



Executive Summary

This report is the second examination by the Office of Environmental Health Hazard Assessment (OEHHA) of the impacts on disadvantaged communities in California from emissions associated with the climate change policies and programs mandated by the Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32) (Nunez, Statutes of 2006), and related legislation. The California Air Resources Board (CARB), along with other state agencies, administer these policies and programs, which are aimed at reducing greenhouse gas (GHG) emissions. Since 2015, OEHHA has been tasked with analyzing and reporting on the benefits and impacts of the GHG emissions limits adopted by CARB under AB 32.

OEHHA's first report on this subject (2017) focused solely on emissions from industrial facilities that were subject to the Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, known as the Cap-and-Trade Program (CARB 2019a). This report builds on that work, while also evaluating another significant contributor of GHGs, namely localized co-pollutants in the form of emissions from heavy-duty vehicles (HDVs). A range of federal, state and local laws and regulations over the years have led to significant air quality improvements throughout California. In addition to emission reductions from those efforts, important co-pollutants like air toxics and particulate matter may be reduced when climate policies are implemented, especially when they result from fuel combustion.

This report's major findings include the following:

1. Both HDVs and facilities subject to the Cap-and-Trade Program have reduced emissions of co-pollutants, with HDVs showing a clearer downward trend when compared to stationary sources. These emission reductions have major health benefits, including a reduction in premature pollution-related deaths.
2. The greatest beneficiaries of reduced emissions from both HDVs and facilities subject to the Cap-and-Trade Program have been in communities of color and in disadvantaged communities in California, as identified by CalEnviroScreen (CES). This has reduced the emission gap between communities with high and low CES scores, but a wide gap still remains.
3. The transition to zero-emission HDVs will expedite further emissions reductions.
4. While the progress observed is encouraging, inequities persist and federal, state, and local climate and air quality programs must do more to reduce emissions of

GHGs and co-pollutants in order to reduce the burden of emissions on disadvantaged communities and communities of color.

Heavy-Duty Vehicle Emissions

We found that diesel particulate matter (DPM) concentrations have decreased across California for the last 20 years, with the greatest benefits accruing to high-scoring communities identified by CES as having high levels of both pollution and vulnerability to its effects. DPM has decreased in these communities three times more than it has in low-scoring communities.

We also found taking certain actions to transition from HDVs to zero-emission vehicles by 2045 could significantly reduce statewide emissions of fine particulate matter (PM_{2.5}) associated with HDVs by an estimated 58%, when compared to business as usual. These reductions have the potential to avoid an estimated 3,800 premature deaths over 25 years, two thirds of which would benefit people of color. These benefits would be felt in California's most impacted communities, with a third of the avoided premature deaths would be located in high-scoring CES communities.

Emissions from Cap-and-Trade Covered Facilities

We found that facilities subject to the Cap-and-Trade Program are three times more likely to be located in or near disadvantaged communities and communities of color. As a result, these communities also have the potential to benefit most from reductions in co-pollutant emissions. We evaluated the change in emissions from Cap-and-Trade-covered facilities in 2017 compared to 2012 and found a 45-fold greater reduction of PM_{2.5} exposure in high-scoring versus low-scoring communities. We also found that the majority (68%) of health benefits from reductions in emissions from facilities subject to the Cap-and-Trade Program have been for people of color. Although we observed statewide reductions in GHGs, PM_{2.5}, and air toxics, the relationship between facility emissions of GHGs and co-pollutants is variable by sector, pollutant, and year.

While significant improvements have been made in disadvantaged communities and communities of color, which may be attributed to a range of federal, state and local programs and policies, they continue to be overburdened. We found that Black Californians in particular experience twice the PM_{2.5} exposure from facilities covered by the Cap-and-Trade Program than White Californians do. Furthermore, we found that Black Californians experience three times greater exposure from refinery emissions than all other stationary source sectors covered by the Cap-and-Trade Program combined.

To comply with requirements under the Cap-and-Trade Program, entities may surrender a specified number of offsets to fulfill part of their compliance obligation, in addition to emission allowances. For entities subject to this Program, we evaluated emission trends, the use of

offsets, and the location of their associated facilities. We found that four of the top five entities that use the most offsets own petroleum refineries, and refineries contribute more to PM disparity by CES score and race/ethnicity than any other sector. However, despite the use of offsets by entities that own refineries, Black Californians experienced a four-fold greater reduction in PM2.5 exposure from these sources compared to White Californians for the periods that were compared.

Approach to the Analysis

We conducted our analysis by evaluating GHG and co-pollutant emissions from HDVs and facilities subject to the Cap-and-Trade Program, modeling the associated primary and secondary PM2.5 concentrations and estimating health effects due to exposure changes to PM2.5. For HDVs, we examined historical trends (2000-2019) for DPM and modeled projected PM2.5 concentrations for 2020-2045. For our analysis of facilities subject to the Cap-and-Trade Program, we examined emission trends from pre-Cap-and-Trade implementation (2011) to the most recent year emission data was available (2018). We then modeled PM2.5 exposure concentrations using 2012 and 2017 PM2.5 and precursor emissions. While data from 2011 to 2018 was available to us, we used the emissions from 2012 and 2017 for modeling and health analysis because these two years were used for the National Emissions Inventory. Consequently, the emissions data was subject to more rigorous quality checking than other years in the study period. These analyses were facilitated by work since the last report such as the Pollution Mapping Tool (CARB 2018).

We paid particular attention to communities already disproportionately burdened by environmental, socioeconomic and health issues, as identified by CES. We defined communities as disadvantaged and overburdened if they scored in the top 25% of communities statewide when ranked by CES score. We examined emissions, exposure, and health benefits by high (top 25%) and low (bottom 25%) scoring CES communities and by race/ethnicity.

Future Work

OEHHA will continue to provide updates, and seek new and improved data to evaluate emission trends and impacts in disadvantaged communities associated with emissions sources affected by California's climate change policies and programs. OEHHA staff will work to better inform our future research efforts with input and partnerships from those who live in impacted communities. While emissions reductions have narrowed the air quality gap between communities with high and low CES scores, there continue to be inequities. Similarly, while additional data has become available since the previous report, there are still significant gaps in available data.

Efforts that would facilitate future analyses include:

1. Collecting granular, community-level data for mobile sources.
2. Improving data accessibility for criteria pollutant and air toxics emissions data.
3. Adding finer scale criteria pollutant and air toxics emissions reporting for the oil and gas sector.
4. Implementing statewide data standards for all emission sources.
5. Increasing transparency regarding offset entity information.
6. Creating environmental and health equity benchmarks.