Five Key Policies to Make the Shift to Zero Emission Heavy-Duty Vehicles

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HDVs will contribute more to transport GHG emissions over time

As the global passenger vehicle stock transitions to electric vehicles, trucks and buses combined are projected to become the largest source of on-road CO2 emissions due to slower rates of electrification.

Well-to-wheel CO2 emissions from passenger vehicles, trucks and buses under a transport decarbonization policy scenario that includes EVs. (Mt CO2/year)

Mt CO2 = million tonnes of carbon dioxide
Data Source: https://www.globalfueleconomy.org/media/018302/gfei-working-paper-20.pdf
Market Transition to HD ZEVs

Sales of HD ZEVs in Major Markets, 2020

Total sales and zero-­emission sales of heavy-­duty vehicles in ZEV Transition Council members

ICCT
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION
China HD ZEV Sales are Large but Falling

China Sales of Zero Emission Buses and Trucks, 2011-2020

Areas of Concern

• No national 100% HD ZEV goal
• No performance-based technology forcing standards
• Declining fiscal incentives
• No national HD ZEV infrastructure program

Five Key Actions to Accelerate Zero Emission Trucks and Buses

- ZEV Phase-in Targets
- Performance Requirements
- Fiscal incentives
- Infrastructure Programs
- Purchase requirements
1. Adopt zero-emission sales and operations targets
Target: 100% HD ZEV Sales by 2040

Recommendations

- Adopt ambitious near-term ZEV sales targets
- Adopt long-term 100% ZEV sales and operations targets
- Maintain technology neutral approach

2. Adopt zero-emission performance standards for new vehicles
Zero emission powertrain performance requirement (0 g CO₂/NOₓ/PM per km)

California Advanced Clean Trucks ZEV Sales Requirements, 2024-2035

Recommendations
- Align zero-emission requirements with sales targets
- Adopt aggressive timelines for high priority vehicle segments
- Adopt fleet average technology forcing standards
- Limit incentive credits

3. Provide Fiscal Incentives
Road toll exemptions to achieve price parity between battery electric and diesel trucks

Change in TCO Parity with Road Toll Exemptions

<table>
<thead>
<tr>
<th>Country</th>
<th>Current policies</th>
<th>With toll exemptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>2028</td>
<td>2023</td>
</tr>
<tr>
<td>Spain</td>
<td>2025</td>
<td>2022</td>
</tr>
<tr>
<td>France</td>
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<td>2021</td>
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<td>Italy</td>
<td>2027</td>
<td>2023</td>
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<td>2022</td>
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<tr>
<td>Poland</td>
<td>2026</td>
<td>2025</td>
</tr>
<tr>
<td>UK</td>
<td>2025</td>
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</tr>
</tbody>
</table>

Recommendations

• Provide both purchase and operating incentives
• Maintain incentives equal to incremental cost
• Support long-term incentives with ‘bonus-malus’ incentive design

Germany 100% exemption, 75% in other countries

4. Establish Infrastructure Programs and Policies
Construct a National Zero Emission HDV Charging and Fueling Network

Recommendations

- Establish a national plan for public and private investment in charging and H₂ infrastructure
- Establish minimum number and power requirements of the charging network
- Prioritize key freight corridors and stopping locations
- Increase investment by 25-35% annually
5. Expand Fleet Purchase Requirements
Achieve zero emission operations through: 100% fleet purchase requirements

California Proposed Advanced Clean Fleets Requirements (Sep 2021)

<table>
<thead>
<tr>
<th>Zero-Emission Fleet Percentage</th>
<th>10%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
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</thead>
<tbody>
<tr>
<td>Box trucks, vans, two-axle buses, yard trucks</td>
<td>2025</td>
<td>2028</td>
<td>2031</td>
<td>2033</td>
<td>2035</td>
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<tr>
<td>Work trucks, day cab tractors, three-axle buses</td>
<td>2027</td>
<td>2030</td>
<td>2033</td>
<td>2036</td>
<td>2039</td>
</tr>
<tr>
<td>Sleeper cab tractors and specialty vehicles</td>
<td>2030</td>
<td>2033</td>
<td>2036</td>
<td>2039</td>
<td>2042</td>
</tr>
</tbody>
</table>

**Recommendations**
- Establish national fleet purchase requirements for dedicated fleets
- Expand zero emission areas beyond city centers and including freight corridors

Achieve zero emission operations through: Zero emission zones

**Recommendations**
- Expand zero emission areas beyond city centers and including freight corridors

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*Zero-emission zones grant unrestricted access to battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs) only. In addition to BEVs and FCEVs, near-zero-emission zones grant unrestricted access to plug-in hybrid electric vehicles (PHEVs). Zones for freight are defined in different ways, with affected vehicles ranging from urban delivery vehicles to medium- and heavy-duty trucks. Affected areas of zones range from a few streets to an entire city.*
Recommendations

1. Phase out targets
   • Adopt target of 100% zero emission sales of HDVs by 2040, with faster targets for key segments

2. Zero Emission Performance Requirements
   • Adopt ZEV regulations to align with ZEV targets and transportation decarbonization goals.

3. Fiscal incentives
   • Adopt fiscal incentives equal to incremental cost across all vehicle classes
   • Adopt in-use fiscal incentives such as road tolls

4. Charging infrastructure
   • Develop a national zero-emission charging and H2 refueling plan to shape public and private investment

5. Market demand
   • Adopt national fleet purchase requirements and expand zero emission areas
THANK YOU

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Phase-out targets for ICE HDVs (Aug 2021)

## Non-Binding ZEV Sales and Stock Targets

<table>
<thead>
<tr>
<th>Market</th>
<th>Vehicle segment</th>
<th>Type of target</th>
<th>Year</th>
<th>Target</th>
<th>Source</th>
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<tbody>
<tr>
<td>Austria</td>
<td>All medium- and heavy-duty vehicles</td>
<td>New sales</td>
<td>2030</td>
<td>100% zero-emission buses</td>
<td>Government document⁴</td>
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<td></td>
<td></td>
<td></td>
<td>2032</td>
<td>100% zero-emission trucks under 18 t</td>
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<td></td>
<td></td>
<td></td>
<td>2035</td>
<td>100% zero-emission</td>
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<tr>
<td>Korea</td>
<td>Trucks</td>
<td>Vehicle stock</td>
<td>2040</td>
<td>40,000 fuel-cell electric trucks</td>
<td>Government document⁶</td>
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<td>Netherlands</td>
<td>Fuel-cell electric HDVs</td>
<td>New sales</td>
<td>2025</td>
<td>3,000 sales</td>
<td>Government document⁷</td>
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<td>Norway</td>
<td>Trucks</td>
<td>New sales</td>
<td>2029</td>
<td>50% zero-emission</td>
<td>Government document⁸</td>
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<td>Pakistan</td>
<td>Trucks</td>
<td>New sales</td>
<td>2030</td>
<td>30% electric</td>
<td>Government document⁹</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2040</td>
<td>90% electric</td>
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<td>United Kingdom</td>
<td>Trucks</td>
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<td>2035</td>
<td>100% zero-emission trucks under 26 t</td>
<td>Government document and consultation¹⁰</td>
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<td></td>
<td></td>
<td>2040</td>
<td>100% zero-emission</td>
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<td>California (U.S.)</td>
<td>All medium- and heavy-duty vehicles</td>
<td>Vehicle stock</td>
<td>2045</td>
<td>100% zero-emission</td>
<td>Executive order¹¹</td>
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<td>15 U.S. states¹ and the District of Columbia</td>
<td>All medium- and heavy-duty vehicles</td>
<td>New sales</td>
<td>2030</td>
<td>30% zero-emission</td>
<td>Government Memorandum of Understanding¹²</td>
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<td></td>
<td>2050</td>
<td>100% zero-emission</td>
<td></td>
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<tr>
<td>Hainan (China)</td>
<td>Sanitation vehicles</td>
<td>New sales</td>
<td>2019</td>
<td>50% New Energy Vehicles (NEV)</td>
<td>Government document¹³</td>
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