CO_2 targets propel Europe to 1st place in emobility race

February 2021

Summary

With the entry in force of the 2020/21 car CO2 standards, 2020 was the year of the electric car in Europe. Despite the COVID-19 pandemic, electric mobility surged across Europe, as plug-in vehicles[1] made up 10.5% of the market, compared to only 3% in 2019. Battery-electric vehicles (BEV) accounted for 5.4% of passenger car sales in the EU27, while plug-in hybrids (PHEV) reached 5.1% of the market.

More than a million plug-ins were registered in the EU27 in 2020 (1,045,000 units), which effectively doubled the number of EVs on the road to more than two million. Around half of the EV were battery-electric (51.5%), down from 62.5% in 2019. The top selling BEVs were the Renault Zoe, Tesla Model 3, and Volkswagen ID.3, while the top selling PHEVs were the Volkswagen Passat PHEV, Volvo XC40 PHEV, and Mercedes A250e.

More plug-ins were sold in 2020 in Germany alone (395,000) than in the whole EU27 in 2019 (391,000). The largest EV markets after Germany are France (186,000), the United Kingdom (175,000) and Norway (106,000). Looking at national plug-in market shares, Norway leads, as half of all new cars in 2020 were battery-electric and a quarter were plug-in hybrids. In the EU, Sweden, the Netherlands, and Finland rank highest, with plug-in market shares of 32%, 25%, and 18% respectively. The plug-in shares in the largest markets are 13.5% in Germany, 11.3% in France, and 11.2% in the United Kingdom. EV volumes grew faster in Central and Eastern European Members (+173%) than in the EU15[2] (+163%).

[1] Throughout this briefing, the terms 'EV' and 'plug-in' will be used interchangeably to refer to all plug-in electric cars: battery electric (BEV) and plug-in hybrid (PHEV).

[2] Pre-2004 EU Members: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom

Electric vehicles weathered the COVID-19 crisis far better than petrol and diesel engines, whose combined volumes dipped by 36%. To keep watch on the booming European EV market, Transport and Environment is launching an online dashboard to monitor the state of play in European countries.

In Europe as a whole, nearly 1,365,000 electric vehicles were sold in 2020, surpassing for the first time the Chinese EV market by 2% (1,337,000 plug-ins sold in 2020) and thereby taking the global lead. Thanks to the 2020 car emissions targets, Europe is now the emobility frontrunner. Regulations expected later this year will determine whether Europe remains in the lead.

1. More than one out of 10 new cars had a plug in 2020

Together, battery-electric and plug-in hybrid vehicles accounted for more than one out of ten new car registrations in the European Union. From a mere 3% in 2019, the EU market share of electric vehicles jumped to 10.5% (see Figure 1). In the EU27, battery-electric vehicle registrations doubled as nearly 539,000 BEVs were sold in the EU27 in 2020, reaching a market share of 5.4% in 2020 compared to 1.9% in 2019. Meanwhile, plug-in hybrid registrations trebled to 507,000 cars, from a 1.1% market share in 2019 to a 5.1% market share in 2020[3].

[3] For the EU in general (i.e. EU28 in 2019 and EU27 in 2020), BEV volumes increased by 89% and PHEV volumes by 190%.

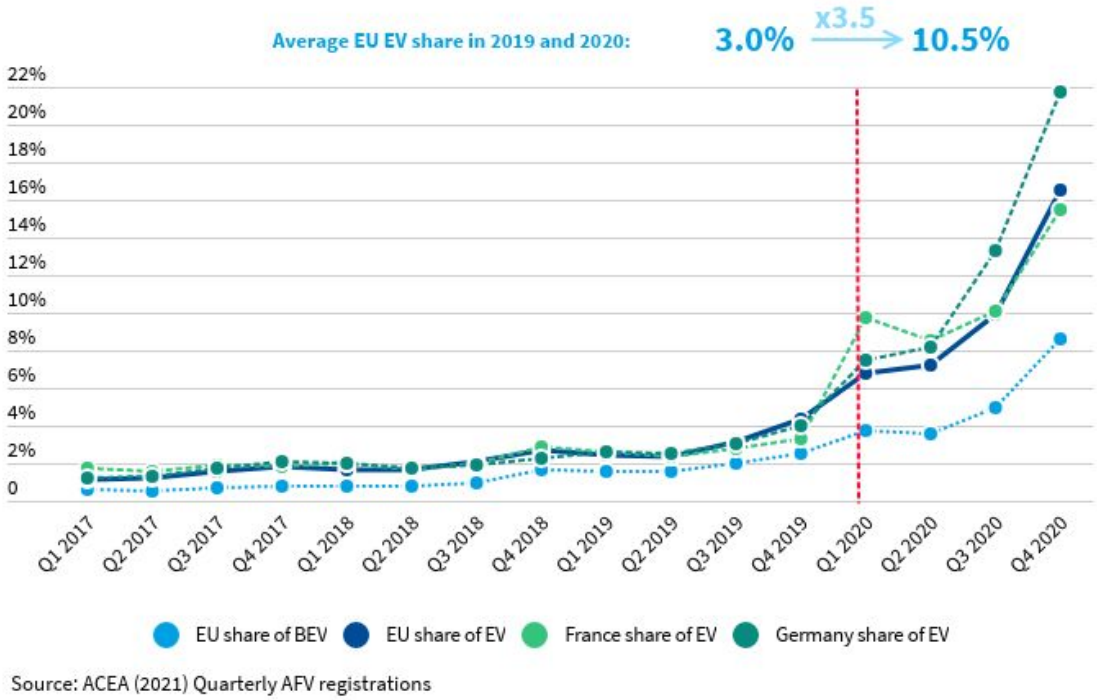


Figure 1: EV market share in the European Union

Regarding conventional fuels, petrol and diesel market shares dropped for the first time under 50% and 30% respectively. The share of non-chargeable hybrids grew from 5.7% to 11.9% and that of gas from 1.7% to 2.1%.

T&E new interactive tool

In order to follow the evolution of the EV market at the European and national levels, Transport & Environment developed Plugged-In, an online market monitor. The tool is updated every quarter with the most recent data on electric mobility. The EU and all its Member States (with the exception of Malta) as well as Norway and the UK each have their unique dashboard providing a comprehensive look at their emobility market.

The dashboard showcases the historical and current market shares of battery-electric and plug-in hybrid vehicles. It also provides quarterly registrations and annual market shares by fuel, the annual split between battery-electric and plug-in hybrids, the year-on-year volume growth of electric

vehicles, the top 3 BEV and PHEV models sold in the country, and the size of the public charging infrastructure network.

When including the UK to the EU market, the market share of electric vehicles grew to 10.6% in the EU+UK from 3.0% in 2019, and reached 11.5% in 2020 in the European Economic Area[4] (the scope of the car CO2 standards), more than threefold its 2019 value of 3.6%.

This boom in emobility across the European Economic Area is the upshot of the **entry into force of new passenger car CO_2 targets**. Under this regulation, automakers must reduce their overall fleet emissions to 95 gCO_2/km in 2020/21 (for 95% of their car sales in 2020). As a result, car manufacturers have diversified their offer and ramped up EV production. Last year, T&E forecasted electric vehicles would reach a market share of 10.5% in the EEA and 9.4% in the EU27, assuming full compliance with the regulation by all car manufacturers[5]. In reality, most carmakers over-complied while, at the time of writing, only two have announced the likelihood of having missed their targets[6]. Consequently, the actual market shares of 11.5% in the EEA and 10.5% in the EU27 are 1 percentage point higher than predicted.

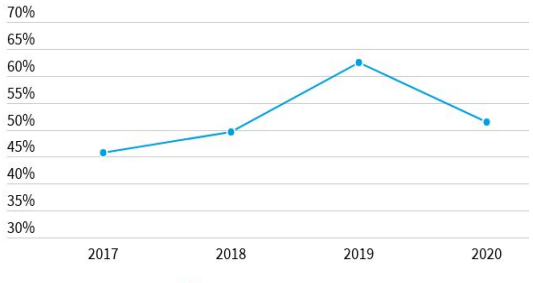


Figure 2: BEV share of all EU plug-ins

In 2020, the share of BEVs within EU plug-in sales fell to 51.5% (see Figure 2). It is the first decline registered given that between 2017 and 2019, this share continuously increased. This drop is due to a strong increase in PHEV sales which are an important part of the compliance strategy of many car manufacturers with the car CO_2 regulation[7].

[4] Here, EU+UK+EFTA. The UK ceased to be an EEA member on December 31st 2020. Therefore, it is still included as an EEA member in this briefing, which focuses on the year 2020.
[5] Transport & Environment (2020). *Mission (almost) accomplished*. Link
[6] Source for Volkswagen. Source for Jaguar Land Rover.
[7] Transport & Environment (2020). *Mission (almost) accomplished*. Link

The impact of COVID-19 on emobility

The passenger cars market shrunk in 2020 as a result of the COVID-19 pandemic, which forced car dealerships to close and disrupted production schedules. While some called for delaying the entry into force of the long-awaited 2020/2021 CO2 standards, their implementation was not postponed. What's more, subsidies to EV adoption were included in the recovery plan to stimulate demand. The new or increased EV purchase subsidies undoubtedly supported the electric momentum. However, carmakers are under the legal obligation to lower the emissions of their new car fleets and as a result, had to sell those vehicles to avoid fines regardless of the situation[8]. Supply-side measures such as the CO_2 targets are the main driver of the uptake of electric cars and the wider industrial transformation.

2. Emobility growth across Europe

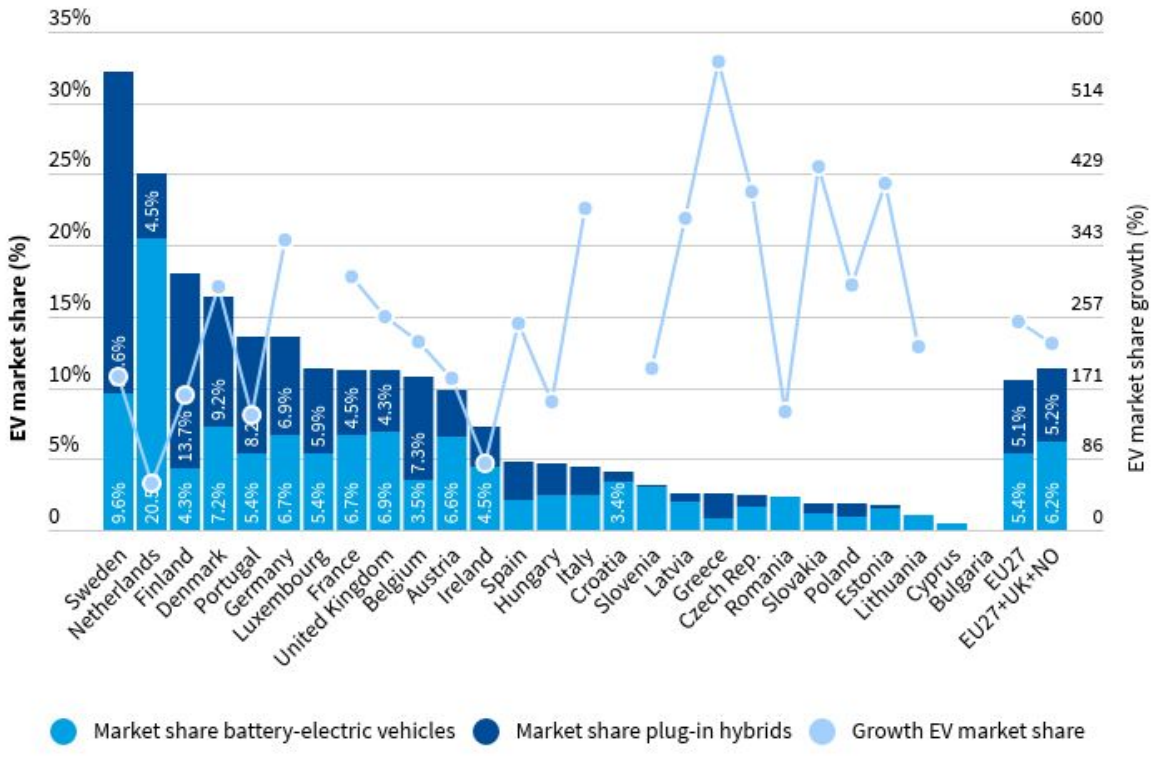
Electric vehicles now own a market share over 10% in nine EU countries (see Figure 3): Sweden, the Netherlands, Finland, Denmark, Portugal, Germany, Luxembourg, France, and Belgium; as well as in Norway and the United Kingdom. Plug-in volumes exceed 50,000 in 5 EU countries (see Figure 8, in Annex): Germany, France, Sweden, the Netherlands, and Italy.

Member states which joined the EU in 2004 or later (mostly Central and Eastern European (CEE) countries)[9] represented an EV market of 27,000 vehicles in 2020, up from fewer than 10,000 in 2019. EV volumes grew faster in CEE Members (+185%) than in the EU15[10] (+165%). BEV sales also experienced more growth: +164% in CEE Members compared to +126% in the EU15. However, PHEVs saw similar growth everywhere (+229% in CEE and +228% in EU15). 62% of plug-ins sold in the CEE Members in 2020 were battery-electric, down from 67% in 2019. Though the EV market is still relatively small in CEE countries, electric cars, in particular zero-emission vehicles, show clear momentum.

[8] Transport & Environment (2020). *Mission (almost) accomplished*. Link

[9] Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia. NB: No data are available for Malta. No data are available for Bulgaria for the year 2020.

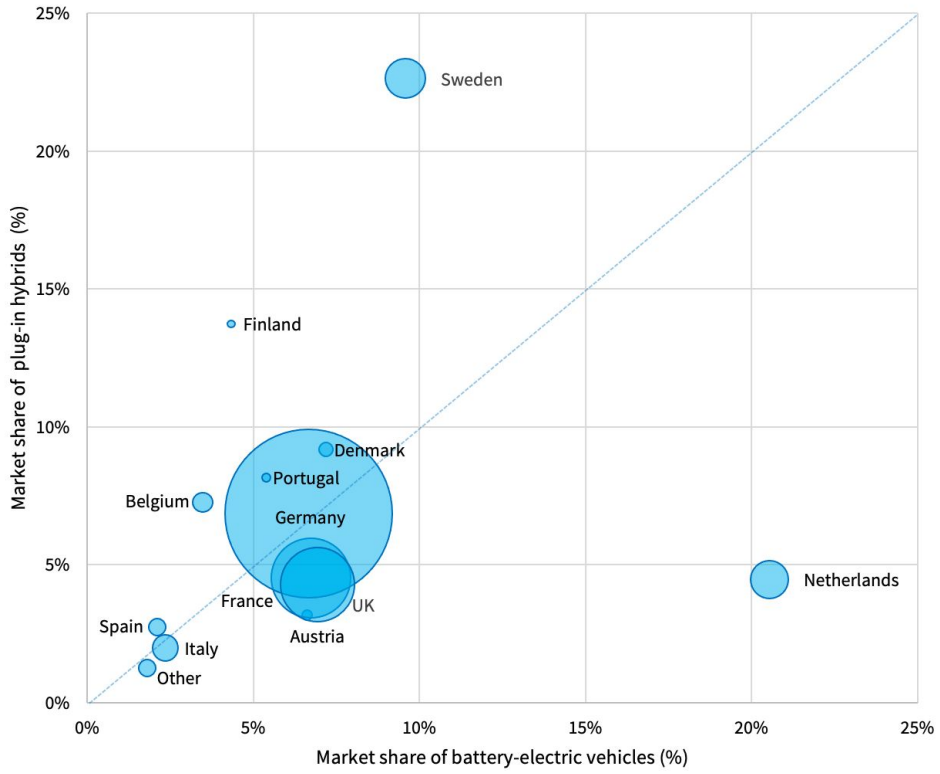
[10] Pre-2004 EU Members: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom



Source: T&E analysis of ACEA quarterly registration statistics

Figure 3: Plug-in market shares in EU countries with year-on-year growth

Most large EU EV markets have an even split between BEV and PHEV (see Figure 4), as in the European Union as a whole where 51.5% of plug-ins are battery-electric and 48.5% are hybrids. Two clear exceptions are Sweden and the Netherlands. Both have plug-in market shares above 25% but clearly diverging trajectories as 70% of electric vehicles sold in Sweden are PHEVs and 82% of electric vehicles sold in the Netherlands are BEVs.



Only EU28 countries where more than 10,000 new electric vehicles were registered in 2020 are shown. Other includes all EU28 countries with EV volumes under 10,000 units in 2020. Bubble width is proportional to EV sales.

Source: T&E analysis of ACEA quarterly AFV registrations (February 2021)

Figure 4: Overview of EV sales in key EU countries

In **Germany**, more than one out of eight cars sold in 2020 (13.5%) was an electric vehicle. Battery-electric vehicles own 6.7% of the passenger car market, as 194,000 new BEVs were registered in 2020, triple their 2019 volume. Plug-in hybrid electric vehicles own 6.9% of the market, as 200,000 PHEVs were sold in 2020, a 342% year-on-year increase in volume. Germany's EV market is the largest in Europe, and is now larger than the entire EU27 market in 2019 (395,000 EVs sold in Germany in 2020 versus 388,000 in the EU27 in 2019). It should be noted that until 2020, more BEVs than PHEVs were sold, as in 2018 and 2019, BEVs were respectively 53.5% and 58.3% of all new plug-in sales in Germany. 2020 marks the first year since 2017 where more than half (50.8%) of new electric vehicle registrations are PHEVs.

France is the second largest EV market in the EU, with 186,000 electric vehicles sold in 2020, attaining 11.3% of the car market. 60% of new plug-ins are battery-electric, a share that is down from 70% in 2019. BEV accounted for 6.7% of new passenger cars, i.e. 111,000 vehicles,, while 4.5% of new cars were PHEVs, i.e. 75,000 vehicles. The French preference for BEVs can be explained by Renault's "electric star", the Renault Zoe, which is the all-time EV best-seller in France since 2013 (and best-selling EV in the EU in 2020, see Section 3). More than 37,000 Zoe cars were sold in France in 2020, i.e. 34% of BEV registrations and 20% of all EV registrations[11].

In the **United Kingdom**, the third largest EV market in Europe, 11.2% of all new cars were plug-ins, 62% of which were battery-electric. BEVs reached a market share of 6.9% (108,000 units sold in 2020) and PHEVs attained a market share of 4.3% (67,000 units). Interestingly, it is the only country with EV volumes above 20,000 units where battery-electric vehicles saw more growth than plug-in hybrids. Indeed, BEV volumes increased by 186% while PHEV only increased by 91% compared to 2019. From January 1st 2021, CO_2 emissions from new passenger vehicles in the UK are no longer governed by the EU, but by the UK Department of Transport.

In the fourth largest European EV market, **Norway**, 54.3% of all new passenger vehicles were battery-electric (77,000 units), and 20.4% were plug-in hybrids (29,000 units), with internal combustion engines barely keeping one fourth of the market. Electric vehicles now make up 15.8% of the entire fleet[12]. In the EU, the only two markets where electric vehicles exceed a quarter of the market are **Sweden** (32.2% of new cars are EVs) and the **Netherlands** (25.0%), which are respectively the fifth and sixth largest EV markets in Europe. However, the two countries show very different trajectories: 82% of new plug-ins in the Netherlands are battery-electric vehicles, a number down from 93% in 2019, while 70% of new plug-ins in Sweden are PHEVs[13].

In **Italy** (the seventh largest European EV market), a total of 60,000 new plug-ins were sold, reaching 4.3% of the market in 2020. This represents the largest increase in EV market share in Western Europe in 2020 (+388%). BEV volumes trebled to 32,000 units (2.4% of the market) while PHEV volumes quadrupled to 27,000 units (2% of the market). In **Spain**, plug-ins made up 4.8% of the car market. 18,000 new BEVs were registered in 2020, reaching a 2.1% market share, and PHEV volumes trebled to 23,000 units, attaining 2.7% of the market.

[11] EAFO (2021) Passengers cars. Link
[12] Ibid
[13] The Swedish preference for PHEVs is likely due to the Swedish carmaker Volvo, which has only one BEV on sale but is the largest PHEV seller in Europe (source).

In **Poland**, the largest EV market in Central and Eastern Europe, electric vehicles made up 1.9% of the car market, with 8,000 units sold in 2020. BEV and PHEV volumes grew respectively by 147% and 260%. The second largest EV CEE market is **Hungary**, where plug-in volumes doubled from 2019 to 2020, followed by the **Czech Republic**, where plug-in sales quadrupled. Plug-in sales grew the fastest in **Slovenia**, as EV volumes were multiplied by 7.9. There, BEV volumes were also multiplied by 8.9, the highest year-on-year growth rate for zero-emission vehicles in 2020. The second fastest-growing BEV market is **Slovakia** (x5.6).

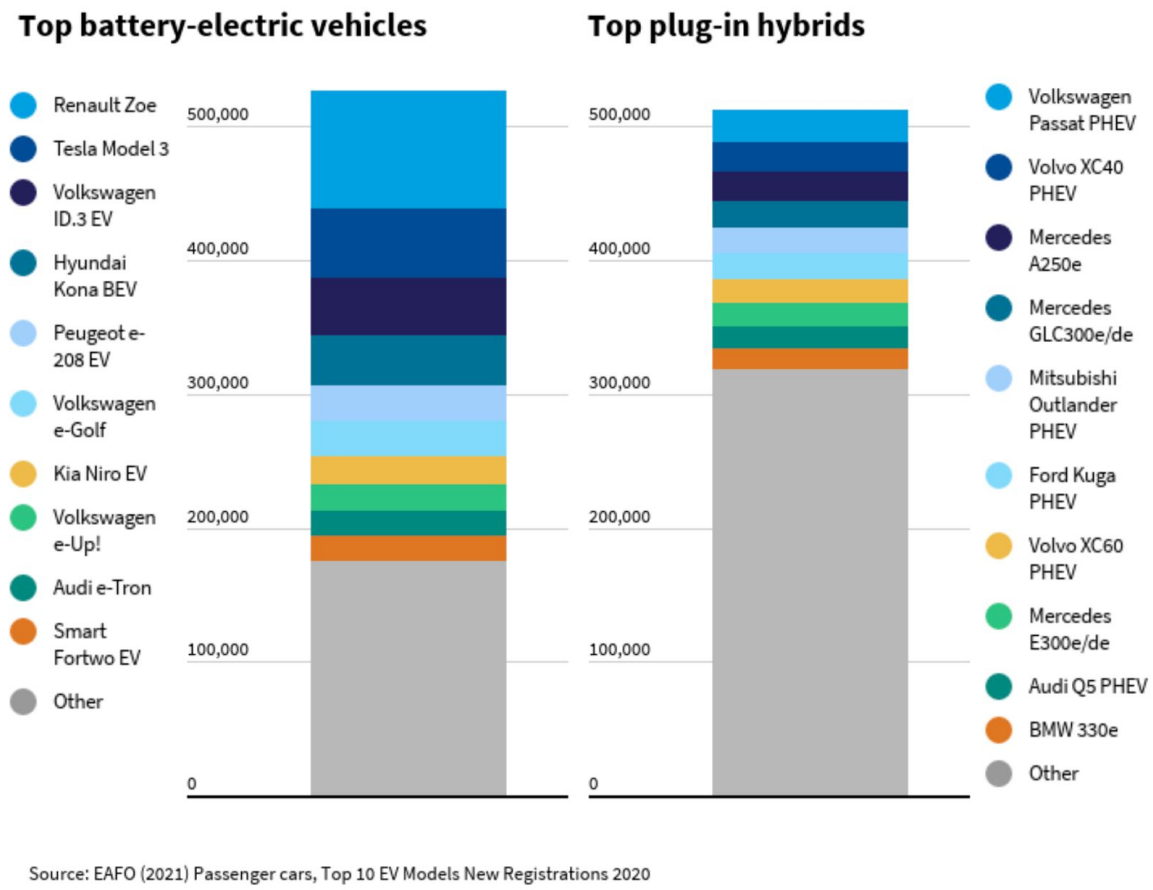
3. Model ranking

The top-selling BEV in the European Union in 2020 was the Renault Zoe, manufactured in France, with nearly 88,000 units sold (see Figure 5)[14]. It was followed by the Tesla Model 3, with 51,000 units sold, and by the Volkswagen ID.3 EV, with 43,000 units sold. Together, the top 3 models represent more than a third (34.7%) of all battery-electric vehicles sold in the EU in 2020.

The top-selling plug-in hybrid was the Volkswagen Passat PHEV, with almost 25,000 units sold, followed by the Swedish Volvo XC40 PHEV, with 22,000 units, and the Mercedes A250e, with 22,000 units sold. Together, the top 3 models make up 13.4% of all plug-in hybrids registered in the EU in 2020.

Worthy of note is the new small city car, the Škoda Citigo e iV, particularly popular in Central and Eastern Europe. It is the best-selling BEV in the Czech Republic, Slovakia (where it is manufactured), and Poland (the largest EV CEE market), and makes the top 8 in six other CEE countries[15].

[14] All data from this section comes from EAFO (2021) Passenger cars. Link
[15] Croatia, Estonia, Latvia, Lithuania, Romania, Slovenia



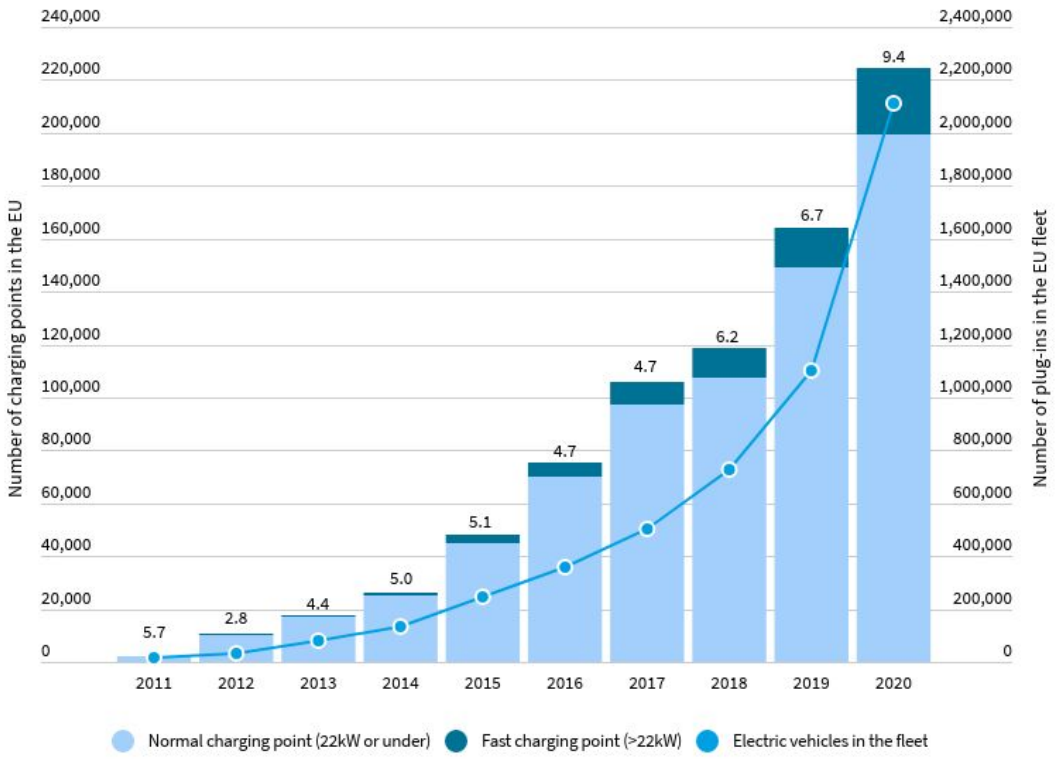
Source: EAFO (2021) Passenger cars, Top 10 EV Models New Registrations 2020

Figure 5: Most popular EV models in the EU in 2020

4. Public charging infrastructure

As of end of 2020, 225,000 public charging points exist across the EU[16] (see Figure 6). More than 60,000 new charging points were installed in 2020, expanding the network by 37%. In particular, the number of fast charging stations whose power is over 22 kW increased by 67%, growing their share of all charging points from 9.2% in 2019 to 11.3% in 2020.

[16] EAFO (2021) Alternative fuels. Charging Infrastructure Statistics. Link



The numbers on top of the bars represent the ratio of electric vehicles per charging station.
Source: Fleet data from EAFO (2021) Passenger cars. Infrastructure data from EAFO (2021) Alternative Fuels.

Figure 6: Charging infrastructure in the EU

Public infrastructure development did not fully match the growth of electric mobility, as the total number of plug-ins on the road nearly doubled in the EU, from 1,101,000 EVs in 2019 to 2,111,000 EVs in 2020[17]. As a result, the ratio of plug-ins per charging point jumped from 6.7 to 9.4. This ratio is very close to the one currently recommended by the European Commission of one public charger for every ten EVs, indicating that the public charging supply is maturing. However much more needs to be done to match the future uptake of emobility thanks an ambitious revision of the Alternative Fuels Infrastructure Directive (AFID)[18].

[17] EAFO (2021) Passenger cars. Link
[18] Transport & Environment (2020) *Recharge EU: How many charge points will Europe and its Member States need in the 2020s.* Link

5. Europe becomes the global EV leader

In spite of the COVID-19 pandemic, the European EV market surpassed the Chinese market, as nearly 1,365,000 plug-ins were sold in Europe[19], that is to say 2% more than in China where 1,337,000 plug-ins were sold[20] (see Figure 7). While the market contracted by 25% in Europe and by 6% in China[21], plug-in registrations experienced 144% growth in Europe, reaching 11.5% of the market, versus a 12% growth in China, reaching a 6.8% market share.

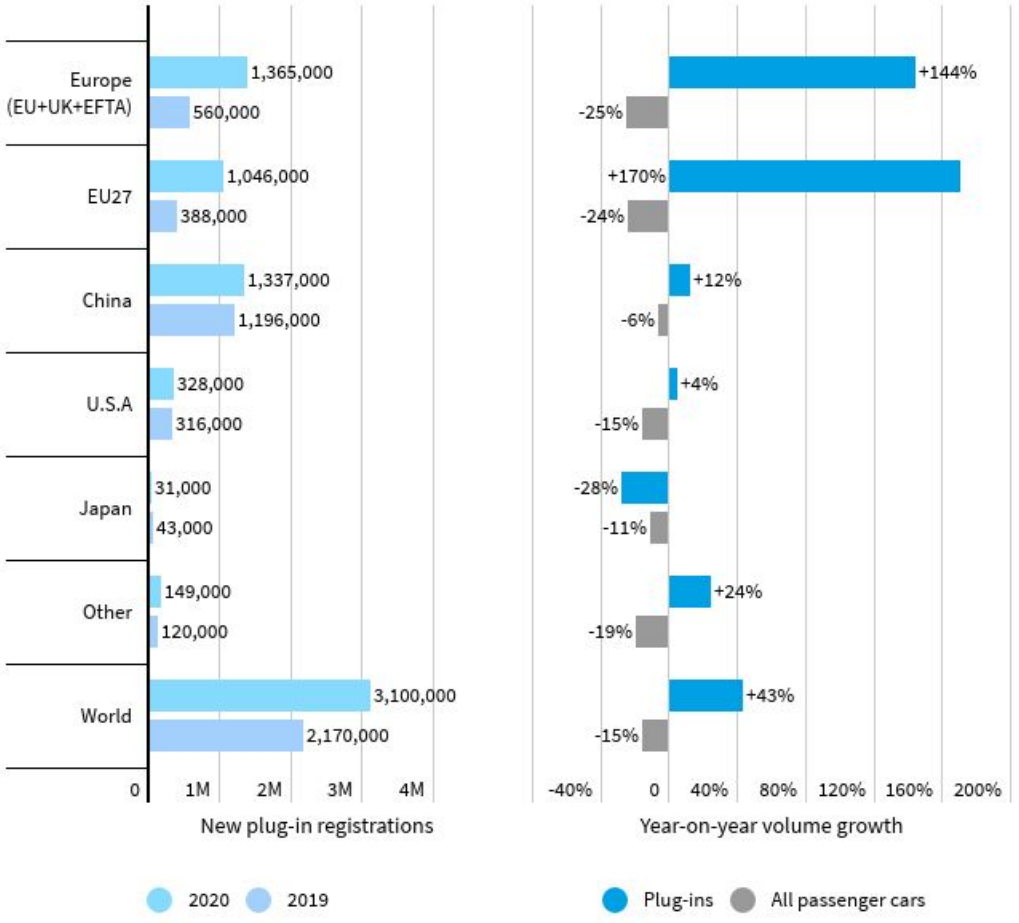
It must be noted that the split between battery-electric vehicles and plug-in hybrids is different between the two regions. 80% of plug-ins sold in China in 2020 were battery-electric[22], compared to only 55% in Europe[23]. However this does not mean Europe is a battery-electric laggard relative to China. Based on preliminary data, battery-electric cars are estimated to make up 5.4% of the Chinese car market[24], the same share as in the EU27 and less than in Europe as a whole, where BEVs own 6.3% of the market[25].

In the United States, EV growth was more sluggish, rising to 328,000 new plug-in registrations from 316,000 in 2019, i.e. a 3.7% growth in volume[26]. EV market share grew from 1.9% in 2019 to 2.3%. Importantly, U.S. President Biden recently signed an executive order to electrify the federal fleet, some 645,000 vehicles, to stimulate the zero-emission vehicle market and boost employment in clean energy.

Regarding automakers, the U.S. manufacturer Tesla leads globally, having sold almost half a million battery-electric vehicles worldwide in 2020[27]. Other top plug-in manufacturers are the German carmaker Volkswagen (220,000 EV sales), the Chinese carmaker BYD (179,000 EV sales), and the Chinese-American SAIC-GM-Wuling venture (171,000 EV sales). In Western Europe, the zero-emission

[19] EU+UK+EFTA. Source: ACEA (February 2021) Quarterly AFV registrations. The European Free Trade Association (EFTA) includes Iceland, Liechtenstein, Norway, and Switzerland. The European Economic Area, the scope of the passenger car CO_2 standards, includes the EU, Iceland, Liechtenstein, and Norway.
[20] Source: EV Volumes (preliminary data)
[21] Source: Best selling cars (2021) Car sales statistics. Link
[22] CleanTechnica (2020) *Record Electric Vehicle Sales in China.* Link
[23] EU+UK+EFTA. Source: ACEA (February 2021) Quarterly AFV registrations
[24] Assuming that BEV make up 80% of plug-in registrations (source); 1,337,000 plug-ins were registered in China in 2020 (preliminary data, source); and the total market size was 19,790,000 cars in 2020 (source).
[25] EU+UK+EFTA. Source: ACEA (February 2021) Quarterly AFV registrations
[26] Source: EV Volumes (preliminary data)
[27] CleanTechnica (2020) *World plug-in vehicle sales*. Link

vehicle market was led by the Volkswagen Group (174,000 BEV sold), Renault-Nissan-Mitsubishi (136,000 BEV sold), and Tesla (98,000 BEV sold)[28].



Source: European volumes from ACEA quarterly AFV regristrations. Global volumes from Statista. Other data from EV Volumes and best-selling-cars.com.

Figure 7: EV volumes in major world markets

[28] Source: Financial Times

6. Conclusion and future outlook

The surge in electric vehicle sales witnessed in 2020 was the consequence of the new CO_2 targets that pushed carmakers to invest in and supply these vehicles in order to avoid fines; the momentum was helped (but did not originate from) the post-COVID incentives. For the first time, stringent targets limit the average CO_2 emissions of cars sold in the EU. This resulted in the largest rise in EV sales (+144% in EV volume in Europe) and largest fall in CO_2 emissions from new cars to date, as they dropped by 12.6% from 122 gCO_2/km in 2019 to 107 gCO_2/km in 2020[29] (as measured using the NEDC test protocol). 2020 has been a tipping point, ushering in the age of electric vehicles.

Now that the market is reaching an inflection point, the next step is to go towards 100% emissions-free electric sales. Many European carmakers demonstrate a clear ambition to electrify their fleet. The French carmaker Renault plans to sell 20% of battery-electric vehicles in 2022, by diversifying its BEV lineup. CEO Luca de Meo also expects that 70% of Renault sales to be plug-ins by the mid-2020s, before phasing out internal combustion off its products before 2035. The Swedish manufacturer Volvo also expects to only sell electric vehicles from 2025 onwards (half battery-electric and half plug-in hybrid). Last month, the German manufacturer Audi announced they would only offer cars with electric drive within 10 to 15 years.

While such voluntary commitments are welcome, carmakers have little incentive to further clean their fleet before 2025, as CO_2 standards are currently only tightened every 5 years. T&E has shown this would not foster a smooth uptake in zero-emission vehicles[30]. Under the current policy scenario, EV market share would stagnate until 2025 when it would slightly increase, before stagnating again until 2029. This trajectory is an inefficient path that would fail to establish Europe as an emobility leader or help achieve 2030 CO_2 emission goals.

As mentioned in Section 1, PHEVs play an important role in the CO_2 standards compliance strategy of many automakers. Yet, the climate benefits of PHEVs are unclear, as many PHEV models are not designed to be driven on electric mode (T&E calls them “fake electrics”). Their real-world emissions are 28% to 89% times higher than advertised under optimal conditions, and 3 to 8 times higher than official values on battery charging mode[31].

[29] ICCT (2021) *Market monitor: European passenger car registrations, January-December 2020.* Link
[30] Transport & Environment (2021) *Cars CO2 review: Europe’s chance to win the emobility race.* Link
[31] Transport & Environment (2020). *A new Dieselgate in the making.* Link

Therefore, it is essential for the EU to seize the opportunity offered by the revision of the post-2020 CO_2 standards in June to correct the flaws in the current regulation and accelerate the transition to zero-emission mobility. Transport & Environment recommends that the European Commission:

- **Raise the ambition of CO_2 targets:** Set the 2025 target to at least -25% (compared to 2021 levels) and set the 2030 to at least -65%.
- **Avoid market stagnation:** Set an intermediate target of -40% in 2027 to foster continuous investment and clean vehicle uptake.
- **Introduce a zero-emission goal:** Set an EU-wide phase-out date for the sale of new cars with internal combustion engines in 2035 or earlier.
- **Apply more realistic CO2 credentials to PHEVs:** Reforming the WLTP regulation and the way in which the utility factors are currently calculated.

Europe has a head start thanks to the 2020 EV momentum, but global competitors are gearing up and the emobility race is far from over. As the demand soars and vehicle prices become competitive, a set of smart regulations expected later this year will determine whether Europe remains in the lead and capitalises on the jobs and value chain opportunities that come with the transition to emobility[32].

Further information

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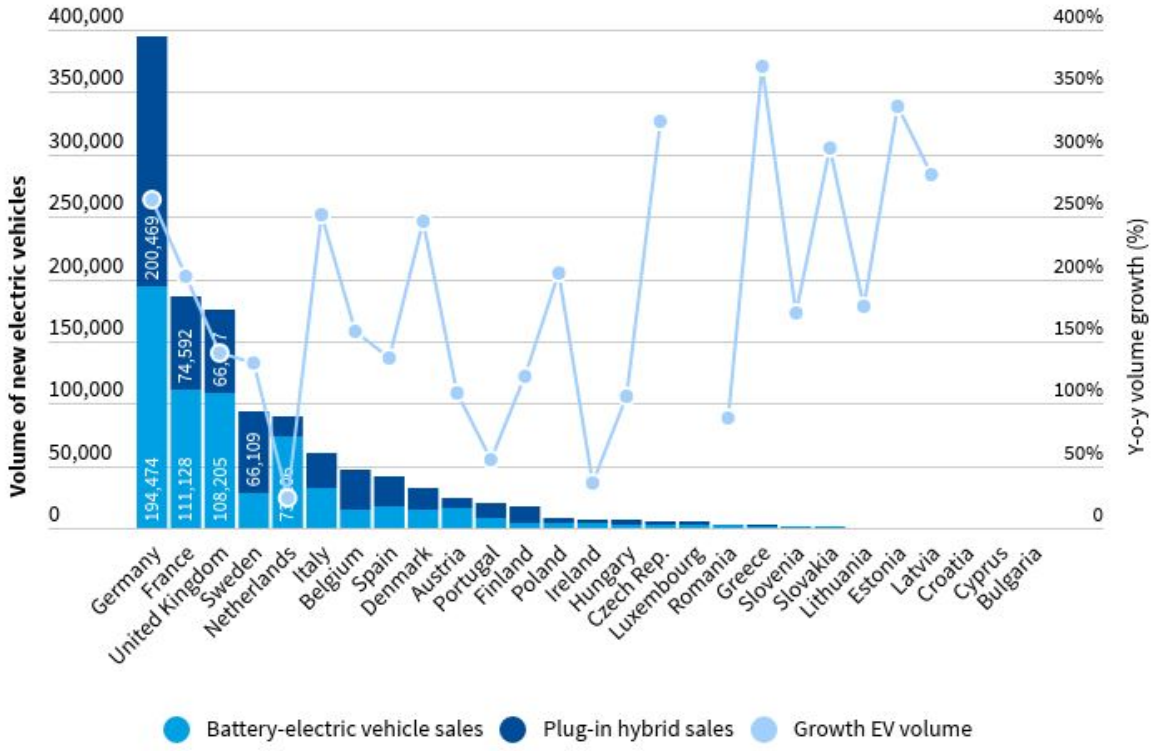
[32] Transport & Environment (2021) *Cars CO2 review: Europe's chance to win the emobility race.* Link

Annex



Source: T&E analysis of ACEA quarterly registration statistics

Figure 8: Plug-in volumes in EU countries with year-on-year growth