Zero-Emission Vehicles Progress Dashboard

ZEV Transition Council

Corey Cantor, Nikolas Soulopoulos, Ryan Fisher,
Aleksandra O'Donovan, Albert Cheung

September 21, 2022

BloombergNEF

About this dashboard

This ‘dashboard’ has been produced for the Zero-Emission Vehicles Transition Council (ZEVTC) by BloombergNEF, in consultation with the UK Department for Business, Energy and Industrial Strategy (BEIS) and the US Environmental Protection Agency (EPA).

The report is primarily aimed at tracking the latest statistics on ZEV adoption, charging infrastructure deployment and automakers’ ZEV sales. It is focused on ZEV Transition Council countries.

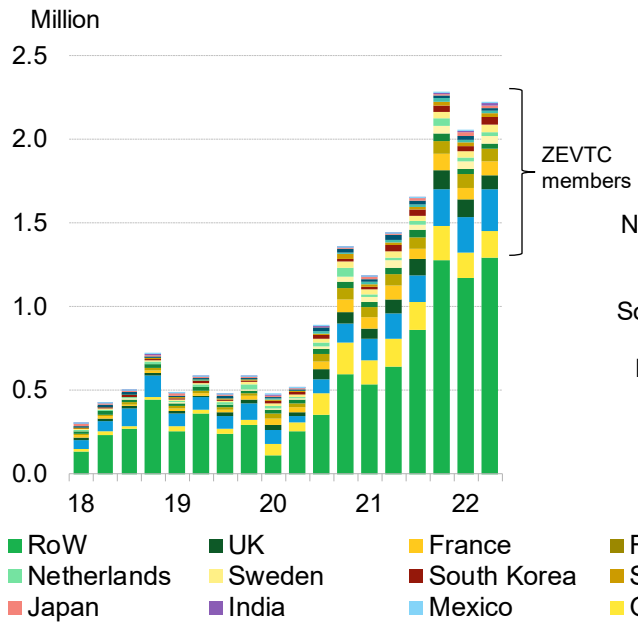
The previous edition, published in May, was based on data up to the end of 2021.

This edition now includes data up to and including the first half of 2022, and the text has been updated to describe the latest trends.

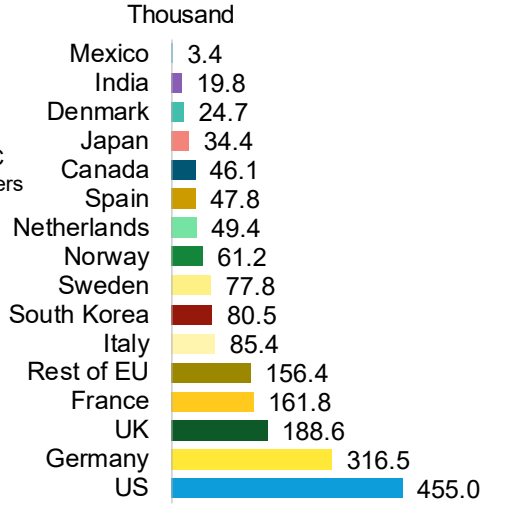
Data sources include BNEF primary research and other sources noted on each slide.

Global passenger EV sales continued to increase in the first half of 2022

Quarterly EV sales, by country



1H 2022 EV sales in ZEV Transition Council countries



Global passenger EV sales grew by 63% (year-on-year) in the first half of 2022, to nearly 4.3m units.

China and Europe have led the global passenger EV and FCV market since 2015, and accounted for 84% of global EV sales in the first half of 2022.

Sales growth in Europe has slowed to 12% year-on-year, while China now plays a much more prominent role, growing at 115% year-on-year.

ZEVTC member countries combined were responsible for 42% of global passenger EV sales in 1H 2022 (this share is slightly down since 2021).

The EU-27 still leads the way in this group, with 920,000 EVs sold in 1H 2022, but the bloc's share of global sales decreased from 28% in 2021 to 22% in the first half of 2022.

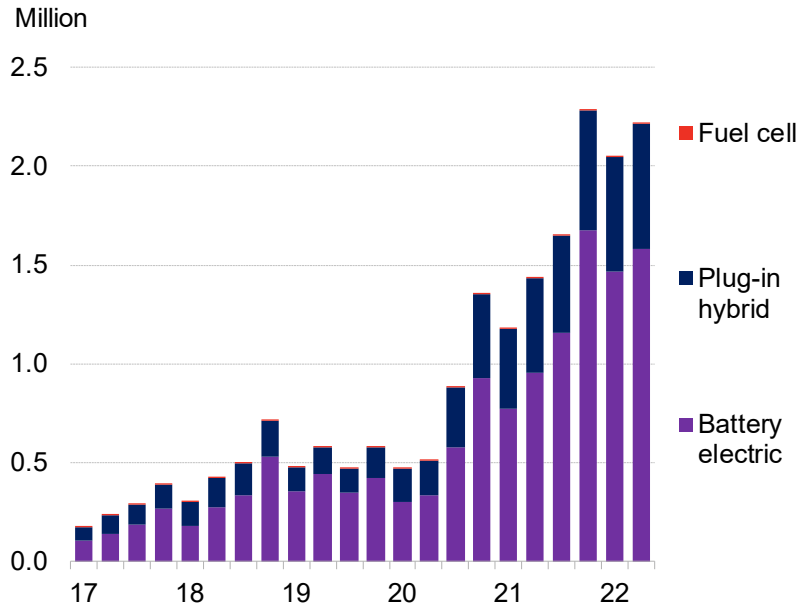
EV sales grew the fastest in India, up 321% in 1H 2022 compared to 1H 2021, followed by Mexico at 125% and the US at 66%. The US is also the leading ZEVTC nation with 455,000 EVs sold in 1H 2022.

Source: BloombergNEF, Marklines, Jato. Note: Includes BEV, PHEV and FCVs.

BloombergNEF

Pure battery EVs are still comfortably beating out plug-in hybrids

Global passenger EV sales by drivetrain



Source: BloombergNEF, Marklines, Jato. Note: Includes BEV, PHEV and FCVs

Globally, sales of battery electric vehicles outweigh those of plug-in hybrids and fuel cell vehicles – and are increasing their market share.

- BEVs were 71% of 1H 2022 global EV sales, up from 66% in 1H 2021, and 70% in all of 2021.
- PHEVs were 29% in 1H 2022, down from 34% in 1H 2021, and 30% in all of 2021.
- FCVs are a miniscule portion of the EV market, below 1% of sales globally

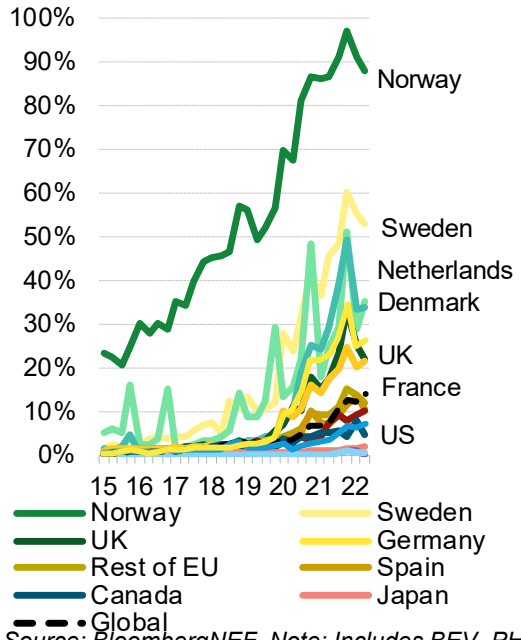
FCVs continue to find it difficult to compete with BEVs on cost and popularity and are unlikely to gain market share in the passenger vehicle segment.

Of the ZEVTC countries, only South Korea and Japan have meaningful activity on fuel cell vehicles. Their sales in 1H 2022 were still limited though and their share of total EV sales in those two countries shrunk compared to 2021.

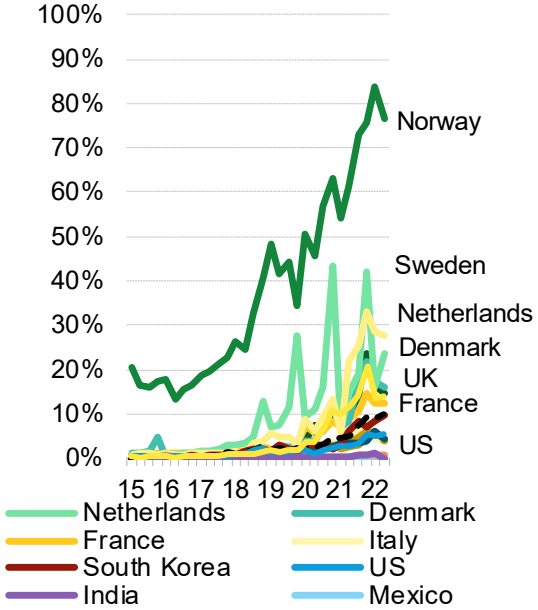
FCVs accounted for 6% of all EVs sold in South Korea in 1H 2022 – down from 8% in 2021, and 2% in Japan – down from 5% in 2021.

Global EV sales share holds steady, despite slippage in some countries

EV share of passenger vehicle sales



ZEV share of passenger vehicle sales (excludes PHEVs)



Source: BloombergNEF. Note: Includes BEV, PHEV and FCVs

EVs accounted for 13% of global passenger vehicle sales in 1H 2022, or 9% when excluding PHEVs. This is the same as in the last quarter of 2021.

If plug-in hybrids are included, countries like Norway (89%), Sweden (54%), Denmark (44%) and Netherlands (32%) were the leading markets for the first half of the year.

These are the same leaders as in 2021, but the wider European market's EV share of sales has dropped compared to last year overall and 4Q 2021. This is partly due to market seasonality, but also continued automotive supply chain issues and the prolonged 'cost of living crisis'.

When considering only ZEVs (ie, excluding PHEVs), Norway (80%) maintains its leading position.

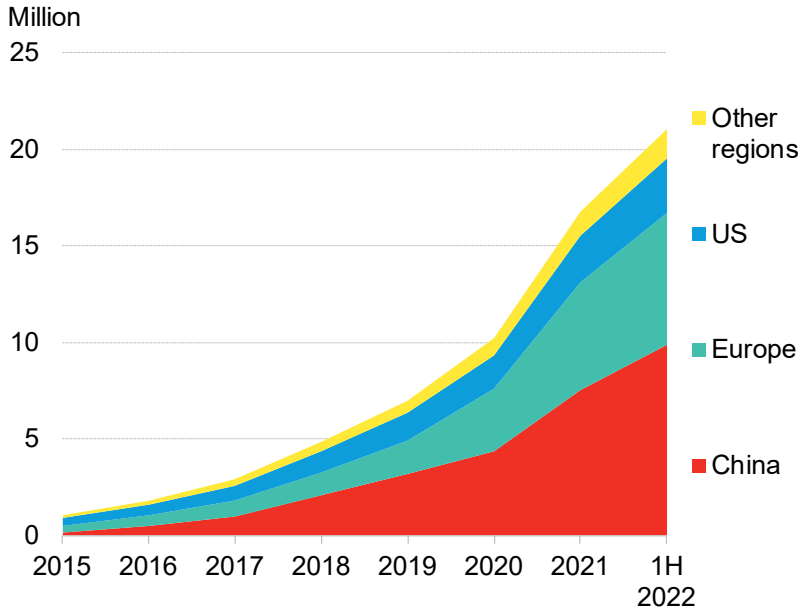
Sweden (28%), Netherlands (20%) and Denmark (18%) follow, albeit at much lower rates highlighting their still-significant reliance on PHEVs.

The US surpassed 5% ZEV share of sales in 1H 2022 – up from 3% in 2021, but still below the global average.

BloombergNEF

There are now over 21 million passenger EVs on the road

Global passenger EV fleet



The global fleet of passenger EVs keeps growing – 59% per year on average since 2015 – and by June 2022 there were over 21 million EVs on the road globally.

Nearly half of that fleet (47%) is currently located in China, followed by Europe at 32%.

Some 1.7% of cars on the road globally were EVs in the first half of 2022. This is an improvement from 1.3% at the end of 2021.

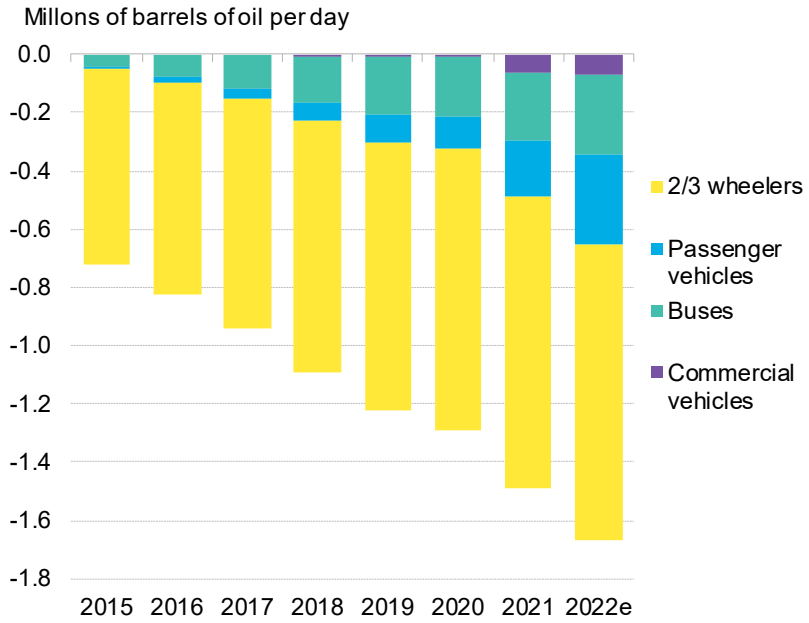
Some countries are moving faster than the global average. China is leading, with 3.8% of its passenger vehicle fleet being electric in 1H 2022 (up from 2.9% in 2021), followed by Germany at 3.6% (up from 2.9% in 2021) and the UK at 2.4% (up from 2.3% in 2021).

Other markets, like India or Mexico, are moving more slowly. EV sales increased rapidly in the two countries in 1H 2022, but it takes time for sales to flow through to the fleet. EVs were still just over 0.1% of the fleet in India in the first half of the year.

Source: BloombergNEF, Marklines, Jato. Note: Includes BEVs, PHEVs and FCVs. The total passenger vehicle fleet size for 1H 2022 is estimated.

Oil use avoided by EVs has more than doubled since 2015

Oil demand avoided by EVs and FCVs



Source: BloombergNEF, IEA.

Global oil demand in road transport is expected to reach roughly 43.9 million barrels per day in 2022, a slight increase over the past year.

The adoption of electric vehicles and fuel cell vehicles are expected to avoid almost 1.7 million barrels of oil per day in 2022, up from 1.5 million barrels per day in 2021. This is about 3.8% of total demand.

Avoided oil consumption has more than doubled from 2015-2021, up from ~725,000 barrels of oil per day in 2015. This is expected to accelerate.

Two- and three-wheeled EVs should account for 61% of the oil demand avoided in 2022 due to their rapid adoption particularly in Asia.

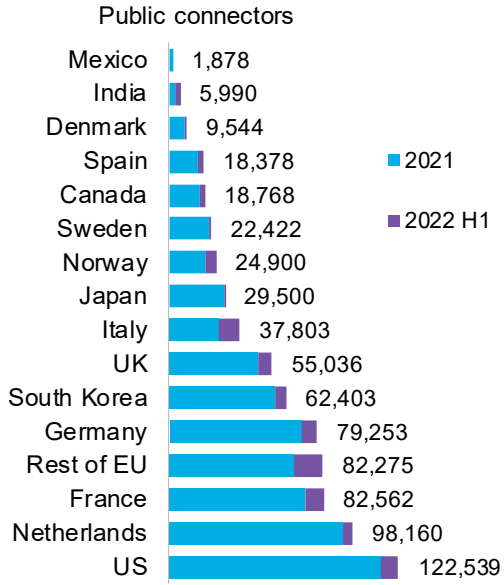
Passenger EVs are expected to surpass buses in 2022 to represent 18% of total oil demand avoided. The other two segments remain consistent with last year's data: buses with 16% and commercial vehicles accounting for just 4% of oil demand avoided in 2022.

In BNEF's Net-Zero Scenario, which achieves a zero-emission vehicle fleet globally by 2050, oil displacement increases to over 7 million barrels per day in 2030 – roughly equivalent to Russia's total oil and products exports prior to the war.

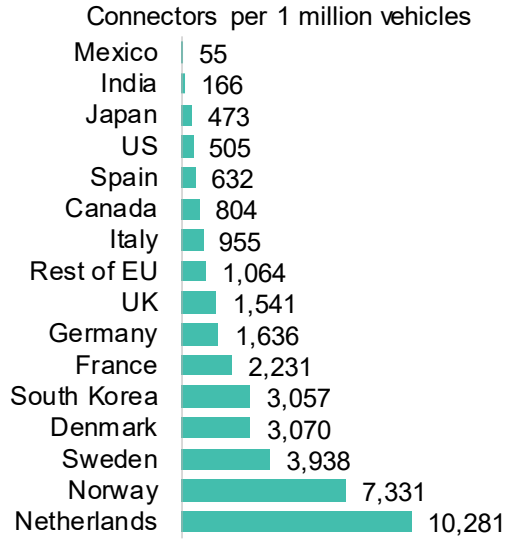
This figure rises to nearly 16 million barrels per day in 2035, and represents permanent removal of oil dependency.

Public charging infrastructure growth continues

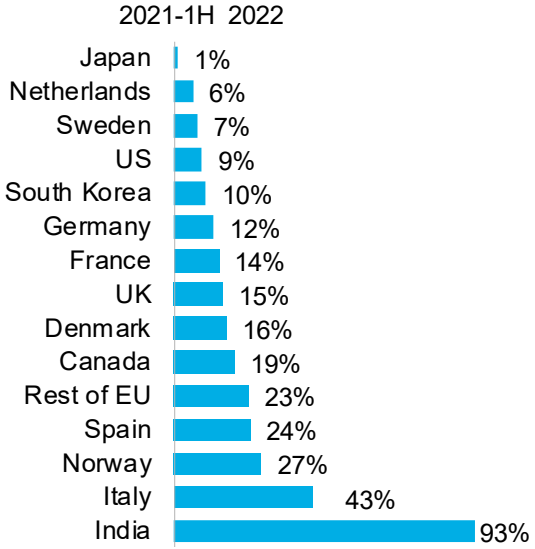
Cumulative public charging connectors installed, 1H 2022



Public charging connectors normalized by vehicle fleet, 1H 2022



% net change 2021-1H 2022

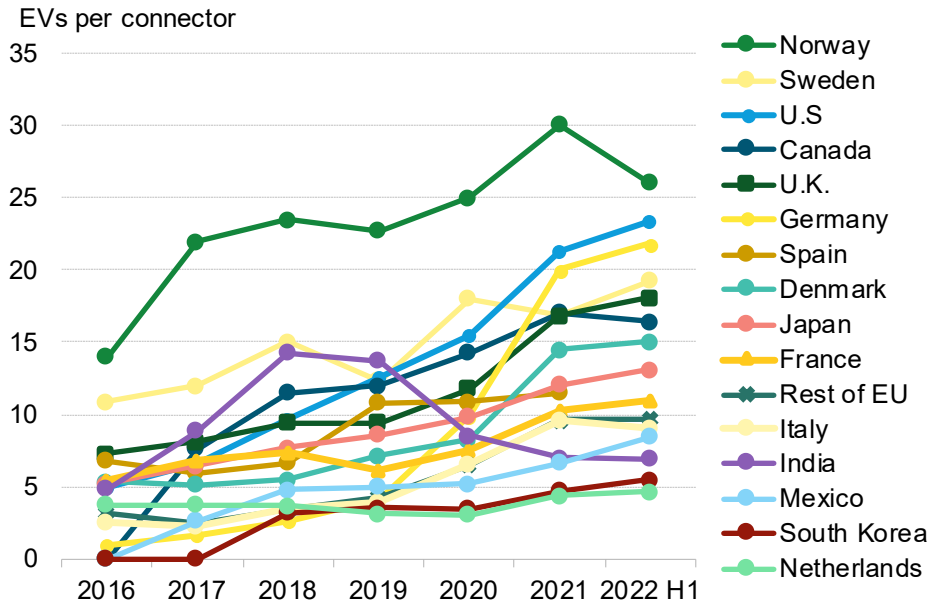


Source: BloombergNEF, Ecomovement, Various private and government sources. Note: middle chart is normalized by total passenger vehicle fleet size in 2021 (all drivetrains). No mid-year update for Mexico available so removed from right-hand side chart.

BloombergNEF

The number of EVs per public connector stays flat globally, but many countries rise

EVs per public charging connector



In 1H 2022, the global ratio of EVs on the road to public charging connectors remained unchanged from the end of 2021, at 9.1 EVs per connector.

The consistency of the global ratio hides the mixture of countries that have seen their ratios rise and others fall.

Those with rising ratios include the US, Germany, Denmark, France, South Korea, Netherlands and the UK – this indicates that the charging infrastructure base was growing slower than the EV market.

Those with falling ratios include Norway, Sweden and Italy – indicating that the charging base is growing faster than the EV fleet.

Differences depend on access to home charging, drivetrain mix and utilization of existing infrastructure.

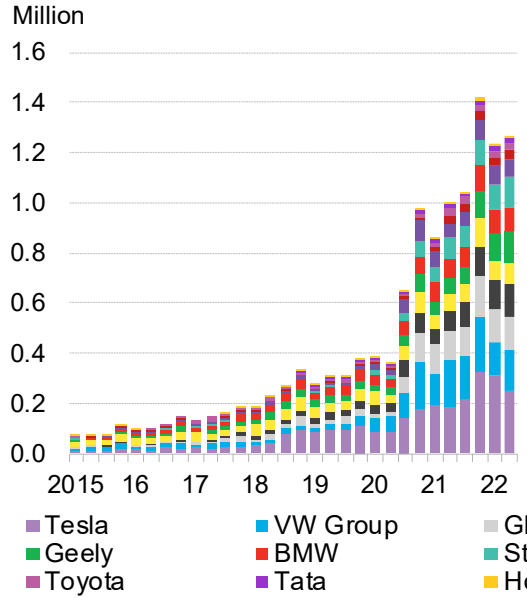
Norway has the highest ratio of EVs to public chargers. This can be explained by the high prevalence of detached houses in the country, and therefore home charging availability. Increasing utilization of existing infrastructure also plays a role.

Source: BloombergNEF, Ecomovement, Various private and government sources.

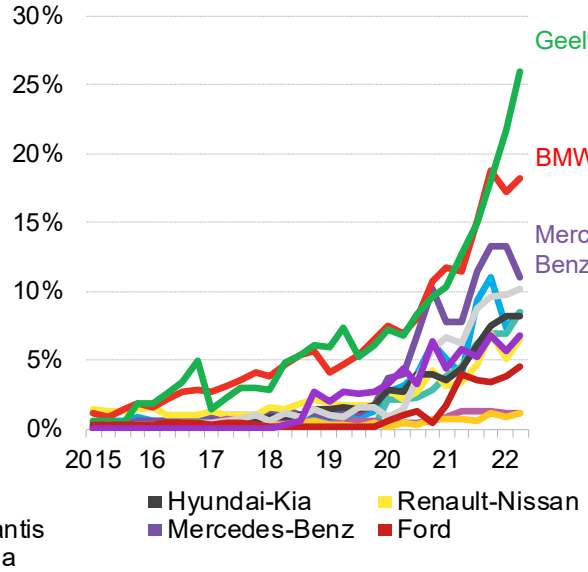
BloombergNEF

ZEVTC-associated automakers continue EV growth trajectory

Passenger EV sales by automakers associated with ZEVTC countries



Passenger EV share of sales by automaker



Leading automakers active in ZEVTC countries achieved 2.5 million in EV sales in 1H 2022. This equates to 59% of the global total in 1H 2022, and a 34% increase compared to 1H 2021.

Tesla, VW Group, GM and Hyundai-Kia led the pack in volume terms, contributing 55% of the total covered in this slide in 1H 2022.

These leaders are unchanged from the previous report, but their contribution to the group's sales dropped from 60% in 2021.

Tesla is still leading the group, with nearly 565,000 units sold in 1H 2022. VW came in second, as in 2021.

Geely, BMW and Mercedes-Benz had the highest EV share of sales, excluding Tesla.

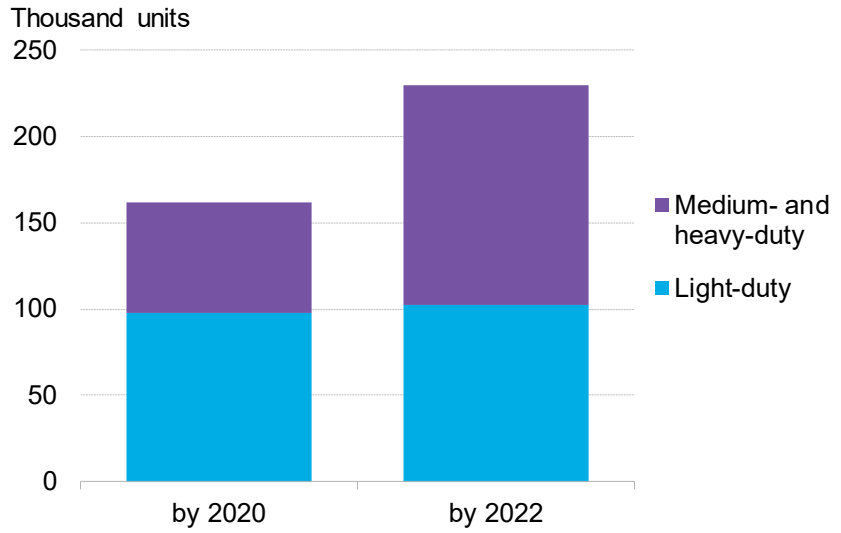
Geely's EV sales share was 24%, overtaking BMW (18%), which finished first in 2021.

Source: BloombergNEF. Note: Includes automakers that are headquartered or have major operations in ZEVTC countries. Renault Nissan includes Mitsubishi. Geely includes Volvo. Commercial vehicles are included in manufacturers total sales. EV sales from Chinese JVs are attributed to both partners in full.

BloombergNEF

Demand for zero-emission vans and trucks accelerates

Cumulative zero-emission commercial vehicle orders, by announcement date



Source: BloombergNEF, company announcements, news reports. Note: orders until July 2022; includes BEV and FCV vans and trucks; list of orders is not exhaustive; we assumed that Amazon's 100,000 order to Rivian in 2019 is equally split between light- and medium-duty vehicles

Fleet owners have placed around 230,000 orders for battery electric vans and trucks in the last several years. Orders for fuel cell vehicles were for just under 1,000 units.

Until 2020, start-up manufacturers such as Arrival, Rivian, Workhorse or Chanje were the main receipients of these orders, primarily for light-duty delivery vans. Many of these vehicles have not begun deliveries yet.

Growth since 2020 has been driven by medium- and heavy-trucks, due to orders for Class 3 vehicles which we categorize as medium-duty. The focus has mostly been on delivery vans and distribution trucks. Buyers have started ordering heavier vehicles for these tasks, placed with a wider range of suppliers.

Interest is also increasing in heavier all-electric trucks to be used in municipal services, ports and regional distribution.

Manufacturers like Daimler Truck, Volvo, Scania, Volta Trucks and Einride account for most of the additional orders since 2021, some of which are already being fulfilled.

Large logistics and distribution companies, such as A.P. Moller - Maersk, Schneider National and Sysco Corporation, placed most orders for zero-emission heavy trucks in 2021 and 2022.

BloombergNEF

A busy year for electric truck charging as projects ramp up

High-power electric truck charging projects

Companies involved	Country	# chargers / charger power/ site power	Investment	Year
DAIMLER TRUCK, PGE, BLACK & VEATCH	United States	8 / not stated/ 4.5MW	Not disclosed	2021
VOLVO, Shell		Not stated	$2 million	2022
CALSTART and 15 other partners		Not stated	$13 million	2022
WattEV (3 sites)		52MW* (site power)	Not disclosed	2022
DAIMLER TRUCK, BlackRock, NEXTera ENERGY		Not stated	$650 million	2023
WattEV		8MW (site power)	Not disclosed	2023
DAIMLER TRUCK, TRATON, VOLVO	Europe	1,700 chargers	$510 million	2022
IBERDROLA	Spain	1MW (charger power)	Not disclosed	2022
Fraunhofer ISI and 20 other partners	Germany	8** / 0.75MW	$31 million	2022
DAIMLER TRUCK, EnBW	Germany	6 / 0.3MW	Not disclosed	2022

*Source: BloombergNEF, press releases. Note: these projects are indicative and specifically target the charging of medium- and heavy-duty commercial vehicles; "Year" refers to the start of project development; *refers to all three of WattEV's stations planned for 2022; ** refers to the project's 8 MCS chargers, while another 8 CCS high-power chargers will also be installed.*

At least 12 projects targeting commercial electric vehicle charging are now underway or set to begin construction by 2023. These projects were announced in the last 18 months and disclosed investments exceed $1.2 billion.

For many projects the ultimate goal is to operate MW-scale chargers, once the relevant standard is finalized. Some developers plan to use CCS high-power connectors initially.

The Megawatt Charging System (MCS) – a charging connector developed for electric trucks – was demonstrated for the first time in June 2022 in Oslo, where an electric Scania truck was charged at more than 1MW.

Most of these projects are currently located in the US. Daimler Trucks and PGE were first, and in 2021 deployed eight mega chargers in Portland.

Meanwhile, the EU has set targets for commercial vehicle charging stations along the TEN-T network, setting a lower power limit of 1.4 MW per site.

Bi-directional charging vehicles are coming, experimentation ongoing

Key developments in bi-directional charging

Vehicle manufacturers bring bi-directional vehicles to market

- By the end of 2022, seven automakers will have bi-directional capable vehicles on the road – up from just one in 2020.
- Volkswagen is adding the feature to vehicles with batteries greater than 77kWh, likely to limit degradation effects.
- Vehicle-to-home is currently a marketing focus for automakers due to the hurdles that exist for vehicle-to-grid at a commercial scale.

Business model exploration for vehicle-to-grid (V2G)

- There are several vehicle-to-grid (V2G) pilots globally exploring the value of V2G and potential business models.
- Duke Energy Carolinas plans a 2023 pilot of V2G services with 100 Ford F-150 Lightning customers. Participants will pay lower leases in exchange for allowing Duke to draw energy from their EVs.

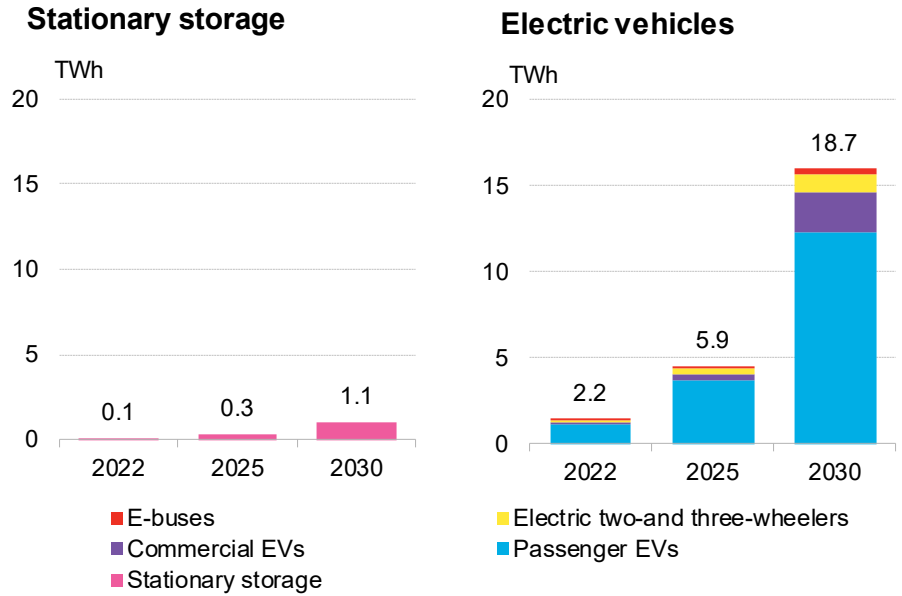
Policy makers and utilities assess levers to integrate bi-directional charging EVs

- The California Public Utilities Commission will allow EV owners to use their charger to measure an EV's energy use independently from the owner's main utility meter, through submetering. This avoids the need for expensive additional meters to take advantage of EV time-of-use tariffs, separate to the whole home bill.
- Without submetering, bi-directional charging customers would also forego the opportunity to participate in effective EV-specific rates.

Source: BloombergNEF, company press releases.

EVs will have 17 times the battery capacity of stationary storage systems by 2030

Cumulative storage capacity by application



Source: BloombergNEF. Note: reflects Economic Transition Scenario from the 2022 Long-Term Electric Vehicle Outlook and 1H 2022 Energy Storage Market Outlook

The global EV fleet is expected to contain 18.7TWh of energy storage capacity by 2030, roughly 17 times the cumulative deployment of stationary storage on the power grid by that year.

This illustrates the great potential for power grid balancing services from EVs, even if only a small amount of the total capacity is tapped.

Passenger vehicles will account for over 65% of storage available in the electric vehicle fleet by 2030. There will still be almost four times more storage available from commercial EVs, buses and two-and three-wheelers than stationary storage though.

Challenges remain for integrating the huge storage capacity available from the electric vehicle fleet into the energy system.

Creating a viable business model and incentives for drivers to make their batteries available to the energy system is still a challenge. Costs for bi-directional hardware and installation are currently high, leading to unattractive payback times.

The cumulative storage available from the EV fleet is so large that if it were all available, it would saturate revenues in the power system. This means there is likely a limit to the share of vehicles that charge bi-directionally.

BloombergNEF

Copyright and disclaimer

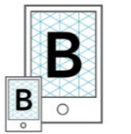
BloombergNEF (BNEF) is a strategic research provider covering global commodity markets and the disruptive technologies driving the transition to a low-carbon economy.

Our expert coverage assesses pathways for the power, transport, industry, buildings and agriculture sectors to adapt to the energy transition.

We help commodity trading, corporate strategy, finance and policy professionals navigate change and generate opportunities.

BloombergNEF

Get the app



On IOS + Android

about.bnef.com/mobile

Client enquiries:

Bloomberg Terminal: press <Help> key twice
Email: support.bnef@bloomberg.net

Learn more:

about.bnef.com | @BloombergNEF