

# The Paris Agreement necessitates an accelerated global transition to zero emission vehicles

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# Topics

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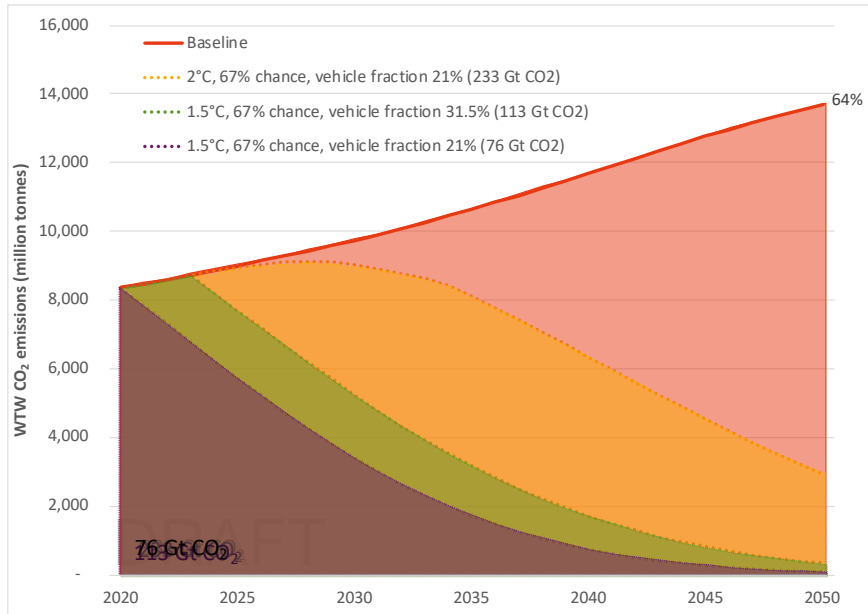
- What is the current status of ZEV uptake globally?
- What is the trajectory for global vehicle CO<sub>2</sub> based on current policies?
- To what extent will recent policy announcements alter this trajectory?
- What is the remaining mitigation potential and need under an accelerated ZEV transition, and how far can it take us toward climate goals?
- What are the implications for policies to secure these benefits?

# Currently adopted policies for road transport are inadequate to meet climate goals.

- IPCC estimates for a 67% chance to limit warming to 1.5°C or 2°C, global CO<sub>2</sub> emissions must be limited to **360 Gt CO<sub>2</sub>** or **1,110 Gt CO<sub>2</sub>**, respectively, from the start of 2021 until reaching net zero.
- In 2020, cars, vans, buses, and trucks emitted **21%\*** of global anthropogenic CO<sub>2</sub> emissions.
- With currently adopted policies, global vehicles are on track to emit **335 Gt CO<sub>2</sub>** from 2021 to 2050.
- Sectoral carbon budget for vehicles is around **233 Gt CO<sub>2</sub>** for 2°C and **76–113 Gt CO<sub>2</sub>** for 1.5°C.
- Higher 1.5°C budget assumes vehicles use 50% more of the carbon budget than their current fraction of CO<sub>2</sub>.

\*Numerator includes WTW CO<sub>2</sub>. Denominator includes CO<sub>2</sub> from the energy sector and land-use change.

Global vehicle\*\* CO<sub>2</sub> emissions compared to sectoral carbon budget



\*\*Excludes two- and three-wheelers.

Zero-emission vehicles—specifically battery-electric vehicles and hydrogen fuel cell electric vehicles—are the only technologies that can achieve deep decarbonization of road transport on a lifecycle emissions basis at sufficient scale at reasonable cost.

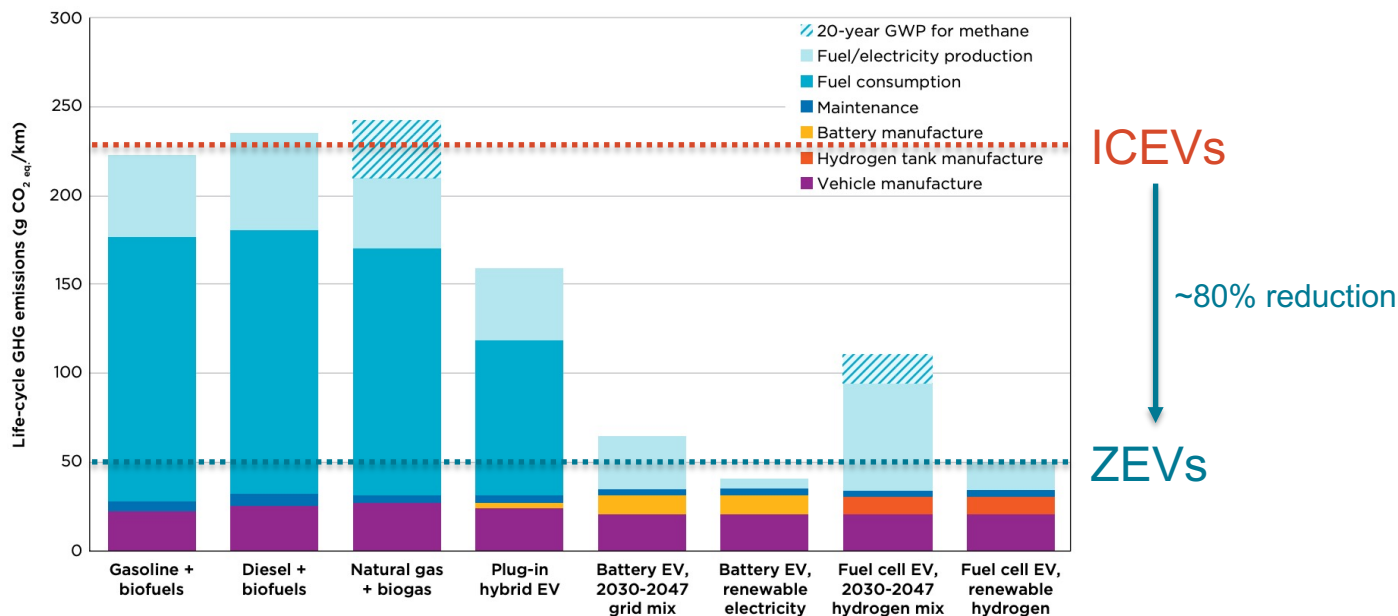
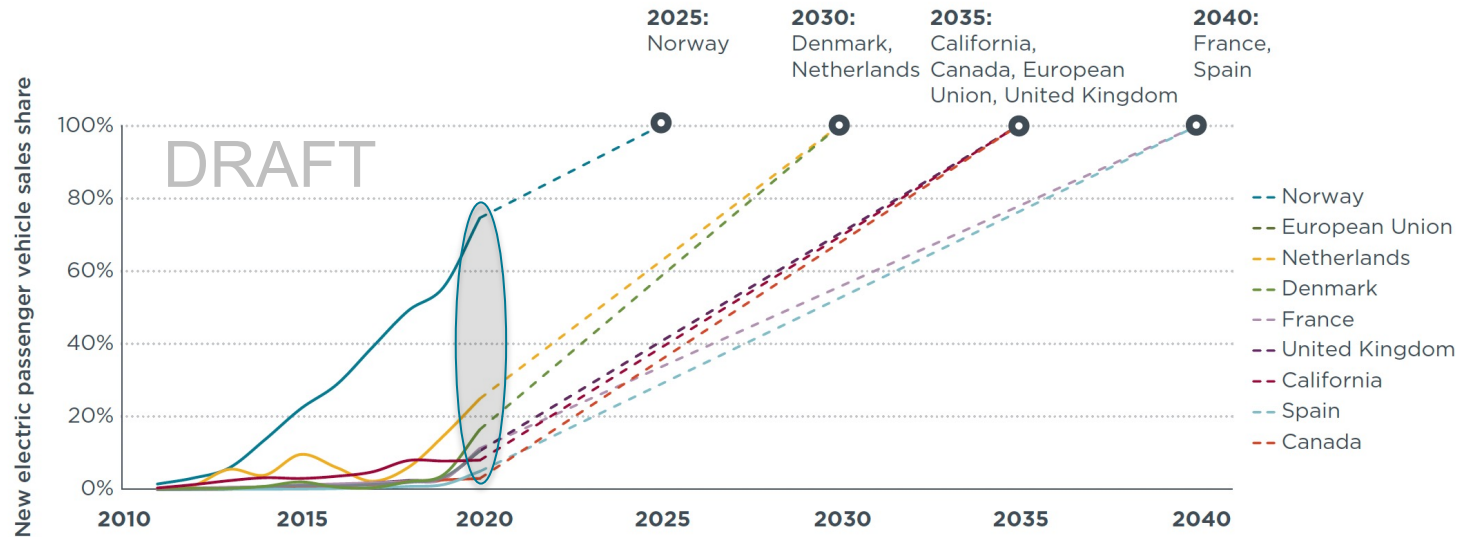


Figure 2. Life-cycle GHG emissions for global typical medium-size passenger cars registered in 2030.

# Governments with strong EV policies achieved significant EV uptake for cars in 2020.



**Figure 1.** New ZE-LDV sales shares by country from 2011-2020 and future 100% targets in select ZEV Transition Council markets.

# ZEV uptake varies significantly among G20 economies.

2020 ZEV sales shares in G20 economies

	Car	Van	Bus	Medium truck	Heavy truck
Australia	0.8%	0.0%	0.0%		
Brazil	0.0%	0.0%			
Canada	2.3%	0.0%	1.7%		
China	5.0%	2.3%	22.9%	1.3%	0.2%
European Union	11.7%	3.9%	6.1%	3.5%	0.0%
India	0.2%		0.4%		
Indonesia	0.0%	0.1%			
Japan	0.4%	0.1%	0.1%		
Mexico	0.2%		0.0%		
Republic of Korea	1.8%	0.0%	0.0%		
Russia	0.1%	0.0%			
Saudi Arabia	0.0%				
South Africa	0.0%		0.0%		
Turkey	0.1%				
United Kingdom	15.1%	3.5%	6.2%	2.8%	0.1%
United States	1.7%	1.0%	0.6%	0.0%	0.0%
G20 economies	4.5%	1.6%	7.6%	0.7%	0.1%

ZEV share of total vehicle sales

0.0%  22.9%

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ZEVTC members

Not ZEVTC members

# ZEV Transition Council (ZEVTC) governments account for about half of new vehicle sales and have committed to accelerate the global ZEV transition.

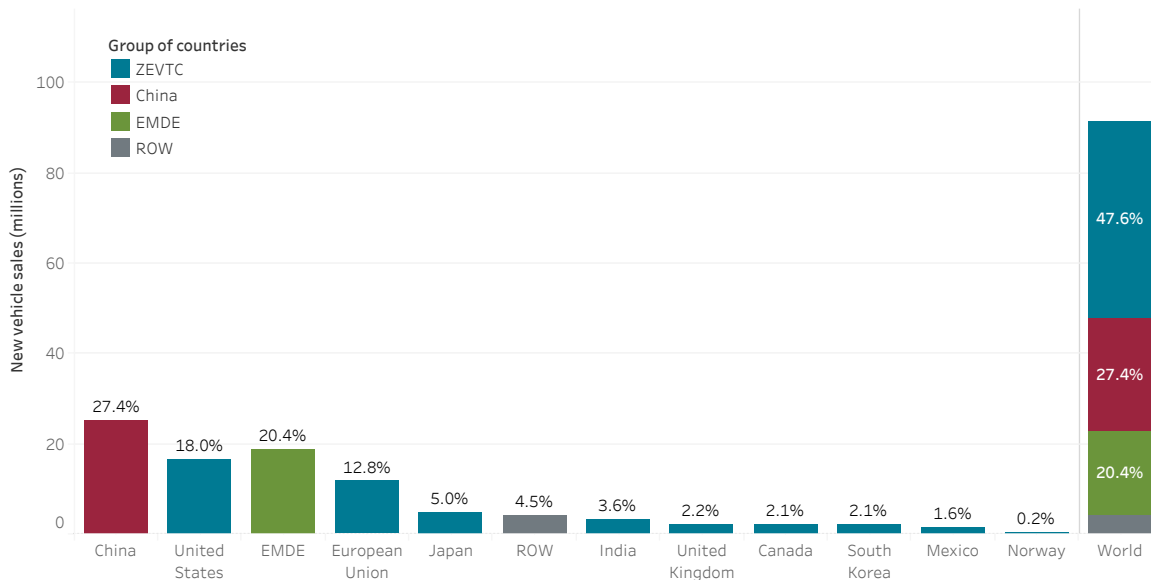
'ZEVTC' includes the EU-27, India, USA, Canada, Japan, Mexico, Norway, South Korea, and the UK.

China has participated in the ZEVTC as an observer but is not a member as of September 2021.

'Emerging markets and developing economies' (EMDE) include 117 countries that are not ZEVTC members but were considered in ICCT's analysis. Most of these are middle-income and lower-income countries.

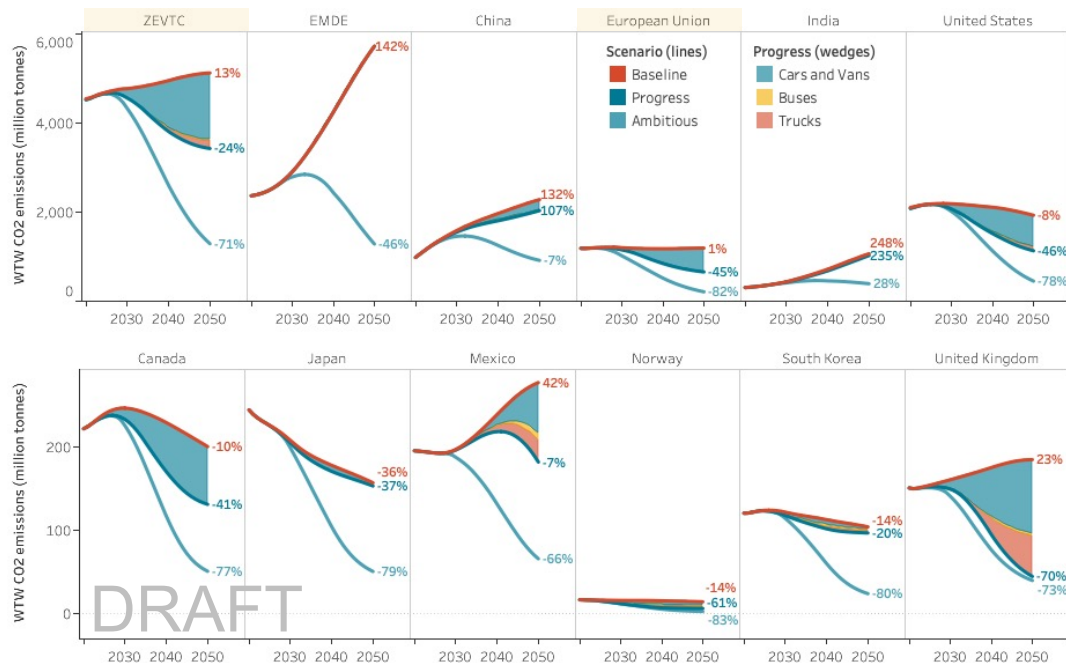
'Rest of world' (ROW) includes high-income countries that are not ZEVTC members, e.g., Russia and Australia.

New vehicle sales in 2020 (excluding two- and three-wheelers)



# ZEVTC governments have made significant policy progress since its founding in November 2020 to the present.

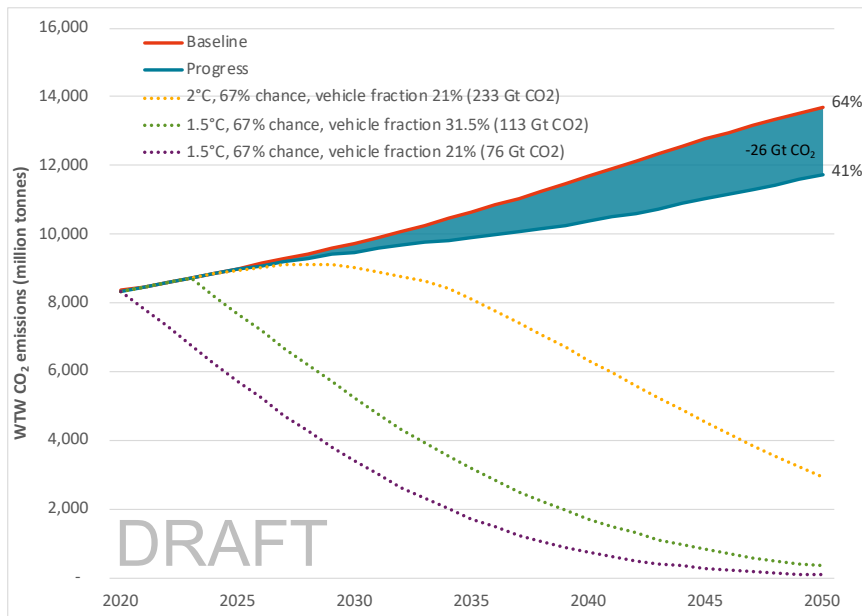
Projected vehicle CO<sub>2</sub> emissions by scenario for ZEVTC members, major vehicle markets, and emerging markets and developing economies (EMDEs).





While progress to date among ZEVTC members is impressive, it is not adequate to bring global vehicle emissions in line with climate goals.

- ZEVTC members could avoid **23 Gt CO<sub>2</sub>** by following through on policies and announcements in the Progress to Date scenario.
- China could avoid another **3 Gt CO<sub>2</sub>** by implementing its New Energy Vehicle Industrial Development Plan.
- Without further policies, vehicle CO<sub>2</sub> emissions in EMDEs are on track to more than double by 2050.



# We analyzed how much more could be achieved under an accelerated global ZEV transition.

- Ambitious scenario is constrained by feasibility; it allows sufficient lead time for:
  - governments to develop and implement ZEV policies;
  - manufacturers to make investments and ramp up production capacity;
  - public and private entities to deploy adequate charging and hydrogen refueling infrastructure.
- Leading markets will need to move more quickly: we assume their ZEV sales shares reach 90–100% for cars, vans, and buses and 60–90% for medium and heavy trucks by 2035.

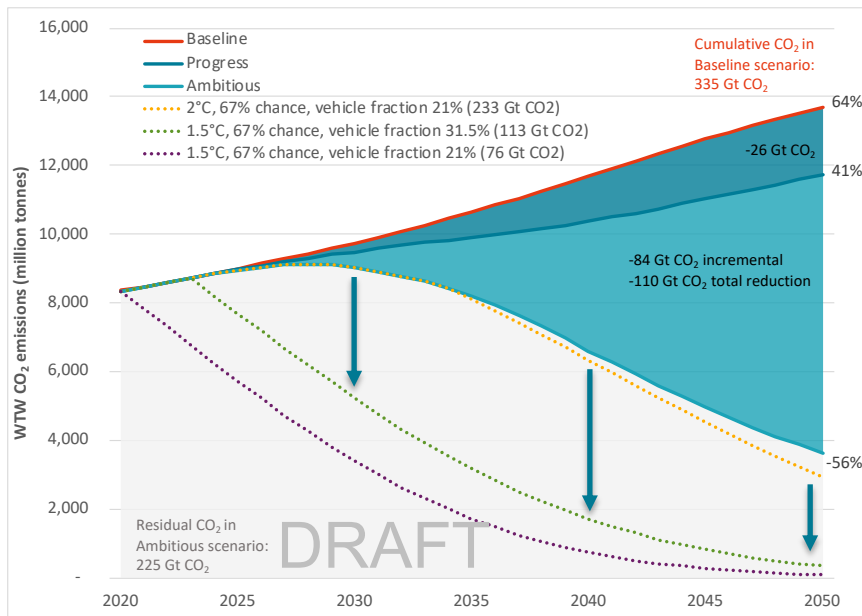
Ambitious scenario assumptions of ZEV sales shares. Ranges indicate variability in uptake among countries. **DRAFT**

Vehicle type	2030	2035	2040	2045
Car	30–75%	60–100%	90–100%	100%
Van	30–75%	60–100%	90–100%	100%
Bus	60–90%	90–100%	100%	100%
Medium truck	30–50%	60–90%	90–100%	100%
Heavy truck	20–40%	40–75%	75–100%	100%

We compared these assumptions with other studies such as BNEF's [EV Outlook 2021](#), IEA's [Net Zero by 2050](#), United Nations Climate Change's [2021 vision](#), and the [2035 report](#). In general, our Ambitious assumptions are close to BNEF and UN, a bit more ambitious than IEA, and a bit less ambitious than the 2035 report.

## Achieving the Ambitious ZEV scenario globally could nearly eliminate the gap between projected vehicle CO<sub>2</sub> emissions under current policies and a 2°C pathway.

- Ambitious scenario could avoid 110 Gt CO<sub>2</sub> cumulatively from 2020–2050.
- Cars account for about 50% of this mitigation potential, followed by trucks (31%), buses (11%), and vans (7%).
- ZEVTC markets account for 44% of this mitigation potential (48 Gt CO<sub>2</sub>), of which 23 Gt CO<sub>2</sub> could be secured by following through on policies and announcements in the Progress to Date scenario.
- 117 EMDEs account for 38% of global mitigation potential (42 Gt CO<sub>2</sub>).
- Remaining potential of 20 Gt CO<sub>2</sub> is split between China (16 Gt CO<sub>2</sub>) and the rest of the world, which includes G20 economies like Russia and Australia.
- Complementary policies (e.g., accelerated ZEV fleet transitions, avoid and shift policies) are needed to fully eliminate the gap with 2°C and especially to limit warming to below 2°C.



# Recommendations

**1. Adopt and implement the six major policies\* to transition to 100% ZEV sales for LDVs by 2035 and HDVs by 2040.** Set phase-out targets with aligned policies that achieve ZEV sales shares of:

- at least 60–75% for cars, vans, and buses and 30–40% for trucks no later than 2030;
- 90% for cars, vans, and buses and 60–75% for trucks by 2035;
- 90% for heavy trucks and 100% for all other vehicle types by 2040;
- and 100% for heavy trucks by 2045.

**2. Reduce the gap with a 1.5°C scenario by accelerating ZEV transitions for specific fleets and looking to other types of policy measures to reduce vehicle travel.**

- Large scale ZEV penetration in leading markets will significantly bring down the costs of ZEV technology and increase ZEV model availability and manufacturing capacity.
- As a result, the costs will be lower for the rest of the world to get access to ZEVs and related technologies.



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