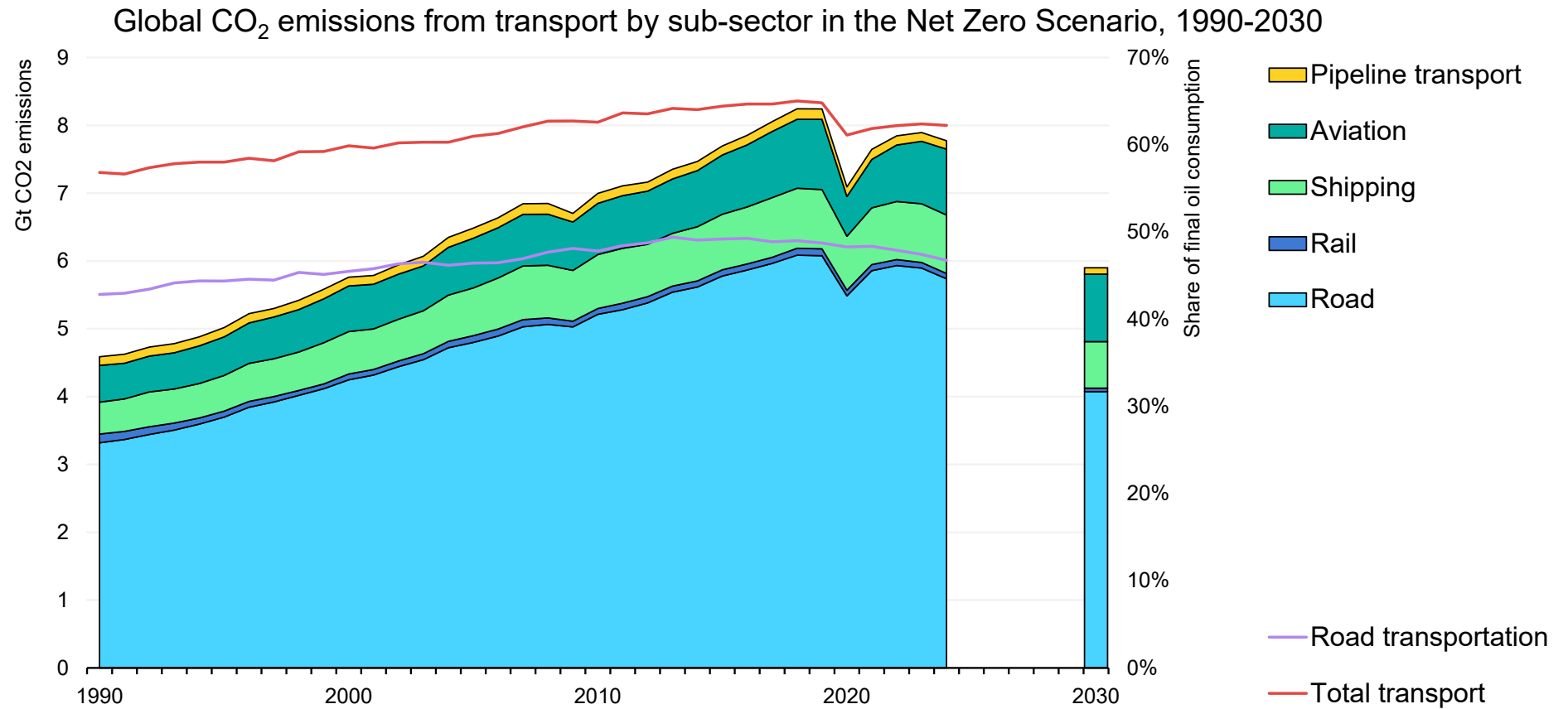




Transport policies and technologies to enable Net Zero by 2050

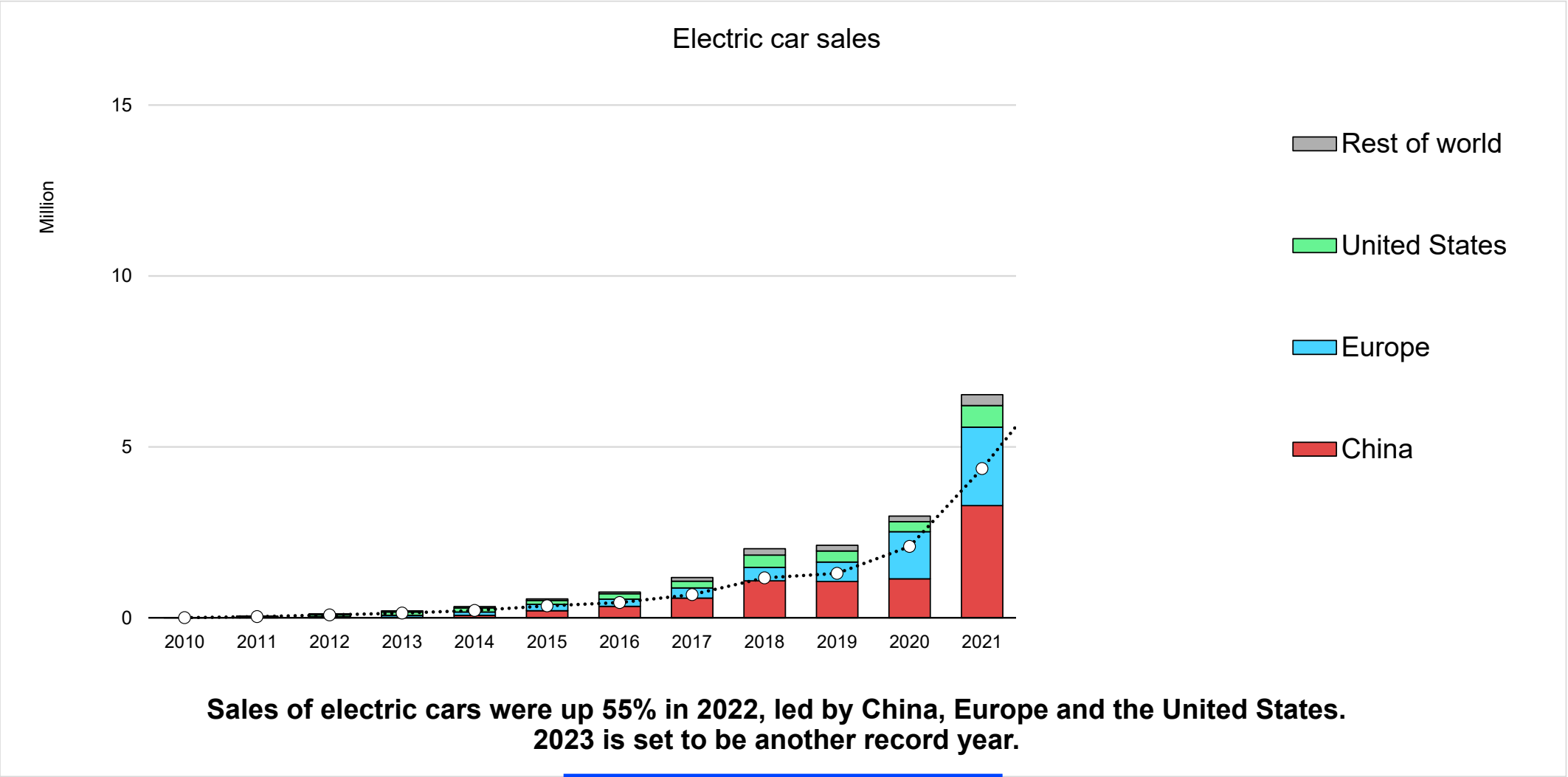
September 2023

CO₂ emissions from transport – breakdown by mode

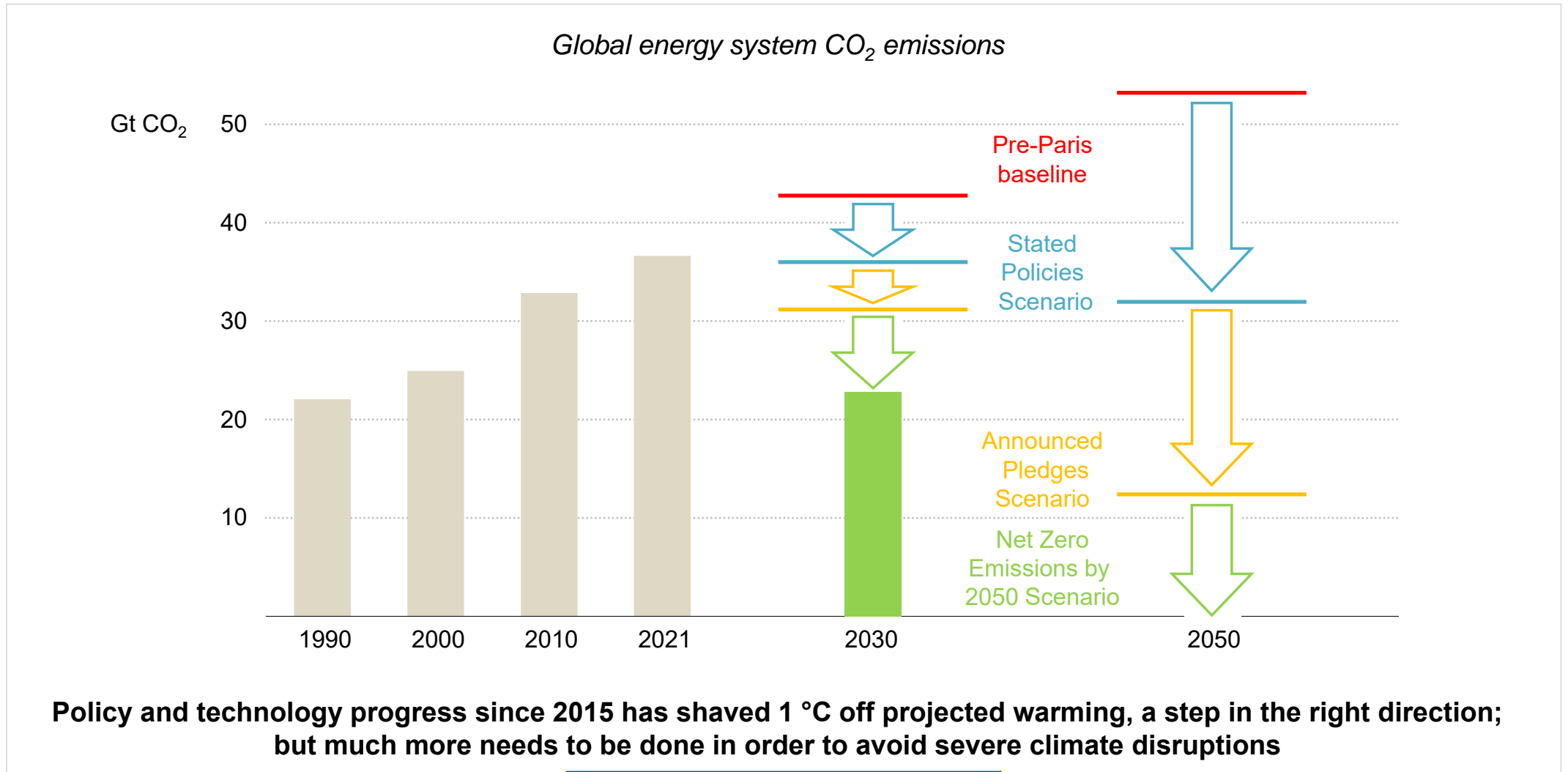


Road transport modes account for most (about 75%-80%) of transport energy consumption. The share of road in total final energy use from oil products grew from 40% in 1990 to more than 50% in 2020.

Electric car sales exceeded 10 million in 2022

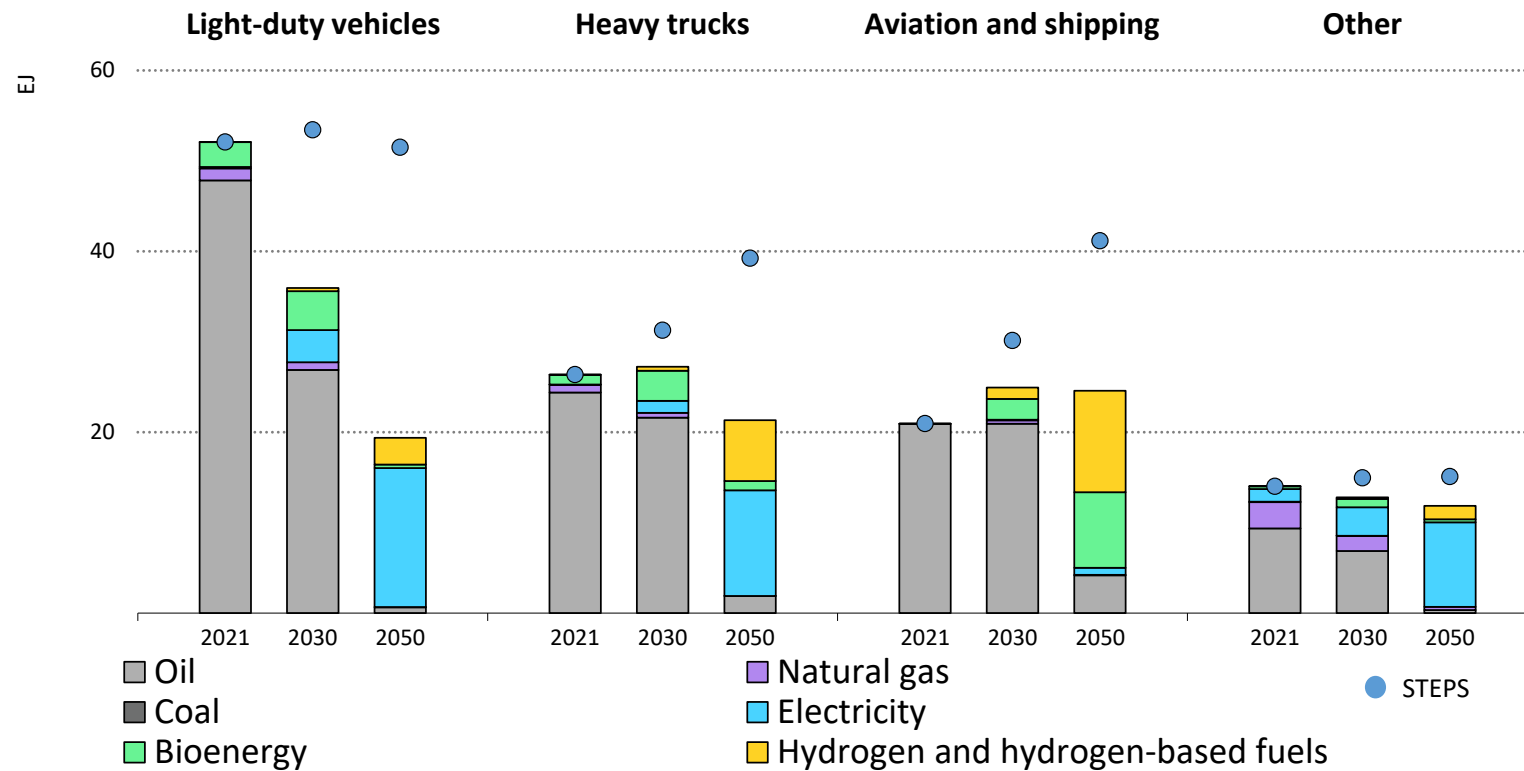


Keeping the door to 1.5 °C open



Transport energy consumption under the NZE Scenario

Final energy consumption in transport by source and mode in the NZE Scenario, 2021-2050

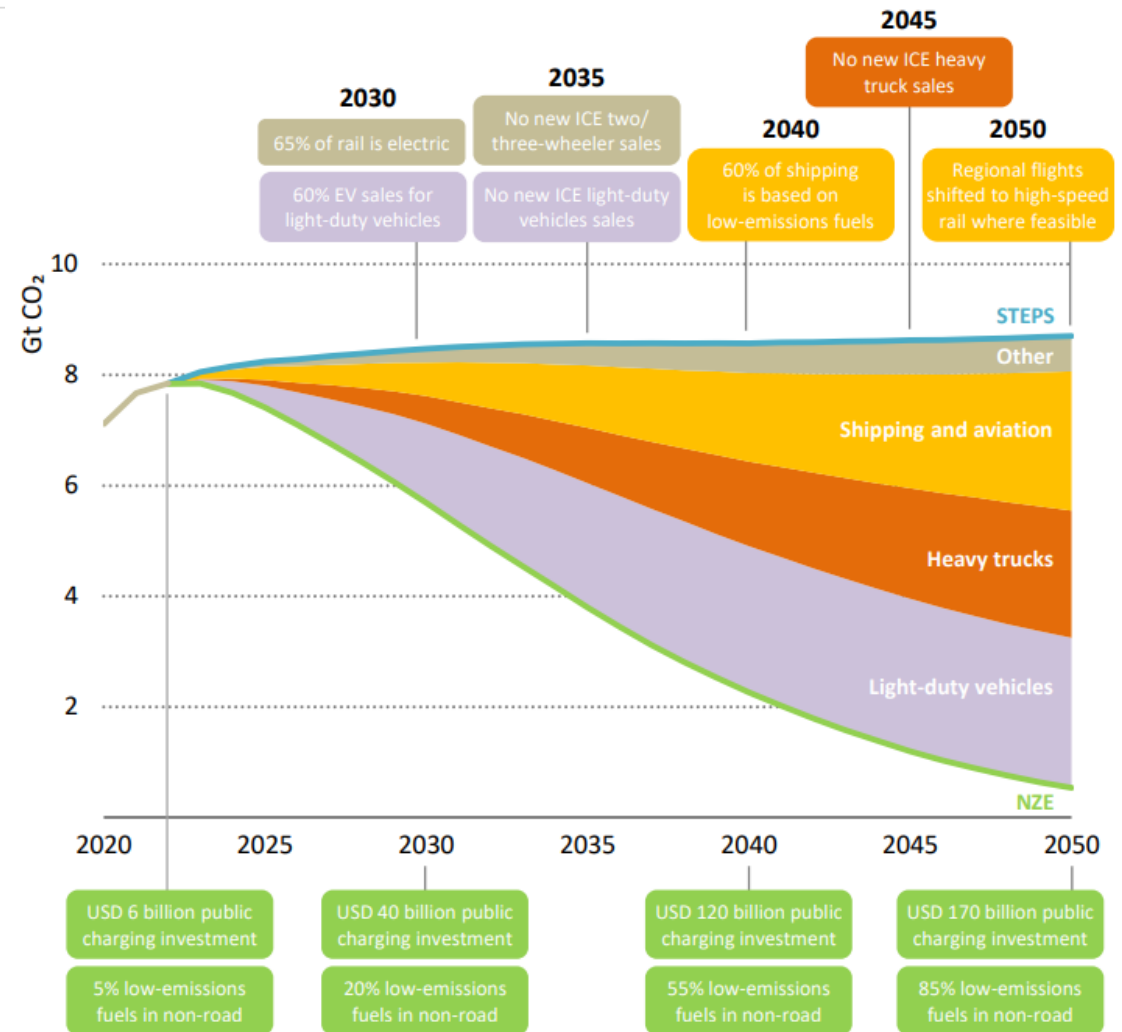


**Direct electricity use is key to decarbonising road transport and rail;
hydrogen and hydrogen-based fuels play a major role in aviation and shipping**

Emissions reductions and key milestones in transport, STEPS-NZE



- Electrification of road transport and rail brings rapid and massive emissions reductions
- Behavioural changes and low-emissions fuels are key in aviation and shipping
- Advanced economies, like Europe, will need to transition faster than emerging economies.



Tracking Clean Energy Progress 2023



Cross-cutting

Energy system overview

- Energy efficiency
- Behavioural changes
- Electrification
- Renewables
- Bioenergy
- Hydrogen
- Carbon capture & storage
- Innovation
- Digitalisation
- International collaboration

Technology deep dives

- Direct air capture
- Bioenergy with carbon capture & storage
- CO₂ capture & utilisation
- Electrolysers

Infrastructure deep dives

- CO₂ transport & storage
- Data centres & transmission networks
- District heating

● Electricity

Technology deep dives

- Coal-fired electricity
- Gas-fired electricity
- Solar PV
- Wind
- Hydro
- Nuclear
- Demand response
- Grid-scale storage
- Smart grids

Infrastructure deep dives

● Oil & natural gas supply

Subsectors

- Methane emissions from oil and gas operations
- Flaring

● Low-emission fuel supply

Subsectors

- Biofuels supply

● Transport

Subsectors

- Cars and vans
- Trucks and buses
- Rail
- Aviation
- International shipping

Technology deep dive

- Electric vehicles

● Industry

Subsectors

- Steel
- Chemicals
- Cement
- Aluminium
- Paper
- Light industry

● Buildings

Subsectors

- Heating
- Space cooling
- Lighting
- Appliance & equipment

Technology deep dives

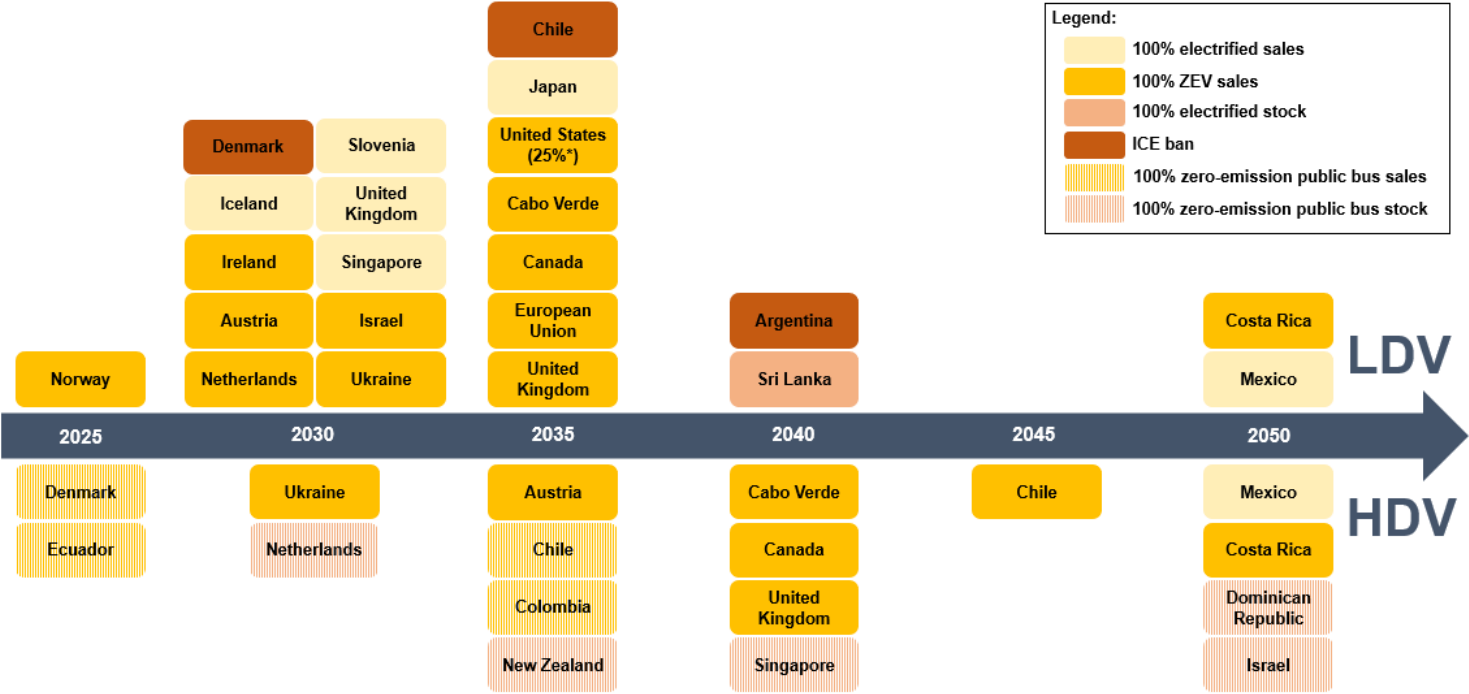
- Buildings envelope
- Heat pumps

Examples of (member) states implementing Net Zero by 2050



Road

Global zero-emission vehicle mandates and internal combustion engine bans



Zero-emission vehicle targets are now in place in an increasing number of countries, including in emerging markets and developing economies.

Many EV policies are currently on the way in major markets

Road

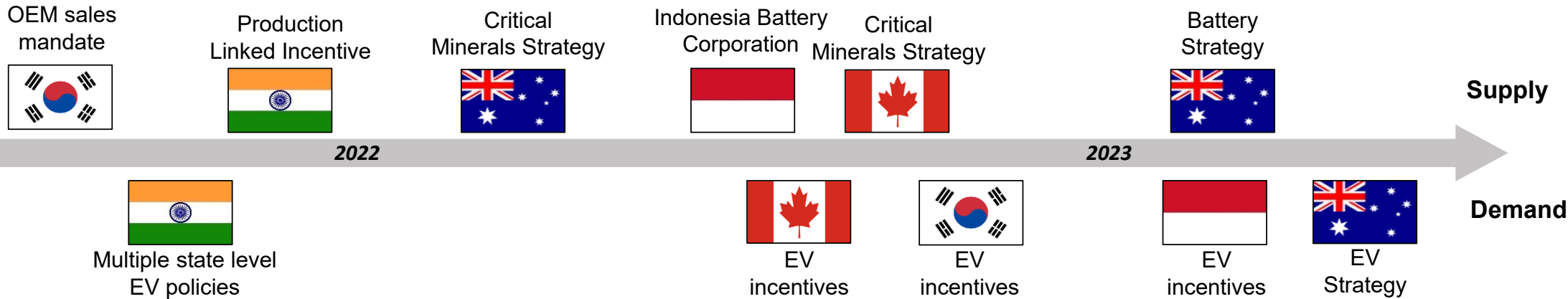


- Inflation Reduction Act
- Clean Vehicle Tax Credit
 - Clean Heavy-Duty Vehicle Program
 - Commercial Clean Vehicle Credit
 - And others..



- Green Deal Industrial Plan
- Net Zero Industry Act
 - Critical Mineral Act
 - EU Battery Directive
 - Revised CO₂ standards, Euro 7 regulations, and the Alternative Fuel Infrastructure Directive

Examples of key EV related policies



Targets for international shipping are shaping



IMO GHG strategy, 2023

- Enhanced common ambition to reach net-zero from international shipping in 2050
- Commitment to ensure update of **alternative zero and near-zero GHG fuel** by 2030, between 5% and 10% in 2030



EU Fuel Maritime, 2021

- Constraining average annual **GHG intensity** on-board energy
- 2% reduction in 2025, 6% in 2030, 75% in 2050
- Gradual **low-carbon fuel** adoption within the EU and half of voyages to and from the EU



Clean shipping Act, 2022

- Sets **carbon intensity standards** for marine vessel fuels
- Requires 100% zero-emission fuels from 2040

Financial support for sustainable aviation fuel is growing



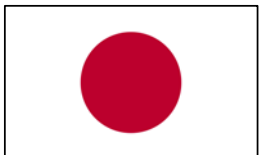
USA:

- Inflation Reduction Act (2022) encourages production of **sustainable aviation fuel (SAF)** with tax credits and grants
- Lifecycle emissions compared to fossil jet kerosene provision



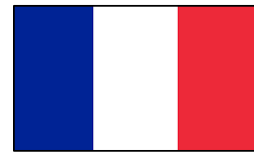
EU

- Phase out of allowances given to aviation industry in the **ETS** by 2026
- European green deal mandates a **minimum share of SAF**



China and Japan:

- In 2030 Japan mandates that **SAF** must account for 10% of aviation fuel.
- China has set a Five-Year Plan for green development of Civil Aviation

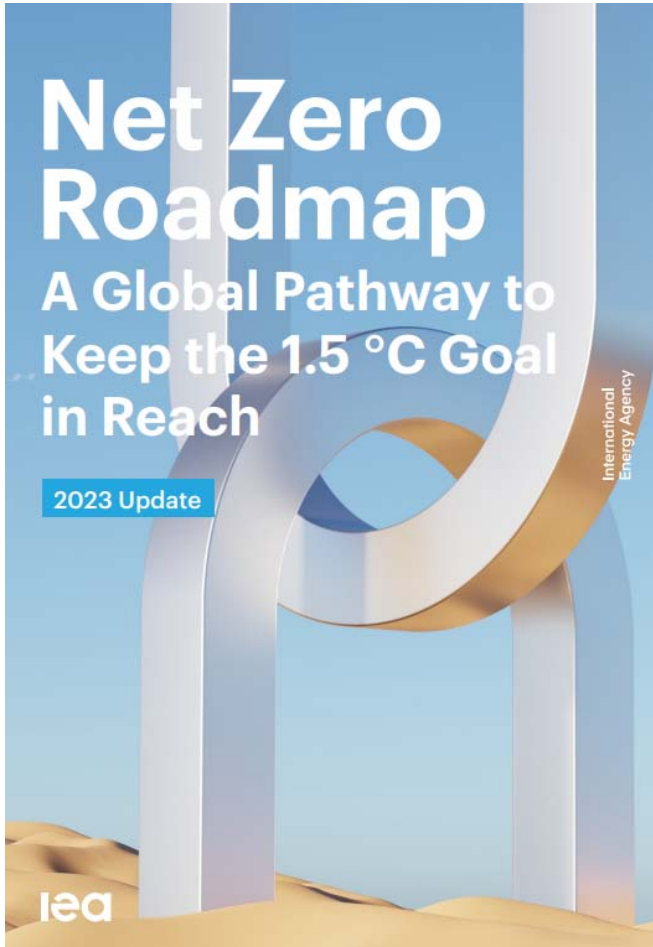


Individual EU countries:

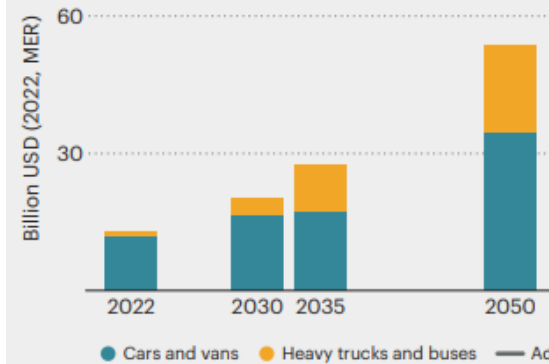
- **Blending mandates** for France and Norway already in place
- Sweden will invest SEK 15 million annually into research on **electric aircrafts**



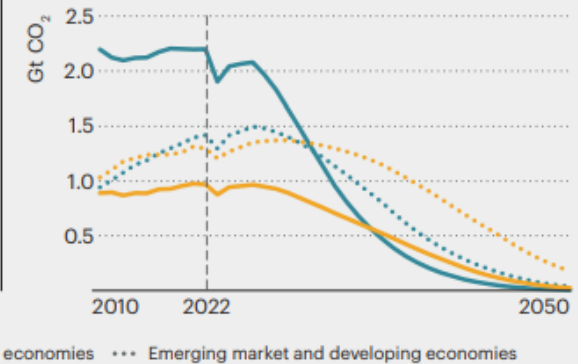
The road to Net Zero: investments, research and policies



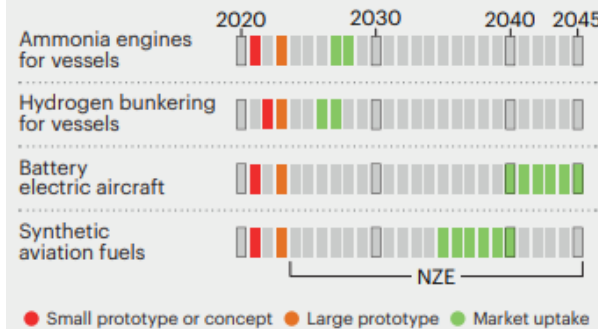
Investments in public chargers scales up, first for cars and vans, then for heavy trucks and buses



Road transport emissions drop dramatically to 2030, particularly in advanced economies



Technologies are being developed to enable the use of low-emissions fuels in shipping and aviation



CO₂ emissions from shipping and aviation decrease more rapidly in advanced economies

