts based on a summary of projections method in an adopted plan, planning document or environmental document, and may use the projections in the plan or document for the for its cumulative impacts analysis. (CEQA Guidelines §15130(b)(1)(B).) The projections may be inadequate if they are outdated or inaccurate. (See *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1217.)

The FEIR explained that there was a cumulative impacts analysis for each environmental topic in the DEIR, and that the City chose the "'summary-of-projections' method rather than the "list" method due to the size, location, and development phasing or horizon of the project, and used the City's General Plan buildout projections, which were available at that time. Petitioners correctly pointed out that using the 2006 Update to the General Plan incorporated outdated information into the FEIR given the increase of large warehouse projects in Moreno Valley since 2006, and amendments to the General Plan. Thus, the FEIR fails as to cumulative impacts by failing to consider recently constructed and proposed warehouse projects.

*Consideration of How Individually Insignificant Impacts*

*May Be Cumulatively Significant*

Petitioners argue that the FEIR failed to consider how individually insignificant impacts, even if minor impacts, could be cumulatively significant. They cite to the FEIR's response to Comment 5-5-24 analysis on storm water impacts as an example. This Comment describes certain mitigation measures applicable to water quality impacts, and water treatment controls, and then concludes: "It is reasonable to assume that if each individual cumulative project mitigates its own water quality impacts, then the cumulative water impacts ...can be effectively mitigated to less than significant levels." Petitioners point out that there is no analysis of cumulative effects relating to water quality impacts other than analysis of the project itself. Respondents do not cite to specific instances in the record to demonstrate that there is substantial evidence in the FEIR that an adequate cumulative impacts analysis considering incremental effects was done. Accordingly, any new cumulative impacts analysis should also consider and discuss whether any environmentally insignificant impacts may be cumulatively significant, taking into account all relevant past, present, and probable future projects.

The petition is denied as to all remaining arguments.

Petitioners shall prepare and serve a proposed judgment and a proposed peremptory writ of mandate and present it to the Court no later than February 22, 2018. A hearing is set to insure the Court's receipt of these documents. No appearance is required.

Sharon Waters, Judge
L. Hall (vis), Clerk
Page 6 of 6 Page(s)

# EXHIBIT 2

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IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF RIVERSIDE

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| ALBERT THOMAS PAULEK; FRIENDS OF THE NORTHERN SAN JACINTO VALLEY, et al.,<br><br>Petitioners/Plaintiffs,<br>v.<br><br>CITY OF MORENO VALLEY, a municipal corporation; MORENO VALLEY COMMUNITY SERVICES DISTRICT, a dependent special district of the City of Moreno Valley; and DOES 1-20 inclusive,<br><br>Respondents/Defendants,<br><br>HIGHLAND FAIRVIEW; HIGHLAND FAIRVIEW OPERATING COMPANY, a Delaware general partnership; HF PROPERTIES, a California general partnership; SUNNYMEAD PROPERTIES, a Delaware general partnership; 13451 THEODORE LLC, a California limited liability company; and DOES 21-40 inclusive<br><br>Real Parties in Interest. | Case No: RIC 1510967 [MF]<br><br>Consolidated with<br>Case No. RIC 1511118<br>Case No. RIC 1511195<br>Case No. RIC 1511213<br>Case No. RIC 1511279<br>Case No. RIC 1511327<br>Case No. RIC 1511421<br><br>(California Environmental Quality Act)<br><br>Dep't: 10<br>Judge: Hon. Sharon J. Waters<br><br>~~[PROPOSED]~~ **PEREMPTORY WRIT OF MANDATE** |

To Respondents CITY OF MORENO VALLEY and MORENO VALLEY COMMUNITY SERVICES DISTRICT:

Judgment having been entered in this proceeding, ordering that a peremptory writ of mandate be issued from this Court,

**IT IS ORDERED** that, immediately on service of this writ, Respondents set aside the following remaining August 2015 discretionary approvals, including any related findings and determinations, for the World Logistics Center and are remanded back to Respondents for reconsideration after completing compliance with this writ:

1. **Resolution No. 2015-56** of the City Council of the City of Moreno Valley certifying the final Environmental Impact Report ("EIR"), adopting the findings and Statement of Overriding Considerations, and approving the Mitigation Monitoring Program for the World Logistics Center; and
2. **Resolution No. 2015-58** of the City Council of the City of Moreno Valley approving PA12-0015 (Tentative Parcel Map No. 36457) for purposes of establishing twenty-six (26) parcels for financing and conveyance purposes, including an 85-acre parcel of land currently located in the County of Riverside adjacent to Gilman Springs Road and Alessandro Boulevard and which is included in the World Logistics Center Specific Plan.

**IT IS FURTHER ORDERED** that,

1. Respondents shall proceed consistent with the Court's February 8, 2018 Ruling on Peremptory Writ of Mandate with respect to any subsequent California Environmental Quality Act ("CEQA") review for the World Logistics Center project; and
2. Respondents are restrained and enjoined from any actions or approvals, including granting any authority, permits, or land use entitlements for the World Logistics Center project's construction. Real Parties in Interest HF Properties, Sunnymead Properties, Theodore Properties Partners, HL Property Partners, and 13451 Theodore LLC, including its agents and successors, are ordered to suspend and cease all construction and other development activities of the World Logistics Center project's site.

Under Public Resources Code section 21168.9(c), this Court does not direct Respondents to exercise their lawful discretion in any particular way.

Under Public Resources Code section 21168.9(b), this Court will retain jurisdiction over Respondents' proceedings by way of a return to this peremptory writ of mandate until the Court has

determined that Respondents have complied with the provisions of CEQA. In issuing this writ and its February 8, 2018 Ruling, the Court does not make the required findings, including findings of severability, under Public Resources Code section 21168.9(b) partially limiting this writ to a portion of a determination, finding, or decision or to the specific project activity or activities found to be in noncompliance. For these reasons, the EIR is voided in whole.

Respondents must file a return to this writ no later than 120 days following service of writ.

**IT IS SO ORDERED.**

Date: 6/12/18

Signature

~~SUPERIOR COURT JUDGE~~ L. Hall
Clerk of the Court

APPROVED AS TO FORM ONLY:

COX, CASTLE & NICHOLSON LLP

Date:

Kenneth B. Bley
Attorney for Real Parties in Interest,
HF Properties, Sunnymead Properties, Theodore Properties Partners, 13451 Theodore LLC, and HL Property Partners (collectively "Highland Fairview")

OFFICE OF THE CITY ATTORNEY

Date:

Martin D. Koczanowicz
Attorney for Respondents/Defendants,
City of Moreno Valley and Moreno Valley Community Services District

# Attachment P

## Additional Documentation
## Attachment to Comment 2-G5

ESA

**IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA**
**FOURTH APPELLATE DISTRICT, DIVISION TWO**

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|---|---|
| **ALBERT THOMAS PAULEK, et al.,**<br><br>Plaintiffs and Respondents,<br>**v.**<br><br>**MORENO VALLEY COMMUNITY SERVICES DISTRICT,** et al.**,**<br><br>Defendants and Appellants.<br><br>**HF PROPERTIES, et al.,**<br><br>Real Parties in Interest and Appellants. | Case No. E071184<br>(Riverside Cty. Super. Ct. No. RIC1510967 MF, RIC1511279, RIC1511327, RIC1511421, & RIC1511195) |
| **LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, et al.,**<br><br>Plaintiffs and Appellants,<br>**v.**<br><br>**MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.**,<br><br>Defendants and Respondents.<br><br>**HF PROPERTIES, et al.,**<br><br>Real Parties in Interest and Respondents. | (Riverside Cty. Super. Ct. No. RIC 1511279 & RIC1511327) |

Riverside County Superior Court
The Honorable Sharon J. Waters, Judge

# BRIEF OF AMICI CURIAE THE ATTORNEY GENERAL AND THE CALIFORNIA AIR RESOURCES BOARD IN SUPPORT OF PLAINTIFFS AND RESPONDENTS ALBERT THOMAS PAULEK, ET AL. AND PLAINTIFFS AND APPELLANTS LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, ET AL.

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## INTRODUCTION

The massive World Logistics Center (Project) will cause approximately 70,000 daily truck trips transporting goods from the ports of Long Beach and Los Angeles to Moreno Valley. (AR 003039, 058605–06.) These vehicle trips will emit hundreds of thousands of metric tons of greenhouse gas (GHG) emissions every year over the life of the Project. (AR 002729.) These GHG emissions, along with emissions from electricity needed to power the more than 40-million-square-foot project, will add to the existing climate pollutant problem, accumulating in the atmosphere and persisting for decades or longer.

Rather than analyzing and mitigating the Project's emissions, lead agency Respondents Moreno Valley Community Services District, *et al.* (Respondents) shirk their responsibility as a local government to address climate change. They improperly rely on CARB's statewide Cap-and-Trade climate program (Cap-and-Trade Program), which does not impose any regulatory requirements on this Project, as an excuse not to analyze and mitigate the Project's climate change impacts. Respondents improperly ignore roughly 95% of the GHG emissions from the Project (AR 002718–19), disregarding the significance of those emissions, avoiding their duty to adopt all feasible mitigation measures, and failing to properly disclose their responsibility for this pollution to the public.

Respondents' approach mischaracterizes the way state climate policies work and violates the California Environmental Quality Act (CEQA). CEQA directs that Respondents take "all action necessary" to protect the environment, recognizing the importance of local action driven through "meaningful" consideration of environmental impacts. (See Pub. Resources Code, §§ 21000, 21001, 21002, 21002.1.) CEQA does not allow Respondents to waive their CEQA obligations by pointing to a regulation that does not bind them (Cal. Code Regs., tit. 14, § 15000 et seq. (CEQA

Guidelines), § 15064.4), and Respondents wholly misconstrue the regulatory scheme they seek to use.

Although Respondents claim their approach is consistent with state climate policy, it is not. (See Plaintiffs/Appellants' Supplemental Request Regarding Judicial Notice, Exhibit 1, California Air Resources Board, California's 2017 Climate Change Scoping Plan (Nov. 2017) (2017 Scoping Plan) at pp. 19 ["Local actions are critical for implementation of California's ambitious climate agenda"], 97–99 [more extensive discussion about the need for local action to achieve California's climate goals]; see also Health & Saf. Code, §§ 38502, subd. (h) [identifying competing priorities to balance in emissions reductions], 38592 [nothing in this division relieves any person, entity, or agency of compliance with other law], 38690 [identifying overlapping automobile emissions policy].) Respondents' approach has been repudiated by CARB, the Attorney General's Office, and the Natural Resources Agency, as contrary to critical state climate goals. The state has long—and expressly—relied on a portfolio of climate change measures, including significant efforts by local governments, to address emissions that result from their land use decisions.

Respondents rely on the Cap-and-Trade Program to excuse their obligation to make better land use decisions. Cap-and-Trade is not intended as a stand-alone climate policy; instead, it assumes steady efforts to reduce emissions across the state. While Cap-and-Trade has an important role to play in limiting emissions from entities like power plants and refineries, the Program does not cover a host of other sources, including warehouses. Although the Program creates financial and legal obligations on fuel suppliers and electricity generators that may ultimately supply this Project, the Project experiences neither the direct legal requirements of the Program nor the full economic costs associated with its additional emissions. If projects were allowed to evade responsibility in

this way, they would steadily increase Cap-and-Trade Program costs upstream, while locking the state into ever-more expensive and inappropriate high-emitting development patterns. This is a recipe for failure in achieving the state's climate goals. To avoid this scenario, the state relies on local governments to limit emissions from new development projects. Emissions from such projects are the responsibility of local governments and should be mitigated through the proper application of CEQA. Eliminating this crucial piece of the state's portfolio approach undermines the state's climate goals.

We have arrived at a crossroads for the future of GHG analysis under CEQA. If Respondents prevail, this case could singlehandedly undo the will of the Legislature by excusing essentially all projects from the obligation to consider GHG impacts from vehicle trips and energy use. This Court should reject Respondents' argument and confirm that all lead agencies must do their part if we are to meet the state's long-term climate stabilization objective.

## STATEMENT OF INTERESTS

### I. INTEREST OF THE ATTORNEY GENERAL

California has already begun to experience significant adverse impacts from climate change such as "more frequent, more catastrophic and more costly" wildfires, drought, "coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution." (2017 Scoping Plan at p. ES2.) As California's chief law enforcement officer, the Attorney General has the independent power and duty to protect the interest of all of California's current and future residents in a clean, health, and safe environment. (See Cal. Const., art. V, § 13; Gov. Code, §§ 12511, 12600–12612; *D'Amico v. Bd. of Medical Examiners* (1974) 11 Cal.3d 1, 15.)

Upholding this duty, the Attorney General has actively encouraged lead agencies to fulfill their CEQA responsibilities as they relate to climate change for well over a decade. (See, e.g., *Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 3 Cal.5th 497 (*SANDAG*) at p. 519 ["nothing we say today invites regional planners to 'shirk their responsibilities' under CEQA"]; *City of Long Beach v. City of Los Angeles* (2018) 19 Cal.App.5th 465; *People v. County of San Bernardino* (San Bernardino County 2007) No. CIVSS0700329.)

The World Logistics Center, like every large development project, has the potential to either facilitate or hinder the state's achievement of its climate goals. Here, Respondents' unsupported approach to analyzing the Project's GHG emissions has the potential to seriously undermine the overall effort to meet the state's science-based GHG reduction goals for the transportation and land use sectors and to disproportionately affect environmental justice communities.[1] Given these significant interests, the Attorney General submits this amicus brief in support of Appellants,[2] in compliance with rule 8.200(c)(7) of the California Rules of Court in his independent capacity and on behalf of the California Air Resources Board (CARB).

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[1] The Attorney General opposed this methodology in a comment letter it submitted on the revised sections of the Final EIR for this Project (Revised Final EIR or RFEIR). (Letter re: Revised Sections of the Final Environmental Impact Report for the World Logistics Center Project, Sept. 7, 2018, at: <https://oag.ca.gov/sites/all/files/agweb/pdfs/environment/comments-revised-sections-feir.pdf?>.) The Revised Final EIR is not at issue in this litigation, but it includes the original EIR's same flawed GHG analysis.

[2] This brief is submitted in support of Plaintiffs and Respondents Albert Thomas Paulek, et al. and Plaintiffs and Appellants Laborers International Union of North America, Local 1184, et al.

## II. INTEREST OF THE CALIFORNIA AIR RESOURCES BOARD

CARB has a strong interest in participating in this case as amicus curiae. CARB is charged with protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change. As creator and administrator of the Cap-and-Trade Program, and as the lead agency on the Scoping Plan setting out many of the state's climate policies, CARB is an expert on how the Cap-and-Trade Program was designed to function and interact with other state laws and programs as part of California's portfolio approach to addressing GHG emissions. In their briefing, Respondents misrepresent CARB as effectively endorsing the EIR's approach to GHG analysis. (Combined Respondents' and Cross-Appellants' Opening Brief at pp. 17, 36–38, 47–48, 56, 63.) But CARB has repeatedly made clear it does *not* support Respondents' approach.[3] As explained more fully below, Respondents' arguments regarding GHG analysis are contrary to the construction given to applicable regulations by CARB, and by the Natural Resources Agency, agencies charged with interpreting and enforcing the programs at issue.

# BACKGROUND

## I. LEGAL BACKGROUND REGARDING CALIFORNIA'S EFFORTS TO COMBAT CLIMATE CHANGE

In 2006, recognizing the importance of combatting climate change and furthering the objectives of Executive Order S-3-05, the Legislature enacted the Global Warming Solutions Act of 2006, commonly known as

[3] CARB also explained this approach when it formally opposed the GHG analysis Respondents rely on here through its comments on the RFEIR for this Project. (Letter re: World Logistics Center Revised Final Environmental Impact Report, Sept. 7, 2018, at: <https://ww3.arb.ca.gov/toxics/ttdceqalist/logisticsfeir.pdf?_ga=2.236813640.855160185.1575908432-1460774677.1564163003>.)

AB 32. (Health & Saf. Code, § 38500, et seq.) AB 32 mandates that, by 2020, California must reduce its total statewide annual GHG emissions to the level they were in 1990, and to 40 percent below that level by 2030. (Health & Saf. Code, §§ 38550, 38566.) This mandate putts the state on a trajectory of significant and continuous GHG emissions reductions through 2050, in order to stabilize the atmospheric levels of GHGs and reduce the risk of dangerous climate change.

Under AB 32, the Legislature tasked CARB with preparing a guidance planning document, known as the Scoping Plan that, while not binding, set out the state's views based on extensive environmental and economic analyses on how policies may be effectively implemented so that California will meet the its ambitious GHG reduction goals. (See Health & Saf. Code, §§ 38561 et seq.) The Scoping Plan emphasizes the need for a multi-pronged emissions reduction approach that can be carried out by many entities and reflects the state's position that it is necessary to reduce emissions at the source and through reductions in demand for energy. (2017 Scoping Plan, pp. 12, 19, 28).

The Scoping Plan includes a suite of regulations, measures, and policies designed to operate together to reduce GHG emissions. The Cap-and-Trade Program is one such policy. Entities that are directly subject to the Cap-and-Trade Program—like power plants, factories, refineries, and electricity generators and importers—must purchase and surrender compliance instruments (e.g., allowances) for their emissions. (See Cal. Code Regs., tit. 17, § 95812.) Downstream emitters such as cars and trucks, much less warehouses that such cars and trucks drive to, are not covered entities under Cap-and-Trade and have no such obligation to purchase or surrender allowances. The existence of the Program, in other words, does not obviate the need for action at other levels of the economy. On the contrary: If sources like the long-lasting development project in this

case build without regard to their emissions, they will increase overall state emissions and hence increase pressure and costs within the Cap-and-Trade Program.

To address the wide range of GHG emissions sources that are not directly controlled through the Cap-and-Trade Program, the state relies on other policies[4]—many of which require collaboration between the state and local governments. Agencies large and small across the state (including, crucially, cities and counties) are responsible for ensuring that proposed new land use plans, transportation projects, and development projects are consistent with evolving scientific knowledge and state regulatory schemes; CEQA is a critical tool for implementing these obligations.[5] (See *SANDAG*, *supra*, 3 Cal.5th at p. 519; see also CEQA Guidelines, § 15064.4, subd. (b).)

The Scoping Plan makes clear that the Cap-and-Trade Program was *not* designed to replace local governments' long-term planning obligations, but rather designed to work in concert with those policies to achieve the

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[4] See, e.g., Health & Saf. Code, §§ 38561, subd. (e) (requiring CARB to consider "the relative contribution of each source or source category to statewide greenhouse gas emissions"), 43018.5, subd. (a) (requiring CARB to "adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles").

[5] For example, CARB provides regional emission reduction targets for local jurisdictions' land use and transportation planning obligations under Senate Bill (SB) 375. (See Health & Saf. Code, § 65080, subd. (b)(2)(A) [known as "The Sustainable Communities and Climate Protection Act"].) CARB also works with regional air pollution control districts and air quality management districts to address emission sources that have both local and global effect, including methane from landfills and hydrofluorocarbons (HFCs), as well as to support state- and federally-mandated permitting of certain industrial sources of GHG emissions. (See California Air Resources Board, California's 2017 Climate Change Scoping Plan (Nov. 2017) pp. 3, 104 <https://ww3.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf >.)

state's goals. (2017 Scoping Plan at p. 102 ["California's future climate strategy will require increased focus on integrated land use planning"].)

Recent state reports have shown that California's vehicular GHG emissions continue to increase year after year, and CARB has emphasized the need for local action. (See California Air Resources Board, 2018 Progress Report: California's Sustainable Communities and Climate Protection Act (November 2018) at 4.) These increasing emissions demonstrate the crucial need for *more* complementary local action—not less—to ensure the state meets its GHG targets in cost-effective ways.

In light of the state's GHG reduction policies, and CEQA's focus on embedding environmental considerations in local decision-making, the Supreme Court has emphasized that careful CEQA analysis of GHG impacts will be required going forward, as lead agencies must "stay in step" with the evolving science and law related to the state's long-term climate objectives in order to carry out their duties under CEQA. (*SANDAG*, *supra*, 3 Cal.5th at p. 519.)

## II. OVERVIEW OF THE GHG ANALYSIS IN RESPONDENTS' EIR

Mischaracterizing the collaborative efforts required to combat climate change and the role of the Cap-and-Trade Program, Respondents' EIR takes a very unusual and troubling approach to addressing the Project's GHG-related impacts.[6] Respondents divide the Project's GHG emissions into two categories, which the EIR terms "capped" and "uncapped." (AR 002719.) What the EIR deems "uncapped" emissions constitute only about 4.6% of the Project's emissions. (*Ibid*.) The "uncapped" category includes comparatively minor landfill emissions caused by waste generated at the

[6] The Attorney General and CARB only address Respondents' inappropriate use of the Cap-and-Trade Program in the GHG analysis of the EIR. This amicus brief is not intended to and should not be construed as an exhaustive discussion of the EIR's compliance with CEQA.

Project and the use of refrigerants at the Project. (*Ibid.*) For these emissions, the EIR follows the approach that would be expected under CEQA: the City of Moreno Valley, in its discretion, designated a significance threshold (in this case, 10,000 metric tons of GHG emissions as recommended by the South Coast Air Quality Management District), compared the "uncapped" emissions to that threshold, and required feasible mitigation measures to ensure those emissions fall below that threshold. (AR 002719, AR 002729.)

What the EIR terms "capped" emissions, however, constitute the remaining 95.4% of the Project's predicted emissions. (AR 002719.) Those include emissions caused by mobile sources (namely, diesel trucks), as well as natural gas and electricity use at the Project. (*Ibid.*) For these emissions, the EIR deviates dramatically from standard CEQA methodology. The EIR asserts these emissions are "covered" by Cap-and-Trade and therefore wholly exempt from any further CEQA analysis or mitigation. (AR 002723.) The EIR does *not* compare the Project's "capped" emissions to the 10,000 metric ton threshold. (AR 002725.) Indeed, after mitigation measures are applied to the Project, the "capped" emissions remain nearly 40 times greater than the significance threshold. (AR 002729.) In forgoing any attempt to decrease the Project's true total emissions to a less-than-significant level, Respondents fail to consider further mitigation measures that could have made this Project more compatible with the state's climate goals. As described below, this approach is unlawful.

**ARGUMENT**

Respondents avoid disclosing and addressing mitigation for thousands of tons of GHG emissions each year pursuant to the misguided theory that those emissions are addressed by Cap-and-Trade. This argument is founded on misunderstandings of both the Cap-and-Trade Program and

CEQA—both of which require different industries and projects to take responsibility for their own impacts, rather than rely on others for mitigation. Most fundamentally, warehouse projects like the Project are not subject to Cap-and-Trade. Respondents therefore cannot accurately assert that "compliance" with Cap-and-Trade provides any legal basis to avoid analyzing and adequately mitigating the majority of the Project's emissions.

The CEQA Guidelines allow projects to consider regulations "[with] which the project complies" for purposes of considering significance of GHG emissions. (See CEQA Guidelines, § 15064.4, subd. (b)(3).) However, that consideration does not apply here and Respondents' approach, which in effect relies on other entities to undertake Respondents' CEQA mitigation, not only violates both CEQA's legal requirements and public disclosure and mitigation purposes, but also undermines the state climate objectives Cap-and-Trade is intended to further. Cap-and-Trade is designed to act in tandem with—not in spite of—critical tools like local land use planning to reduce GHG emissions. If allowed for Respondents and adopted by other local jurisdictions, such abdication by local governments would dramatically hinder the state's ability to achieve its legislatively mandated long-term climate stabilization objectives and forgo pollution reduction co-benefits from GHG mitigation measures that are vital for environmental justice communities.

The Resources Agency agrees with CARB that "to demonstrate consistency with an existing GHG reduction plan, a lead agency would have to show that the plan actually addresses the emissions that would result from the project." (See California Natural Resources Agency, Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97 (2009),

<http://resources.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf>, at p. 27.)

## I. WAREHOUSE AND LOGISTICS PROJECTS ARE NOT REGULATED BY CAP-AND-TRADE AND THEIR EMISSIONS MUST STILL BE MITIGATED BY LOCAL GOVERNMENTS

Warehouse and logistics complexes are not regulated by Cap-and-Trade. The Cap-and-Trade Program thus provides no legal or policy basis for Respondents to avoid their obligation to evaluate and mitigate GHG emissions. Cap-and-Trade applies "an aggregate greenhouse gas allowance budget [to] *covered entities* and provides a trading mechanism for" such allowances. (Cal. Code Regs., tit. 17, § 95801 (emphasis added).) Respondents seek to use Cap-and-Trade to zero-out and excuse the application of feasible mitigation measures to over 95% of all GHG emissions from the Project. Cap-and-Trade applies only to expressly identified entities ("covered entities") such as cement producers, petroleum refiners, electricity generators, natural gas suppliers, fuel importers, and liquid petroleum gas suppliers. (Cal. Code Regs., tit. 17, § 95811.) Warehouse and logistics complexes are *not* covered entities. Cap-and-Trade compliance instruments do not factor in *whatsoever* because this Project is not covered by Cap-and-Trade.

The mere fact that warehouse and logistics complexes are in the chain of commerce with covered entities does not transform them into covered entities themselves. As an example, although the operator of a refinery that produces gasoline in California is subject to Cap-and-Trade, (Cal. Code Regs., tit. 17, § 95811, subd. (e)(1)), entities downstream from that refinery in the chain of commerce are not. The refinery itself may have compliance obligations under the Cap-and-Trade Program, which can be met by reducing the refinery's own GHG emissions or surrendering allowances, but the gas station that resells the gas, the truck drivers who purchase it, and

the warehouses to which the trucks drive do not have compliance obligations. Under the state's portfolio approach, while the refinery may have met some or all of its climate obligations via Cap-and-Trade, the downstream entities have not. Because warehouses receive no set price or regulatory signals from Cap-and-Trade, they are not being directly incentivized to reduce emissions. Instead, other components of the state's portfolio address those emissions. Nothing in Cap-and-Trade explicitly or impliedly repealed the use of other measures to address climate change; they were designed to work together. (See, e.g., 2017 Scoping Plan at p. 28.) Local governments must responsibly plan new development to further the state's climate goals.

## II. ALLOWING RESPONDENTS' UNTENABLE APPROACH TO GHG ANALYSIS WOULD HAVE SIGNIFICANT, NEGATIVE STATEWIDE CONSEQUENCES

If Respondents' approach to GHG analysis is endorsed, other lead agencies will undoubtedly follow this approach, and emissions from the transportation and land use sectors will be largely omitted from analysis and mitigation under CEQA. Widespread adoption of this approach would: (1) place the entire burden of California's well-established, long-term land-use related GHG reduction goals on Cap-and-Trade, thereby straining the program beyond its intended purpose and (2) expose already burdened communities in the state to greater amounts of GHG emissions and co-pollutants that accompany GHG emissions, such as diesel particulate matter and nitrogen oxides.

### A. Respondents' GHG analysis undermines California's GHG reduction goals

As explained above, the Cap-and-Trade Program is just one part of a suite of complementary measures designed to achieve California's ambitious GHG reduction and climate stabilization objectives. Cap-and-

Trade provides no legal basis for Respondents to avoid local governments' obligations as lead agencies under CEQA to evaluate and mitigate GHG emissions from a project that the Cap-and-Trade Program does not even cover.

While any one policy may be insufficient or at risk of circumvention, the suite of policies work in concert toward the state's goals.[7,8] This overlap is by design, and makes the suite of policies more resilient to changed circumstances, enforcement problems, and legal challenges. The upstream Cap-and-Trade Program thus works in tandem with downstream choices, including planning choices, to ensure both that total emissions decline and that projects throughout the state are designed to avoid putting undue upstream pressure on emissions or control costs. Weakening one policy because another policy might address it runs contrary to this approach.

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[7] See 2017 Scoping Plan, *supra*, pp. ES7–8, 10, 22, 97; cf. Elinor Ostrom, A Polycentric Approach for Coping with Climate Change (2014) 15 Annals Econ. & Fin. 97, 123 <https://perma.cc/YSF4-B7N8> (Nobel laureate describing an ideal policy approach to climate change as "Complex, Multi-Level Systems to Cope with a Complex, Multi-Level Problem"); Amir Bazaz, et al., Global Covenant of Mayors, Summary for Urban Policymakers: What the IPCC Special Report on Global Warming of 1.5.°C Means for Cities (Dec. 2018) pp. 22–23 <https://perma.cc/R37B-3WDD> (identifying interaction between sources of governance and importance of incentives beyond financial consequences at the community level).

[8] Complementary measures are also important in light of the risk to any one measure posed by litigation. Private parties and the federal government have challenged California's GHG reduction policies, including aspects of the Cap-and-Trade Program. California's GHG vehicle emissions regulatory authority is currently also under challenge. The wisdom of the portfolio approach endorsed by the Scoping Plan is to ensure that the state's efforts continue via many channels, rather than relying on any one potentially challenged measure.

If other lead agencies adopt Respondents' approach to GHG analysis under CEQA, their development projects would produce millions of metric tons of GHG emissions that would go unmitigated through what amounts to an unauthorized categorical exemption from CEQA. The economic analyses and feasibility of achieving the state's legislatively mandated goals in the Scoping Plan account for all policies working in tandem. If any one policy fails to deliver reductions, this would put strain on the Cap-and-Trade Program to deliver more reductions than anticipated and at higher costs.

Respondents' failure to account for the significance of the Project's GHG emissions from transportation is particularly troubling in light of the fact that the transportation sector accounts for over 35% of the state's total GHG emissions and these emissions continue to rise. (2017 Scoping Plan, *supra*, pp. ES1, 11 [charts of emissions by source]; see also California Air Resources Board, 2018 Progress Report: California's Sustainable Communities and Climate Protection Act (November 2018) at 4.) As the California Supreme Court noted, "transportation emissions are affected by the location and density of residential and commercial development, the Scoping Plan does not propose statewide regulation of land use planning but *relies instead on local governments*." (*Center for Biological Diversity v. Department of Fish and Wildlife* (2015) 62 Cal.4th 204, 230; emphasis added.) Local governments thus play a unique role in decreasing GHG emissions from the transportation sector.

Respondents contend that because statewide emissions are capped under the Cap-and-Trade Program, the amount of emissions from "capped" sources will be the same with or without their Project, but this claim ignores both their obligations under CEQA to disclose and mitigate their emissions and the intended design of the Cap-and-Trade Program. (See

Combined Respondents' and Cross-Appellants' Opening Brief at pp. 48–49.)

Cap-and-Trade is not a program designed to reduce emissions from local government actions, or land use; instead, it was designed on the assumption that local actors would simultaneously work to reduce emissions within their spheres. Cap-and-Trade alone was designed to account for less than 40% of the total emissions reductions needed to achieve California's 2030 climate goals, and on the explicit assumption that local design choices would continue to reduce overall emissions (and hence economy-wide costs in the Cap-and-Trade Program). (2017 Scoping Plan at p. 28.) Indeed, relying entirely on the Cap-and-Trade Program to address land use would produce a mismatch that would strain the Program by functionally increasing demand for emissions reductions as unregulated entities displace their obligations onto the Program rather than taking action themselves, raising compliance costs for covered entities across all sectors and all consumers across the state at all income levels. California's portfolio approach was designed to meet AB 32's requirement that "greenhouse gas emissions reduction activities . . . adopted and implemented by [CARB] are complementary, nonduplicative, and can be implemented in an efficient and cost-effective manner." (Cal. Health & Saf. Code, § 38561.) By taking a portfolio approach, the state has recognized that taking GHG action in specific sectors ensures that we achieve our broader climate and energy demand reduction goals. (See 2017 Scoping Plan at pp. 2, 24, 100 [describing Governor Brown's five key climate change strategy "pillars"].) Ultimately, cost increases could make the Cap-and-Trade Program less effective as a key part of the suite of California's climate policies.

In sum, Respondents' position is fundamentally inconsistent with the state's approach to climate change, and so disregards significant emissions

that should properly be addressed under CEQA, not an unrelated emissions program like Cap-and-Trade. Moreover, Respondents' approach would allow similar emissions from other projects that would follow its lead. (See Part III(A), *infra*.) The majority of land use projects are, like this Project, not covered by the Cap-and-Trade Program. Freight alone is an enormous industry; over 1.5 billion tons of freight were moved in California during 2015. (*Id*. at p. 73.) And other types of projects such as residential developments or agricultural enterprises may seek to invoke precedent created by this case. Thus, even if the Project standing alone does not excessively strain the Cap-and-Trade system, the collective weight of new projects failing to address GHG emissions in the CEQA process would.

### B. Respondents' GHG analysis prevents co-pollutant reduction measures necessary to protect California's environmental justice communities

Permitting massive land development projects without requiring the necessary mitigation measures to decrease project emissions will also harm California's environmental justice communities—those already suffering from the worst environmental pollution in the state. The census tract the Project will be built in is ranked in the 75th to 80th percentile of census tracts in California in terms of greatest pollution burden indicators and health and vulnerability factors for population characteristic indicators. (CalEnviroScreen 3.0 for Census Tract 6065042624, Office of Environmental Health Hazard Assessment, last visited November 27, 2019 <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>.) Even without the Project, residents of this census tract already experience ozone, the main ingredient of smog, at a rate higher than 98% of the rest of California. (*Ibid.*) Relatedly, these residents also experience cardiovascular disease, which can result from exposure to air pollution, at a rate higher than 95% of the state. (*Ibid.*)

Considering additional mitigation properly may have resulted in additional zero-emissions technologies used for the Project, including, perhaps, from its trucks, as many commenters recommended. If such measures are not considered from this Project and other future projects like it are not mitigated, Moreno Valley and communities throughout the state will likely continue to suffer from worse air pollution. (See Nicky Sheats, *Achieving Emissions Reductions for Environmental Justice Communities Through Climate Change Mitigation Policy* (2017) 41 WM. & MARY ENVTL. L. & POL'Y REV. 377, 387 ["[E]ven without the intentional maximization of co-pollutant reduction, there should be incidental co-pollutant reductions as GHGs are being reduced [which] should improve the health of local communities."]; see also Scoping Plan at p. 74 ["Air pollution from tailpipe emissions contributes to respiratory ailments, cardiovascular disease, and early death, with disproportionate impacts on vulnerable populations such as children, the elderly, those with existing health conditions . . . , low income communities, and communities of color."].)

## III. RESPONDENTS' EIR VIOLATES CEQA

As explained above, the EIR's approach to GHG analysis misrepresents the Cap-and-Trade Program and the Project's place in that scheme. As a result, the EIR takes an unsupportable approach to evaluating the significance of GHG emissions from the Project. Contrary to CEQA's focus on information disclosure and local responsibility for mitigation, the EIR ignores the vast majority of the Project's emissions, and, in a misleading analysis, compares only a small fraction of the Project's emissions to the applicable significance threshold. This flawed analysis leads the EIR to conclude that the impact from GHG emissions would be mitigated to a less-than-significant level, misleading the public and shirking mitigation responsibilities. Even if the Cap-and-Trade Program directly

applied to the Project's emissions (it does not since, as explained above, this Project is not a covered entity under the Program), this method of evaluating a project's significance *after* taking into account purported "mitigation" or impact-reducing components is not allowed by CEQA. As a result of its flawed analysis, the EIR fails to adopt all feasible mitigation measures and subverts CEQA's important political function of ensuring informed decision making and informed public participation.

The EIR's approach to GHG analysis fails on multiple levels. Perhaps most critically, in addition to pointing to "compliance" with a regulation that simply does not cover the Project to excuse mitigation, the EIR focuses on a single significance consideration while ignoring other evidence showing potentially significant impacts. CEQA does not allow clearly significant GHG impacts to be overlooked, even if a lead agency believes those impacts are considered less than significant under one particular metric. (See, e.g., *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 274 [citizens' personal observations about the significance of noise impacts on their community constituted substantial evidence that the impact may be significant and should be assessed in an EIR, even though the noise levels did not exceed general planning standards]; accord *SANDAG*, *supra*, 3 Cal.5th at p. 515 ["An adequate description of adverse environmental effects is necessary to inform the critical discussion of mitigation measures and project alternatives at the core of the EIR"].) This failure to address potentially significant impacts not only minimizes the Project's significant impacts, but also warps the evaluation of whether the Project's contribution to GHG emissions is a cumulatively considerable impact. (CEQA Guidelines, § 15064.) The cumulative effect of dozens of similar warehouse projects in the Moreno Valley area could—and almost certainly will—be significant.

### A. The EIR improperly applies CEQA Guidelines Section 15064.4 to determine the significance of the Project's GHG emissions.

The Resources Agency, the state's expert on CEQA, has rejected the approach of using purported "compliance" with an inapplicable program to mitigate emissions. (Final Statement of Reasons for the CEQA Guidelines Amendments (2018) at p. 27 ["a subdivision project could not demonstrate 'consistency' with [CARB's] Early Action Measures because those measures do not address emissions resulting from a typical housing subdivision"].)

The EIR misapplies CEQA Guidelines section 15064.4, which offers multiple factors a lead agency should consider in assessing the significance of impacts from GHG emissions. That Guideline provides, in pertinent part:

> (b) A lead agency should consider the following factors, *among others,* when assessing the significance of impacts from greenhouse gas emissions on the environment:
>
> (1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
>
> (2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
>
> (3) The extent to which *the project complies* with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a *particular project* are still cumulatively considerable notwithstanding compliance with the adopted

> regulations or requirements, an EIR must be prepared for the project.[9]

(CEQA Guidelines, § 15064.4, subd. (b), italics added.)

As reflected in subdivision (b)(3), compliance with "regulations or requirements adopted to implement a statewide, regional, or local plan" can factor into the assessment of GHG significance, but only when *the project complies* with those regulations or requirements. Yet, the EIR relies upon subsection (b)(3) to claim that emissions for which upstream suppliers surrendered allowances need not be analyzed and mitigated under CEQA. This approach excuses all of the Project's transportation- and electricity-related emissions, thus requiring analysis and mitigation of only a tiny fraction of the Project's emissions.

---

[9] The 2018 update to the CEQA Guidelines added the following language:

(b) In determining the significance of a project's greenhouse gas emissions, the lead agency should focus its analysis on the reasonably foreseeable incremental contribution of the project's emissions to the effects of climate change. The agency's analysis should consider a timeframe that is appropriate for the project. The agency's analysis also must reasonably reflect evolving scientific knowledge and state regulatory schemes.

(b)(3) . . . In determining the significance of impacts, the lead agency may consider a project's consistency with the State's long-term climate goals or strategies, provided that substantial evidence supports the agency's analysis of how those goals or strategies address the project's incremental contribution to climate change.

(c) A lead agency may use a model or methodology to estimate greenhouse gas emissions resulting from a project. The lead agency has discretion to select the model or methodology it considers most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change. The lead agency must support its selection of a model or methodology with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use.

Respondents' application of subdivision (b)(3) to this Project is wrong. Because the Project is not a covered entity under the Cap-and-Trade Program, subsection (b)(3) is inapplicable, as the project cannot "comply" with Cap-and-Trade at all. Moreover, as discussed above, such "compliance" would undermine Cap-and-Trade's purposes if adopted as a CEQA approach, not serve the environmental goals both AB 32 and CEQA set out to deliver.

### B. The EIR failed to apply the SCAQMD's GHG emissions threshold to *all* of the Projects' GHG emissions.

The EIR takes an impermissible approach of applying the Cap-and-Trade Program to ostensibly reduce the Project's emissions significantly, then comparing only that reduced quantity to the bright-line significance threshold. This approach is not supported in law.[10]

CEQA requires lead agencies to "make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." (CEQA Guidelines, § 15064.4.) CEQA then provides that the lead agency must consider "whether *the project emissions* exceed a threshold of significance the lead agency determines applies to the project." (*Id.* at subd. (b)(2).) As explained in the EIR, a potentially appropriate

[10] The EIR also attempts to justify excluding "capped emissions" from its significance analysis by referencing two seemingly cherry-picked 2013 mitigated negative declarations from other lead agencies, and one 2014 guidance document from the San Joaquin Valley Air Pollution Control District (SJVAPCD). (EIR 4.7-33.) The EIR does not explain why it chose to follow the methodology allegedly used in two obscure mitigated negative declarations and in a policy document from an air district in a different air basin, rather than following traditional CEQA GHG analysis and mitigation principles. These irrelevant, project-specific documents do not constitute substantial evidence supporting Respondents' argument.

significance threshold in this case is the South Coast Air Quality Management District's (SCAQMD) SCAQMD's 10,000 metric ton limit.[11] (EIR at p. 4.7-32.)

The problem here is that the EIR does not compare the Project's total GHG emissions against this 10,000 metric ton threshold, and then mitigate those emissions to below that threshold to the extent feasible. Instead, the EIR simply subtracts from the total any GHG emissions it deems to be "capped," and compares only the few "non-capped" emissions to the bright-line threshold. Because the EIR only compares a small fraction of the Project's GHG emissions to the applicable bright-line significance threshold, it only requires relatively minor mitigation measures to reduce the Project's emissions to what the EIR considers "less than significant." (EIR at pp. 1-55–57.)

Respondents' approach improperly applies so-called "mitigation" (the Cap-and-Trade Program) *before* comparing GHG emissions to the significance threshold. By combining impacts and mitigation analyses, it is unclear how the purported mitigation reduces impacts. This approach was rejected in *Lotus v. Dept. of Transportation* (2014) 223 Cal.App.4th 645, where the court stated:

> The failure of the EIR to separately identify and analyze the significance of the impacts . . . before proposing mitigation measures is not merely a harmless procedural failing. . . . [T]his shortcutting of CEQA requirements subverts the purposes of CEQA by omitting material necessary to informed decisionmaking and informed public participation. It precludes both identification of potential

[11] It is worth noting that the Scoping Plans are not binding as to any particular CEQA methodology, or as to land use planning generally, and do not require use of any particular significance threshold. They are guidance documents; individual land use authorities can and do depart from particular suggestions in them if they have appropriate reasons to do so. The issue in this case, however, is that the Cap-and-Trade program does *not* provide such an appropriate reason.

> environmental consequences arising from the project and also thoughtful analysis of the sufficiency of measures to mitigate those consequences. The deficiency cannot be considered harmless.

(*Id.* at p. 658.)

Furthermore, if the full scope of the GHG emissions attributable to the Project were compared to the applicable bright line threshold, the emissions, as mitigated, would still be substantially over the threshold—and would therefore require consideration of additional mitigation measures. (See EIR, pp. 4.7-35–36.)

Applying appropriate mitigation measures to reduce the so-called "capped" emissions would not "result in double counting and double mitigating emissions that are already mitigated through cap-and-trade" as Respondents assert. (Combined Respondents' and Cross-Appellants' Opening Brief at p. 57.) Gesturing towards Cap-and-Trade regulated entities is not proper mitigation because Cap-and-Trade does not apply to this Project in any way, and the Project itself has ample mitigation opportunities onsite. To mitigate this Project's GHG emissions, Respondents would have to address emissions from mobile sources, which account for over 70% of the Project's total emissions (which again are nearly 40 times greater than the significance threshold). (AR002729.) To reduce these emissions, fewer trucks could drive from the Project to the Ports of Long Beach and Los Angeles every day, the Project could be built closer to the ports, the Project could require more zero emission vehicles be used or provide charging equipment or incentives to encourage their use, or any number of other meaningful mitigation measures. But Cap-and-Trade does not require any of this. Such measures are instead included by local governments in local land use projects to ensure approved project impacts fall below significance thresholds. By never counting the "capped" emissions toward the significance threshold, there is *no* counting and *no*

project-level mitigation of hundreds of thousands of tons of yearly GHG emissions from this Project.

### C. Respondents fail to consider the long-term GHG impacts of the Project.

The Supreme Court has made clear that an EIR should consider a project's long-term GHG impacts, and should address whether the project as a whole is in accord with the state's climate goals. (*Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 3 Cal.5th 497 (*SANDAG*) at p. 515.)[12] The state's climate change goals extend beyond 2030. (See, e.g., Executive Order S-03-05 [established a statewide target of reducing GHG emissions to 80 percent below 1990 levels by 2050].) Because the Project is expected to operate for decades into the future, Respondents must account for emissions beyond 2030. But Respondents fail to account for emissions beyond that point—despite the fact that the Project's full operation will not start until *five years later*, in 2035. (EIR at p. 4.3-61.) Respondents present no substantial evidence that any of the Project's post-buildout operational emissions are mitigated by the Cap-and-Trade Program. (See, e.g., EIR, pp. 4.7-36–37 [stating, without citation, that "[s]ome of the project's GHG emissions are subject to the requirements of the AB 32 Cap and Trade Program and will have a GHG allocation based on current GHG emissions levels"].) This is not an adequate CEQA analysis. (See *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884, 904 [EIR must contain substantial evidence that mitigation measures will reduce associated impacts to less-

[12] The parties in *AIR v. Kern* did not have the opportunity to brief the significance of *SANDAG* because the California Supreme Court filed its opinion in *SANDAG* over a month after the close of briefing in *AIR v. Kern*. It appears to amici that this is the first case at the California Court of Appeal where parties have had the opportunity to address both *SANDAG* and *AIR v. Kern* in their briefs.

than-significant-levels, such as by requiring compliance with applicable regulatory standards and preparation of site-specific studies]; Cal. Code Regs. tit. 14, § 15370, subd. (d) ["mitigation" includes "[r]educing or eliminating the impact over time by preservation and maintenance operations during the life of the action"].)

**D. Reliance on *AIR v. Kern County* is improper.**

Respondents incorrectly claim the Fifth Appellate District's decision in *Association of Irritated Residents v. Kern County Bd. of Supervisors* (2017) 17 Cal.App.5th 708 (*AIR*) upheld the use of the same GHG methodology as Respondents attempt to use here. (Combined Respondents' and Cross-Appellants' Opening Brief at p. 53.) Respondents' use of the Cap-and-Trade Program here goes far beyond what was sanctioned in *AIR.* In *AIR*, the project being evaluated under CEQA was a refinery, a *covered entity* under Cap-and-Trade. The court held a lead agency was authorized "to determine that a project's greenhouse gas emissions will have a less than significant effect on the environment based on *the project's* compliance with the cap-and-trade program." (*Id.* at p. 718; italics added.) Regardless of whether or not *AIR* was rightly decided, *here*, the question is much simpler and different from the question before the court in *AIR*. Here, it is undisputed that the Project is *not* a covered entity required to comply with the Cap-and-Trade Program. (Cal. Code Regs., tit. 17, § 95811.) Accordingly, this Court need only decide if projects that are *not* covered entities under Cap-and-Trade are nonetheless allowed to use the program to ignore significant GHG emissions they cause. The answer to that question is no.

Respondents argue the distinction between covered and non-covered entities is "a distinction without a difference." (Combined Respondents' and Cross-Appellants' Opening Brief at p. 63.) Respondents are incorrect.

This distinction is crucial under CEQA and vital to the success of California's ambitious climate policies.

From a CEQA perspective, the distinction is important because CEQA Guidelines section 15064.4, subdivision (b)(3) instructs lead agencies to consider the extent to which *a project* complies with GHG regulations or requirements. It is thus inappropriate for entities downstream in the chain of commerce from a covered entity to rely upon compliance with the Cap-and-Trade Program as a basis for avoiding analysis of project-related emissions.

From a policy perspective, as described above, the distinction is crucial because projects that are not subject to the Cap-and-Trade Program do not have the same direct incentives to reduce their GHG emissions as covered facilities, and Cap-and-Trade alone is not designed to achieve California's ambitious climate goals. The distinction between covered and not-covered entities is thus crucial to the portfolio of climate change measures the state is relying on to protect our citizens going forward.

### E. Respondents' GHG analysis obfuscates the climate change impacts of this Project, undermining CEQA's public disclosure purpose.

By failing to comply with CEQA Guidelines Section 15064.4, failing to compare all of the Project's emissions to the GHG emissions threshold, and failing to consider the long-term GHG impacts of the Project, Respondents' analysis undermines the informational purpose of CEQA. The purpose of an EIR "is to inform the public generally of the environmental impact of a proposed project." (Cal. Code Regs. tit. 14, § 15003, subd. (c).)

CEQA prohibits public agencies from approving or carrying out a project that will have significant effects on the environment unless the agency makes "findings" demonstrating either that it made changes to the

project to avoid or mitigate those significant impacts, or that certain overriding considerations outweigh the impact. (Pub. Resources Code, § 21081.) Without a full and accurate disclosure of the Project's impacts, Respondents erroneously concluded that the GHG impact would be less-than-significant, and thereby avoided making the subsequent findings that would inform the public whether the Project's significant impacts are unavoidable and/or justified. Additionally, Respondents' approach hinders the public's ability to submit informed comments during the EIR's public comment period—aside from addressing the *lack* of analysis—because the public is not provided with, and thus cannot evaluate, complete information or proper CEQA analysis.

## CONCLUSION

California is striving on all fronts to meet its ambitious, long-term GHG reduction objectives; the health of its citizens and the environment depend on it. But this Court's approval of Respondents' approach to GHG analysis and mitigation would treat the Cap-and-Trade Program as the sole remedy to limit GHG emissions from land-use projects, placing unnecessary strain on Cap-and-Trade's cost-effectiveness and seriously undermining the state's critical climate change efforts. Amici respectfully request this Court reject the trial court's holding and find in favor of Appellants as to GHG analysis.

Dated: January 10, 2020

Respectfully submitted,

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## CERTIFICATE OF COMPLIANCE

I certify that the attached Brief of Amici Curiae the Attorney General and the California Air Resources Board in Support of Plaintiffs and Respondents Albert Thomas Paulek, *et al*. and Plaintiffs and Appellants Laborers International Union of North America, Local 1184, *et al*. uses a 13 point Times New Roman font and contains 7,647 words.

Dated: January 10, 2020

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**DECLARATION OF ELECTRONIC SERVICE VIA TRUEFILING**

Case Name: **PAULEK, ET AL., V. MORENO VALLEY COMMUNITY SERVICES DISTRICT, ET AL., California Court of Appeal, Fourth Appellate District, (Amicus Brief)**
No.: **E071184**

I declare:

I am employed in the Office of the Attorney General, which is the office of a member of the California State Bar, at which member's direction this service is made. I am 18 years of age or older and not a party to this matter. I am familiar with the business practice at the Office of the Attorney General. Correspondence that is submitted electronically is transmitted using the TrueFiling electronic filing system. Participants who are registered with TrueFiling will be served electronically.

On January 10, 2020, I electronically served the attached:

**BRIEF OF AMICI CURIAE THE ATTORNEY GENERAL AND THE CALIFORNIA AIR RESOURCES BOARD IN SUPPORT OF PLAINTIFFS AND RESPONDENTS ALBERT THOMAS PAULEK, ET AL. AND PLAINTIFFS AND APPELLANTS LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, ET AL.**

by transmitting a true copy via this Court's TrueFiling system to the parties as follows:

**SEE ATTACHED SERVICE LIST**

I declare under penalty of perjury under the laws of the State of California the foregoing is true and correct and that this declaration was executed on January 10, 2020, at Sacramento, California.

| PAULA CORRAL | /s/ Paula Corral |
|---|---|
| Declarant | Signature |

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**IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA FOURTH APPELLATE DISTRICT, DIVISION TWO**

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ALBERT THOMAS PAULEK, et al.,
Plaintiffs and Respondents,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants

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HF PROPERTIES, et al.,
Real Parties in Interest and Appellants

---

LABORERS' INTERNATIONAL UNION NORTH AMERICA LOCAL 1184,
Plaintiffs and Appellants,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Respondents

---

HF PROPERTIES, et al.,
Real Parties in Interest and Respondents

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Appeal from the Superior Court of California
Hon. Sharon J. Waters, Judge, Case Nos. RIC1510967 MF, RIC1511279, RIC1511327, RIC1511421 & RIC1511195

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# PROPOSED BRIEF OF CALIFORNIA CEQA AND CLIMATE POLICY EXPERTS IN SUPPORT OF PLAINTIFFS/ APPELLANTS

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## AMICI CURIAE BRIEF

### I. Introduction

The World Logistics Center complex (the "Project"), the 40 million square foot warehouse development at the heart of this dispute, will impact the environment for decades. The resolution of this case may have an even larger footprint, answering important questions about the California Environmental Quality Act ("CEQA") and its relationship to the state's climate laws. The EIR's analysis, if endorsed, would have dire consequences for California's ability to meet its greenhouse gas ("GHG") reduction goals and would upend settled CEQA precedent about the role state-level regulation should play in assessing the significance of project impacts.

The City of Moreno Valley; HF Properties, Inc.; Sunnymead Properties; Theodore Property Partners; 13451 Theodore, LLC; and HL Property Partners (collectively, "Respondents") are asking this Court to endorse a novel approach to assessing the significance of a project's GHG emissions under CEQA. Although the Project is not regulated under California's cap-and-trade program—and, moreover, although nearly all of the emissions at issue in this case will be emitted after 2030, the sunset date of cap and trade—the Project's EIR relies on that program to write off an overwhelming majority of the Project's lifetime GHG emissions. The Project is estimated to draw 70,000 truck trips

per day at full buildout, yet the EIR declines to consider as significant ***any*** mobile source emissions associated with the Project.

Respondents' rationale for this outcome misconstrues the state's climate program, and its relationship to CEQA, by treating cap and trade as California's one-and-done policy for controlling certain greenhouse gas emissions. The EIR's analysis breaks Project emissions into "capped" emissions, which are regulated by cap and trade, and "uncapped" emissions. Because cap and trade requires "upstream" fuel suppliers and electricity generators to surrender compliance instruments while applying a declining emissions cap over time, the EIR takes the position that "downstream" emissions from mobile sources and electricity use associated with the Project are "capped," are already "mitigated" by the program, and need not be considered by the lead agency when assessing significance. (Resp. Br. at 35-36.) Asking the Project to address these emissions itself, according to the Respondents, would be "double counting," (Resp. Br. at 57) because state-level regulation already takes care of them in the most efficacious way. (Resp. Br. at 35.)

But that is not the case. California has never adopted a one-and-done approach to controlling capped emissions; in fact, the opposite is true. The state has ***not*** determined that the cap-and-trade program alone "is the most effective, efficient way to

reduce GHG emissions." (Resp. Br. at 35.) Instead, the program is designed to work together with other, coordinating and overlapping state-level emission reduction regulations and policies—including, *inter alia,* land use policies, transportation fuel policies, and CEQA. Cap and trade was never intended to be the sole, or even the main, driver of California's GHG reductions. Given its design, it cannot bear that load alone, for reasons discussed in this brief. The Project actually burdens the cap-and-trade program, and failing to reduce that burden using the robust tools that CEQA provides would create significant difficulties for California in controlling emissions, especially from the critically important transportation sector.

CEQA does not permit this result. While the CEQA Guidelines allow lead agencies to consider a project's compliance with a GHG-reducing regulation when assessing significance of project emissions, that consideration marks the beginning of the inquiry, not a *de facto* conclusion that emissions are not significant. For "capped" emissions, however, the EIR simply identifies the cap-and-trade program and ends its assessment there. It provides no analysis showing that the Project's own emissions will be reduced or mitigated by cap and trade. (In fact, it could not make that showing; the cap-and-trade program does not mitigate project-specific emissions, particularly at the Project's scale.) It does not explain how the Project would

guarantee compliance with cap and trade, given that it is unregulated by the law. And it fails to assess whether Project GHG emissions are significant even in light of compliance with the cap-and-trade regulation. In other words, the EIR assumes that the existence of a state-level regulation relieves the lead agency of the requirement to assess the significance of an individual project's impacts. This misapprehends the CEQA Guideline, which allows consideration of the state-level regulation, but does not make it dispositive. It is also wholly inconsistent with CEQA's focus on project-level impacts, and its requirement to demonstrate, both from a significance and a mitigation standpoint, that impacts are addressed. Approving such an approach would undermine the objectives of CEQA, not just in this case, but in any case where a state-level regulatory regime intersects with project impacts.

CEQA is, at its core, a public disclosure and mitigation statute. It is designed to ensure that decisionmakers and community members fully understand the significance of a project's environmental impacts in time to reduce those impacts through, among other tools, changes in project design and adoption of project-specific mitigation measures. Instead, the EIR here obscures the Project's GHG impacts by representing that most of the Project's emissions need not even be considered in weighing significance, claiming that they are "mitigated" by a

state-level program without providing any analysis or evidence showing that to be true.

The on-the-ground consequences of the EIR's misguided approach are real and illustrative. If this Project's mobile source emissions were identified as significant, Project proponents and the lead agency would be obligated to consider and adopt Project-specific mitigation measures to reduce mobile source emissions. Local decisionmakers might even decide to reject the proposal altogether once its full significance is understood. These decisions would be made before Project approval, when design changes can be most effectively implemented. By contrast, cap and trade alone cannot effectively mitigate the Project's mobile source emissions. The entities with fuel-related compliance obligations under cap and trade are third-party, distant-in-time fuel suppliers who cannot exercise control over Project design or operations. In other words, the EIR's analysis lays the burden for reducing the Project's mobile source emissions solely at the feet of a program that has very limited tools for carrying it. Writ large, this approach would undercut California's ability to meet its climate targets.

Because cap and trade does not apply to most of the Project's GHG emissions, and because the EIR's assessment of the significance of the Project's GHG emissions contradicts settled CEQA principles and misrepresents the function of the

cap-and-trade program, *amici* urge the Court of Appeal to reverse the trial court's decision.

## II. Discussion

At the heart of the EIR's GHG analysis lies Respondents' argument that the cap-and-trade program "mitigates" a majority of the Project's emissions and that, accordingly, those emissions should not be considered against the GHG emission significance threshold. (See Resp. Br. at 35 ["Far from 'brushing aside' or 'ignoring' the emissions…the City accounted for them and mitigated them…"].) Respondents go so far as to suggest that assessing these emissions at the project level would be "double counting." (Resp. Br. at 57). In fact, the cap-and-trade program does not cover the time frame of the vast majority of Project GHG emissions and does not apply to warehouse projects at all. Respondents' characterization additionally misstates the CEQA Guidelines, misapprehends the nature of the cap-and-trade program, and is inconsistent with CEQA's purposes.

### A. The EIR's GHG Impact Analysis Fails Because The Project Cannot Demonstrate "Compl[iance] With Regulations Or Requirements Adopted To Implement A Statewide, Regional, Or Local Plan For The Reduction or Mitigation Of Greenhouse Gas Emissions."

The CEQA Guidelines explain that, when determining the significance of a project's GHG emissions impacts, a lead agency may consider:

> The ***extent to which*** the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions (see, e.g., section 15183.5(b)). Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. (CEQA Guidelines, § 15064.4, subd. (b)(3) [emphasis added].)

However, the EIR simply concludes that the Project complies with cap and trade—assuming that is sufficient to mitigate the majority of the Project's emissions for the purposes of assessing the significance of the Project's GHG impacts—without ever evaluating "the extent to which the [P]roject complies" with the program. If the extent of the Project's compliance had been analyzed, it would necessarily have been found wanting. First, the cap-and-trade regulation will sunset long before the bulk of Project emissions occur. Second, cap and

trade does not cover emissions from out-of-state fuels, which may be burned by Project traffic.

**1. The cap-and-trade program will expire by operation of statute before most Project emissions occur.**

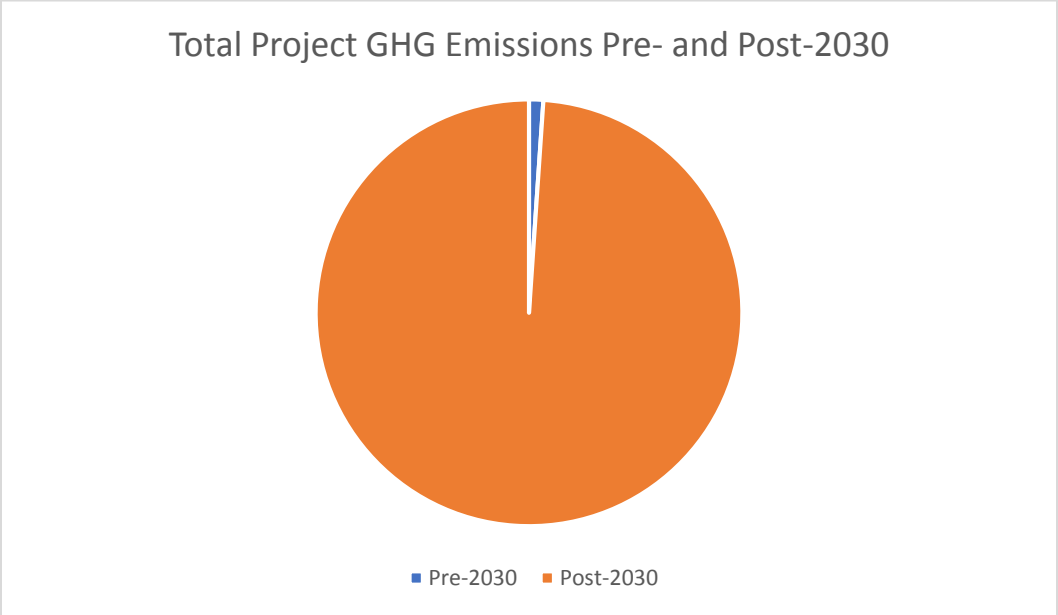
Critically, the cap-and-trade program is set to expire well before the Project is fully built out, and thus before most Project emissions occur. The EIR is clear that the Project will not be operational until 2035, ***five years after*** the cap-and-trade regulation sunsets by automatic operation of statute. (Cal. Health & Safety Code, § 38562, subd. (h).) This means that the majority of the Project's lifetime GHG emissions are not, in fact, capped at all. The cap-and-trade program therefore cannot be used as a reason to disregard those emissions.

In 2017, the California Legislature passed Assembly Bill 398, which reauthorized the cap-and-trade program, initially set to expire in 2020, for an additional decade. (Cal. Health & Safety Code § 38562; see California Legislative Analyst's Office, Cap-and-Trade Extension: Issues for Legislative Oversight ("LAO Cap-and-Trade Extension Report") (Dec. 2017) at 1.) This legislation specifically provides that the law authorizing the cap-and-trade program "shall remain in effect only until January 1, 2031, and as of that date is repealed, unless a later enacted statute which is enacted before that date, deletes or extends that

date." (Cal. Health & Safety Code § 38562, subd. (h).) Thus, unless the Legislature again affirmatively acts to extend the cap-and-trade program, it cannot continue beyond 2030. If the Legislature does nothing, cap and trade will no longer exist in ten years.

The vast majority of the Project's emissions, including nearly all of the emissions that the EIR labels as "capped," will occur after the expiration of cap and trade. Prior to 2035, the EIR estimates that the Project will emit a total of about 222,000 MT $CO_2e$ of construction-related GHGs. Nearly 40 percent of those emissions, or about 86,000 MT $CO_2e$, will occur after cap and trade expires in 2030. But even total construction emissions are dwarfed by the approximately 412,000 MT $CO_2e$ of ***annual*** emissions the Project will produce at full buildout. As demonstrated by the chart below, pre-2030 emissions represent only about 1 percent of total Project GHG emissions assuming a

30-year life for the Project at buildout.




In fact, just one year of Project GHG emissions after 2035 will exceed all Project GHG emissions before that date—and is more than triple the amount of pre-2030 construction emissions. None of the post-2030 emissions will be covered by the cap-and-trade program, unless the California Legislature enacts a change in state statute.

Respondents have tried to deflect from this fact, arguing that it would be "wrong…not to apply current law because it might change sometime in the future." (Resp. Br. at 68.) But it is Respondents who are asking this Court to assume the law might change. With no change at all, it is clear that cap and trade expires and will not apply to the gross majority of Project GHG emissions. And the Court should be wary of Respondents'

speculative approach: cap and trade reauthorization is by no means a certainty. The process to extend cap and trade beyond 2020 was politically fraught, requiring a two-thirds majority vote of the Legislature for reauthorization and inciting battles over the program's efficacy and role in addressing local sources of pollution. Just as it was prior to the original 2020 sunset date, cap and trade reauthorization to extend the program beyond 2030 may be an arduous political process, with no guarantee that the program will continue at all, or in its current form. (See, e.g., Georgina Gustin, INSIDE CLIMATE NEWS, California's New Cap-and-Trade Plan Heads for a Vote—With Tradeoffs (Jul. 15, 2017); Christopher Cadelago and Taryn Luna, SACRAMENTO BEE, California's climate change vote delayed until Monday (Jul. 12, 2017) [noting that then-Governor Jerry Brown expressed concern that a two-thirds majority would be needed to pass extension legislation and that such a threshold could not be met].)

Simply put, the Project cannot "comply" with cap and trade when cap and trade no longer exists. The EIR contains no analysis to explain why these emissions should not be considered significant in light of cap and trade's expiration, and the Court should reject Respondents' arguments and overturn the District Court's decision for this reason alone.

**2. Cap and trade does not cover emissions from out-of-state fuels.**

The EIR also fails to assess the extent to which mobile source emissions will necessarily be covered by the cap-and-trade program, instead assuming that all mobile source emissions are "capped". However, the cap-and-trade program is not designed to cover all mobile source emissions in California. Instead, the program requires fuel suppliers to surrender compliance mechanisms equivalent to the amount of $CO_2e$ released from the burning of the fuels they sell ***in California***. (17 Cal. Code Regs. § 95811.) In other words, if a mobile source enters California from another state or country—Nevada, Arizona, New Mexico, Utah, or even Mexico—to travel to the Project, burning fuel that it purchased outside of California, cap and trade does not cover those emissions. A typical 18-wheel diesel truck can travel between 1260 to 2250 miles on a tank of gas, so the Project may very well attract traffic from mobile sources that purchase fuel outside California's borders.

But the EIR does not include these emissions among its assessment of "uncapped" emissions, or make any attempt to quantify the amount of mobile source emissions that will result from the burning of out-of-state fuels. Accordingly, the EIR fails to assess the extent of the Project's compliance with cap and trade and fails to meet its burden to demonstrate that these emissions should be considered insignificant. This lack of

analysis is further evidence of the EIR's misapprehension of the cap-and-trade program. All mobile source emissions are not equal under cap and trade; the EIR improperly failed to take this distinction into account.

### B. The EIR's Approach Cannot Satisfy The Purpose Of A GHG Impact Analysis Under CEQA.

Even if cap and trade were not set to expire in 2030, and even if all mobile source emissions caused by the Project were the result of burning fuels purchased in California, the EIR's analysis would still be invalid under CEQA. The EIR is premised on a fundamental mischaracterization of the cap-and-trade program, one that is reiterated numerous times in Respondents' brief. (See, e.g., Resp. Br. at 35 ["The State has made the policy determination that Cap-and-Trade is the most effective, efficient way to reduce GHG emissions…the City accounted for [GHG emissions] and mitigated them in precisely the way that the authoritative California agency has determined to be the optimal way to achieve the State's emission-reduction goals."], 36 ["CARB…made it clear that it intended to have greenhouse gas emissions accounted for, and mitigated, at the producer level…"], 48 ["CARB made perfectly clear its decision that the mitigation of certain greenhouse gas emissions statewide at the production level was the most efficient, cost-effective way to implement AB 32's mandate."], 57 ["Appellants' preferred approach…would

result in double counting and double mitigating emissions that are already mitigated through cap-and-trade."].)

The EIR's misrepresentation of cap and trade is twofold. First, at the core of the analysis is the erroneous assertion that under California law, cap and trade is the primary (even sole) regulation responsible for reducing or avoiding GHG emissions from mobile sources and electricity generation, eliminating the need for overlapping regulation of projects that induce emissions from those sectors. Second, the EIR incorrectly presumes that the cap-and-trade program will mitigate ***project-level*** emissions, without any analysis to support that conclusion. These two missteps result in a GHG analysis that improperly suggests to decisionmakers and the public that the great majority of the Project's GHG emissions—including ***all*** of the mobile source emissions generated by the Project—do not need to be addressed at the project level because they are already reduced or avoided by operation of a state regulation. This is misinformation with serious consequences: it undermines CEQA's role as a transparency and public disclosure tool, and it opens the floodgates for lead agencies to make future land use decisions that will severely compromise California's ability to meet its GHG reduction targets.

### 1. How cap and trade works: The basics.

To assist the Court in its review of this case, we offer here a brief history of the implementation of the legislation that authorized the California Air Resources Board ("CARB") to create the cap-and-trade program, AB 32, as well as an explanation of how the cap-and-trade program works in practice.

AB 32, passed by the Legislature in 2006, was a broad piece of legislation that codified an ambitious GHG emission reduction mandate: It requires California to reduce its statewide GHG emissions back to 1990 levels by the year 2020. (Cal. Health & Safety Code § 38550.) The legislation directed CARB to develop a scoping plan of state-level policies that would lead to the achievement of that goal, and authorized CARB to enact regulations that would implement the policies set forth in the scoping plan. (Cal. Health & Safety Code § 38561, subd. (a).) CARB's first Scoping Plan set forth "a comprehensive array of emissions reduction approaches and tools" to meet the 2020 goal, which included a number of overlapping, complementary policies such as the state's Renewable Portfolio Standard (aimed at increasing generation of electricity from renewable sources), the Low Carbon Fuel Standard (aimed at reducing greenhouse gas emissions from transportation fuels), land use and transportation policies (aimed at reducing emissions from transportation), the expansion of energy efficiency programs (aimed at reducing

emissions from electricity usage), and cap and trade (aimed at pricing greenhouse gas emissions from certain sectors, ultimately to include both electricity generation and transportation fuels). (California Air Resources Board, Climate Change Scoping Plan: A Framework for Change (Dec. 2008) at ES-3-ES-4.) Notably, many of these policies targeted emissions from the same sectors. No single one of these policies was intended to meet the 2020 goal itself, but, working in concert, they were designed to achieve the target.

Since the adoption of the original Scoping Plan, the Legislature has codified additional GHG reduction mandates, including reaching at least 40 percent below 1990 levels by 2030 and net zero emissions from electricity generation by 2045. (Cal. Health & Safety Code § 38566; Cal. Pub. Util. Code § 454.53, subd. (a).) Before leaving office, Governor Brown signed an executive order directing the state to achieve a carbon neutral economy by 2045. (Executive Order B-55-18 to Achieve Carbon Neutrality [establishing a goal "to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter."].) These new targets are designed to make California's emission reduction progress more consistent with evolving science demonstrating that the most severe impacts of climate change could be somewhat alleviated if global temperature rise is contained to

less than 1.5 degrees Celsius. (California Air Resources Board, California's 2017 Climate Change Scoping Plan ("2017 Scoping Plan Update") (Nov. 2017) at ES3; Intergovernmental Panel on Climate Change, Global Warming of 1.5ºC: Summary for Policymakers (Oct. 2018) at 7, 9-12.) The Scoping Plan has been updated as well, and continues to rely on a broad range of policies, including land use and transportation policies, fuels-related policies, energy efficiency policies, and renewable energy policies, to achieve newer targets. (See 2017 Scoping Plan Update at ES4, 1.) CARB has consistently indicated in the Scoping Plan and otherwise that achievement of the state's emission reduction goals is not possible without a commitment to this wide range of policies; no one policy or regulation will be enough to achieve the statewide goals. (See, e.g., 2008 Scoping Plan at 15 ["Reducing greenhouse gas emissions from the wide variety of sources can best be accomplished through a cap-and-trade program along with a mix of complementary strategies that combine market-based regulatory approaches, other regulations, voluntary measures, fees, policies, and programs."]; 2017 Scoping Plan Update at ES4 ["The Plan underscores that there is no single solution but rather a balanced mix of strategies to achieve the GHG target."].)

As part of AB 32, CARB was given the authority—but not, as Respondents suggest, the mandate—to establish a market-

based emission credit trading mechanism. (Cal. Health & Safety Code § 38570, subd. (a) ["The state board ***may*** include in the regulations adopted pursuant to Section 38562 the use of market-based compliance mechanisms to comply with the regulations."] [emphasis added].) CARB elected to create the cap-and-trade system alongside the other emission reduction policies set forth in the Scoping Plan. (California Air Resources Board, California's Cap-and-Trade Program Final Statement of Reasons ("2011 FSOR") (Oct. 2011) at 156 ["This market-based program is… designed to work in concert with…standards for cleaner vehicles, low-carbon fuels, renewable electricity, and energy efficiency."].) From the outset, CARB viewed the cap-and-trade program as just one of multiple regulatory efforts aimed at achieving GHG emission reductions from covered sectors. Indeed, other state-level policies—not cap and trade—were intended to do the bulk of heavy lifting on GHG reductions. (See 2008 Scoping Plan at 22.)

The cap-and-trade program was initially set to expire by operation of statute in 2020. As discussed above, extension legislation passed and the program now sunsets in 2030, five years before the Project will reach full buildout. (Cal. Health & Safety Code § 38562, subd. (h).) Under the cap-and-trade program, covered entities, such as electricity generators, industrial sources, and fuel suppliers, are required to surrender

compliance mechanisms to CARB equal to the amount of their in-state emissions in a given compliance period. (See 17 Cal. Code Regs. §§ 95850, 95855, 95856.) Warehouses are not among the covered entities. Covered entities can comply with the program's requirements in three ways: (1) by reducing their emissions; (2) by obtaining allowances, with each allowance essentially serving as a permit to emit one ton of $CO_2e$; and/or (3) by obtaining offsets, which are generated by certified emission reduction projects from sources that aren't covered by cap and trade, like forestry projects. (See, e.g., 17 Cal. Code Regs. §§ 95820, 95970, 95990, 95991.)

In the context of fuel emissions and electricity generation emissions, as Respondents concede, compliance obligations rest with the fuel supplier or the electricity generator, rather than with the end user of the fuel or electricity. (17 Cal. Code Regs. § 95811.) Where, as here, a project results in increased mobile source emissions, the project itself doesn't bear compliance responsibility when drivers burn fuel to get to the project. Instead, compliance mechanisms for the portion of the fuel that is supplied in-state—as discussed above, out-of-state supply is not covered by the cap—would be surrendered by the suppliers of the fuels those drivers have put in their cars or trucks.

Under the program, the number of total allowances available is capped, and the aggregate statewide cap declines

over time. Emissions from any given project or any covered sector, however, need not decline—and may even rise year over year. This is in part because entities that hold excess allowances may sell those allowances to entities that need them to come into compliance. (See 17 Cal. Code Regs. §§ 95920, 95921.) A significant portion of allowances are allocated for free to certain entities, and CARB holds quarterly allowance auctions of most of the remaining allowances, subject to a price floor. (17 Cal. Code Regs. §§ 95910-95915.)

The higher the demand for allowances, the higher allowance prices climb, creating a price signal that should reduce statewide emissions and help keep emissions below the cap. However, there is a limit to how high allowance prices can rise—and this limit, if reached, can function to create a "hole" in the cap. A small portion of allowances is allocated to a special reserve, the APCR, and those allowances are made available at higher prices once certain trigger levels are hit, creating a "soft" price ceiling that is intended to create market stability rather than accurately price GHG emissions commensurate with the harms they cause. (California Air Resources Board, Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Final Statement of Reasons ("2017 FSOR") (Aug. 2017) at 504 [explaining that the APCR price was designed "looking at the cost of abatement; as opposed

to the Social Cost of Carbon, which looks instead at a cost range related to damages caused by emissions."].) As part of the cap-and-trade extension legislation, CARB was directed to set a "hard" price ceiling, which will allow ***unlimited*** new allowances to be sold at the ceiling price. (Cal. Health & Safety Code § 38562, subd. (c)(2).)

This is a key point: If capped emissions don't decline sufficiently quickly, allowance prices may rise and hit CARB's "hard" price ceiling, triggering the sale of unlimited new allowances. (See Severin Borenstein et al., Expecting the Unexpected: Emissions Uncertainty and Environmental Market Design ("Borenstein Cap and Trade Report") (Aug. 2019) at 2-3 [explaining that the combination of uncertainty surrounding "business as usual" emissions and price-inelastic emissions abatement supply make prices at the ceiling one of the most likely cap and trade outcomes].) Depending on how long allowance prices sit at the ceiling and how many allowances are sold at that price, this could undermine or even negate the statewide cap on emissions. Thus, each of CARB's overlapping and complementary programs that reduces emissions from capped sectors plays an important role in keeping allowance prices down, emissions below the cap, and the cap-and-trade program functioning well. If left to bend California's emissions trajectory downward to the 2030 statewide limit through

allowance prices alone, cap and trade would likely not succeed. And because the existence of the "hard" price ceiling effectively removes the program's cap for emissions between years 2021 and 2030, Respondents' fundamental premise—that the existence of the cap means the Project's mobile source emissions must necessarily be mitigated—also fails.

Another important feature of the cap-and-trade program is the ability to bank allowances. While the cap represents the maximum number of emissions from allowances that are issued in any given year, emissions can, and do, sometimes fall below that maximum, and unused emissions allowances may be carried forward to a subsequent year when they can be used for compliance. (17 Cal. Code Regs. § 95922.) Conversely, real world emissions can exceed the number of emissions allowances issued in a given year, if unused allowances from a previous year are available to meet compliance obligations. (See LAO Cap-and-Trade Extension Report at 9.) In other words, while CARB plans to make fewer allowances available on the market each year, that does not necessarily mean that capped emissions will decrease year to year, because of banking of older allowances (and because of the price ceiling mechanisms described above). Allowance banking is, again, a price stabilizing mechanism for the cap-and-trade market—but it also creates the possibility that annual emissions targets, like California's 2030 target, may not be met

because compliance with the cap-and-trade program will be achieved through the use of banked allowances. (See LAO Cap-and-Trade Extension Report at 9 [explaining that due to banked credits, the Legislative Analyst's Office "found this general result—2030 emissions significantly higher than the annual target—under a couple different scenarios we analyzed."]; 2011 FSOR at 165.)

Lastly, it is important to note that CARB can adjust the annual statewide cap either upward or downward. (See Cal. Health & Safety Code § 38562, subd. (c)(2); LAO Cap-and-Trade Extension Report at 9, 14 [identifying cap adjustment as an area for legislative oversight].) This means, for example, that if complementary policies are doing an especially good job of controlling capped emissions and the state's emissions trajectory is declining faster than anticipated, the state can "capture" those gains. There is no sense in which the state's current cap is its emissions destiny.

**2. Cap and trade was designed to work together with other laws, like CEQA, that reduce emissions from transportation—and it would be overburdened to the breaking point if asked to work alone.**

Respondents argue that "the EIR and the City Council reasonably concluded that the impacts of the capped emissions have already been addressed by the cap-and-trade program, which ensures consistency with statewide greenhouse gas emissions reduction goals." (Resp. Br. at 56.) But this misapprehends the nature of the cap-and-trade program and its place among a large stable of state-level GHG regulations that are collectively intended to push California toward its ambitious GHG reduction targets. Cap and trade is not, and was never intended to be, the one regulation that guarantees compliance with statewide GHG emission reduction goals, and accordingly, even compliance with the program cannot *de facto* lead to a conclusion that a project's GHG impacts have been adequately mitigated.

If this Court were to adopt the EIR's approach, effectively releasing lead agencies from the requirement to mitigate transportation emissions at the project level and at the stage of project design and approval, emissions from developments like the Project would rise significantly as compared with the contrary case. The cap-and-trade market would have to absorb

that additional pressure. Respondents are, in essence, asking the Court to force other market sectors—heavy industry, fuel suppliers, electricity generators, and the like—to bear the weight of reducing emissions created by the development sector. That is not cap and trade's purpose or design.

Indeed, the cap-and-trade program is a minority contributor to GHG emissions reductions, and California cannot reach its looming GHG reduction mandates with cap and trade alone. Both the original Scoping Plan and the two subsequent Scoping Plan updates, as well as CARB's Final Statements of Reasons for the cap-and-trade and cap-and-trade extension regulations, are clear that CARB has never intended the program to be the sole mechanism through which statewide GHG reduction goals are met, even as to capped emissions. (See, e.g., 2011 FSOR at 138 [CARB "is pursuing both direct command-and-control regulations, such as, but not limited to, the low carbon fuel standard, advanced clean car regulation, stationary refrigeration regulation, and a market-based cap-and-trade regulation to reduce GHG emissions."]; 2017 FSOR at 1022 [explaining that in certain sectors, pressure from other programs causes GHG emissions reductions, meaning "the cap decline factor is not needed as an incentive to reduce GHG emissions."].) CARB has explained that cap and trade "is used to supplement, rather than replace, direct regulation approaches. It is also

designed to work in concert with other measures…" (2011 FSOR at 156.)

This fact is widely recognized even beyond CARB, especially in the context of land use decisions and transportation emissions. (See, e.g., California Air Resources Board, First Scoping Plan Update, Appendix D1 [California Air Pollution Control Officers Association's and Other Regional Efforts to Implement Climate Protection Strategies] (Feb. 10, 2014) at D1-2.) For example, the California Air Pollution Control Officers Association ("CAPCOA") explains "it is clear that state actions alone won't be sufficient [to meet coming statewide reduction goals]. State policy is most effective with the support, engagement, and complementary actions of regional and local efforts." (*Id.*) CAPCOA specifically points to mobile source emissions reductions as an area where state-level action must be supplemented by regional and local governments "through land use planning, both on a project-level basis and in integrated, long term blueprints…" and explains that state-level efforts to reduce mobile source emissions are undercut by regional and local decisions that do not prioritize GHG emissions reductions. (*Id.*) Indeed, the California Legislature re-authorized cap and trade in 2017 knowing that the program would continue to work alongside other complementary statutes and regulations designed to reduce transportation sector GHG emissions, such as SB 375—

comprehensive legislation designed to achieve emissions reductions from mobile sources using local land use and transportation planning tools—and the Low Carbon Fuel Standard. (See, e.g., Cal. Gov. Code §§ 14522.1, 14522.2, 65080.) The Legislature did not consider such overlapping measures to constitute "double counting" of mobile source emissions, but instead concluded that they were necessary to provide needed redundancy in light of the complex problem presented by transportation emissions.

CARB has consistently analyzed the percentage of necessary reductions it expects to be achieved by the cap and by other complementary measures, including the Low Carbon Fuel Standard, the Renewable Portfolio Standard, and regional land use and transportation measures; cap-and-trade does not account for even a majority of the needed GHG emissions reductions in those assessments. (See, e.g., 2017 Scoping Plan Update at 28.) CARB expects cap and trade to account for less than a third of the emissions reductions needed to meet California's 2020 target, and less than 40 percent of the emissions reductions needed to meet the 2030 target. (2008 Scoping Plan at 22; 2017 Scoping Plan Update at 26, 28.) Because other state-level, regional, and local policies are themselves effective at reducing GHG emissions, cap and trade allowance prices have historically remained low, auctioning for less than half of Social Cost of

Carbon estimates that many states use. (Borenstein Cap and Trade Report at 3, 23-24; see 2017 FSOR at 504 [allowance prices are not intended to reflect the Social Cost of Carbon].)] This means that, far from accurately reflecting the price to reduce or avoid the full amount of GHG emissions from covered sectors needed to meet statewide goals, as Respondents suggest (Resp. Br. at 57), cap-and-trade allowance prices understate those costs and the program itself simply serves as one program among many. In short, whatever the merits of cap and trade as a partial driver for GHG emissions reductions, it cannot be considered full mitigation for the cumulative impacts of carbon emissions, which is what the EIR proposes.

And because of the "hard" price ceiling the Legislature has directed CARB to create, it is critical that other emission reduction programs continue to take a laboring oar in reducing emissions from capped sectors. Otherwise, allowance prices could skyrocket as the system bears a burden it was never designed to hold. (Borenstein Cap-and-Trade Report at 23-24 [explaining that without complementary policies, the probability of very high allowance prices "more than triples" and could result in price ranges "likely to be politically unacceptable."].) As discussed *supra*, a result of skyrocketing allowance prices could be to undermine the cap, with unlimited allowances available for sale at the ceiling price.

In sum, the existence of the cap-and-trade program does not displace the need to use other state-level, regional, and local policies—including thoughtful land use decisionmaking through the CEQA process—to control emissions from capped sectors. To the contrary, cap and trade works well only if complementary policies are employed, too. Because it acts in concert with other policies to meet statewide goals, cap and trade cannot be relied upon alone as evidence that project-level emissions have been "mitigated" and are not significant. In fact, such an approach would overburden the cap-and-trade market and make it challenging for California to meet its emissions reduction targets. And for those same reasons, the EIR's approach is inadequate for CEQA purposes: The mere existence of the program cannot guarantee that the Project's emissions are addressed, and the EIR's lack of analysis to show that they are renders the document insufficient under CEQA.

**3. Cap and trade will not ensure that Project-level emissions are reduced.**

Cap and trade sets an economy-wide emissions cap that is not project- or sector-specific. This means that while the overall cap declines over time, emissions from an individual project need not, and often do not, decline. Even emissions from an entire sector may not decline in any given compliance period, as long as there are adequate allowances on the market to allow all covered

entities to meet their compliance obligations. Respondents say this doesn't matter; because the overall cap declines over time, this must mean that somewhere, someone is "mitigating" mobile source emissions in a way that allows California to achieve its climate targets. Their view is that because the statewide cap exists, it doesn't matter whether there are project-level efforts to reduce emissions; in aggregate, emissions will be reduced enough by operation of the cap.

In reality, though, the need for simultaneous project-level efforts to reduce emissions remains strong, for all of the reasons discussed *supra*. This is especially true with respect to the Project's transportation emissions, which make up the bulk of the emissions at issue in this case. Transportation emissions from the Project, and from similar development proposals around the state, will not be adequately controlled by cap and trade alone because significant mechanisms for reducing transportation sector emissions, like changing local land use patterns and making mass transit improvements, are out of the hands of fuel suppliers—who are the only covered entities with compliance obligations for transportation fuels under the cap. The success of California's climate policies depends, in part, on local and regional land use authorities and project developers working to reduce project-level GHG emissions throughout the design, approval, and operational phases of proposed projects.

Traditional CEQA mitigation tools, as applied to GHG impacts, are critical in these efforts, especially for a project that results in the creation of 70,000 truck trips per day that would otherwise not occur. The upshot of the EIR's approach is to leave meaningful, project-specific mitigation measures that would reduce transportation emissions on the table.

This is particularly troubling because accelerating reductions in transportation sector emissions is critical to achieving the statewide climate goals. In the worst-case scenario, overburdening the cap-and-trade system in this way could destabilize the market entirely, reducing even cap and trade's economy-wide efficacy as mobile source emissions associated with the development sector continue to rise.

**4. The EIR's GHG analysis undermines CEQA's purpose and role.**

Because it misrepresents the nature of the cap-and-trade program, the ability of the Project to ensure compliance with cap and trade, and the potential for mitigation of Project GHG emissions through cap and trade, the EIR's GHG analysis is inconsistent with CEQA's "fundamental goal": to ensure the public and decisionmakers are fully informed about a project's possible significant environmental impacts. (See *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439, 447.) The Project's EIR cannot serve its

proper purpose as an "environmental 'alarm bell'" when it dramatically understates the extent of the Project's GHG impacts, and, in turn, the amount and type of mitigation that would be required to address them. (See *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810; see also Cal. Pub. Res. Code § 21061 [the purpose of an EIR is to provide "detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."].)

The EIR's analysis is misleading in two significant ways. First, the EIR improperly concludes, without any supporting analysis, that the existence of the cap-and-trade program means Project emissions are necessarily less than significant. Second, the EIR plays fast and loose with the term "mitigation," suggesting that Project emissions are "mitigated" for CEQA purposes when they are not, with serious adverse consequences for both this case and the ability of California to meet its GHG reduction targets.

**a. The existence of state-level regulation does not obviate the need for a robust significance analysis under CEQA.**

Respondents contend that the mere existence of the cap-and-trade program is enough to conclude that GHG impacts from

"capped" sources associated with the Project are not significant. But the EIR contains no analysis to support this conclusion. CEQA does not permit such a logical leap.

CEQA is designed to assess the significance of project-level impacts and ensure mitigation of those impacts. (See Cal. Pub. Res. Code §§ 21002; 21081.) Even though the cap-and-trade program may reduce economy-wide GHG emissions, it has no nexus to the Project's impacts: GHG emissions from the Project will not necessarily decline as a result of the operation of cap and trade and may even increase despite the existence of the program. Equally as important from a CEQA perspective, the Project has no control over whether the entities responsible for the "capped" emissions associated with the Project will actually meet the requirements of the law. The cap-and-trade program applies to a variety of covered entities in the industrial, electricity generation, and fuel production sectors. (17 Cal. Code Regs. § 95811.) Those entities are subject to compliance obligations under the law and must accordingly surrender compliance instruments to the state. (*Id*. at §§ 95811, 95850-95859.) But the Project is not among them: warehouses are not covered entities under cap and trade. (*Id*. at § 95811.) Respondents attempt to downplay the significance of this fact in their brief, calling the line between projects directly covered by cap and trade and those not covered at all, but which may draw

"downstream" emissions, "a distinction without a difference." (Resp. Br. at 63.) To the contrary, the distinction is key, not just for this case but for its CEQA implications more generally. Unlike a refinery, which itself must submit compliance mechanisms under cap and trade and can therefore guarantee that its emissions are being mitigated through the program, the Project has no compliance obligation, and no way to ensure that those who do have such obligations meet them. Without any way to ensure or demonstrate compliance—and without any attempt to explain how it ***could*** demonstrate compliance—the Project cannot fairly be said to meet its CEQA obligations. (See Cal. Nat. Res. Agency, Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines, OAL Notice File No. Z-2018-0116-12 (Nov. 2018) ("Nov. 2018 Guidelines FSOR") at 95 ["…it is only those plans and regulations that are enforceable against a particular project that a lead agency should consider."][discussing a lead agency's assessment of consistency with a plan or regulation for purposes of a GHG impact significance analysis].)

Setting aside the fact that the Project cannot itself ensure compliance with cap and trade, the EIR is required to present evidence demonstrating that compliance with an existing regulation or plan will, in fact, render emissions less than significant, and is also required to consider evidence that, despite

compliance with the regulation or plan, emissions will still rise to the level of significance. (See CEQA Guidelines §§ 15064, 15604.4; Cal. Nat. Res. Agency, Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97 ["SB 97 FSOR"] (Dec. 2009) at 27, 98.) The Project's EIR did neither here.

"Compliance with the law is not enough to support a finding of no significant impact under the CEQA." (*Californians for Alternatives to Toxics v. Department of Food & Agriculture* (2005) 136 Cal.App.4th 1, 17 [citing *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 881-882.].) Courts have consistently found that EIRs must do more than simply recite the existence of a state-level regulation or program when considering the significance of environmental impacts. (*Id.*; see also *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715 ("*SCOPE*").)

For example, in *Californians for Alternatives to Toxics v. Department of Food & Agriculture*, the State Department of Food and Agriculture ("DFA") developed a plan to address diseased grapes in vineyards, including vegetation removal and the use of pesticides. (*Californians for Alternatives to Toxics*, 136 Cal.App.4th 1, 9.) In concluding that the application of pesticides

would not cause an environmental impact, DFA relied on the existence of state and federal pesticide regulations and licensing and worker safety regulations. (*Id*. at 10.) The agency concluded that consistency with these regulatory schemes was sufficient to determine that impacts would be reduced to less than significant. (*Id*. at 17.) The court disagreed, finding that "DFA repeatedly deferred to the [state] regulatory scheme instead of analyzing environmental consequences of pesticide use and therefore fell short of its duty under CEQA to meaningfully consider the issues raised by the proposed project." (*Id*. at 16.) The EIR contained no analysis of the risks of utilizing particular pesticides or of their possible environmental or human health impacts. (*Id*. at 18.) While the existing state law was designed to regulate pesticide administration, the EIR contained no evidence to demonstrate that compliance with the program would not result in adverse environmental effects, and accordingly, the EIR's "conclusory statements [did] not fit the CEQA bill." (*Id*. at 17.)

Similarly, in *SCOPE*, an EIR improperly relied on the State Water Project's allocation of water deliveries to conclude that the project in question would not create significant water supply impacts, without analyzing the state program's application to the project in practice. (*SCOPE*, 106 Cal.App.4th 715, 720-721.) The EIR instead made "no attempt to calculate or even discuss the differences between entitlement and actual supply." (*Id*. at 722.)

Nor did the EIR give any suggestion that the operation of the program could not "be taken at face value," even though in reality, it was unclear whether the project's water supply impacts would truly be ameliorated by the program. (*Id*. at 723.) The end result, concluded the court, was that decisionmakers and the public could not arrive at a meaningful understanding of the project's impacts. (*Id*. at 722.)

And specifically in the context of GHG impacts analysis, the California Supreme Court has explained that mere reliance on and extrapolation from a state-level plan to project impacts is not enough; substantial evidence must support a conclusion that GHG impacts are not significant. (*Center for Biological Diversity v. Department of Fish & Wildlife* (2015) 62 Cal.4th 204 ("*Newhall Ranch*").) In *Newhall Ranch*, the project's EIR referred to CARB's statewide Scoping Plan and its determination that statewide emissions would need to drop roughly 29 percent below "business as usual" levels in order to achieve California's GHG reduction targets. (*Newhall Ranch*, 62 Cal.4th at 218.) Finding that the project's own emissions would fall 31 percent below a hypothetical "business as usual" scenario, the EIR concluded that the project would not impede progress towards California's climate goals and that its impacts were accordingly less than significant. (*Id*.) The Supreme Court rejected this analysis, explaining that even though the EIR could look to consistency

with the Scoping Plan as a measure for determining the significance of project emissions, it did not contain adequate analysis explaining how the project's own GHG emissions reductions would be consistent with meeting the statewide reduction goal. (*Id*. at 225.) In other words, the EIR could not just conclude that a reduction in project emissions consistent with the state-level plan would necessarily result in less than significant GHG impacts; it had to support that conclusion with substantial evidence in the record. (*Id*. at 226-227.)

So too in this case. Just as in *Californians for Alternatives to Toxics* and *SCOPE* the EIR simply points to the existence of a state scheme—in this case, cap and trade—and declares the Project's GHG impacts insignificant. But the existence of, and potential compliance with, a regulation is "a starting point for a lead agency's analysis," not an automatic pass to skip a meaningful significance analysis. (Nov. 2018 Guidelines FSOR at 95.) Critically, the lead agency must consider whether "a project may still have a significant impact despite compliance with the regulation." (SB 97 FSOR at 98.) Thus, the EIR was required to demonstrate, first, that the Project would comply with the regulation, and next, that compliance with the regulation would, in actuality, render Project impacts less than significant. The EIR never explains how "capped" Project emissions could or would be reduced to less than significant. It offers no suggestion

for how the Project would ensure that fuel suppliers or electricity generators actually comply with the cap-and-trade regulation. Nor does it acknowledge the additional stress on the cap-and-trade system of declining to minimize the great majority of the Project's emissions, instead laying responsibility for reductions at the feet of fuel suppliers, who have no ability to control project design or operations. And it never explains that cap and trade does not require reduction or avoidance of the Project's specific emissions at all. "In the absence of substantial evidence to support the EIR's no-significance finding…the EIR's readers have no way of knowing whether the project's likely greenhouse gas impacts will indeed be significant, and, if so, what mitigation measures will be required to reduce them." (*Newhall Ranch*, 62 Cal.4th at 227.)

Respondents argue that the holding in *Association of Irritated Residents v. Kern County Board of Supervisors* (2017) 17 Cal.App.5th 708 ("*AIR*") is an endorsement of the EIR's approach. But *AIR* did not hold "that a threshold of significance for CEQA purposes could consider only greenhouse gas emissions not covered by the cap-and-trade program." (Resp. Br. at 37.) Instead, in *AIR*, the Fifth District Court of Appeal concluded that the project, a refinery that itself was subject to compliance obligations under the cap-and-trade program, could rely on its compliance with the program to demonstrate that certain of its

GHG emissions—notably, ***not*** its mobile source emissions—would be less than significant. (*AIR*, 17 Cal.App.5th at 742-744.) The fact that the *AIR* project had compliance obligations and could, in practice, ensure its own compliance with the cap-and-trade regulation is a critical distinction.

But to the extent that *AIR* held emissions for which the *AIR* project itself held no compliance obligation, like electricity generation emissions, could be treated as less than significant under cap and trade because other "upstream" entities have compliance obligations under cap and trade, that conclusion was incorrect, and this Court should decline to adopt that approach. As explained above, treating such emissions as necessarily less than significant, without more analysis, ignores the realities of the cap-and-trade program and understates the Project's GHG impacts. It also incorrectly places the burden of mitigating the Project's GHG emissions on entities that cannot control them and have no real obligation to reduce or avoid them.

Allowing the EIR to declare "capped" GHG emissions less than significant under these circumstances would have serious implications for California climate policy and for the administration of CEQA. It would lead to ill-informed land use decisions that overburden our state-level regulatory programs and make compliance with our upcoming GHG reduction targets all the more challenging. It would also undercut CEQA's

fundamental role as a public disclosure and transparency statute by allowing lead agencies to rely on the existence of a state-level regulation, without more, to justify a conclusion that project-level impacts are less than significant. A holding of that nature would have consequences not just in the realm of climate policy, but any time a state-level regulatory program intersects with project-level impacts. It would also be inconsistent with past precedent explaining the role state-level regulation should play to inform significance determinations. (See, e.g., *Californians for Alternatives to Toxics*, 136 Cal.App.4th at 17; *SCOPE*, 106 Cal.App.4th at 720-722.)

The CEQA Guidelines only allow that a lead agency may consider ***the extent of a project's compliance*** with an applicable GHG mitigation regulation when assessing significance of project emissions, but the mere existence of the regulation alone is not enough to remove project emissions from a significance calculus. Because the Project cannot ensure compliance with cap and trade, and because even if it could, compliance with the program is not conclusive evidence that the Project's GHG impacts are less than significant, the EIR was required to analyze the significance of the so-called "capped" emissions it discounted. (CEQA Guidelines, § 15064.4, subd. (b)(3); SB 97 FSOR at 98.) Its failure to do so renders the EIR

inadequate. (*Newhall Ranch*, 62 Cal.4th at 226-227; *Californians for Alternatives to Toxics*, 136 Cal.App.4th at 17.)

**b. Project emissions are not "mitigated" as required by CEQA.**

Respondents' brief repeatedly states that cap and trade will "mitigate" the Project's GHG emissions. (See, e.g., Resp. Br. at 35, 49, 57.) This terminology conflates the concept of mitigation of GHG emissions—meaning the reduction or avoidance of GHG emissions—with the concept of mitigation under CEQA, which requires that steps be taken to reduce project-specific environmental impacts. Eliding the two concepts, Respondents suggest that "the source of mitigation for greenhouse gases from fuel combustion—whether at the project level or the fuel supplier level—is irrelevant…" (Resp. Br. at 49.) But from a CEQA perspective, that statement is untrue.

As the California Natural Resources Agency, one of the state agencies responsible for updating the CEQA Guidelines, has explained, "to demonstrate consistency with an existing GHG reduction plan, a lead agency would have to show that the plan actually addresses the emissions that would result from the project." (SB 97 FSOR at 27.) This is consistent with the well-settled CEQA principle that mitigation of project impacts must be fully enforceable and implemented as a condition of project development. (See, e.g., Cal. Pub. Res. Code § 21081.6, subd. (b);

CEQA Guidelines § 15126.4, subd. (a)(1)(D); *Environmental Council of Sacramento v. City of Sacramento* (2006) 142 Cal.App.4th 1018, 1035; *Federation of Hillside & Canyon Associations v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1260-1261.) Even Respondents acknowledge that mitigation of Project emissions has to be "enforceable and verifiable." (Resp. Br. at 49.)

Where mitigation is speculative and vague, it is inadequate under CEQA. (See *California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 197-198; *Lincoln Place Tenants Assn. v. City of Los Angeles* (2007) 155 Cal.App.4th 425, 445 [mitigation must be feasible and enforceable].) Traditionally, CEQA mitigation occurs at the project level, and the adequacy of mitigation is subject to a project-by-project analysis. (See *California Native Plant Society v. County of El Dorado* (2009) 170 Cal.App.4th 1026, 1053; *Environmental Council of Sacramento*, 142 Cal.App.4th at 1024-1028.) Where mitigation is untethered to project-specific mitigation measures themselves, like in the case of in-lieu fee programs that allow a developer to pay into a fund to mitigate project impacts, CEQA still requires the proposed mitigation to be "sufficiently tied to the actual mitigation of the impacts." (*Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 140-141 [specific traffic improvement projects funded by

mitigation fees were in place and would actually reduce traffic impacts caused by the project]; see also *California Clean Energy Committee*, 225 Cal.App.4th at 197-199 [fee program to support fair share plans was impermissibly speculative mitigation and EIR did not adequately explain how it would address project impacts]; *California Native Plant Society*, 170 Cal.App.4th at 1056 [payment of a mitigation fee alone was not enough to ensure that project-level impacts would be mitigated to insignificance]; *Anderson First Coalition v. City of Anderson* (2005) 130 Cal.App.4th 1173, 1188.)

Here, the EIR makes no attempt to tie the supposed cap-and-trade "mitigation" to mitigation of Project-specific GHG emissions—because it cannot. As discussed *supra* in Section II.B.3, the cap-and-trade program imposes an economy-wide cap, and as such provides no way to track or account for how the Project's own emissions would be reduced or avoided, if at all. And there is no way for the lead agency or the Project to enforce cap and trade against the fuel suppliers or electricity generators that hold compliance obligations under the regulation, or for them to verify that an adequate number of compliance mechanisms have been surrendered to cover the Project's emissions. This feature makes the cap-and-trade "mitigation" Respondents propose even more speculative than in-lieu fee programs: in the case of in-lieu fees, projects at least pay into fee

programs, but in this case, the Project has no relation to or involvement with the cap-and-trade program at all.

It also exemplifies the misleading nature of the EIR's GHG impacts analysis. The EIR suggests that the Project's own emissions will be reduced or avoided by operation of the cap-and-trade program such that decisionmakers and the public need not be concerned about the hundreds of thousands of metric tons of new GHG emissions the Project will produce ***every single year*** after it is built out. In reality, the Project will severely compromise Moreno Valley's ability to meet long-term climate goals. To illustrate, the City of Moreno Valley's own Energy Efficiency and Climate Action Strategy explains that to meet AB 32 targets, the City will have to implement local emission reduction policies. (City of Moreno Valley, Energy Efficiency and Climate Action Strategy ("Climate Action Strategy") (Oct. 2012) at 4 ["For California to reach its greenhouse gas reduction goals, communities must address how they grow."], 6 ["the City would still need to supplement the statewide measures with the implementation of local reduction policies" to meet its 2020 target].) To achieve compliance with AB 32, the City set a 2020 target of about 779,790 metric tons of $CO_2e$. (Climate Action Strategy at 6 [stating an emissions reduction target of 15 percent below 2010 emissions to meet 2020 mandate].) Assuming the City is able to meet its target and hold steady to that reduction

through Project buildout, the first year of Project emissions after buildout would result in total City emissions of 171,003 metric tons $CO_2e$ ***above*** 2010 levels—rather than the 15 percent ***below*** 2010 levels that the City has committed to—totally erasing the City's progress toward its climate goal. All told, the Project alone would cause a nearly 40 percent jump in the City's emissions over and above its 2020 target. What's more, this analysis understates the Project's emissions impact relative to the City's climate goals because the City has not yet revised its Climate Action Strategy to meet 2030 reduction targets, which are even more ambitious. In other words, to stay on track to meet statewide climate mandates, the City would have to find some way to reduce ***more than one-third*** of its total annual emissions to accommodate the Project's emissions. Fuel suppliers cannot guarantee these reductions; it is the City and the Project that are "uniquely capable of addressing [these] emissions…" (Climate Action Strategy at 4.)

But the EIR does not contemplate Project-specific mitigation measures, having written off the bulk of those emissions before even comparing Project emissions to the Air District significance threshold. The EIR suggests that over 90 percent of the Project's GHG emissions will be mitigated by somebody else, but that is not, and in practicality cannot be, the case. Without properly acknowledging and attempting to

mitigate these emissions, the EIR cannot serve its proper purpose as an "informational document." (See Cal. Pub. Res. Code § 21061; Cal. Pub. Res. Code §§ 21002, 21081 [requiring mitigation of a project's significant environmental impacts].)

## III. Conclusion

The EIR's analysis of the Project's GHG impacts misapprehends the cap-and-trade program and misinforms the public and decisionmakers about the true significance of the Project's emissions. The case for reversing the lower court decision on these facts strikes us as particularly strong, given the post-2030 timing of Project's emissions and the flimsy relationship of the Project to cap-and-trade compliance obligations. But beyond that, the cap-and-trade program was never intended to be California's sole mechanism for reducing emissions from capped sectors and should not be forced to bear that weight. The EIR's analysis, if endorsed, would have dire consequences for California's ability to meet its climate goals and would upend settled CEQA precedent about the role state-level regulation should play in assessing the significance of project impacts. We respectfully urge the Court to reject the EIR's approach and find the GHG impacts analysis inadequate.

Dated: December 26, 2019

By:_____

Cara A. Horowitz
Julia E. Stein

Counsel for *Amici*
California CEQA and
Climate Policy Experts

**CERTIFICATE OF COMPLIANCE**

(California Rules of Court 8.204(c)(1))

Counsel of Record hereby certifies that pursuant to Rule 8.204(c)(1) of the California Rules of Court, the enclosed brief of a*mici curiae* California CEQA and Climate Policy Experts is produced using 13-point Roman type including footnotes and contains approximately 9,945 words, which is less than the total words permitted by the rules of court. Counsel relies on the word count of the Microsoft Word computer program used to prepare this brief.

Dated: December 26, 2019

By:_____

Cara A. Horowitz
Julia E. Stein

Counsel for *Amici*
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**PROOF OF SERVICE**

ALBERT THOMAS PAULEK, et al.,
Plaintiffs and Respondents,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants;

LABORERS INTERNATIONAL UNION OF NORTH AMERICA, LOCAL 1184, et al.,
Plaintiffs and Appellants,

vs.

MORENO VALLEY COMMUNITY SERVICES DISTRICT, et al.;
Defendants and Appellants;

I am employed in the County of Los Angeles, State of California. I am over the age of eighteen and am not a party to the within action; my business address is 385 Charles E. Young Drive, Los Angeles, California 90095. On December 26, 2019, I served true copies of the following document(s) described as:

**PROPOSED AMICI CURIAE BRIEF OF CALIFORNIA CEQA AND CLIMATE POLICY EXPERTS**

on the parties in this action as follows:

**SEE ATTACHED SERVICE LIST**

**BY ELECTRONIC SERVICE:** I caused a copy of the document described above to be sent via TrueFiling's electronic service system to the persons at the email addresses listed below. I did not receive, within a reasonable time after the transmission, any electronic message or other indication that the transmission was unsuccessful.

**BY U.S. MAIL:** I caused a copy of the document described above to be mailed via U.S. postal service to the Superior Court in this case, at the following address: Riverside County Superior Court, 4050 Main Street, Riverside, California 92501.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on December 26, 2019, at Miami, Florida.

_____

Cara A. Horowitz

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# Attachment R

## Correspondence with Homeowner

ESA

HIGHLAND FAIRVIEW
14255 Corportae Way
Moreno Valley, Ca 92553
Tel: 951-867-5327

March 18, 2020

Mr. Jose Robles
The Breanna Isabel Robles Living Trust / Krattenmaker, David
13100 World Logic Center Parkway
Moreno Valley, CA 92555

Re: Air Filter for Home Furnace

Dear Jose:

As part of Highland Fairview's development program at the World Logistics Center, Highland Fairview is providing homeowners within the project area with furnace air filters free of charge.

The filters we are providing are rated MERV-13. These filters help in capturing dust and contaminates in the air before they enter the house. The MERV-13 filter standard refers to the size and kind of air contaminants it can capture. Additional information on the filter can be found at: https://www.coolray.com/img/uploads/What_does_MERV_Rating_mean.pdf

If you would like us to install the filter system at your home free of charge, please sign below. We are ready to install the filter system at any time that is convenient for you before grading starts at the World Logistics Center.

Very Truly Yours,

Iddo Benzeevi
Highland Fairview

The offer for the installation of the filter system is accepted.

Date: 3/20/20 Homeowner:

Jose Robles