

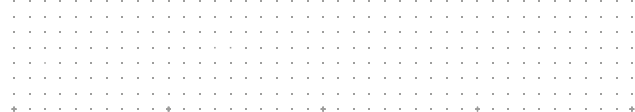
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Electric Vehicle Outlook 2020

BloombergNEF



BNEF's Electric Vehicle Outlook



The Electric Vehicle Outlook is BloombergNEF's annual long-term forecast for road transport. It looks at how electrification, shared mobility, autonomous driving and other trends will impact transport from today to 2040.

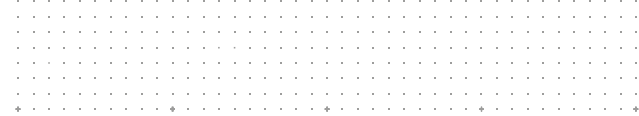
Segments:

- Light duty passenger vehicles
- Shared mobility fleets
- Commercial vehicles
- Buses
- Two/three-wheeled vehicles

Impacts:

- Automotive sales and fleet
- Oil markets
- Electricity markets
- Infrastructure
- Battery metals and materials
- Emissions

10 findings from EVO 2020



1. Covid-19: EV sales drop in 2020 but hold up better than combustion vehicles and rebound faster

Covid-19: passenger EV sales holding up better than internal combustion vehicle sales

Year-on-year change in vehicles sales, 1Q 2020

Drop - more than 50%

Drop - less than 50%

Rise - more than 50%

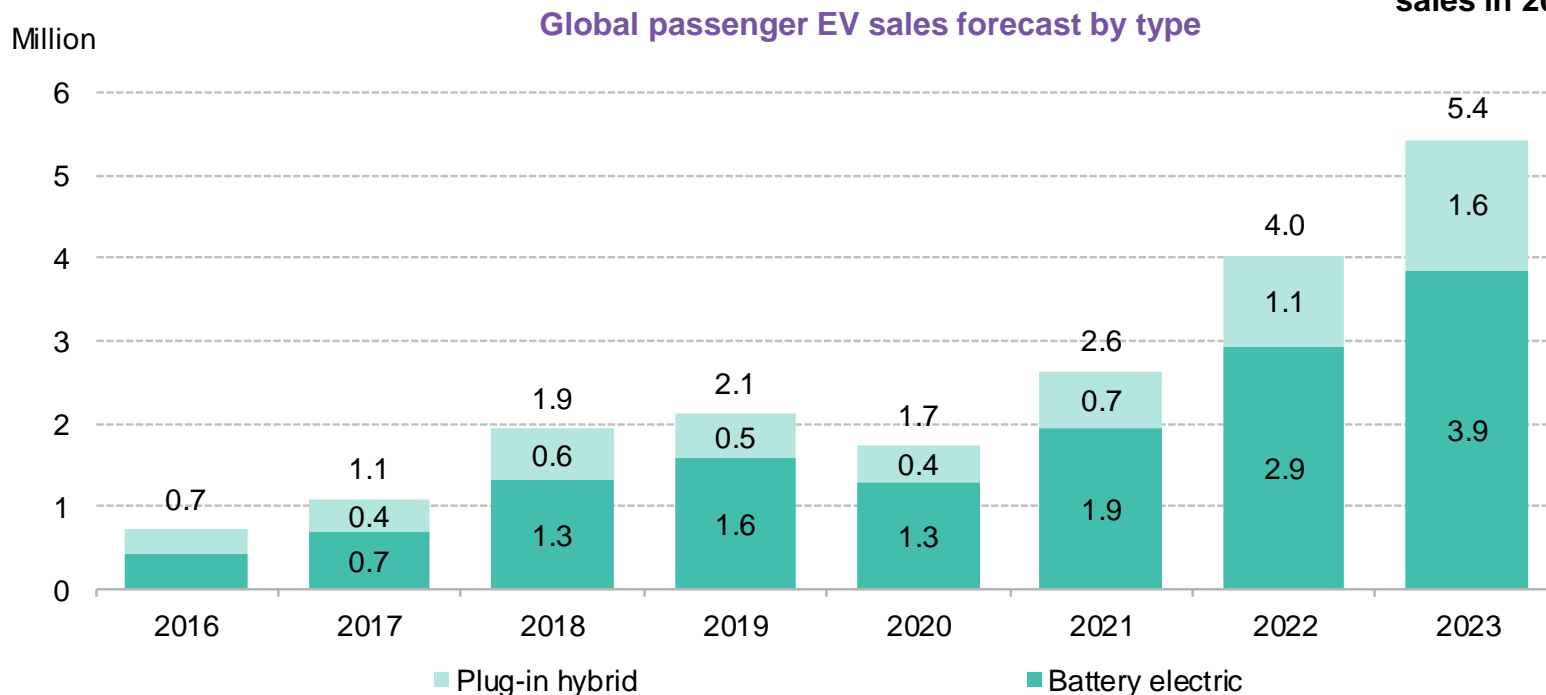
Rise - less than 50%

Region	Country	Internal combustion passenger car sales	Passenger electric vehicles sales
APAC	China	-45%	-60%
	Japan	-10%	-17%
	S. Korea	-7%	+26%
AMER	U.S.	-13%	+5%
EMEA	Germany	-25%	+148%
	U.K.	-34%	+127%
	France	-39%	+123%
	Italy	-36%	+100%
	The Netherlands	-13%	+22%
	Sweden	-25%	+87%
	Norway	-42%	+4%

Source: BloombergNEF

Covid-19: Updated short-term passenger EV sales forecast

EV share of global sales in 2023: **7%**



Source: BloombergNEF. Note: Based on Covid-19 Scenario 2.

Covid-19: Open questions

- **Government stimulus:** Priorities, politics, and trade-offs
- **Consumer attitudes:** To public transit, ride hailing, and private car ownership
- **Automaker strategies:** What to restart when?
- **Covid-19 and urban air quality:** clean air push?



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Two tipping points

1: EV price parity: By mid-2020s for most segments

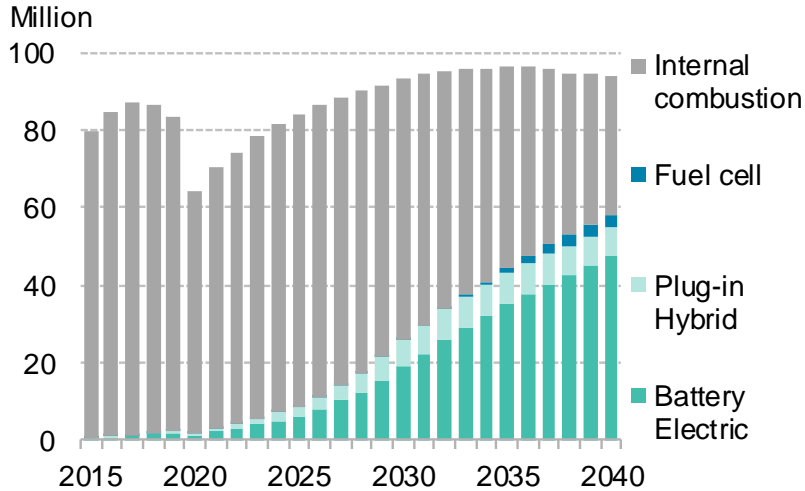
2: Infrastructure slowdown: In mid-2030s for most countries

Source: BNEF

Two tipping points

Global passenger vehicles by drivetrain

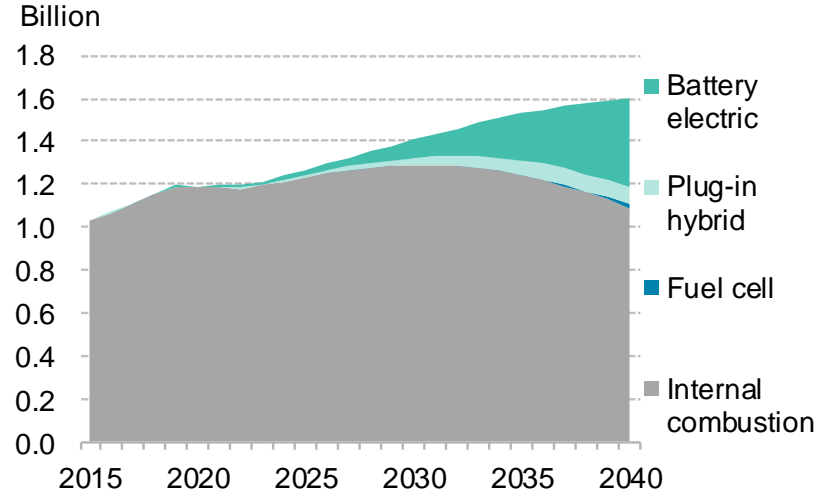
Sales



EV share of global sales in 2040

58%

Fleet



EV share of global fleet in 2040

31%

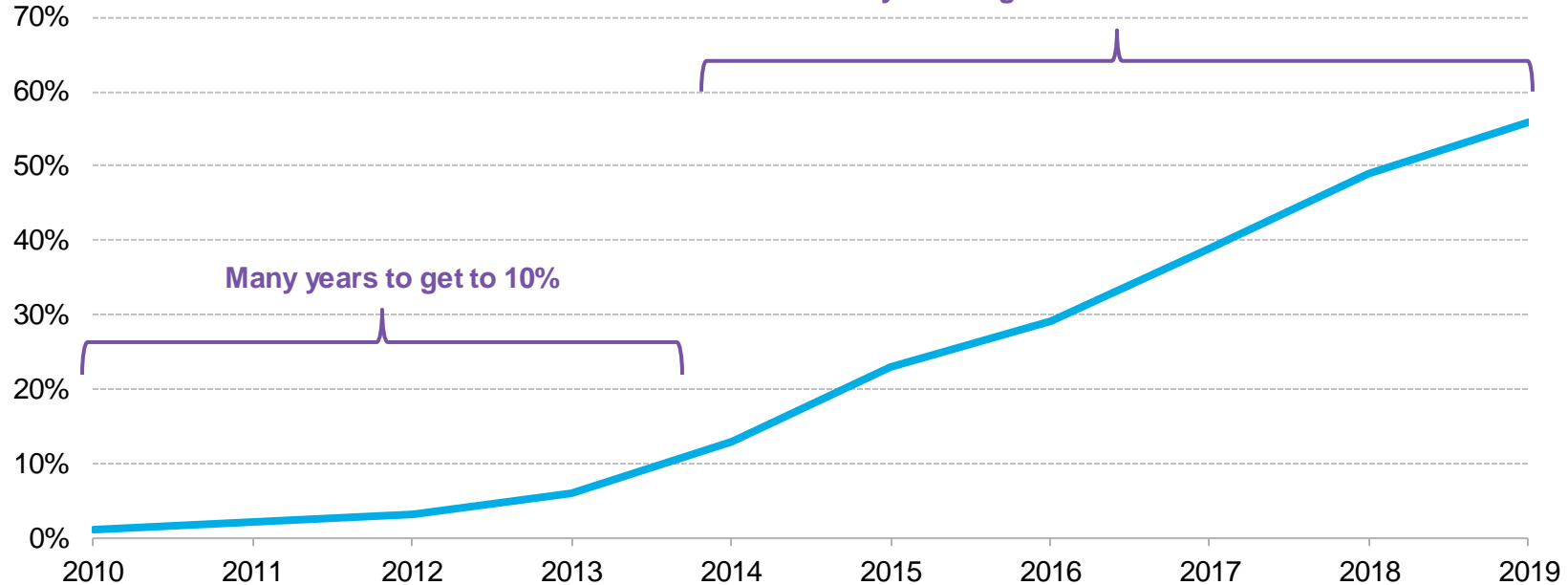
Source: BNEF

The lessons from the Nordics?



EV share of Norwegian passenger vehicle sales

EV share of new sales



Source: BNEF, Marklines

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China and Europe pull further ahead of the U.S.

Europe and China share of global EV market in 2030:

72%

EV share of new passenger vehicle sales

%

50%

Emmanuel Macron injects €8bn to fuel French car industry revival

Subsidies for buyers of electric vehicles and support for makers to develop clean technology

BASIC MATERIALS JUNE 4, 2020 / 8:28 AM / 4 DAYS AGO

German auto stimulus to boost VW's electric push

30%

Bloomberg Green

20%

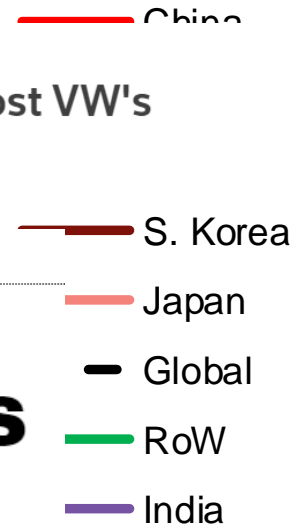
Politics

10%

0%

World's Greenest Coronavirus Recovery Package Arriving in Europe

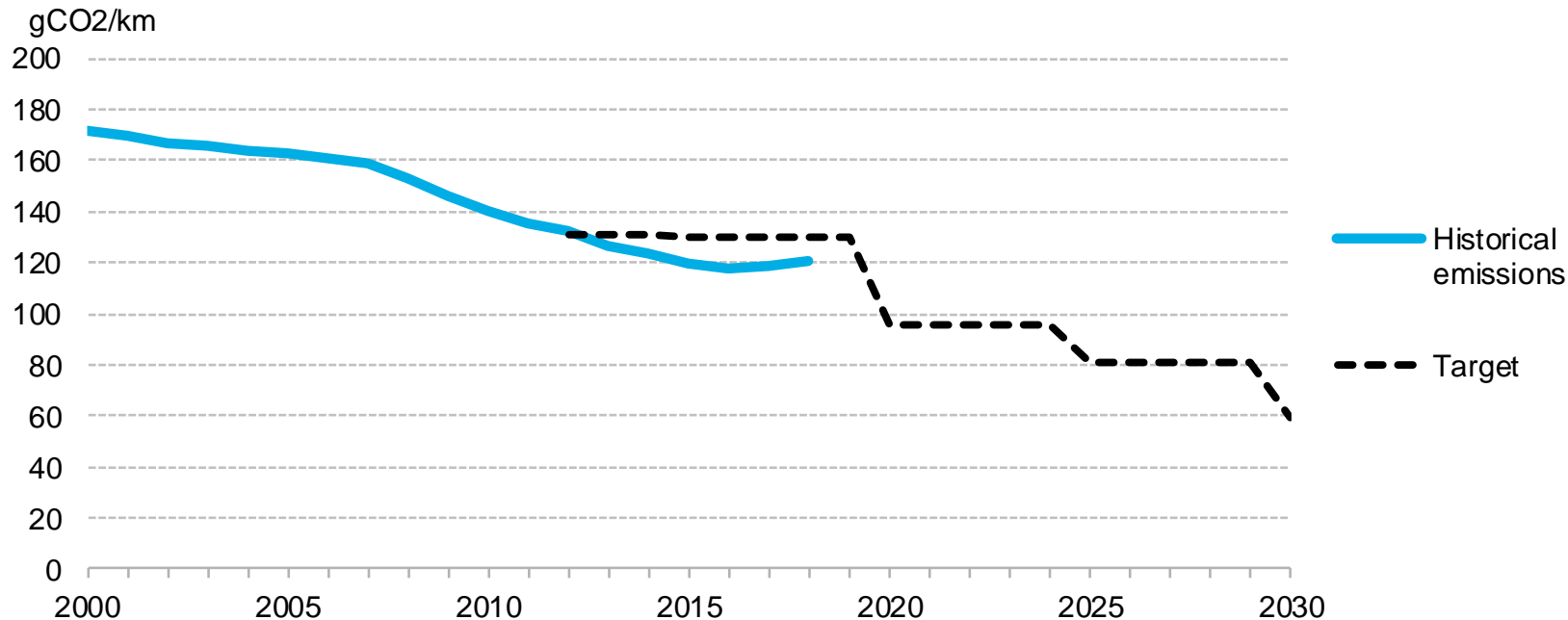
Source: BNE



EU policy is driving EV adoption



Historical and target average vehicle CO2 emissions in Europe

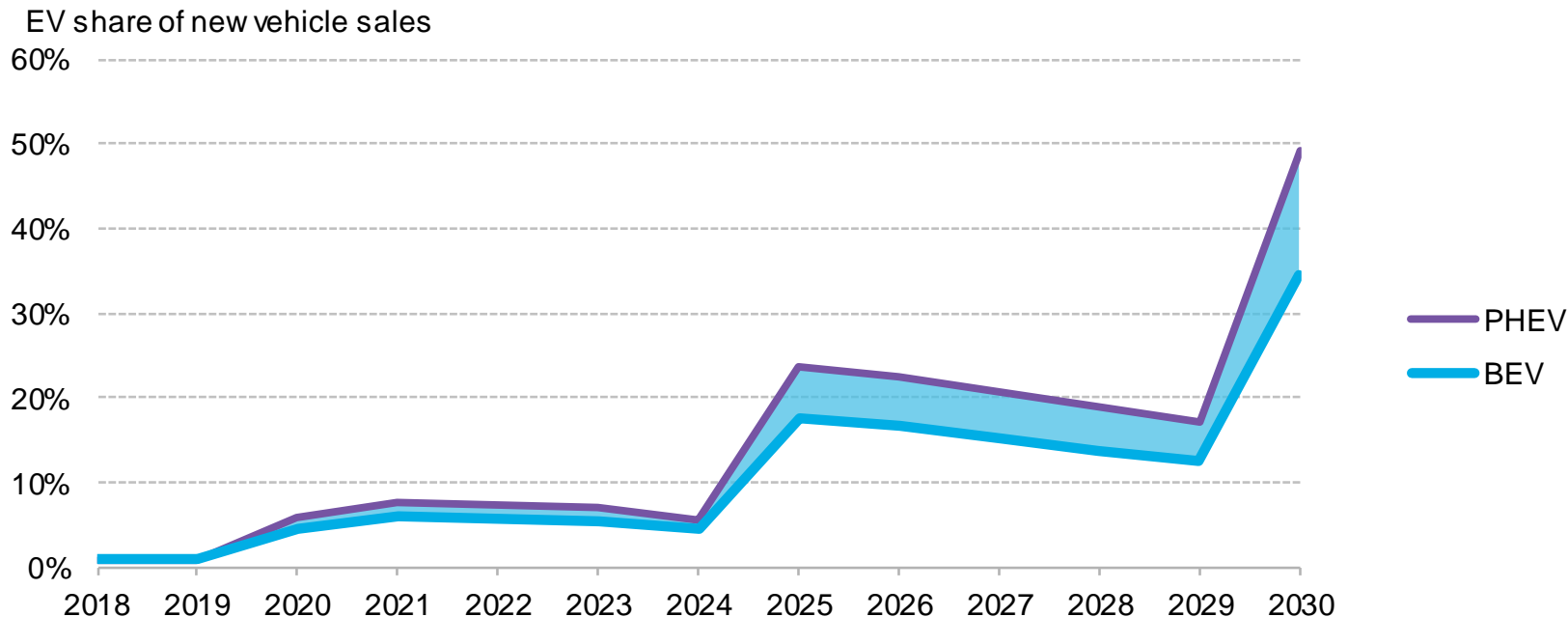


Source: BNEF, European Commission

EU policy is driving EV adoption

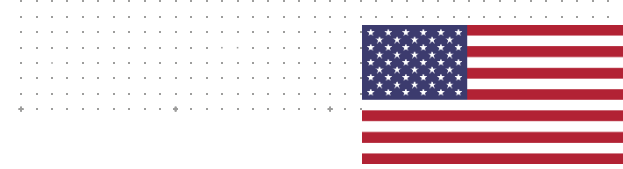


EV share of sales needed to hit EU automotive CO2 emissions targets

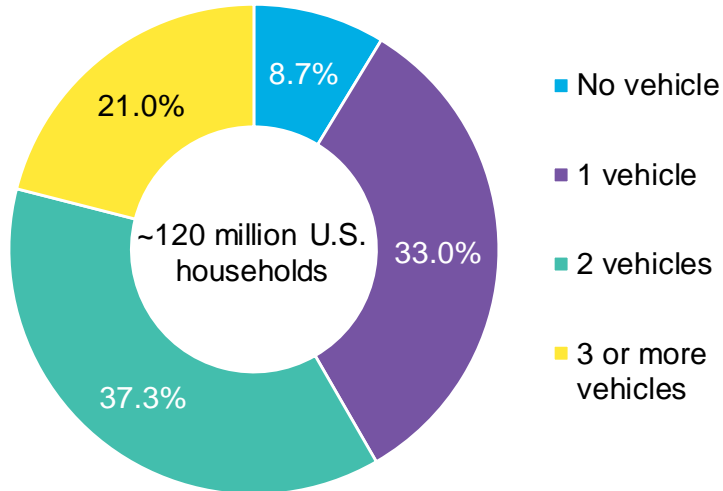


Source: BNEF, Marklines. Shaded region shows the range of EV market share needed to hit EU CO2 targets in the given year.

.....But the U.S. catches up in the 2030s

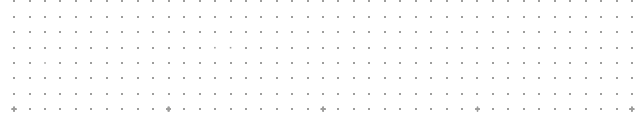


Cars per U.S. household



Source: BloombergNEF U.S. Census Bureau, 2018.

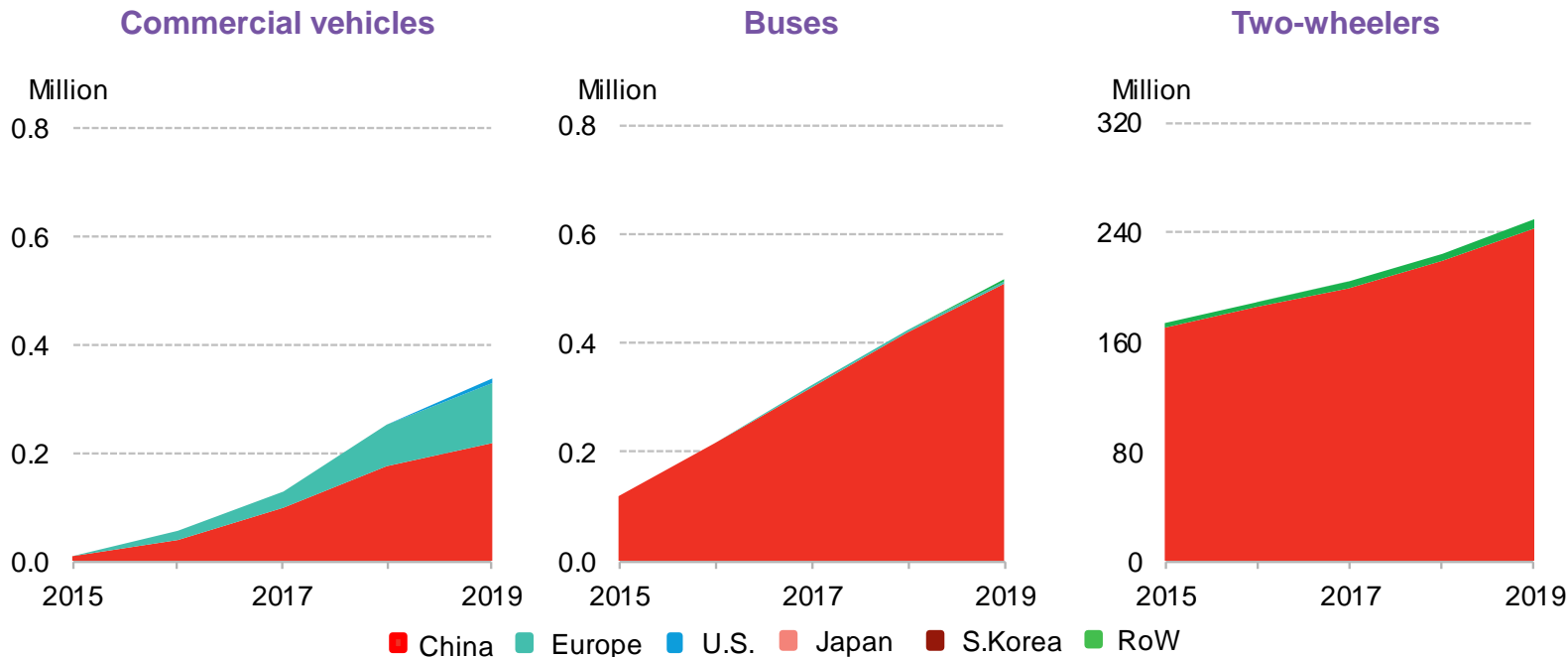
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Several 'killer apps' for electrification are emerging for the 2020s

Current fleet of electric:



Source: BNEF

Several 'killer apps' for electrification are emerging for the 2020s

Commercial vehicles



Current EV
fleet share:

<0.5%

Tipping point: **Next 2-3 years**

Buses



16%

Reached

Two-wheelers

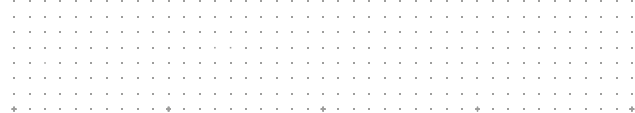


20%

Reached

Source: BNEF

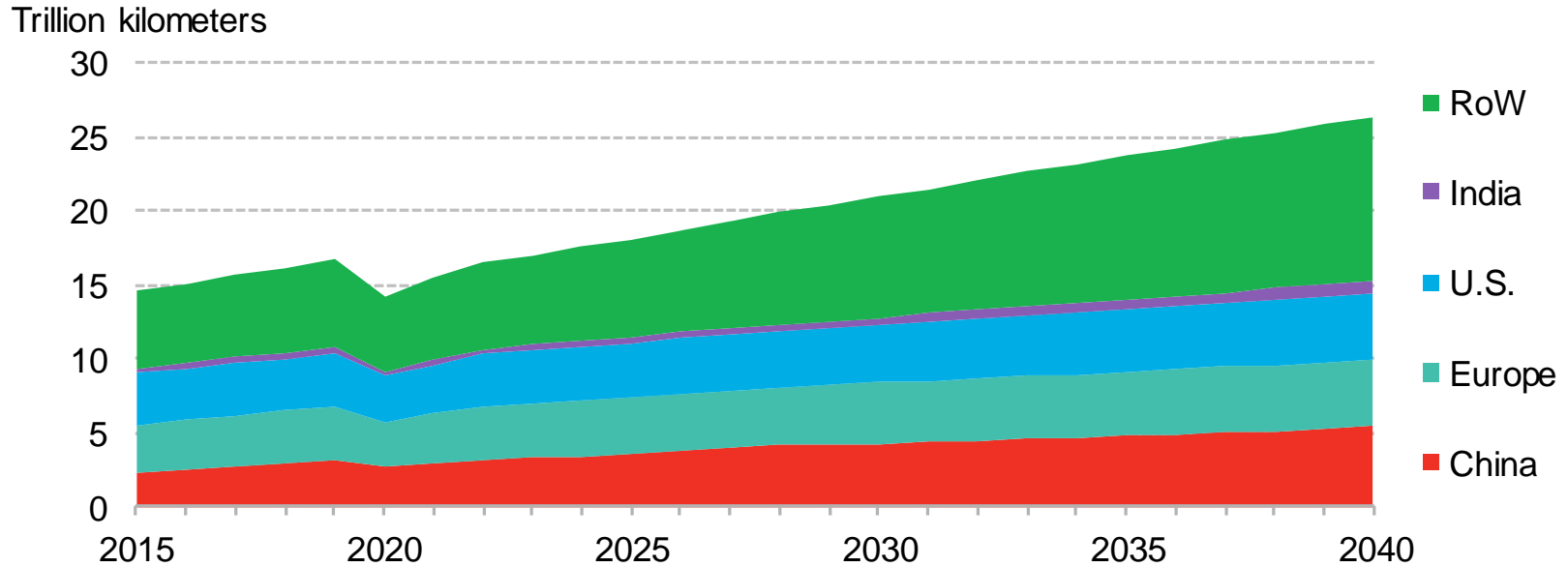
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Demand for mobility keeps rising....

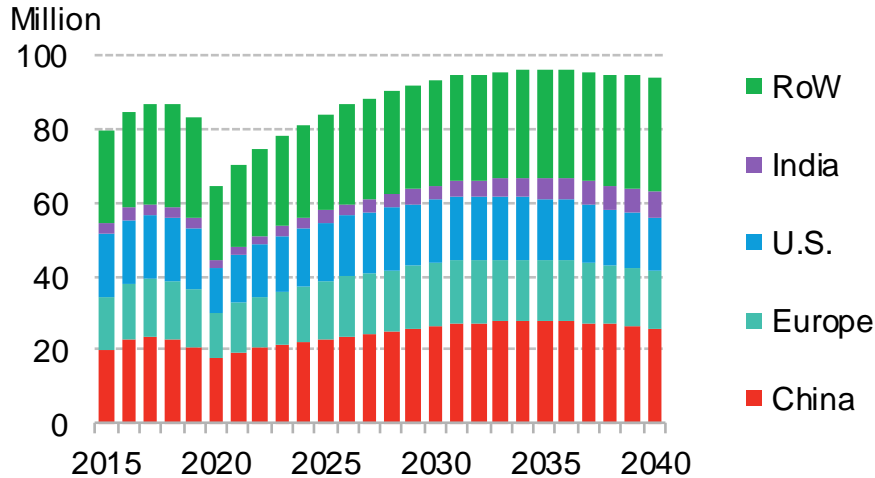
Global annual kilometers travelled by the passenger vehicle fleet by region



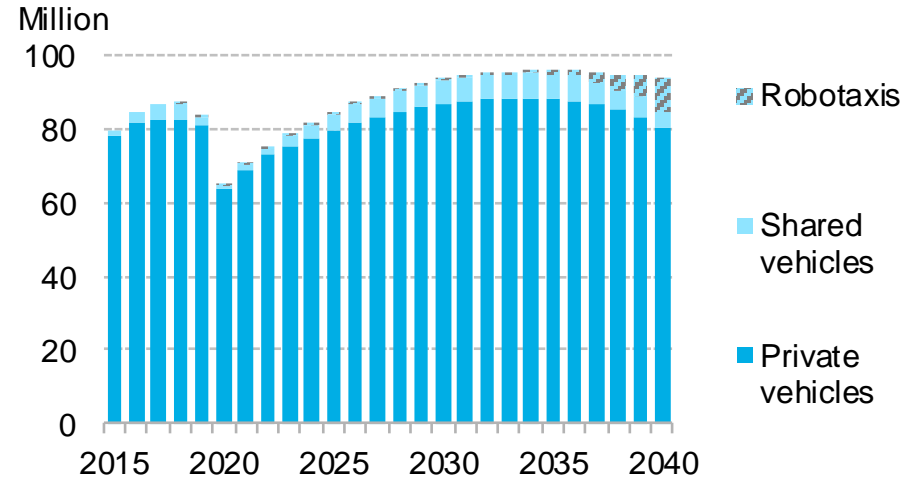
Source: BloombergNEF

...but vehicle sales peak

Global annual passenger vehicle sales by region



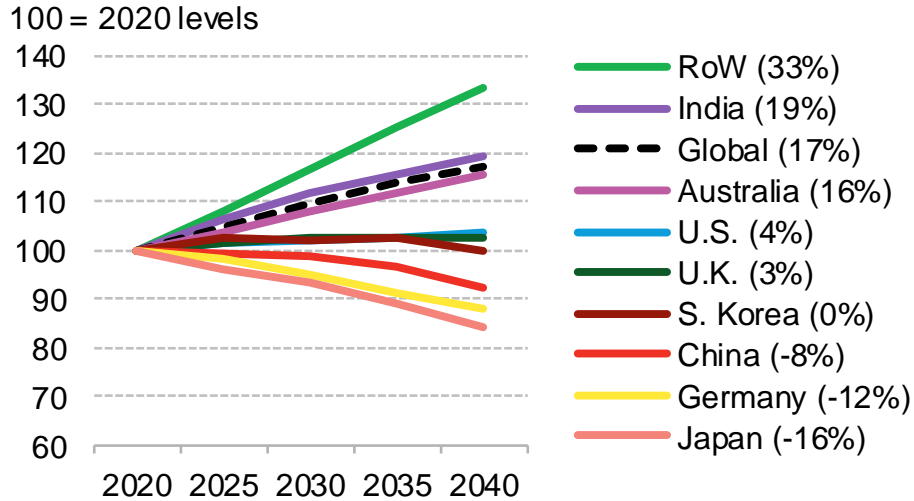
Global annual passenger vehicle sales by type



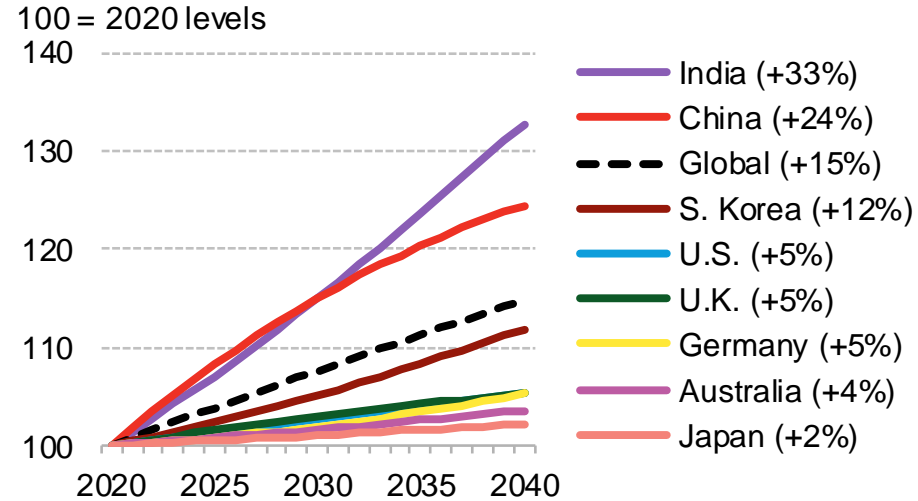
Source: BloombergNEF

Why do vehicle sales peak?

Growth in population of 16-59 year olds



Growth in urbanization

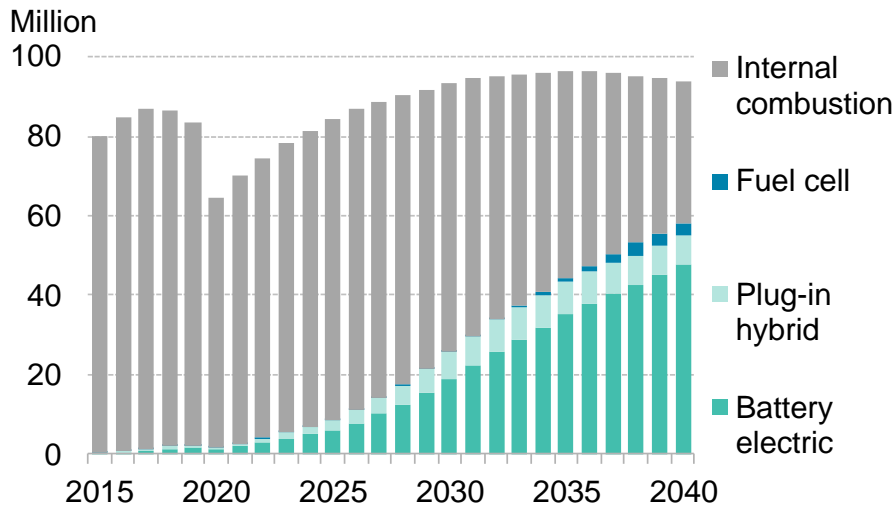


Source: BloombergNEF, United Nations, World Bank. Note: Country income groups come from the World Bank.

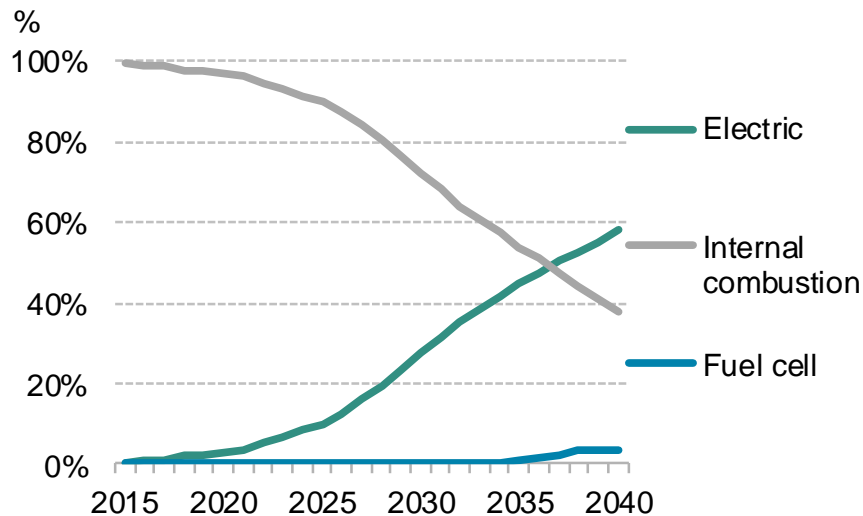
Total passenger vehicle sales peak in 2036

Combustion vehicles sales have already peaked

Global annual passenger vehicle sales by drivetrain

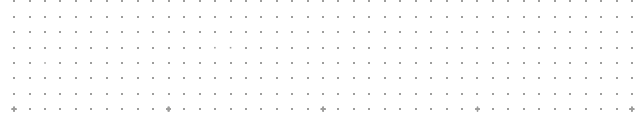


Global share of total annual passenger vehicle sales by drivetrain



Source: BloombergNEF

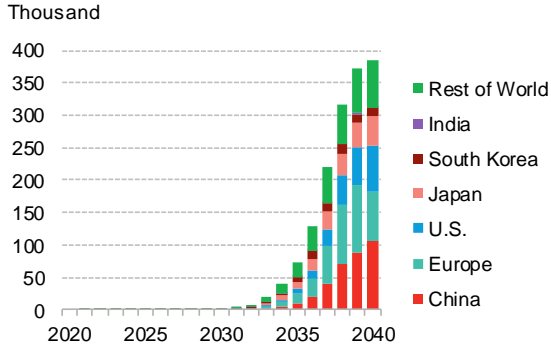
10 findings from EVO 2020



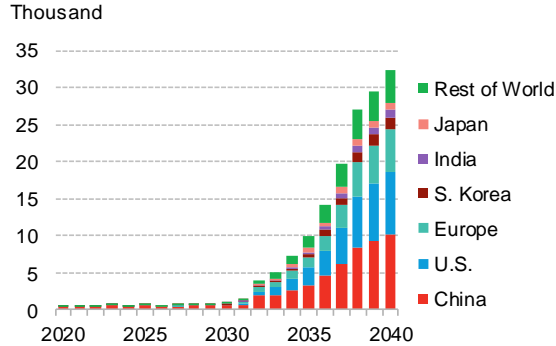
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Fuel cell vehicle sales have an impact on some commercial segments in the 2030s

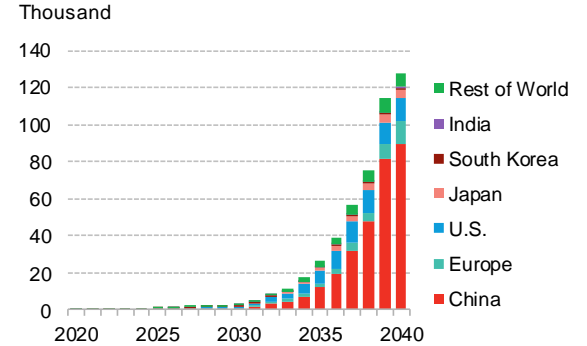
Light commercial FCV sales



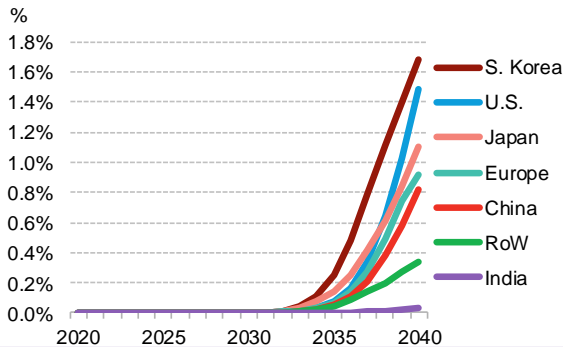
Medium commercial FCV sales



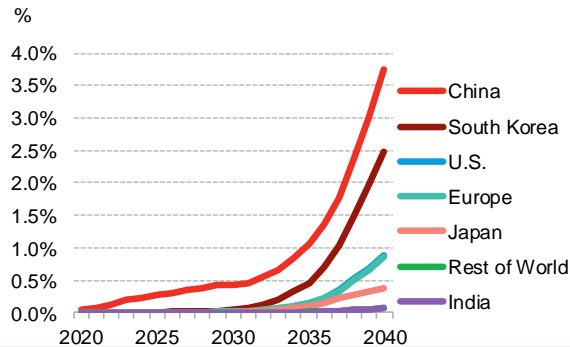
Heavy commercial FCV sales



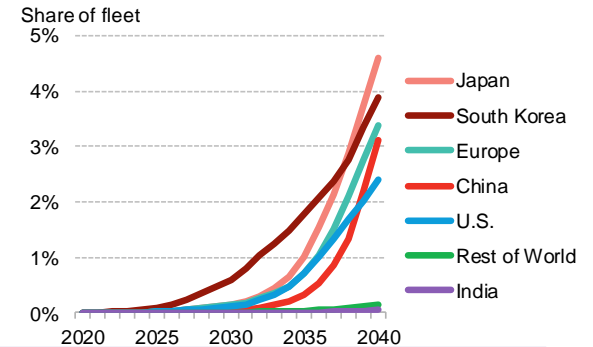
FCV share of light commercial fleet



FCV share of medium commercial fleet



FCV share of heavy commercial fleet



10 findings from EVO 2020

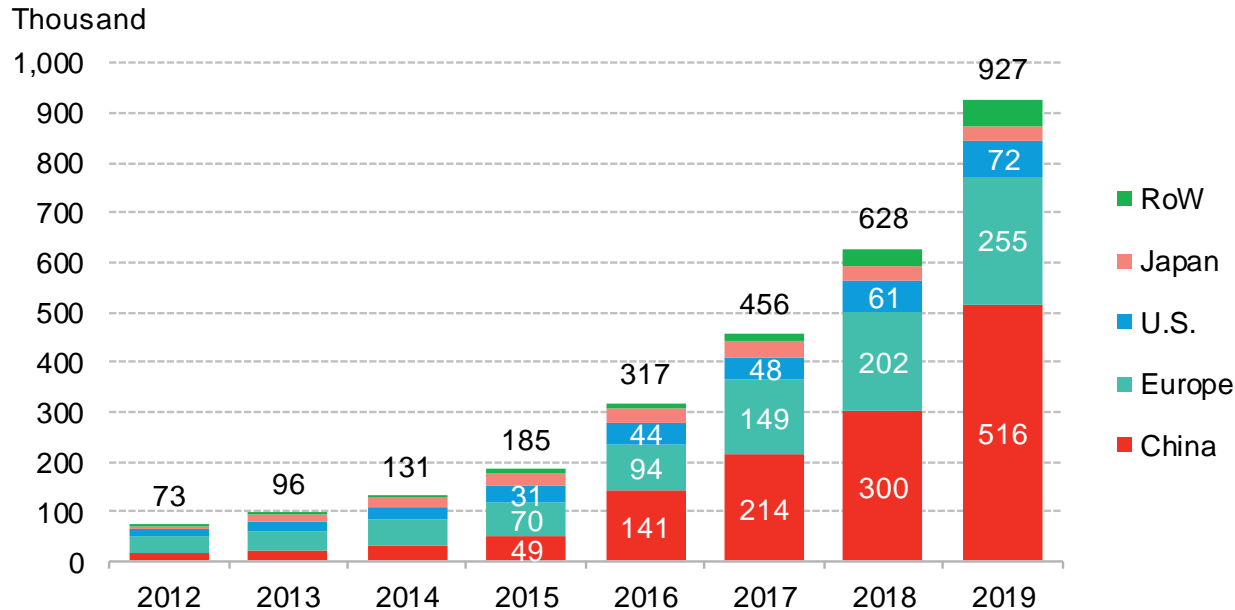
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Much more charging infrastructure needed, but most is at home/work

Current public charging connectors installed globally



Public charging:
Today: 1 million connectors

By 2040: 12 million needed

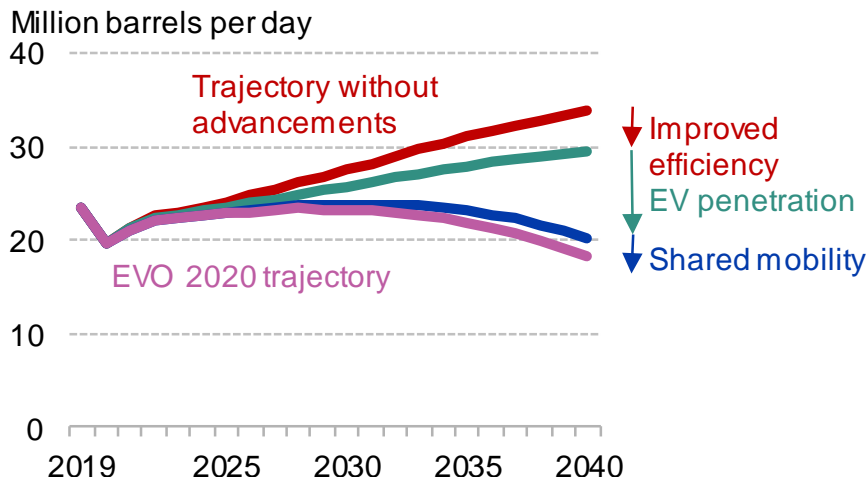
Source: BloombergNEF. Note: Public includes Tesla destination and supercharger network even though this is semi-private.

10 findings from EVO 2020

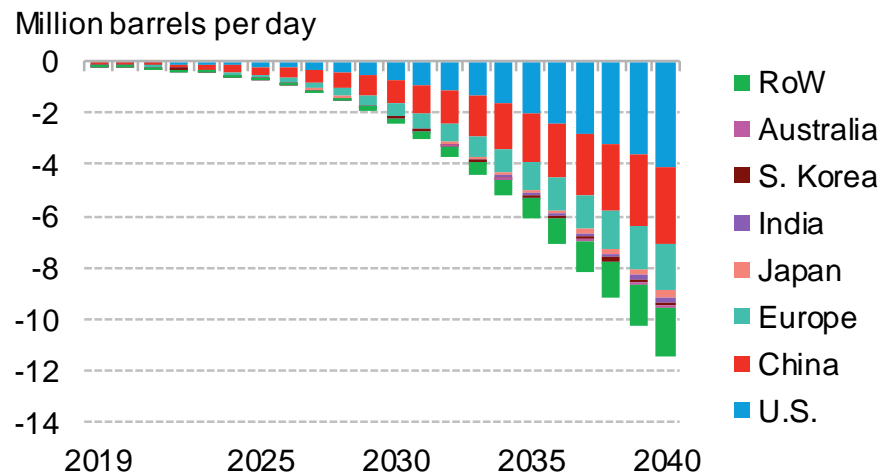
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Passenger vehicle oil demand has already peaked. Overall oil demand from road transport peaks in 2031

Passenger vehicle oil demand forecast



Oil demand avoided by privately owned electric and fuel cell passenger vehicles, and shared mobility

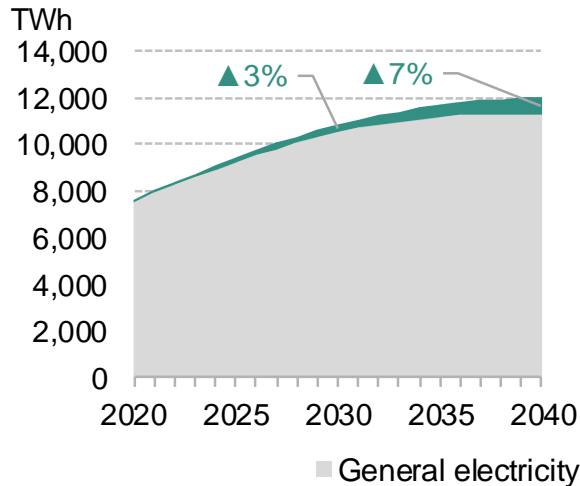


Source: IEA, BNEF. Note: Includes biofuels. Advancements include fuel efficiency improvements and alternative drivetrains.

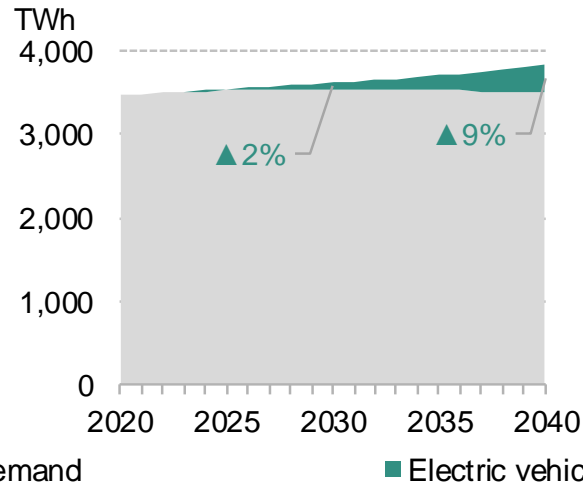
Impact on electricity demand is limited

Electricity demand with and without EVs

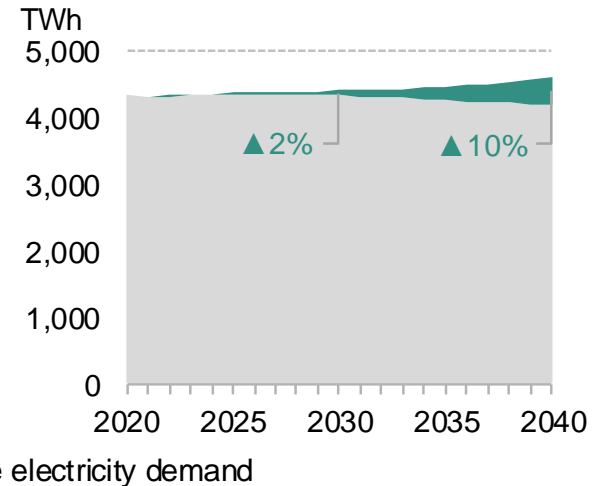
China



Europe



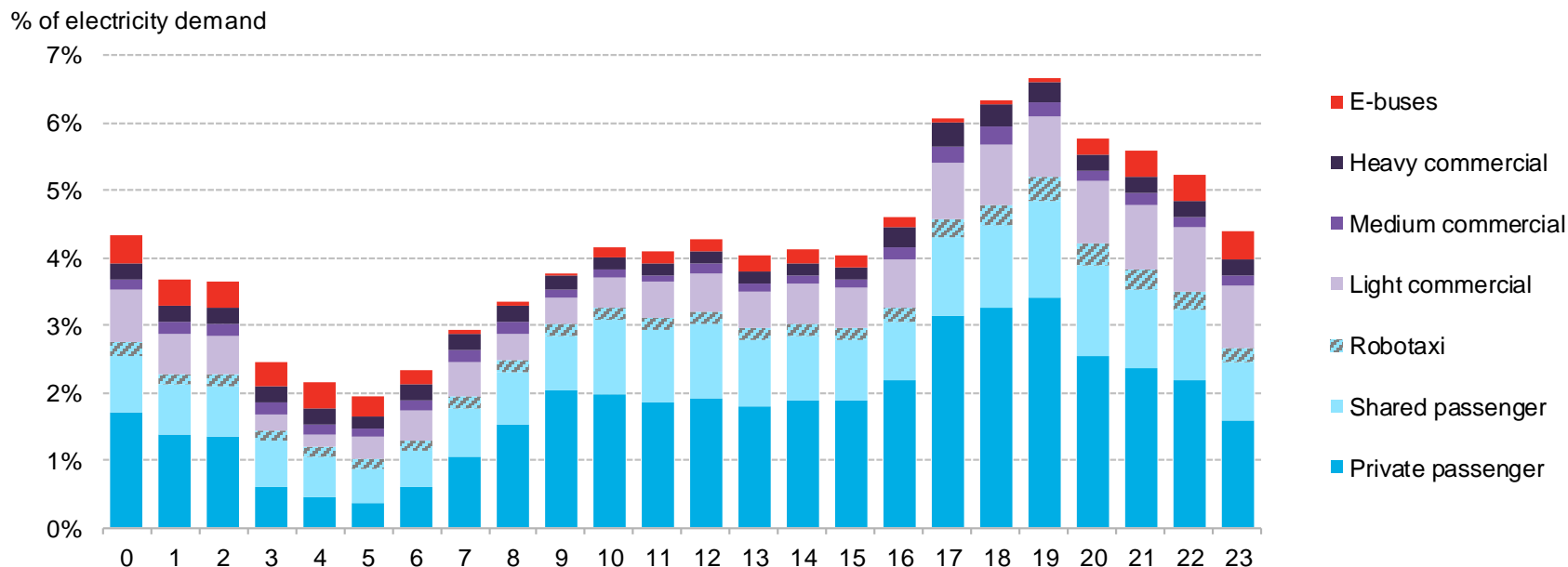
U.S.



Source: BNEF. Note: Uses general electricity demand projections from BNEF's June 24, 2019 "New Energy Outlook 2019" research note. Electric vehicle electricity demand includes demand from passenger EVs, commercial EVs, e-buses (municipal and non-municipal) and electric two-wheelers. Rest of World includes Australia and other rest of world. Percentages refer to the increases in electricity demand caused by EVs in 2030 and 2040.

The EV load profile gets flatter as more segments electrify

24-hour electricity demand by EV segment in 2035 based on "dumb" charging curves



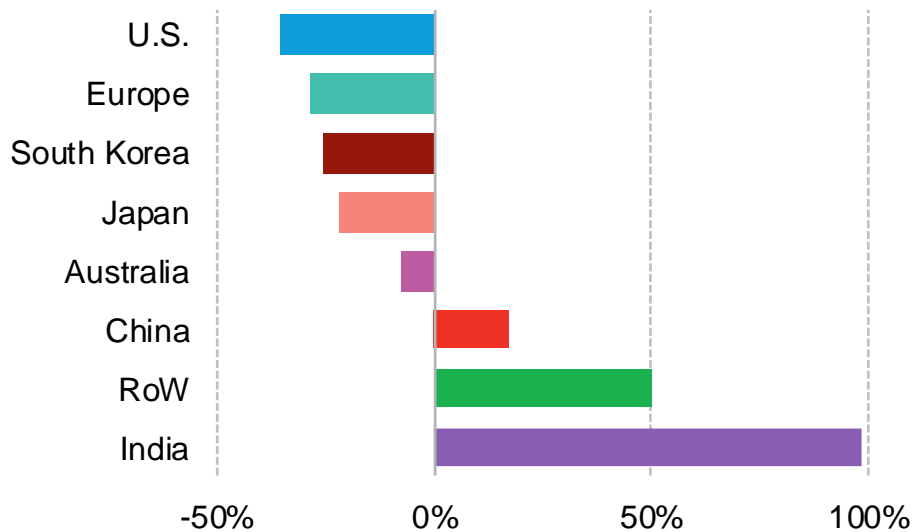
Source: BNEF. Note: Light commercial EVs are considered within home and public infrastructure. 11kW hardware is assumed to encompass 7-22kW chargers.

10 findings from EVO 2020

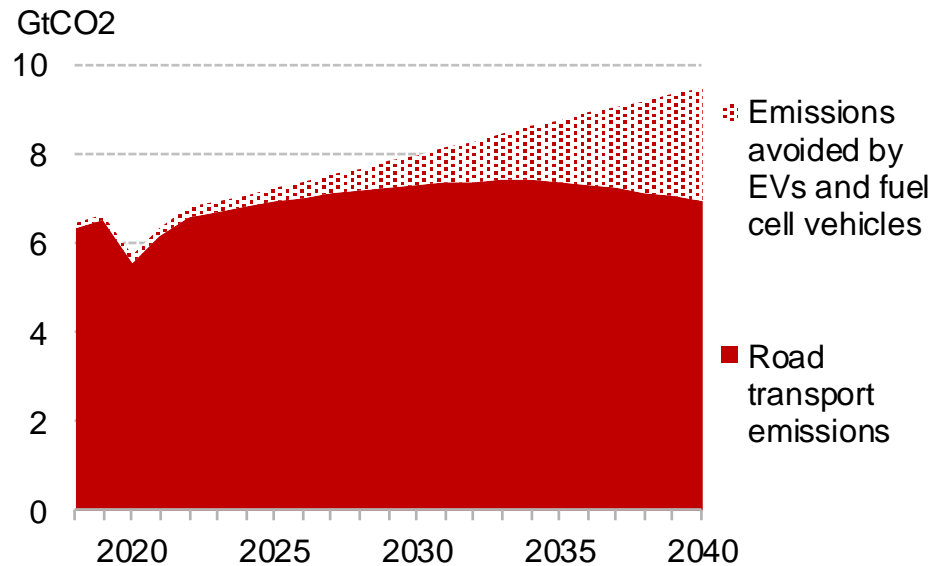
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- 10. Emissions are still not on track**

Emissions are still not on track

Growth in road transport CO2 emissions by country, 2018-2040



Road transport emissions avoided by the penetration of electric and fuel cell vehicles



Source: BNEF. Includes power sector emissions from EVs

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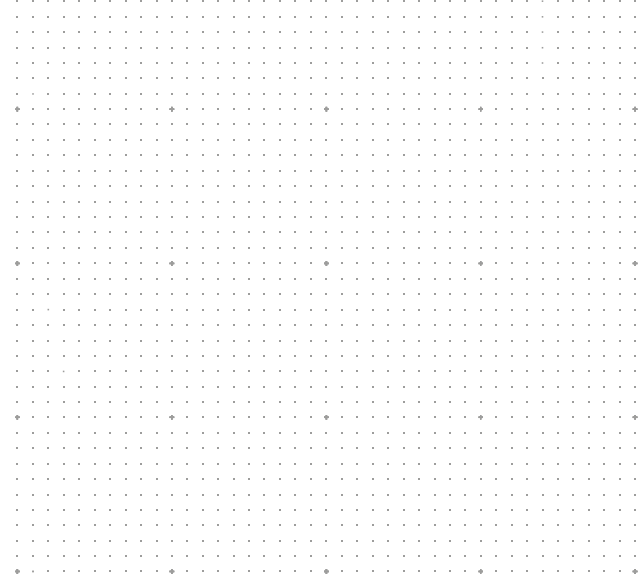
Opportunities in transformation



Where are the opportunities for the market leaders?

- Charging infrastructure business models
- Aggregation, grid integration and forecasting tools
- New mobility business models
- Marine: electric and hydrogen applications
- Other?

Thank you



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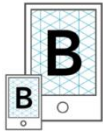
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