



# MAKING THE TRANSITION TO ZERO-EMISSION MOBILITY

ADDRESSING THE BARRIERS TO THE UPTAKE OF  
ELECTRICALLY-CHARGEABLE CARS IN THE EU

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A STUDY BY



European  
Automobile  
Manufacturers  
Association

## CONTENT + KEY FINDINGS

### The 'electrified' car market explained

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- Electrically-chargeable vehicles (ECVs) account for 1.5% of total car sales in the EU.
- The market share of ECVs grew by 0.9 percentage points between 2014 and 2017.

### THREE MAJOR BARRIERS

#### 1. Affordability

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- The market share of ECVs is practically 0% in countries with a GDP per capita below €18,000.
- Half of the 28 EU member states have an ECV market share of 0.75% or lower.
- By contrast, an ECV market share of above 1.8% only occurs in countries with a GDP per capita of more than €35,000.
- 85% of all electric car sales are concentrated in just six Western European countries with some of the highest GDPs.
- Because of this imbalance, over 50% of all cars sold in Western Europe would have to be battery electric to reach an EU average of 30%.

#### 2. Infrastructure availability

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- Today, there are some 100,000 charging points for ECVs in the European Union.
- However, at least two million will be needed by 2025.
- 76% of all ECV charging points are concentrated in just four EU countries, which together cover only 27% of the EU's total surface area.
- 28% are located in the Netherlands (32,875), with another 22% in Germany (25,241), 14% in France (16,311) and 12% in the United Kingdom (14,256).
- On the other end of the spectrum, a vast country like Romania – roughly six times bigger than the Netherlands – counts 114 charging points, or 0.1% of the EU total.

#### 3. Lack of investment

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- Only one in three EU member states provide incentives for ECV recharging infrastructure.
- The EU's Directive on Alternative Fuel Infrastructure (DAFI) set clear objectives for all 28 member states in 2014.
- To date, the implementation of DAFI by national governments remains very poor.

## INTRODUCTION

Future reductions of CO<sub>2</sub> emissions from passenger cars will be strongly dependent on increased sales of alternatively-powered vehicles, including electric, hybrid, fuel-cell and natural gas-powered vehicles.

When it comes to electric cars, there is still a lot of confusion surrounding the term 'electrified'. Some people presume that 'electrified' exclusively refers to battery electric vehicles that are fully powered by electricity, while in fact it also covers plug-in hybrid electric vehicles as well as mild and full hybrids that still largely rely on a combustion engine – each coming with a very different level of CO<sub>2</sub> reduction. As this often leads to confusion, especially from a policy perspective, the first chapter (page 4) explains the main differences between the different types of electrified vehicles.

Even though all European automobile manufacturers are expanding their portfolios of electric vehicles, we unfortunately see that market penetration of these vehicles is still low and very fragmented across the EU. Consumers looking for an alternative to diesel now often opt for petrol vehicles or hybrid ones, but are not yet making the switch to electrically-chargeable vehicles (ECVs) on a large scale.

The latest ACEA data show that ECVs made up 1.5% of total new car sales in 2017, with huge differences between the member states. In other words, the final product alone – no matter how good it is – is not sufficient to create demand. The reality is that the market uptake and consumer acceptance of ECVs depend on several factors that are beyond the control of automobile manufacturers. This study identifies those barriers that are currently hampering the uptake of electrically-chargeable cars in the European Union.

Affordability, for example, remains a major barrier for many Europeans. The findings of this study (page 6) show that 85% of all electrically-chargeable cars are sold in just six Western European countries with some of the highest GDPs per capita. By contrast, in countries with a GDP of less than €18,000, such as those in Central and Eastern Europe as well as crisis-torn Greece, the market share of electrically-chargeable cars remains close to 0%.

This is a serious problem, especially considering the European Commission's recent proposal to set EU-wide 'benchmarks' for sales of full battery electric cars, at the level of 15% by 2025 and 30% by 2030. There is clearly a huge gap in Europe between today's sales of battery electric cars – making up just 0.7% of the market – and the Commission's benchmark. Under this proposal, we would need to jump from less than 1% of sales today to 30% of sales in the space of less than 12 years.

Besides affordability, a balanced supply of charging and refuelling infrastructure is a pre-requisite for stronger sales of alternatively-powered vehicles across the EU. This study demonstrates that, of the roughly 100,000 charging points available today, 76% are concentrated in just four countries (the Netherlands, Germany, France and the UK). On the other end of the spectrum, a vast country like Romania – roughly six times bigger than the Netherlands – only counts 114 charging points (page 8).

Considering all of the above, it is problematic that the European Commission's proposal for post-2021 CO<sub>2</sub> targets for cars and vans does not link the availability of charging and refuelling infrastructure for alternatively-powered vehicles to the CO<sub>2</sub> targets, as these two elements go hand-in-hand.

That is why it is of the utmost importance that the future CO<sub>2</sub> framework for cars and vans includes a mid-term 'reality check' to assess the availability of infrastructure and the maturity of the ECV market, allowing the CO<sub>2</sub> targets to be adapted accordingly.

The auto industry is eager to move as fast as it can towards zero-emission vehicles. There is no doubt that this is the future. But to get there, customers must be convinced that this is the best choice for them; both in terms of affordability as well as convenience. A natural shift in the market will not happen without addressing these barriers.

# 1. THE 'ELECTRIFIED' CAR MARKET EXPLAINED

The market for 'electrified' passenger cars can be split in two main categories:

1. Electrically-chargeable vehicles (ECVs) include full battery electric vehicles and plug-in hybrids, both of which require appropriate recharging infrastructure.
  - Battery electric vehicles (BEVs) are fully powered by an electric motor, using electricity stored in an on-board battery that is charged by plugging into the electricity grid. 
  - Plug-in hybrids (PHEVs) have an internal combustion engine (running on petrol or diesel) and a battery-powered electric motor. The combustion engine supports the electric motor when required, and the battery is recharged by connecting to the grid as well as by the on-board engine. 
2. Hybrid electric vehicles (HEVs) are powered by an internal combustion engine (running on petrol or diesel) but also have a battery-powered electric motor that serves to complement the conventional engine. Their electricity is generated internally from regenerative braking and the internal combustion engine, so they do not need recharging infrastructure. The hybridisation level ranges from mild to full. 

In addition, fuel-cell vehicles (FCEVs) are also propelled by an electric motor, but their electricity is generated within the vehicle by a fuel-cell that uses compressed hydrogen and oxygen from the air. For the time being, fuel-cell cars are still quite rare in Europe. Some 253 units were sold in 2017, with the lack of dedicated hydrogen infrastructure being a major barrier to wider consumer acceptance.

## So, what does the term 'electrified' exactly cover?

Some people presume that the term 'electrified' exclusively refers to battery electric vehicles that are fully powered by electricity and have no CO2 emissions coming from their tailpipe.

However, in fact many statements and announcements (whether they are made by media, policy makers, NGOs or even auto manufacturers) that deal with the 'electrification' of vehicles relate to all available electrification technologies, each coming with a very different level of CO2 reduction.

This sometimes leads to confusion, especially from a policy perspective. Hybrid electric cars, for example, make up 67% of all 'electrified' car sales in the EU, but they are not seen as alternatively-powered vehicles by EU policy – only BEVs and PHEVs are.

	ELECTRICALLY-CHARGEABLE CARS 1.5% of EU car sales in 2017		HYBRID ELECTRIC CARS 2.9% of EU car sales in 2017
	 <b>BEVs</b> Battery-electric vehicles	 <b>PHEVs</b> Plug-in hybrid electric vehicles	 <b>HYBRIDS</b> Full and mild hybrids
<b>TAILPIPE CO2 REDUCTION</b> (on average)	100%	50-75%	Mild: 10-20% Full: 20-30%
<b>SHARE OF 'ELECTRIFIED' CARS</b>	15%	18%	67%
<b>UNITS SOLD IN 2017</b>	97,571	115,405	431,504

Considered to be alternative powertrains from an EU policy perspective. DAFI requirements, for example, only recognise BEVs, plug-in hybrids, CNG and hydrogen cars.

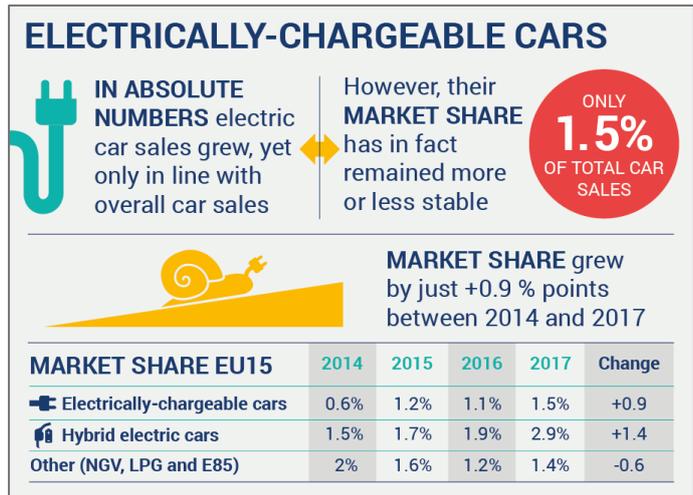
Excluded from EU definition of alternatively-powered vehicles.

The ‘electrified’ technology mix also includes, for example, mild and full hybrids that still largely rely on a combustion engine. This means that any commitments or ambitions to ‘electrify’ vehicle portfolios by a certain percentage do not equal a CO2 reduction (nor BEV sales) of the same magnitude, as they can also include other technologies such as plug-in hybrids with a CO2 reduction potential of 50-75%.

And in the end, offering ‘electrified’ options for a car (on top of petrol and diesel versions) is one thing; the final choice is still up to the consumer based on his or her specific needs.

**What is the market share of electrically-chargeable cars in the EU?**

- Today, electrically-chargeable vehicles account for 1.5% of total passenger car sales in the European Union.
- In absolute numbers, sales of ECVs grew in recent years, but only in line with the overall growth of car sales.
- Their market share, however, has remained more or less stable; growing by just 0.9 percentage points between 2014 and 2017.
- At the current pace, the market share would be 3.9% by 2025 and 5.4% by 2030.



Consumers are sending a clear signal: there are still too many barriers – such as lack of infrastructure, affordability and range – for electrically-chargeable cars to replace diesel or petrol vehicles. Further CO2 reductions will be strongly dependent on greater sales of electric and other alternatively-powered vehicles, so these barriers need to be addressed urgently.

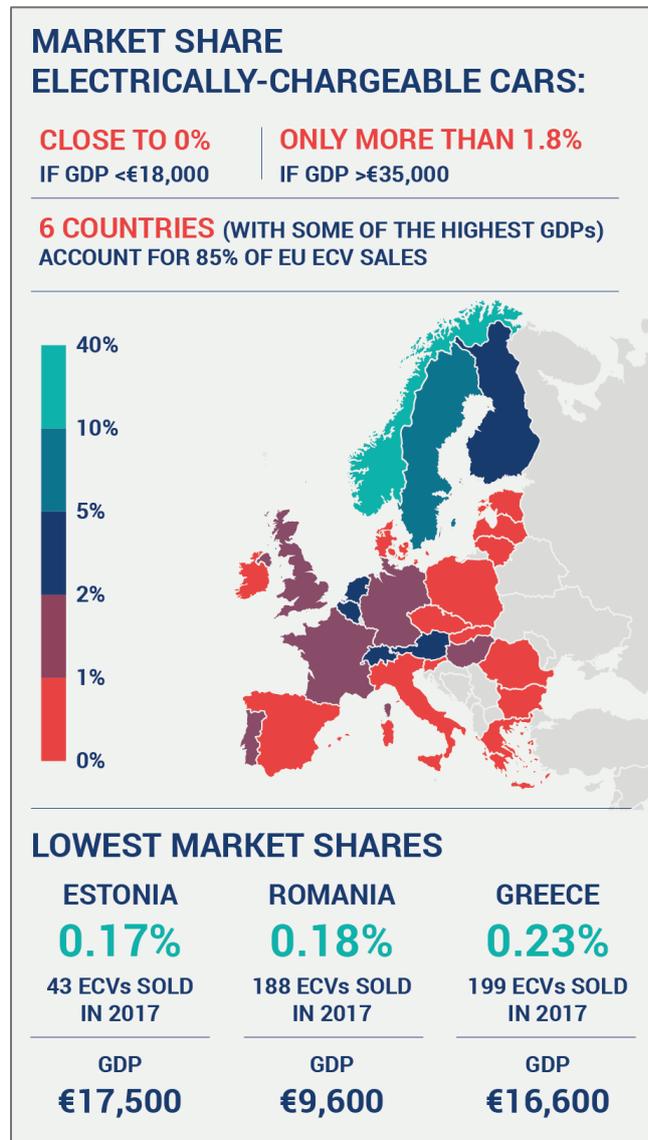
In the following chapters we will look into the three major barriers that are currently holding back the wider consumer uptake of ECVs in the European Union:

1. Affordability;
2. Infrastructure availability;
3. Lack of investment.

## 2. AFFORDABILITY - THE FIRST KEY BARRIER

When we consider that the market uptake of electrically-chargeable vehicles is directly correlated to GDP per capita, affordability is a major barrier to customers.

- The market share of ECVs is practically 0% in countries with a GDP below €18,000 (eg in Central and Eastern Europe, but also crisis-torn Greece).
- Half of all 28 EU member states have an ECV market share of 0.75% or lower.
- By contrast, an ECV market share of above 1.8% only occurs in countries with a GDP per capita of more than €35,000.
- A staggering 85% of all electric car sales are concentrated in just six Western European countries with some of the highest GDPs.
- Because of this imbalance, over 50% of all cars sold in Western Europe would have to be battery electric for an EU average of 30%.
- Many people take the Norwegian market as a benchmark. But just like its €67,000 GDP, more than twice the EU average, Norway's 39.3% ECV share is an exception in Europe.
- On the other end of the spectrum, in Estonia for instance only 43 electrically-chargeable cars were sold in 2017.
- Not only do we see a clear split between Central-Eastern and Western Europe, but also a pronounced North-South divide (eg Greece 0.2%, Italy 0.2% and Spain 0.6%).



A forced push for electrification could lead to social exclusion in these countries, reducing the mobility of people who need it the most. These findings should be a wake-up call for policy makers. Future decarbonisation measures should be inclusive, rather than assuming that all countries are in the same position as a handful of advanced ECV markets with high GDPs.

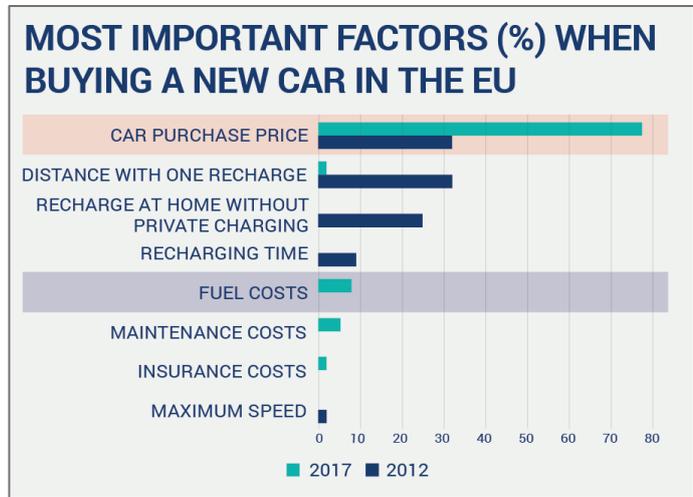
### Do the higher costs of electrically-chargeable vehicles have an impact on their uptake?

Increasing costs have an effect on the affordability of new, low-emission cars. Already now, when we look at the rapidly ageing EU vehicle fleet, we see that customers are increasingly postponing the purchase of a new car. The average age of cars in the European Union is currently 11 years, compared to 8.5 years in 2008, and keeps rising year-on-year.

Aggressively pushing for electrification, ie going against a natural shift in the market, would be counter-productive, as price-sensitive customers will keep their old cars longer. Consequently, fleet renewal will slow down, with a negative impact on the uptake of the latest technologies and thus the environment.

A recent study<sup>1</sup> by the European Commission's Joint Research Centre (JRC) confirmed this:

- “Purchase price continues to represent the major hurdle to widespread adoption of [electric] powertrains.”
- “Other reasons for not buying electric cars: lack of recharging infrastructure and short range.”
- “Attitudes towards electric cars in Europe have remained relatively stable in the last five years.”



### Can incentives make a difference?

As a recent analysis by ACEA<sup>2</sup> demonstrated, there is a clear correlation between the market uptake of electrically-chargeable vehicles and the availability of customer incentives to stimulate ECV sales.

The market share of electrically-chargeable vehicles is only substantial in those EU member states that offer extensive (fiscal and non-fiscal) incentives.

- Sweden, for example, provides many and strong incentives, resulting in a 5.2% market share.
- Poland, on the other hand, does not offer any incentives, resulting in a market share that is close to zero (0.2%).

However, these figures also show that customer incentives for purchasing ECVs, and especially their monetary value, differ greatly across Europe.

- Many of the new EU member states with a low ECV market share, merely offer an exemption from the annual circulation tax for electric vehicles.
- Five EU member states do not offer any incentives at all: Croatia, Estonia, Lithuania, Malta and Poland.

### 3. INFRASTRUCTURE - THE SECOND KEY BARRIER

Both types of electrically-chargeable vehicles require appropriate recharging infrastructure:

- Battery electric vehicles (BEVs), which are fully powered by an electric motor, need to plug into the electricity grid to charge their on-board battery.
- Plug-in hybrids (PHEVs), which have an electric motor that is complemented by a combustion engine, also need to charge the battery by connecting to the grid.

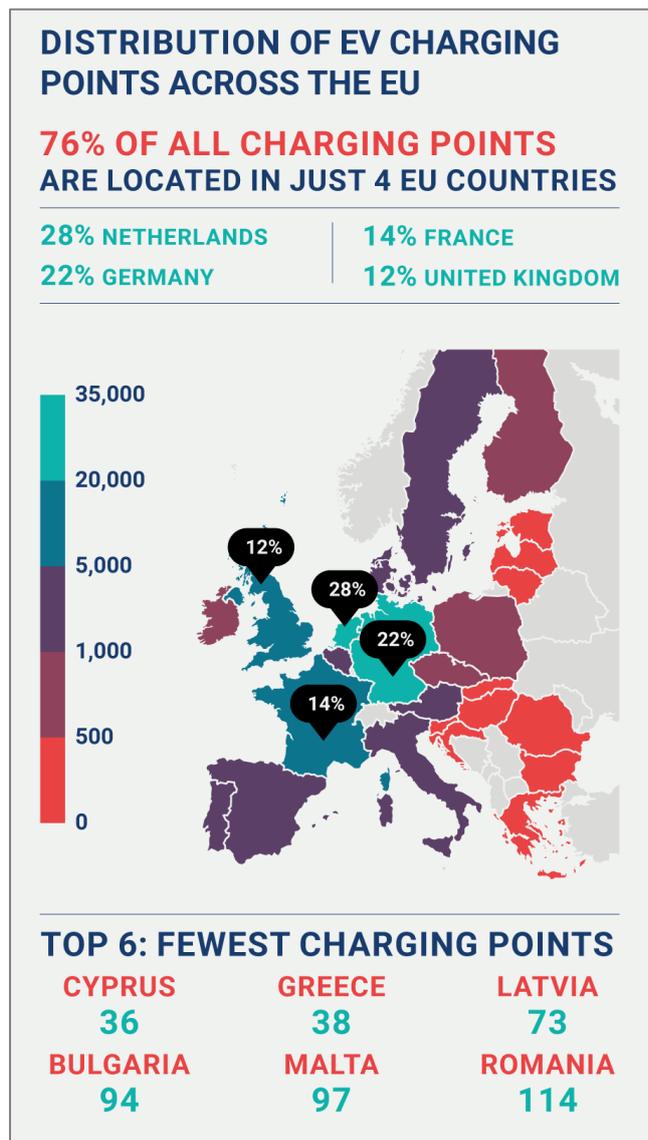


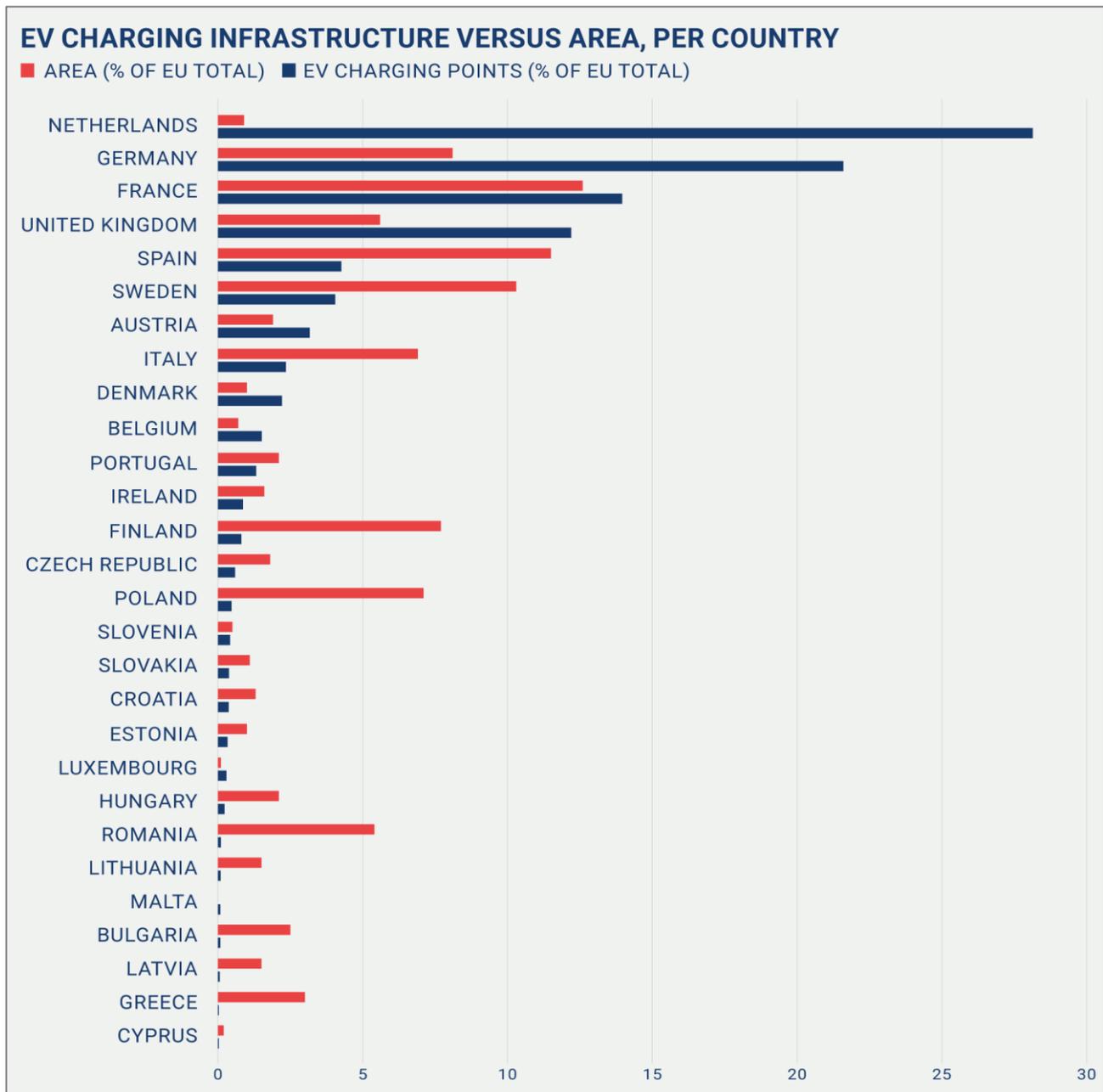
#### Infrastructure availability is still a major barrier for most consumers

Future CO2 reductions are strongly dependent on sales of alternatively-powered cars. However, a natural shift in the market will not happen without improved infrastructure availability. This means that everyone must have the option to refuel or recharge their alternatively-powered vehicle easily, no matter where they live or where in Europe they want to travel to.

#### 76% of all EV charging points are concentrated in just 4 EU countries

- Today, there are some 100,000 charging points for electrically-chargeable vehicles in the European Union<sup>3</sup>.
- However, at least two million will be needed by 2025, according to very conservative estimates by the European Commission.
- That comes down to a twenty-fold increase in less than 7 years.
- What is more, a huge imbalance in the concentration of available charging points is holding back the EU-wide market uptake of electrically-chargeable cars.
- Of the roughly 100,000 charging points available today, almost 30% are located in the Netherlands (32,875), with another 22% in Germany (25,241), 14% in France (16,311) and 12% in the United Kingdom (14,256).
- Together, these four countries account for 76% of all EV charging points in the EU.
- By contrast, the same four countries only cover 27% of the EU's total surface area.
- On the other end of the spectrum, a vast country like Romania – roughly six times bigger than the Netherlands – only counts 114 charging points, or 0.1% of the EU total.





EV CHARGING POINTS PER COUNTRY, PLUS PERCENTAGE OF EU TOTAL<sup>3</sup>

Austria	3,706	3.17%	Italy	2,741	2.35%
Belgium	1,765	1.51%	Latvia	73	0.06%
Bulgaria	94	0.08%	Lithuania	102	0.09%
Croatia	436	0.37%	Luxembourg	337	0.29%
Cyprus	36	0.03%	Malta	97	0.08%
Czech Republic	684	0.59%	Netherlands	32,875	28.14%
Denmark	2,582	2.21%	Poland	552	0.47%
Estonia	384	0.33%	Portugal	1,545	1.32%
Finland	947	0.81%	Romania	114	0.10%
France	16,311	13.96%	Slovakia	443	0.38%
Germany	25,241	21.60%	Slovenia	495	0.42%
Greece	38	0.03%	Spain	4,974	4.26%
Hungary	272	0.23%	Sweden	4,733	4.05%
Ireland	1,009	0.86%	United Kingdom	14,256	12.20%
			EU total	116,842	100%

## 4. LACK OF INVESTMENT - THE THIRD KEY BARRIER

### Insufficient support for investments in charging infrastructure

- Only one in three EU member states provide incentives for ECV recharging infrastructure.
- Indeed, according to a recent report<sup>4</sup> by the European Environment Agency (EEA) specific incentives for electric vehicle charging points were found in only 10 out of 28 EU countries.
- Investments need to be stepped up, both by national governments and infrastructure operators.
- As the EEA rightly points out in its report<sup>5</sup>: “sufficient charging infrastructure is required to give people the confidence that fully electric vehicles will reliably meet their travel needs and help reduce anxiety linked with possible limitations in range.”

### Poor implementation of the Directive on Alternative Fuel Infrastructure (DAFI)

- The EU’s Directive on Alternative Fuel Infrastructure (DAFI) set clear objectives for the 28 member states already back in 2014.
- To date, however, the implementation of DAFI by national governments remains very poor.
- Moreover, several countries have failed to come up with the required national policy frameworks outlining their plans for the deployment of the necessary infrastructure.
- The European Commission has even been obliged to launch several infringement procedures against various member states.
  
- Now it is high time for action. All member states have the responsibility to show their cards and to commit to making the necessary investments.
- Europe needs to be able to show customers that the infrastructure network matches their expectations to be able to travel without anxiety.
- Simply put, if customers don’t see charging points in their every-day environment, they will not be willing to go electric.

### The missing link between future CO2 targets and infrastructure

- Despite the fact that the European Commission explicitly acknowledges that the market uptake of alternatively-powered vehicles and infrastructure roll-out are intrinsically connected, its proposal for post-2021 CO2 targets for passenger cars and vans does not link the availability of charging and refuelling infrastructure to the future CO2 targets.
- Instead, in order to really reflect the reality of the market, Europe’s long-term climate objectives should be linked to future infrastructure availability and consumer acceptance.

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