California’s Proposed Mobile Source Electrification Regulations

David L. Rothbart, P.E., BCEE
SCAP Air Quality Committee Chair
Air Quality Requirements

- Reduce GHG Emissions – AB 32 & SB 32
- Attain Clean Air Act Standards (Ozone)
Air Quality Requirements

- Reduce Toxic Air Emissions – AB 2588

More than 50% of the cancer risk is due to diesel emissions
Primary Sources of Emissions

- Sources of GHG Emissions
  - Electrical power
  - Mobile sources (cars, trucks, ships, planes & trains)

- Sources of Ozone Forming Emissions (NOx)
  - Mobile sources (cars, trucks, ships, planes & trains)

- Air Toxics (Diesel)
  - Mobile sources (trucks, ships & trains)

Fossil Fuels

Coal
Natural Gas
Crude Oil
Governor Newsom’s Zero-Emission by 2035 Executive Order (N-79-20)

Executive Order calls for elimination of new internal combustion passenger vehicles by 2035

DATE January 19, 2021

By setting a course to end sales of internal combustion passenger vehicles by 2035, the Governor’s Executive Order establishes a target for the transportation sector that helps put the state on a path to carbon neutrality by 2045. It is important to note that the Executive Order

The transportation sector, including all passenger cars and light trucks, heavy-duty trucks, off-road vehicles, and the fuels needed to power them, is responsible for more than half of California’s greenhouse gas emissions. It is also responsible for the majority of smog-causing pollutants and is a significant source of toxic air contaminants that directly impact community health. These emissions pose a direct threat to the environment, the economy and public health.
What is Carbon Neutrality?

*Carbon neutrality* means every ton of anthropogenic CO$_2$ emitted is compensated with an equivalent amount of CO$_2$ removed.
Proposed Regulatory Actions

California - Proposed Mobile Source Electrification Regulations

- CARB: Mobile Source Strategy
- CARB: 2022 Scoping Plan Update
- CARB: Advanced Clean Fleets
- CARB: Zero-Emission Forklifts
- CARB: Small Off-Road Engines (SORE)

Local Plans to Attain Federal Ozone Standards

- SCAQMD: 2022 Air Quality Management Plan
- SJVAPCD: 2022 Air Quality Management Plan
CARB’s Mobile Source Strategy

100% ZEV sales by 2035

Full transition to
ZEV short-haul/drayage trucks by 2035

Full transition to ZEV buses & heavy-duty long-haul trucks by 2045*

- Phase-in zero emission trucks and buses 2023 to 2045*
  - State and local government fleets
  - High priority private fleets and federal agencies
“Light- and medium-duty vehicles are in the midst of transitioning to zero-emission technology, and heavy-duty trucks will follow. But full adoption won’t be possible until the obstacles around charging infrastructure and limited range are addressed.” Fleet Equipment, April 2021
Problem Statement

CARB Vehicle Electrification Timeline: 2045

- **NO\textsubscript{x} Emissions**
  - 2031: 73% below 2017
  - 2037: 82% below 2017

- **Greenhouse Gas Emissions**
  - 2045: 76% below 2020

- **85 percent** of passenger vehicles ZEV & PHEV in 2045
- **77 percent** of heavy-duty fleet ZEVs in 2045

*well-to-wheel, excluding aviation
Problem Statement

SCAQMD Attainment Deadlines: **2023/2031**

(Tons of NOx per day)

[Chart showing emission from different sources with deadlines for reduction]
Problem Statement

- CARB’s proposed reductions are insufficient to achieve attainment in South Coast and San Joaquin Valley Air Basins

- Non-attainment sanctions can be imposed by the EPA:
  - Withholding federal highway funds
  - Annual fines on Title V facilities
  - Increased offsetting requirements

<table>
<thead>
<tr>
<th>CARB Control Measures</th>
<th>Adoption</th>
<th>Implementation</th>
<th>SC 2023</th>
<th>SJV 2024</th>
<th>SC 2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>American ETS, DVIP and PSIP*</td>
<td>2018</td>
<td>2019</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Innovative Clean Fuels</td>
<td>2019</td>
<td>2023</td>
<td>0.5</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>South Coast Clock-in/Vehicle Incentive Measure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>San Joaquin Clock-in/Vehicle Incentive Measure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Zero Emission Airport Shuttle*</td>
<td>2019</td>
<td>2027</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Ocean Going Vessels At Berth*</td>
<td>2020</td>
<td>2024</td>
<td>1.1</td>
<td>&lt;0.1</td>
<td>3.6</td>
</tr>
<tr>
<td>ACT and Heavy-Duty Omnibus*</td>
<td>2020</td>
<td>2024</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>7</td>
</tr>
<tr>
<td>U.S. EPA CTI*</td>
<td>2021</td>
<td>~2027</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Zero Emission Heavy-Duty I/M*</td>
<td>2021</td>
<td>2023</td>
<td>0</td>
<td>&lt;0.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Advanced Clean Fleet</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>6.10</td>
</tr>
<tr>
<td>Small Off-Road Engine*</td>
<td>2021</td>
<td>2024</td>
<td>0</td>
<td>&lt;0.1</td>
<td>2.8</td>
</tr>
<tr>
<td>Transport Refrigeration Unit*</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>0.4</td>
</tr>
<tr>
<td>In-U-S</td>
<td></td>
<td></td>
<td>0.4</td>
<td>0.4</td>
<td>7</td>
</tr>
<tr>
<td>Advanced Clean Cars II*</td>
<td>2022</td>
<td>2026</td>
<td>0</td>
<td>0</td>
<td>3.2</td>
</tr>
<tr>
<td>Zero Emission Heavy-Duty On-Road</td>
<td></td>
<td></td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo Handling Equipment</td>
<td>TBD</td>
<td>TBD</td>
<td>0.1</td>
<td>&lt;0.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Construction &amp; Mining</td>
<td>TBD</td>
<td>TBD</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>3.4</td>
</tr>
<tr>
<td>TOTAL (Tons of NOx per day)</td>
<td>6.6</td>
<td>17.3</td>
<td>63-67</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Today, I am requesting that the Air Resources Board evaluate how to achieve **carbon neutrality no later than 2035** as part of its 2022 Climate Change Scoping Plan. The work should include analysis of how to reduce or eliminate demand for fossil fuel in California and end oil extraction in our state. This work can identify a

Dear Chair Randolph,

California is a global leader in setting ambitious goals to combat climate change and implementing innovative policies and programs that limit greenhouse gas emissions while driving economic growth. Our approach to combating the climate crisis is an international model that builds on a long history of environmental protection and innovation that can only happen here, in California, where the future happens first.
Rare Earth Mining Impacts

“...demand from manufacturers could reach 2.8 million metric tons in 2028. However, mining capacity is only expected to reach about 2 million metric tons that year...” IEEE Spectrum, May 2021

Potential Electric Vehicle Barriers

Tiangi Lithium Mine (China)

Sonora Lithium Mine (Mexico)
SB 1383 – Food Waste Recycling

- Increased Potential for Biogas Production
- Potential Future Use of Biogas

### SB 1383 Requirements

<table>
<thead>
<tr>
<th>Year</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>50% reduction in landfilled organic waste (11.5 million tons allowed organic waste disposal)</td>
</tr>
<tr>
<td>2022</td>
<td>Regulations take effect</td>
</tr>
<tr>
<td>2025</td>
<td>75% reduction in landfilled organic waste (5.7 million tons allowed organic waste disposal)</td>
</tr>
<tr>
<td>2025</td>
<td>20% increase in recovery of currently disposed edible food</td>
</tr>
</tbody>
</table>

Image Source: CalRecycle
Near-Zero RNG Option

The Cleanest Commercially Available Heavy-Duty Engine Technology

Cummins Westport’s line of near-zero emission engines are the world’s first (and only) heavy-duty engines certified to meet CARB’s lowest-tier optional low-NOx emission standard of 0.02 g/bhp-hr NOx, which is 90% cleaner than the

“...reduces smog-forming NOx emissions by 90% (to 0.02 g/bhp-hr) compared to the current Environmental Protection Agency (EPA) standard. When operated using RNG, the system is credited with a neutral to negative carbon index, resulting in net greenhouse gas (GHG) emissions at or below zero”. Source: Green Car Congress, March 2021
CARB staff is not including near-zero transportation options in various mobile source electrification regulatory efforts.

Local air districts object to an electrification only approach. Near-zero options should be included to reduce emissions as soon as possible.
CARB is Proposing:
- Passenger vehicle sales: 100% zero-emission in 2035
- Smaller off-road vehicle sales (e.g., forklifts, lawn & garden, engines less than 25 horsepower): 100% zero-emission by 2035
- Heavy duty on-road vehicles: initial zero-emission phase-in by 2023 for state and local government fleets
- Heavier off-road sales: zero-emission, when feasible

Federal attainment will not be achieved, if an electrification only approach is adopted by CARB

Food waste diversion (SB 1383) may be negatively impacted

CASA is requesting near-zero transportation options be included in CARB’s proposed regulations
Questions?

David L. Rothbart, P.E., BCEE
SCAP Air Quality Committee Chair
Los Angeles County Sanitation Districts
Air Quality Engineering Section
(562) 908-4288, extension 2412
drothbart@lacsd.org