

An overview of technologies and policies for decarbonizing the on-road transportation sector

January 12, 2022

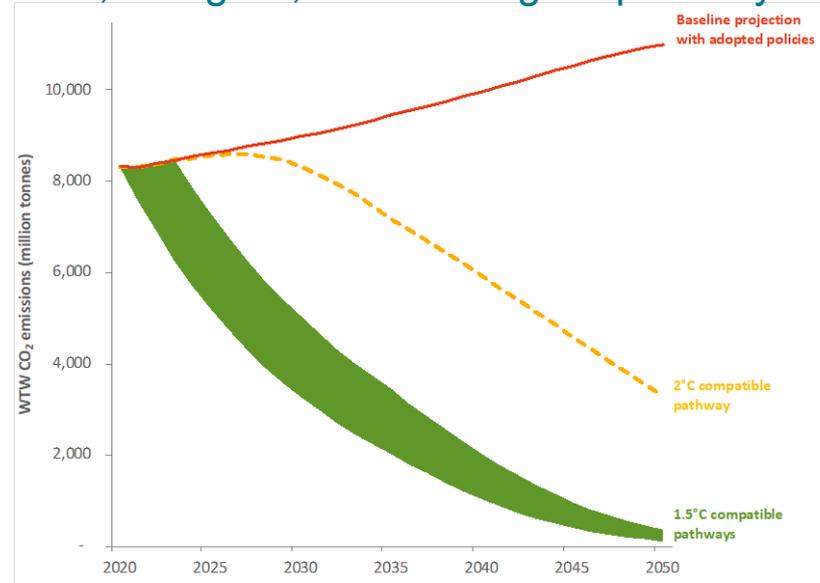
Rachel Muncrief, PhD

Panel, TRB Executive Committee Policy Session
Transportation Research Board, Annual Meeting

Cars/Vans/Tucks/Buses: Paris aligned pathways require near zero emissions by 2050

- 1.5°C pathways:
 - 2020–2030: 40-60% reduction
 - 2040: 80–90% reduction
 - 2050: near 100% reduction
- 2°C pathway:
 - 2030: emissions stabilized at 2020 levels
 - 2040: 30% reduction
 - 2050: 60% reduction

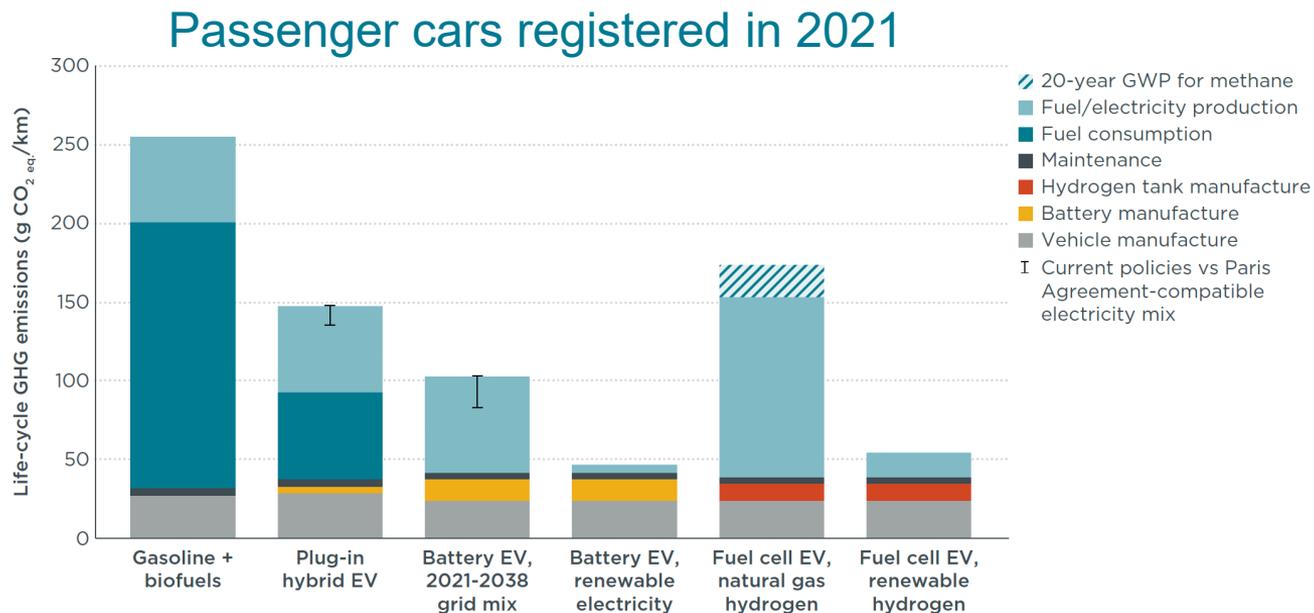
Global on-road transport sector GHG emissions: baseline, 2 degree, and 1.5 degree pathways



ICCT (2021). Decarbonizing road transport by 2050: Accelerating the global transition to zero-emission vehicles.
<https://theicct.org/publications/zevtc-accelerating-global-transition-dec2021>

Life-cycle GHG emissions of average passenger cars in the U.S.

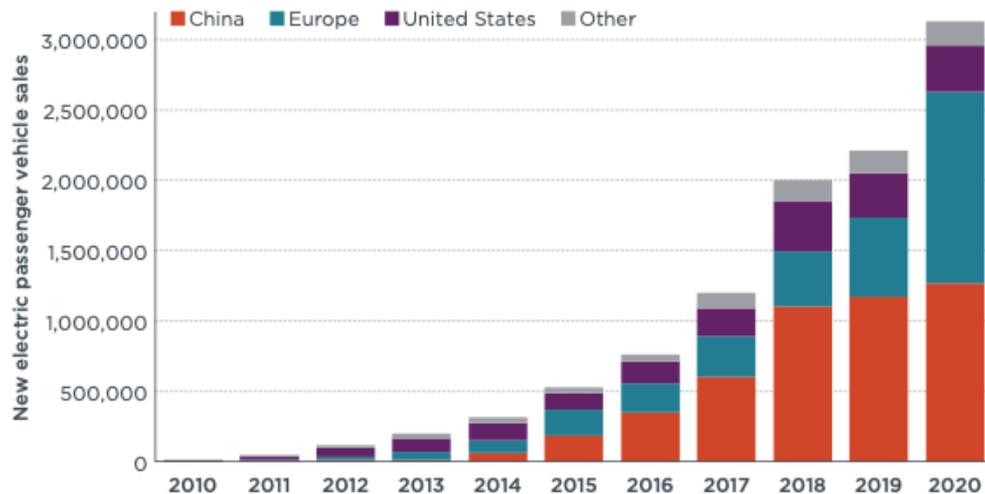
- **Gasoline cars:** highest emissions
- **Plug-in EVs:** moderate emissions (in the U.S.)
- **Battery EVs:** lowest emissions, already for cars registered today
- **Fuel cell EVs:** emissions vary with hydrogen source



Sales of EVs have grown significantly in recent years

- 2020: 15% decrease in vehicle sales. Electric vehicle (EV) sales grew 42% (to 5% of the global market).
- Recent growth in EV sales has been driven by Europe
- September 2021: Global EV sales reached 10% of car sales for the first time

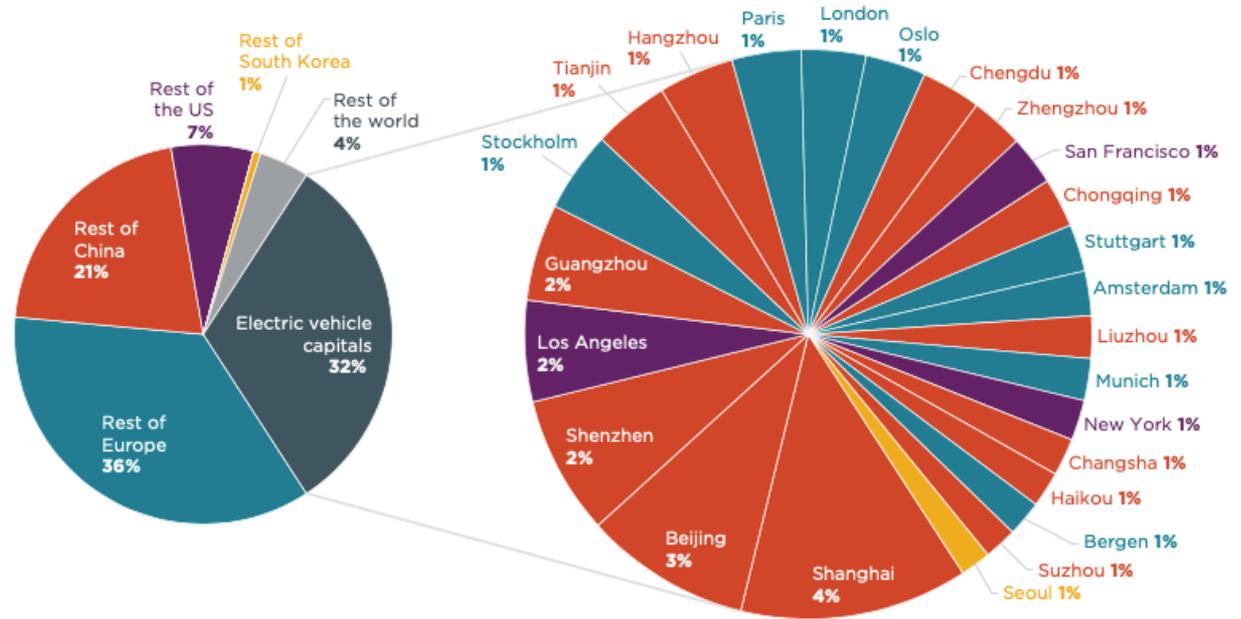
Global new electric passenger vehicle sales by market from 2010 to 2020



<https://theicct.org/publications/evs-capitals-dec21>

A third of EV sales are in just 25 metro areas

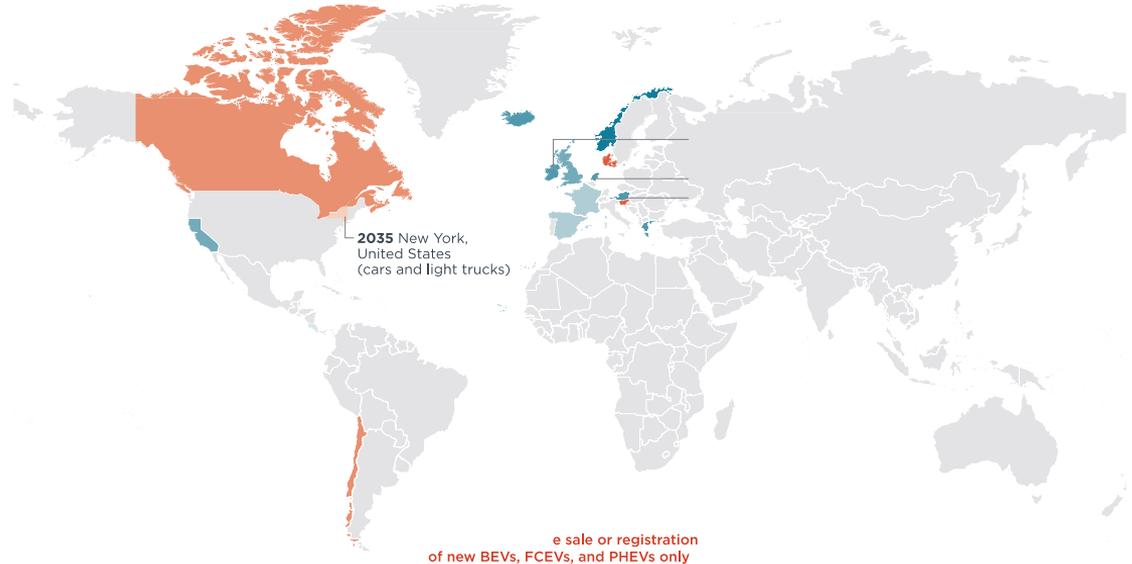
- Top 25 EV metro areas
 - 32% of global EV sales (2020)
 - 13% of global vehicle sales
 - 4% of the world's population



Phase out dates for fossil fuel vehicles set the pace for electrification

- 18 governments have LDV phase out targets accounting for ~12%+ of global sales.
- 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.
- Only official government targets are included in this map: unofficial targets (including some COP26 announcements) are not included here
- On the HDV side: 9 governments have official targets for ICE bus phase out dates and 5 for ICE truck phase out dates

Governments with official targets to phase out 100% of sales or registrations of new internal combustion light duty vehicles (status: through December 2021)



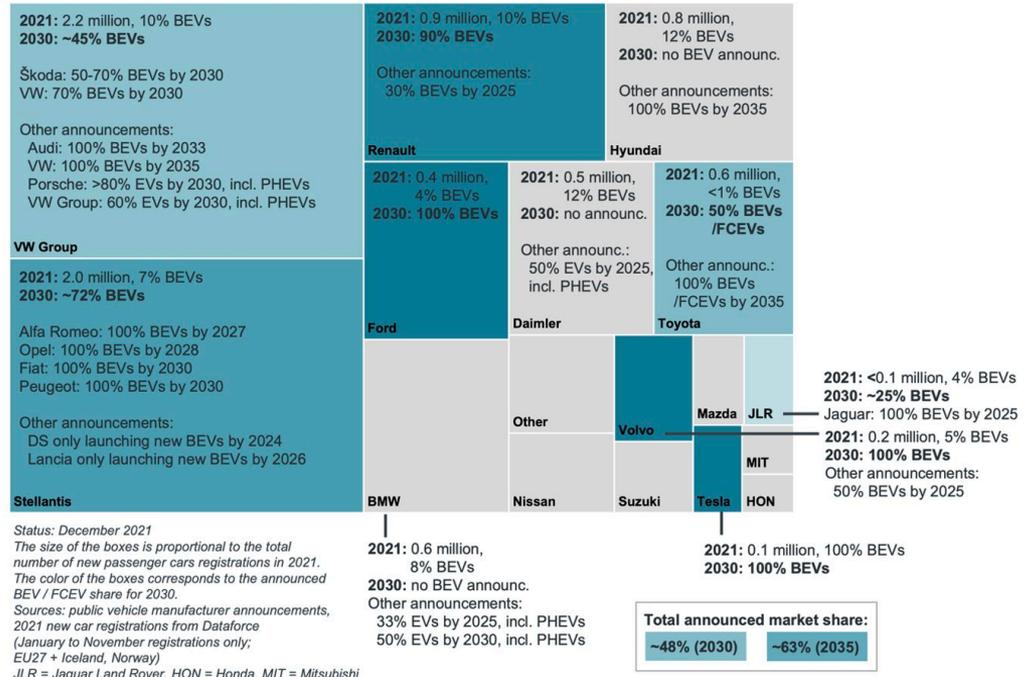
Manufacturer commitments lower barriers for government action

Overview of vehicle manufacturer announcements for expected share of EVs in Europe

- Current commitments equate to:
 - 50% BEVs by 2030
 - 63% BEVs by 2035
- PHEVs are still included in many manufacturer's commitments

Battery and fuel cell electric vehicles (BEVs / FCEVs)

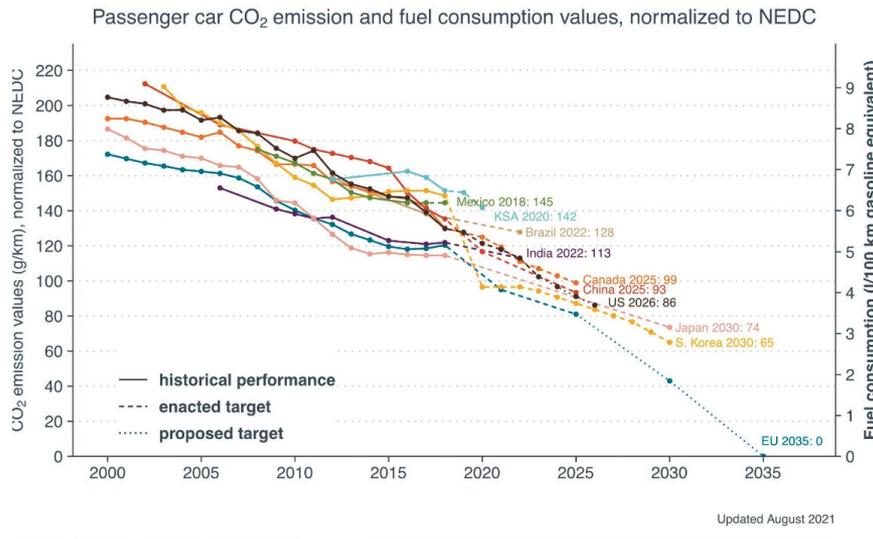
Passenger car vehicle manufacturer announcements for Europe



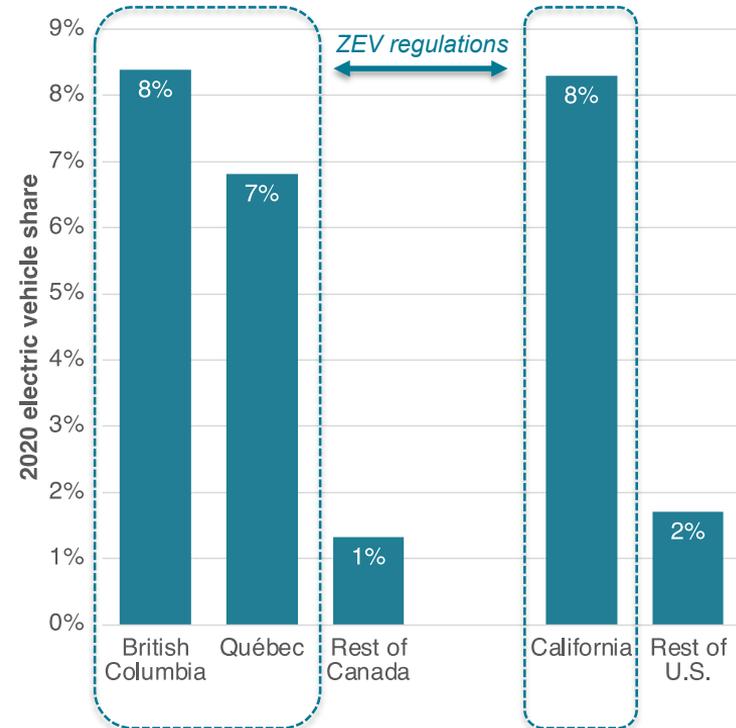
<https://theicct.org/blog/staff/fr-ita-manufacturer-ev-targets-jan21>

CO₂ standards and ZEV regulations are THE key policy driver for EVs...

Passenger cars CO₂ emissions standards



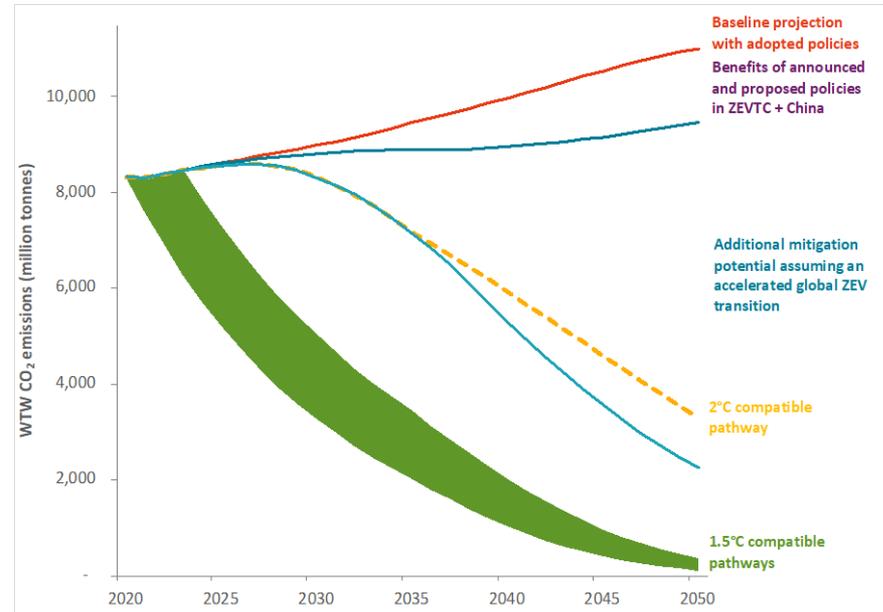
ZEV market share in British Columbia, Quebec and California are 4x to 8x the rest of Canada and United States.



Reaching Paris-aligned targets will require further policy action

- **purple wedge** Major markets could make a significant dent in emissions by implementing announced and proposed policies
- **blue wedge** global economies set ambitious phase out targets along with interim goals in 2025 and 2030
- In this scenario, **2030** sales targets vary by region:
 - 30-75% sales for cars/vans
 - 60-90% for buses
 - 20-50% for MD/HD trucks

Closing the gap between a 2-degree trajectory and 1.5-degree trajectory (**green wedge**) will require complementary policies that accelerate ZEV fleet transitions and avoid and shift vehicle activity.



Global WTW CO₂ emissions from cars, vans, trucks, and buses compared to 1.5°C and 2°C compatible emissions pathways

Thank you!
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