Decarbonizing Road Transport by 2050

Effective policies to accelerate the transition to zero-emission vehicles

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Overview of Presentation

We identify and evaluate six types of policies necessary to accelerate the transition to zero emission vehicles:

1. Phase out targets
2. Emission standards for conventional pollutants
3. ZEV regulations and CO_2 standards
4. Fiscal incentives
5. Charging infrastructure
6. Consumer awareness/ Fleet purchase requirements

Phase out dates for fossil fuel vehicles set the pace for electrification: Light-duty vehicles

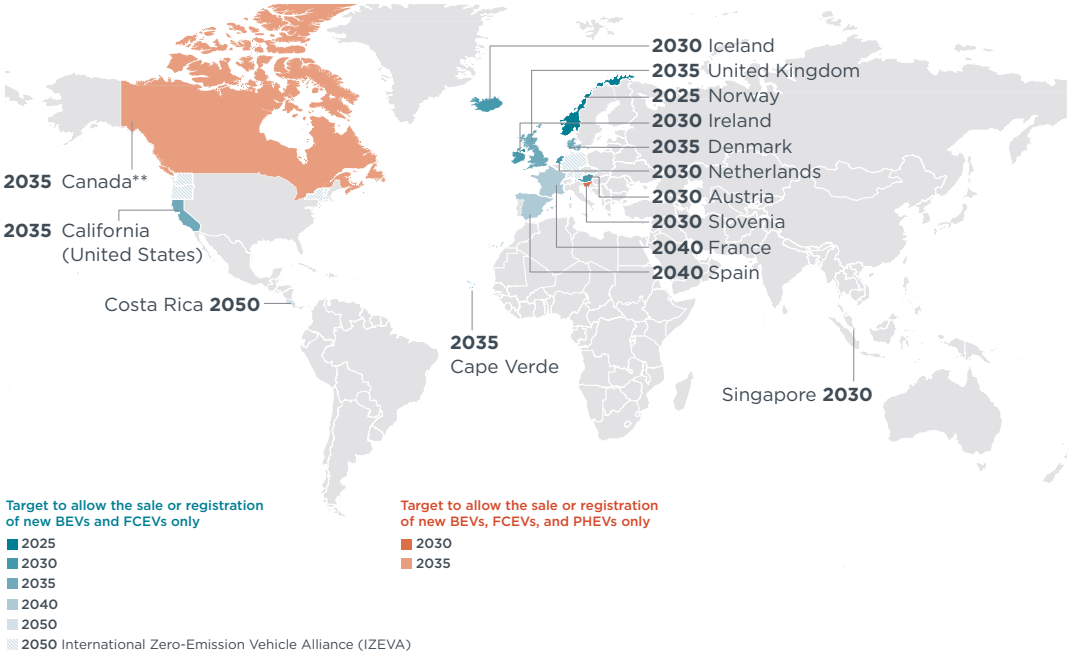
Findings:

- Seventeen (17) governments have LDV phase out targets accounting for 12% of global sales (see map).
- Fifteen (15) US States including California have HDV phase out targets with another nine (9) countries pursuing them.
- Not represented on the map are countries with ZEV targets at less than 100%, including US and China that together account for more than 40% of the global car market.

Recommendation:

- Expand phase out targets for LDVs (2035) with emphasis on major vehicle markets.

Governments with official targets to phase out 100% of sales or registrations of new internal combustion passenger cars by 2050 or earlier.



* Includes countries, states, and provinces that have set targets to only allow the sale or registration of new battery electric vehicles (BEVs), fuel cell electric vehicles (FCEVs), and plug-in hybrid electric vehicles (PHEVs). Countries such as Japan with pledges that include hybrid electric vehicles (HEVs) and mild hybrid electric vehicles (MHEVs) are excluded as these vehicles are non plug-in hybrids.
** The Canadian province of British Columbia has set its 2040 target into binding regulation; the Canadian province of Québec has also set a target for 2035.

Source: https://theicct.org/global-ice-phase-out-map

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Phase out dates for ICEVs set the pace for electrification: Heavy-duty vehicles

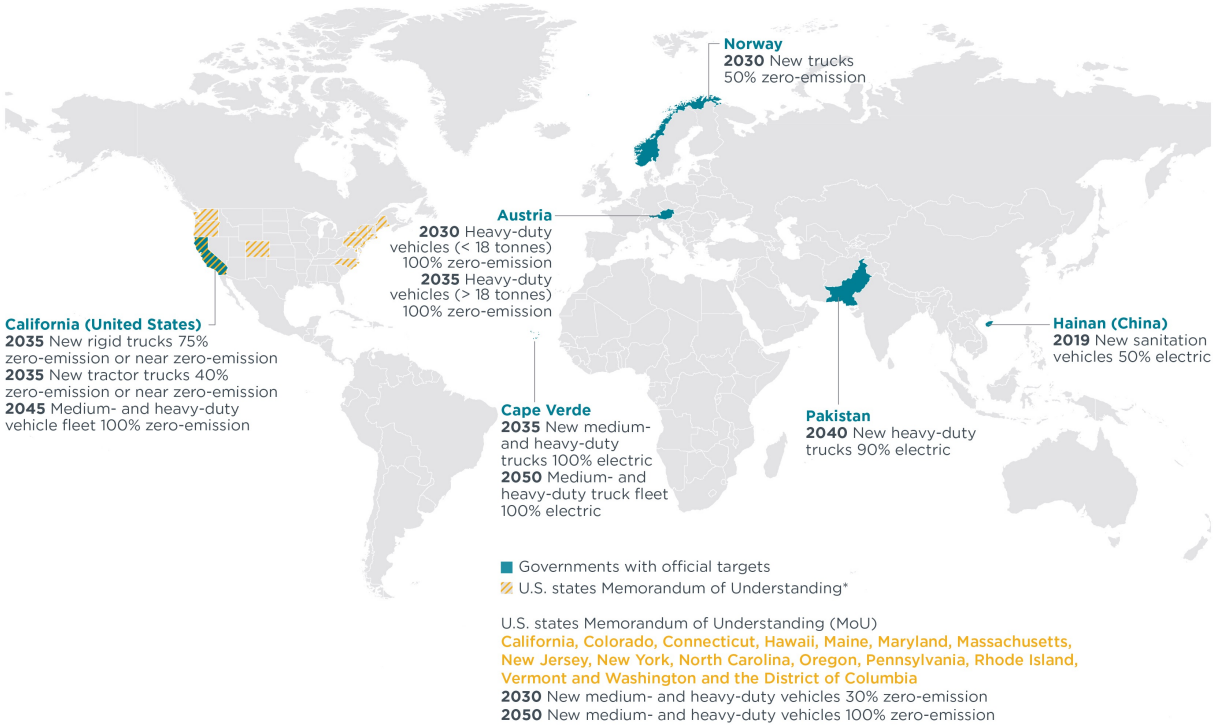
Findings:

- 15 US States including California have HDV phase out targets with another 9 countries pursuing them.
- Not represented on the map are countries with ZEV targets at less than 100%, or targets limited to HDV segments (e.g. buses) such as Pakistan, Hainan Province, and Norway.

Recommendation:

- Expand phase out targets for all HDV sales (2040) and earlier for segments such as buses, sanitation vehicles, and urban delivery trucks.

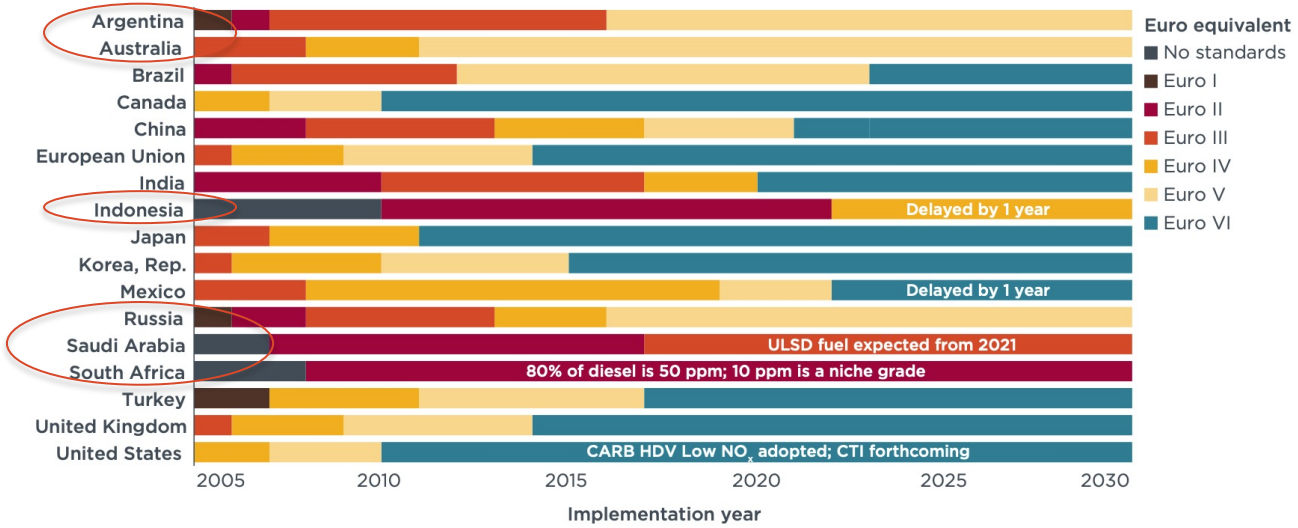
Governments with targets toward phasing out sales of internal combustion engine trucks by a certain date (Status: August 2021)



Note: Governments with an at least 40% new truck sales target.
* Not necessarily yet reflected in an official national/state policy document such as a climate or transport strategy/plan, in a law, or in a similar framework.

https://theicct.org/hdv-ice-global-phase-out-map

Progress toward world-class HDV emission standards continues, but there are still gaps



Implementation year (all sales and registration) of heavy-duty diesel engine emission standards in G-20 economies

Next generation standards

EUROPE

- The European Commission has initiated the regulatory process to increase the stringency of emissions standards for LDVs and HDVs, also known as Euro 7/VII
- ICCT estimates that reductions in NOx emissions under stringent Euro 7/VII standards would prevent 35,000 premature deaths (equivalent to 568,000 years of life lost) from 2027–2050 compared to adopted policies
- Increasing ZEV sales could further increase the overall health benefits

UNITED STATES

- California has adopted an omnibus rule that will tighten current HDV NOx limits 90% by MY2027
- US EPA is expected to propose an update to its HDV emissions standards for MY2027–2029
- ICCT estimates achieving a 90% reduction in real-world NOx emissions compared to EPA 2010 standards could avoid more than 173,000 premature deaths and $1 trillion in associated health damages

ZEV regulations: the most certain and effective policy to ensure auto makers produce a growing share of electric vehicles

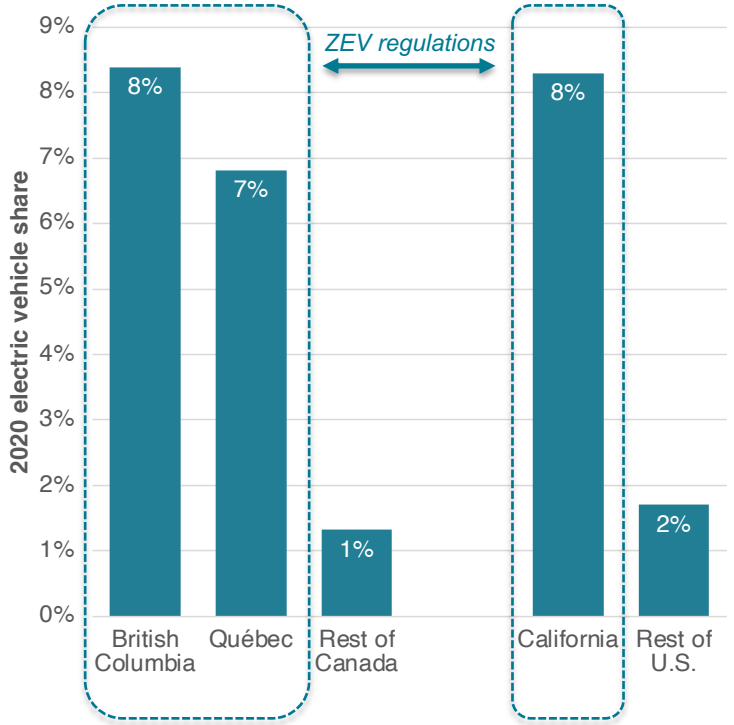
Findings:

- Markets with strong ZEV regulations tend to have higher ZEV uptake and greater model availability (e.g., California, British Columbia, Quebec, China).
- City level policies like zero emission zones have the potential to impact consumers behavior and accelerate adoption of ZEVs (e.g., Amsterdam, London, Oslo, Paris).

Recommendation:

- Adopt ZEV regulations to align with ZEV targets and transportation decarbonization goals.

ZEV market share in British Columbia, Quebec and California are 4x to 8x the rest of Canada and United States.



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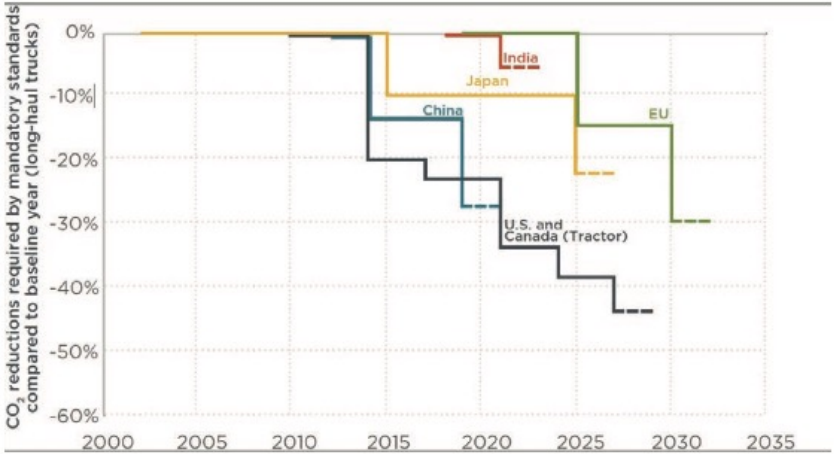
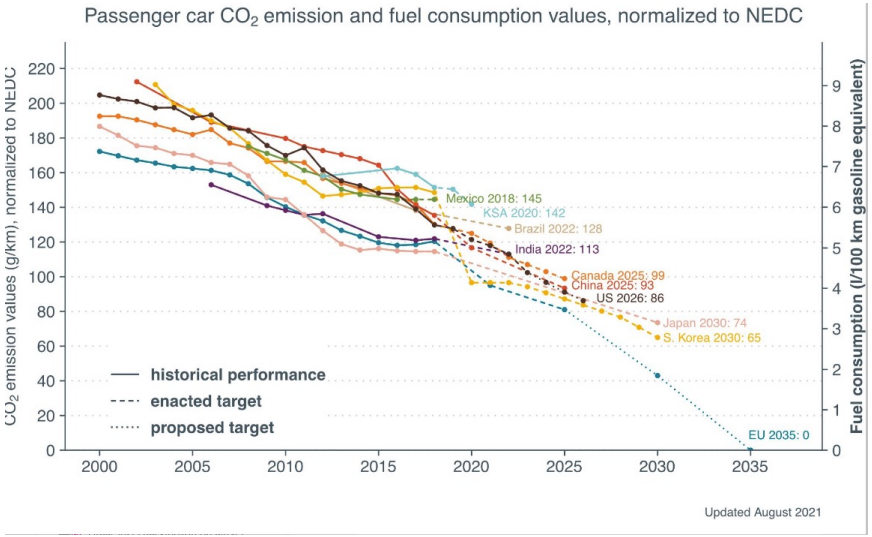
CO_2 standards[1] drive emission reductions from fossil fuel vehicles and – if sufficiently stringent – require increasing sales of ZEVs.

- ***Findings:*** *Most major markets have CO_2 standards for light and heavy-duty vehicles.*
- ***Recommendations:*** *Set long-term standards to 2030 or 2035 to give manufacturers the clarity and certainty to make investments to drive 100% electrification (e.g., Europe).*

Heavy-duty vehicles (long haul trucks)



Passenger cars



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[1] *We use the term CO_2 standards to include fuel economy and greenhouse gas standards.*

Fiscal incentives have proven highly effective for passenger cars and will need to be increased and expanded for heavy-duty vehicles

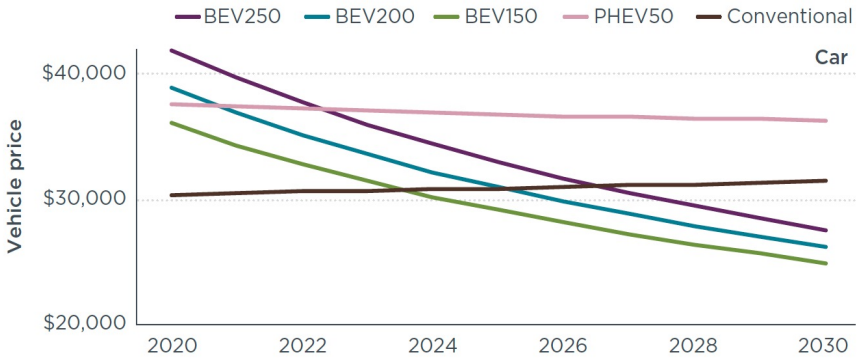
Findings:

- Financial incentives have driven increased ZEV passenger car sales in European markets where each €1,000 in incentive value yielded a 5%–7% increase in sales shares.
- Financial incentives for heavy-duty vehicles are less prevalent and typically focus on only a couple vehicle classes (e.g., buses).

Recommendations:

- For passenger cars**, phase down fiscal incentives as cost parity approaches**, and **consider shifting to financially sustainable mechanisms** (e.g,. bonus / malus, feebates) as ZEVs move from niche to mainstream.
- **Expand fiscal incentives to heavy-duty vehicles** across all vehicle classes and set those fiscal incentives to offset the purchase price differential between ZEV HDVs and fossil fuel HDVs.

BEVs are projected to reach purchase price cost parity with fossil fuel cars in the 2024-2027 timeframe depending on range and market. In 2021, BEVs cost about $7,000 more than a similar fossil fuel car.



The cost of battery electric vehicles (BEVs) varies by battery size and range. The figure shows purchase prices of BEVs with 150, 200 and 250-mile range, and plug-in hybrid vehicles with 50-mile range.

From Nic Lutsey and Michael Nicholas, "Update on Electric Vehicle Costs in the United States through 2030" (Washington, D.C.: International Council on Clean Transportation, April 2, 2019), https://theicct.org/publications/update-US-2030-electric-vehicle-cost.

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All ZEV Transition Council countries need to increase public / private investment into **charging infrastructure by ~ 25 to 35% annually.**

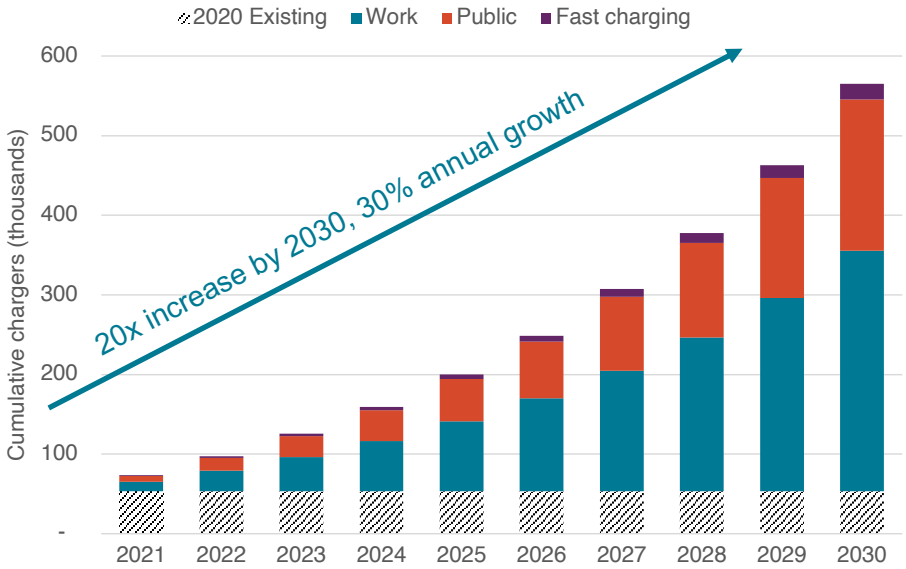
Findings:

- Numerous studies find a clear statistical link between public charging availability and ZEV uptake, including in Europe, the United States, and globally.
- The Netherlands and Norway, with the world's highest shares of zero emission vehicle sales, have about 20 times the global average number of chargers per person.

Recommendations:

- With charging infrastructure, the proper role of government is steering rather than rowing.
- In partnership with industry and civil society (OEMs, power companies, research organizations), develop charging infrastructure action plans for LDVs and HDVs.

*Germany needs to **increase charging infrastructure by 30% annually** to enable 50% electric vehicle sales by 2030.*



From Michael Nicholas and Sandra Wappelhorst, "Regional Charging Infrastructure Requirements in Germany through 2030" (Washington, D.C.: International Council on Clean Transportation, October 21, 2020), https://theicct.org/publications/regional-charging-infra-germany-oct2020.

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Consumer campaigns have resulted in improved awareness of ZEVs.

Findings:

- Consumer understanding of ZEVs is limited as about half of drivers in the US, France, and Japan could not imagine themselves in an EV.
- Commercial fleet purchase requirements for heavy-duty vehicles are effective at increasing market demand.

Recommendations:

- For passenger cars, increase consumer campaigns targeting systematic mis-conceptions about EV and for heavy-duty vehicles, adopt and expand fleet purchase requirements.

***Veloz "Electric for All" campaign (California)**: "We know that the first and often the only hurdle is a lack of familiarity with the choices that are available and the ease of owning and operating these vehicles. Electric for All is knocking down those barriers. Kicking Gas alone made a big splash across the printed, broadcast and online media, with 182 stories and an estimated 6.5 million views and a potential online readership of 5.2 billion."*

California's Veloz campaign created this "edgy and funny" 3-minute video starring Arnold Schwarzenegger, former governor of California, that highlights the benefits of EVs, see here: https://www.youtube.com/watch?v=1cTxLlpiM6o

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Recommendations

1. Phase out targets

- Expand phase out targets for LDVs (2035) and HDVs (2040) with emphasis on major vehicle markets.

2. Emission standards for conventional pollutants

- Introduce Euro VI equivalent standards for HDVs and fuels in all G20 countries
- Set stringent Euro 7 and US HDV NOx standards

3. ZEV regulations and CO_2 standards

- Adopt ZEV regulations to align with ZEV targets and transportation decarbonization goals.
- Set longer-term CO_2 standards to 2030 or 2035 to give manufacturers the clarity and certainty to make investments to drive 100% electrification (e.g., Europe).

4. Fiscal incentives

- For passenger cars, phase down fiscal incentives as cost parity approaches, and consider shifting to financially sustainable mechanisms (e.g,. bonus / malus, feebates) as ZEVs move from niche to mainstream.
- Expand fiscal incentives to heavy-duty vehicles across all vehicle classes and set those fiscal incentives to offset the purchase price differential between ZEV HDVs and fossil fuel HDVs.

5. Charging infrastructure

- With charging infrastructure, the proper role of government is steering rather than rowing. In partnership with industry and civil society (OEMs, power companies, research organizations), develop charging infrastructure action plans for LDVs and HDVs.

6. Market demand

- For passenger cars, increase consumer campaigns targeting systematic mis-conceptions about EV and for heavy-duty vehicles, adopt and expand fleet purchase requirements.