International Transport Forum Expert Workshop
International best practices to promote eco-friendly cars

25 January, 2021

International Energy Agency

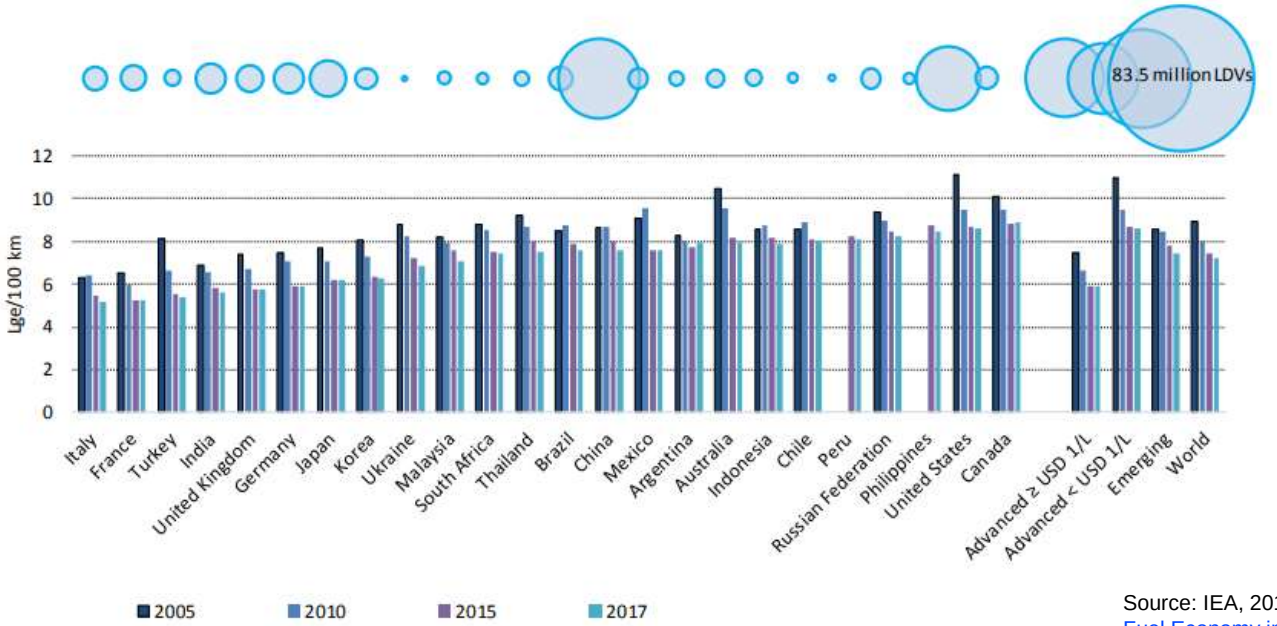
Taking stock of clean car policies and technologies

Jacob Teter

Transport Energy Analyst, International Energy Agency

What progress has been made thus far?

Average new LDV fuel economy by country or region (2005-17) and new registrations (2017)



Note: Fuel consumption measured in Lge/100 km, WLTP.

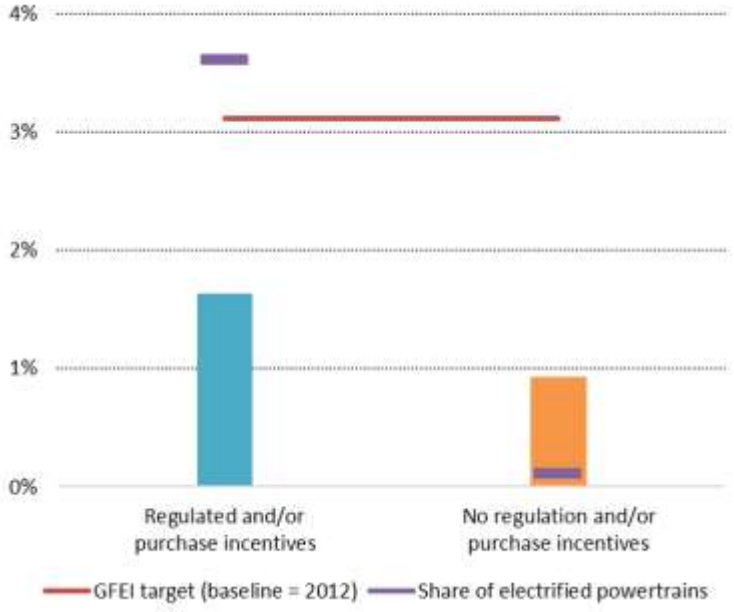
Sources: IEA elaboration and enhancement for broader coverage of IHS Markit database (IHS Markit, 2018).

Source: IEA, 2019 - Fuel Economy in Major Car Markets: Technology and Policy Drivers 2005-2017

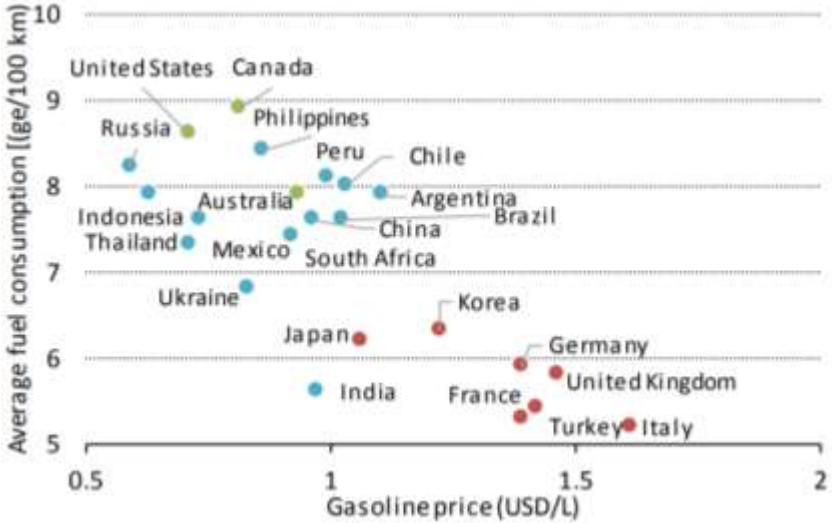
Average LDV fuel economy improved in all regions between 2005 and 2017, though there is a wide divergence of absolute levels and trends between countries and regions.

What policies have been successful in promoting clean cars?

Average annual fuel economy improvement rates, selected countries, 2012 and 2017



Rated fuel consumption (lge/100 km) and gasoline price (2016) for selected countries, 2017



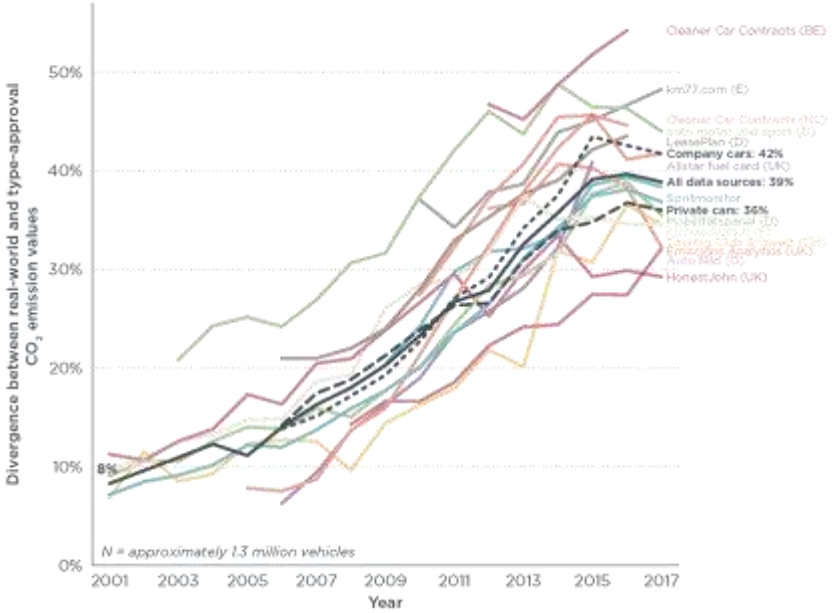
Notes: GDP values refer to USD with annual average exchange rates in 2017. Gasoline prices are for 2016. Advanced < USD 1/L = advanced economies with gasoline prices below USD 1 per litre; Advanced > USD 1/L = advanced economies with gasoline prices above USD 1 per litre.

Source: IEA, 2019 - Fuel Economy in Major Car Markets: Technology and Policy Drivers 2005-2017

Fuel economy policies and road fuel taxation have driven reductions in fuel consumption

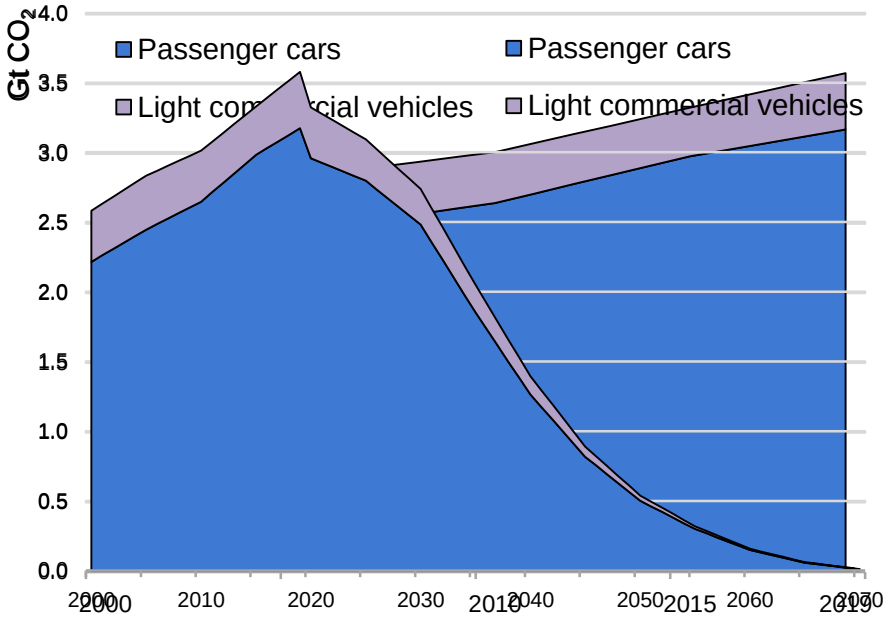
Progress to date has been measurable, but limited

Gap between tested and real-world CO_2 emissions – Europe



Source: ICCT 2019 - [Real-world vehicle fuel consumption gap in Europe is stabilizing]

Direct global CO_2 emissions from light-duty vehicles

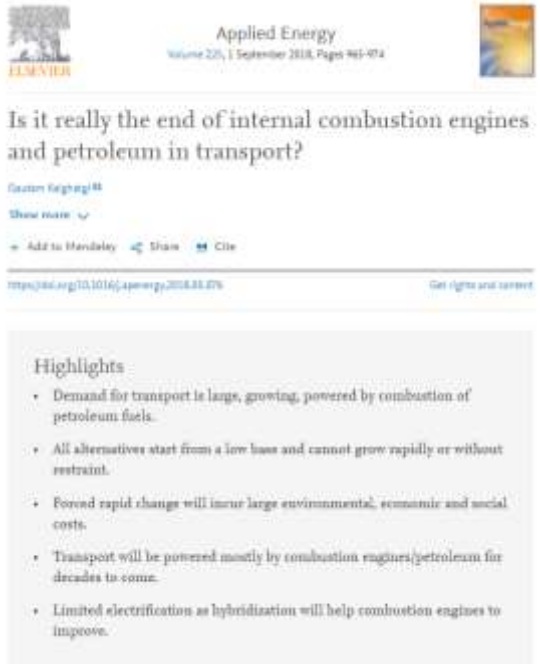


Source: IEA 2020 – [Energy Technology Perspectives]

The gap between rated fuel consumption and real-world performance, together with growth in global ICE car stocks, translates to continuing growth in direct CO_2 emissions. But emissions from cars need to decrease dramatically.

But are electric cars really better for the environment?

"Where there's smoke, there's fire"

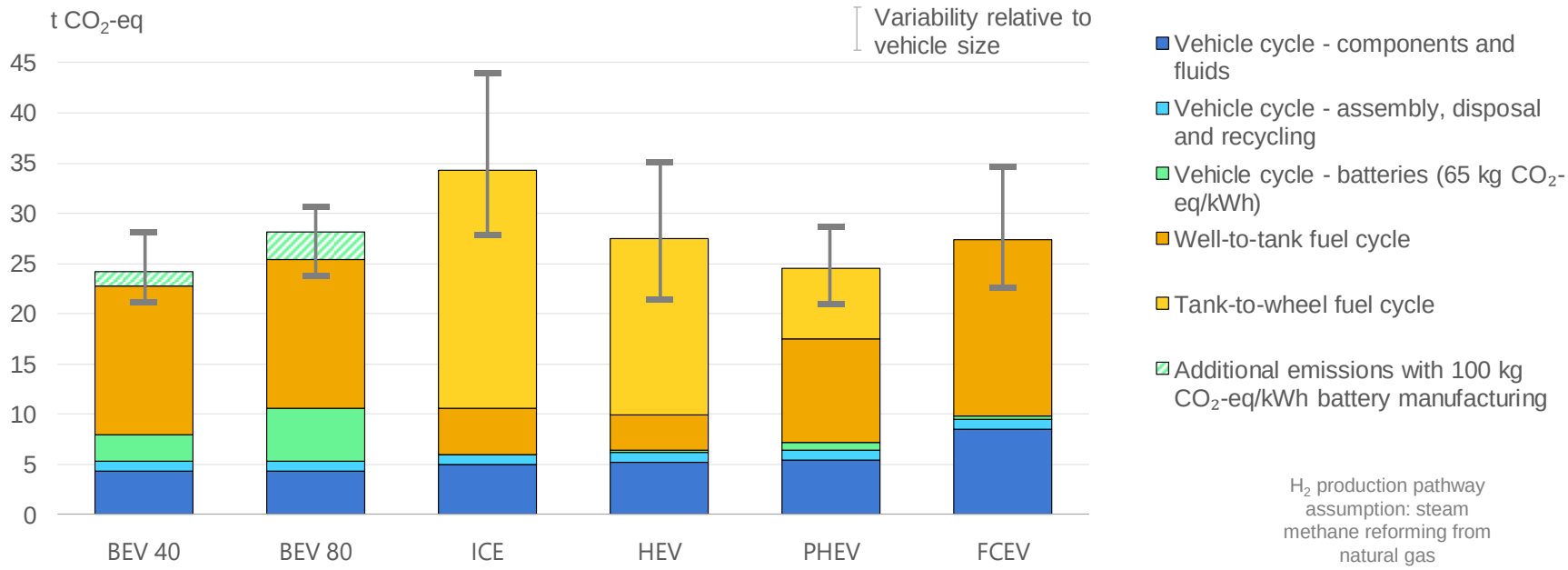


Electric cars only greener than petrol after 50,000 miles

In all contexts but the most coal-intensive grids, reputable lifecycle analysis studies find that EVs already outperform ICEs in terms of GHG emissions. These results are robust to a wide array of assumptions.

The climate advantage of alternative powertrains is clear

Lifecycle GHG emissions for passenger cars by powertrain, 2018



H_2 production pathway assumption: steam methane reforming from natural gas (representative of current production)

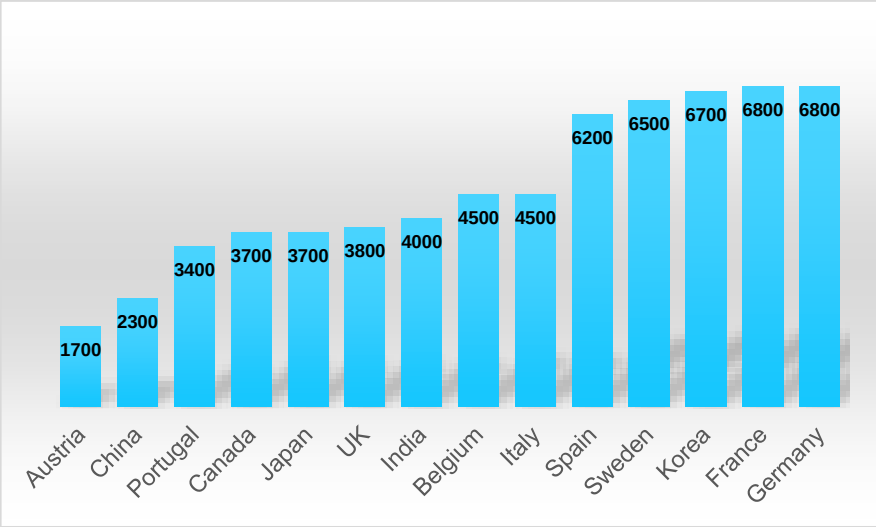
Source: IEA, 2020 – Global EV Outlook, 2020

Under the global average GHG intensity of electricity generation, BEVs provide life-cycle GHG emissions benefits relative to ICE vehicles. As electricity generation decarbonises, GHG emissions of BEVs and PHEVs will significantly decline.

Bridging the purchase price gap

- EV subsidies and other purchase incentives have been instrumental in driving EV adoption in all main EV markets

National subsidies for BEV purchase (USD)
(maximum amount*, USD equivalent, private cars, as of March 2020)



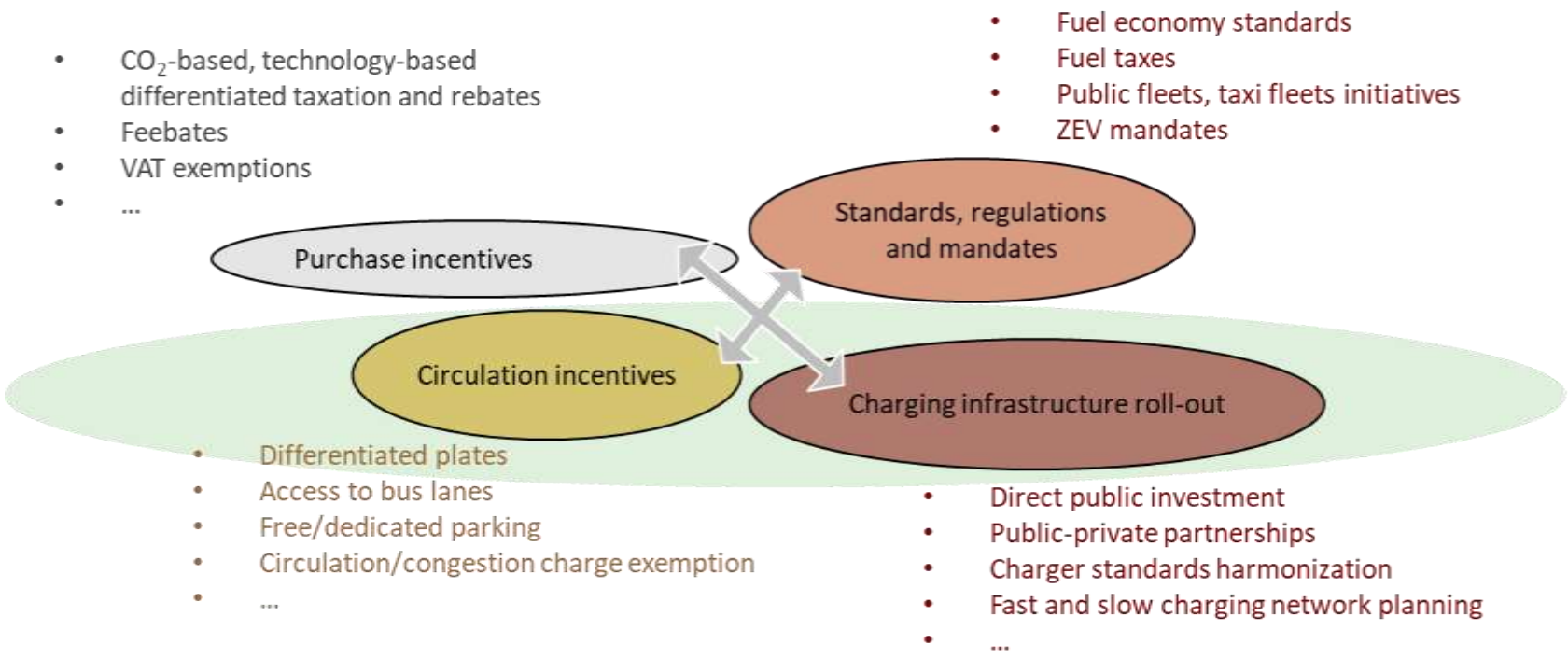
Source: IEA, 2020 – Global EV Outlook, 2020

*Amount can depend on car sticker price, battery capacity or range

- Additional stimulus policies in Q1-Q3 of 2020 targeted EVs: including incentives in Germany, France, Italy, extension of subsidies in China and the UK.

EV purchase is incentivised at a national level in most key markets, in the form of subsidies and/or tax reduction

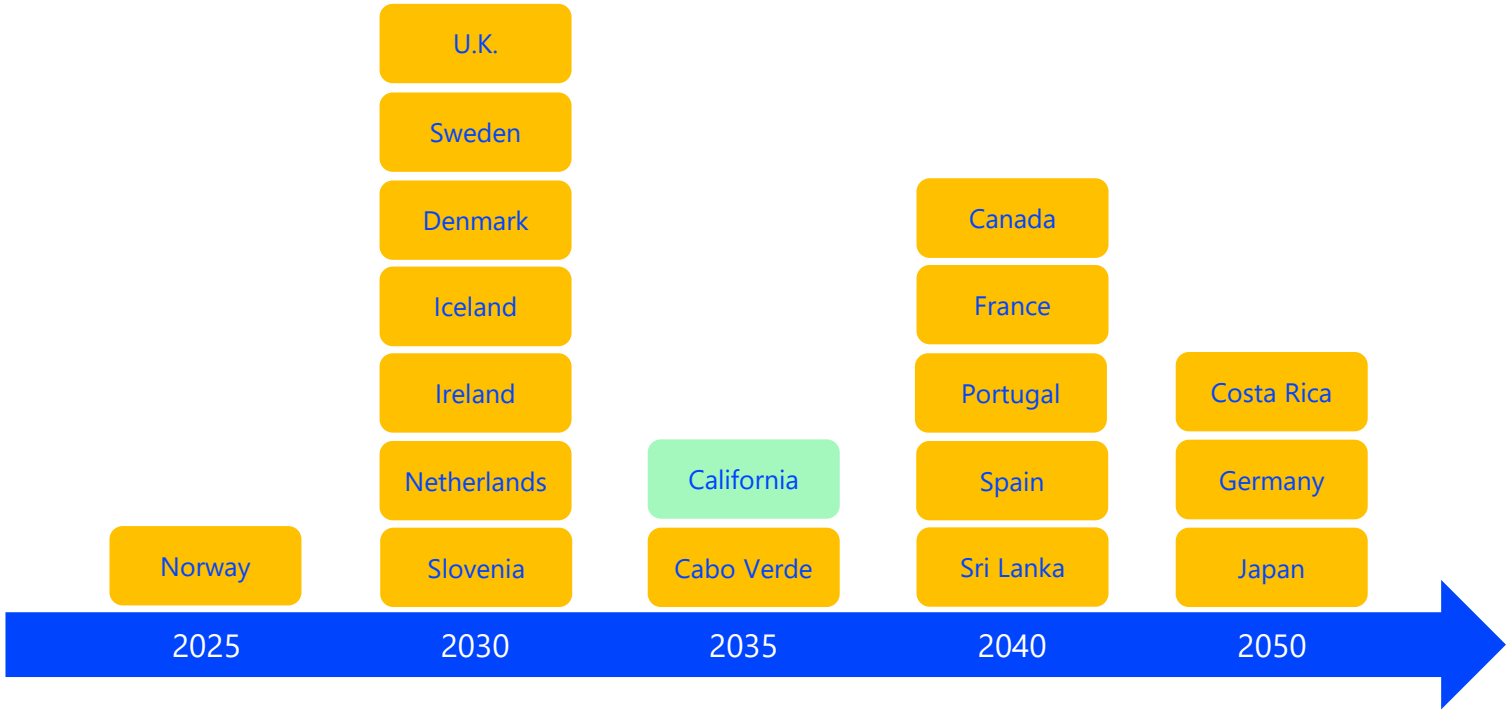
Zero-emission vehicle support policies



Close monitoring of the effect of EV support policies are paramount to avoid adverse effects

EV policies continue to evolve and adapt

Countries with ICE car phase out goals, or 100% EV sales targets



17 countries have announced a phase out of conventional cars or 100% EV sales within the next three decades

Turning near-term challenges into long-term opportunities

Challenges

1. **Shift from near-total dependence on oil to ZEVs leads to revenue losses**
   - from vehicle taxation exemptions (e.g. Norway) and from EV subsides
   - from fuel taxation (e.g. California)
2. **Resources – shift from strategic geopolitical importance of fossil fuels to critical minerals**
   - Critical minerals in batteries: fluctuating prices, stockpiling, concentrated extraction
   - Not limited to batteries: efficient use of the vehicle stock to provide mobility services, and efficient use of space in increasingly congested cities

Further challenges,
both of which could provide big opportunities:

3. Potential shift to connected & automated cars, and transition from ownership to service-based mobility
4. Charging availability / impacts on electricity grids

Solutions

1. **Extract revenue based on externalities of vehicle operations**
   - Road pricing, mileage-based user fees, congestion charges
   - Travel demand and parking management
   - Urban planning

2/3/4. Circular economy – from a vision to a reality in the car industry

- Increased supply chain transparency (e.g. long-term mining contracts)
- Battery end-of-life / circularity / extended producer responsibility (battery passport concept, China's battery regulation)
- Clarity and certainty over future market (ZEV mandates, targets, bans)
- Multimodality / more efficient use of vehicles (e.g. Mobility-as-a-Service)
- Circular Cars Initiative - the World Economic Forum

Policies favouring the transition to electric mobility

CARBON PRICING OF FUELS

PUBLIC PROCUREMENT

BRIDGING THE PRICE GAP

FUEL ECONOMY STANDARDS

LOCAL ACCESS REGULATIONS

ROAD PRICING

PRIVATE & PUBLIC EVSE ROLLOUT

DEMAND-DRIVEN & BUSINESS-DRIVEN EVSE

SUCCESSFUL GRID INTEGRATION

MATERIAL DEMAND MANAGEMENT

SECOND LIFE, END-OF-LIFE AND RECYCLING

The right mix of policies, technology and service-based business development, and product transformation can lead to truly clean cars (and beyond this, to clean mobility)