



Public charging in Europe: where are we at?

How to get national charging strategies right

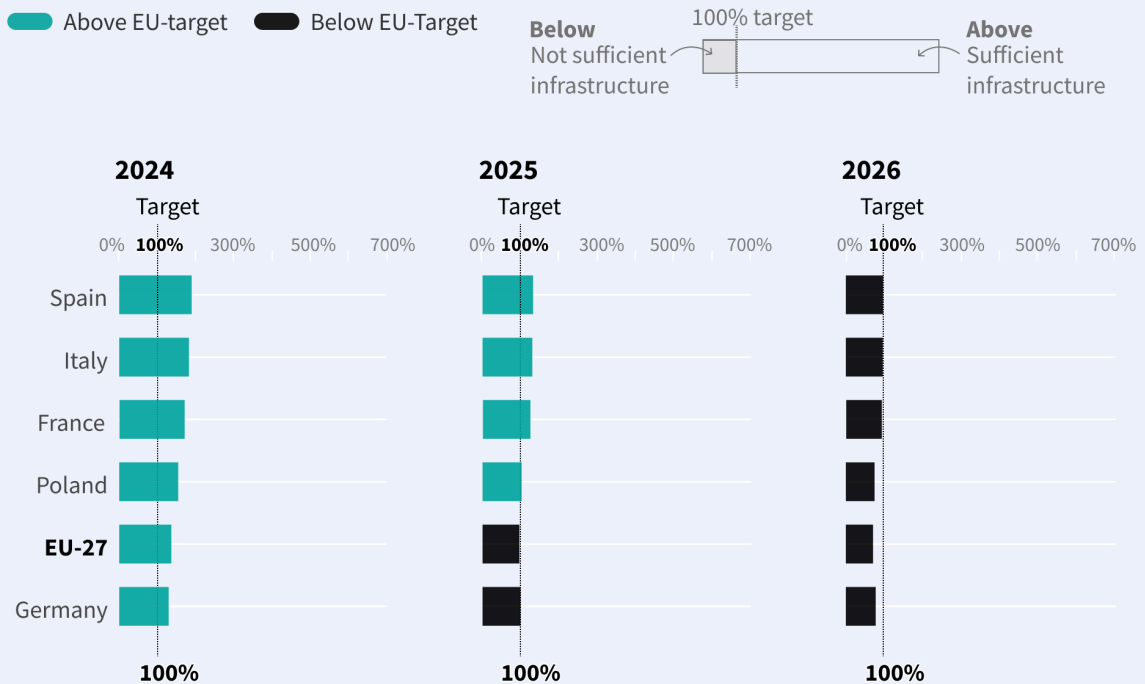
April 2024

Public charger deployment on track, but uptake needs to continue

Charging, or the lack thereof, is often cited as one of the biggest reasons why people are still hesitant to switch to electric vehicles (EVs). In this short briefing, we analyzed both the historic growth of charging infrastructure in Europe and the future needs. While many countries fail again and again to meet their self-set EV goals, the speed of charging infrastructure deployment is almost exclusively a success story across all EU members.

Most EU countries already meet their 2024 charging target

% of public charging infrastructure deployed in 2023 in relation to projected EU-targets



Source: EAFO (2024), eco-movement (2024). Based on internal EV uptake projections.



Figure 1: tracking EU's public charging infrastructure target

Even though it is repeatedly claimed otherwise, the deep East-West and North-South divide lacks any basis. On the contrary, many Eastern and Southern European countries have, relative to the number of EVs on the road, more charging power available than most of their Western and Northern European counterparts. The next step on the East and South would be to better implement the uptime and interoperability requirements of AFIR.

However, the proper implementation of the AFIR target is key to making it a lasting success. T&E recommends that member states shall go beyond the minimum ambition of AFIR and take into account the following elements:

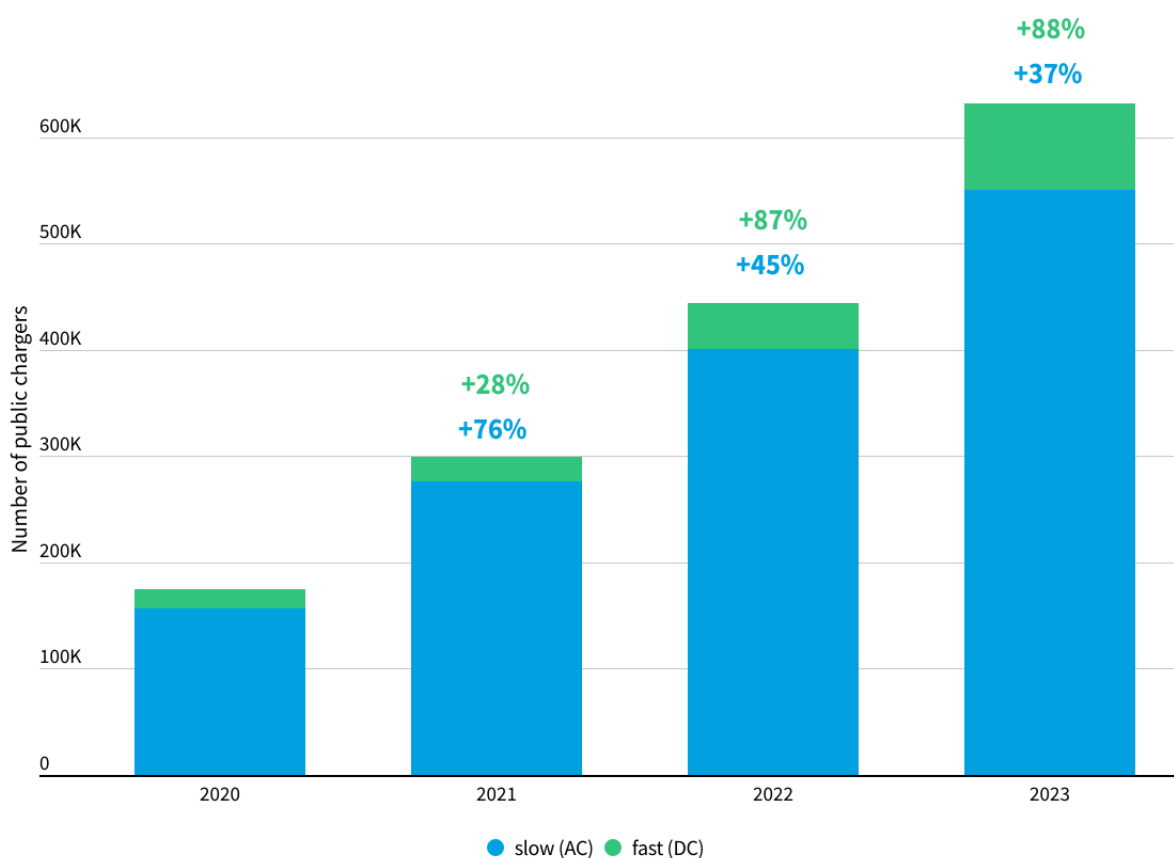
- **Forward-looking planning:** anticipate future demand to avoid 'grid-locks' along the way. This proactive approach is essential to prepare adequately for increasing charging demands.
- **Close the gaps in the network:** AFIR mandates that fast charging hubs for long-distance travel are essential every 60 km along the main roads by 2030 at the latest. However, this should be completed by 2025 to eliminate charging and range anxiety across countries and the EU once and for all.
- **Ensure a homogeneous rollout:** the 'fleet-based' charging target should be implemented in a decentralized manner, ensuring that the deployment of charging infrastructure follows the EV uptake at the regional or even provincial level. This approach supports a balanced expansion that meets actual local demand.
- **Ensure infrastructure is user-friendly:** member states should require that Charge Point Operators (CPOs) ensure publicly operated charging stations maintain a minimum uptime of at least 98% annually. Furthermore, CPOs should implement other interoperability and accessibility requirements outlined in AFIR as soon as possible to enhance user experience.
- **Limit red tape and fund smartly:** Through the harmonization of permitting and administrative procedures and the focus of public financial support where and when market failure occurs. This strategic approach helps expedite infrastructure development while ensuring efficient use of resources.

1. The number of charging points is increasing rapidly

Over the past three years, the EU has experienced remarkable growth in its public charging infrastructure. Slow (AC) charging points, designed for longer-term charging needs or for top-ups of EV batteries, have seen a more than threefold increase since late 2020, reaching over half a million points by the end of 2023. Meanwhile, fast (DC) charging points, ideal for rapid EV recharging, have surged by over fourfold during the same period, soaring from fewer than 20,000 chargers to more than 80,000 plugs in just three years.

Number of public chargers 2020- 2023 - EU-27

2020-2023: +348%, +251%



Source: EAFO (2024).

Figure 2: Number of public chargers 2020-2023 EU-27

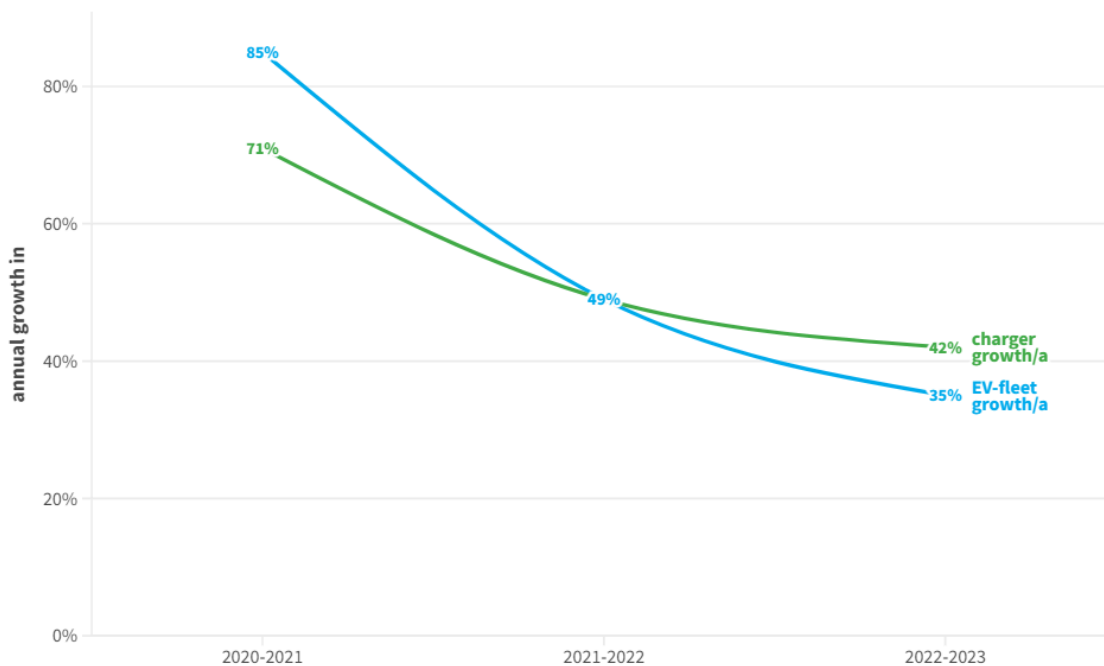
With over 630,000 charging points now installed throughout Europe, the EU is making significant strides towards achieving the targets outlined in the European Commission's Green Deal initiative, set in 2021.¹ At that time, the Commission committed to reaching 3 million public chargers by 2030, with a milestone of 1 million by 2025. These goals were particularly ambitious considering there were only 190,000 public

¹ European Commission (2021): Sustainable & Smart Mobility Strategy. Retrieved from: https://transport.ec.europa.eu/document/download/be22d311-4a07-4c29-8b72-d6d255846069_en?filename=2021-mobility-strategy-and-action-plan.pdf

charging points available for EVs. Earlier the same year, T&E, along with the automotive industry association ACEA and the consumer association BEUC, advocated for similar targets.²

Based on the average growth rate of charging infrastructure deployment of the past three years, Europe is projected to achieve the milestone of one million chargers in early 2025. If the growth trend continues, the ambitious 2030-target of three million chargers could be reached as early as 2027. Despite all the concerns³, the pessimistic forecasts and the recurring narrative that charging is the bottleneck for EV uptake, the actual speed of deployment in these past 3 years has surpassed the most optimistic expectations.

Our analysis is also refuting another popular myth, that the growth of the EV fleet is happening at a much faster pace than charge point operators (CPOs) can deploy their charging stations. While the EV fleet did grow slightly faster from 2020-2021, the growth of charging infrastructure caught up a year later and has grown 20% faster than the EV fleet from 2022-2023.



Source: EAFO (2024), annual EV (BEV + PHEV) growth in %, annual growth of public charging points (AC + DC).



Figure 3: Comparison annual EV-fleet growth and annual number of charging points growth

² T&E (2021). Time for EU to set national targets for EV chargers. Retrieved from: <https://www.transportenvironment.org/discover/time-eu-set-national-targets-ev-chargers/>

³ ACEA (2023). Distribution of electric car charging points across the EU. Retrieved from: <https://www.acea.auto/figure/interactive-map-correlation-between-electric-car-sales-and-charging-point-availability-2022-data/>,

What is most noteworthy, this development happened before the Alternative Fuel Infrastructure Regulation (AFIR) even entered into force, or in other words, before Europe established any mandatory targets whatsoever.

1.1. Progress and speed of infrastructure development in member states

The remarkable growth rate of charging infrastructure deployment is a phenomenon that can be observed across the EU-27. Strong growth rates are observed across the board, in virtually all EU countries and with a similar dynamic almost everywhere. This is true for absolute as well as relative numbers, so the uptake in relation to the uptake of EVs.

France

Out of the four biggest EU countries France is performing best. With almost 120,000 publicly accessible charging points it has practically the same amount of chargers as Germany, despite having significantly less registered EVs and a lower population than its Eastern neighbor. What is in particular noteworthy is the almost explosive growth of the French fast charging network. In less than 2 years the number of fast DC-chargers went from merely 3,600 to 18,500, a fivefold increase.

Number of public chargers (France) 2021- 2023

2021-2023: +409% +97%

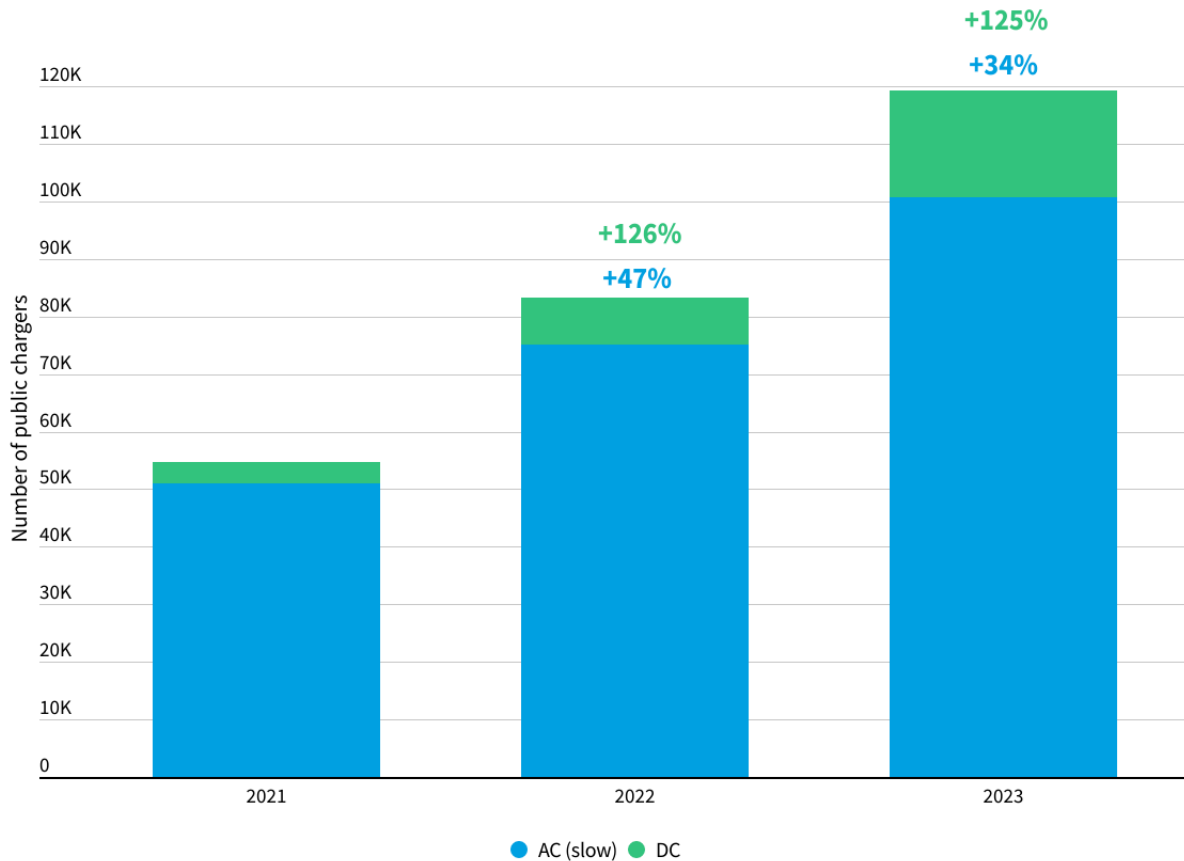


Figure 4: Number of public chargers (France) 2021-2023

Germany

Just behind France, Germany has also shown a remarkable expansion of its charging network. Although the country still has a couple of hundred more chargers deployed within its borders, it also has a higher population density and a higher absolute number of EVs registered in its territory. With almost 23,000 fast charging points by the end of 2023, Germany is also home to Europe's largest fast-charging network, almost quadrupling its numbers since 2020.

Number of public chargers (Germany) 2020- 2023

2020-2023: +290% +170%

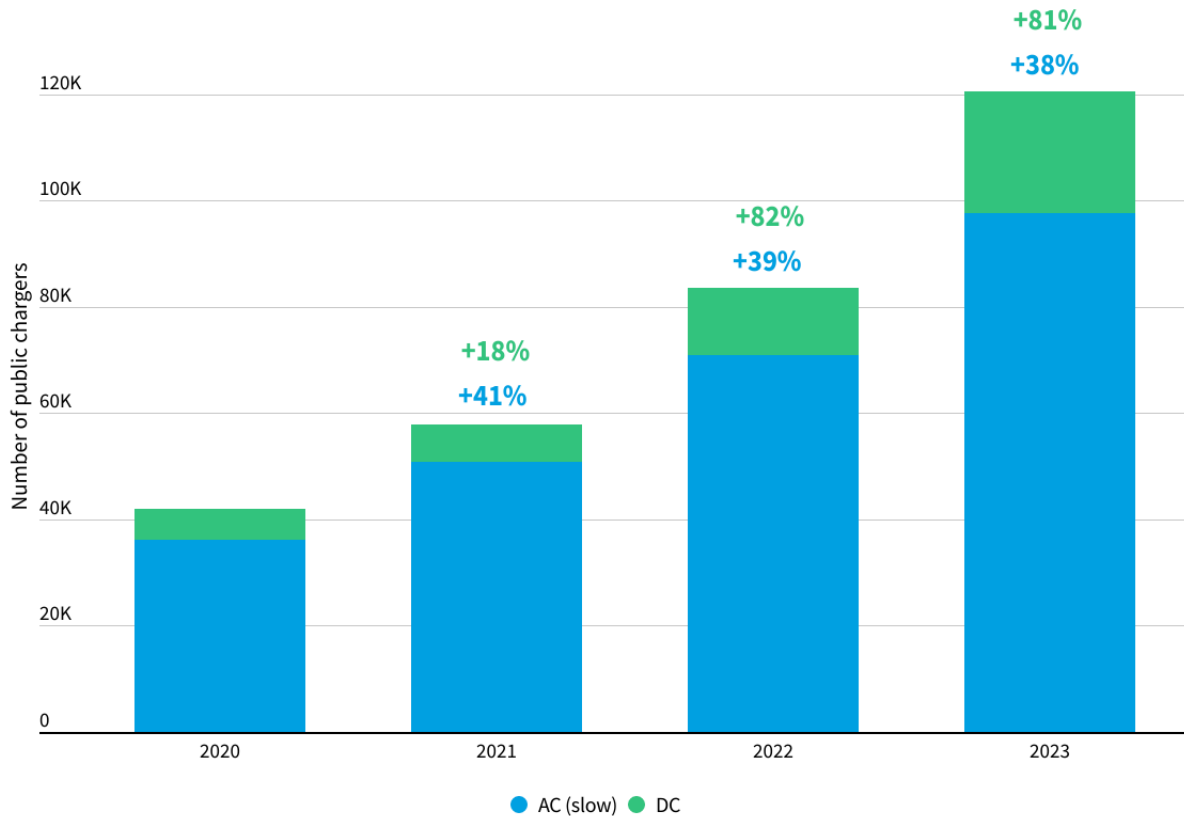


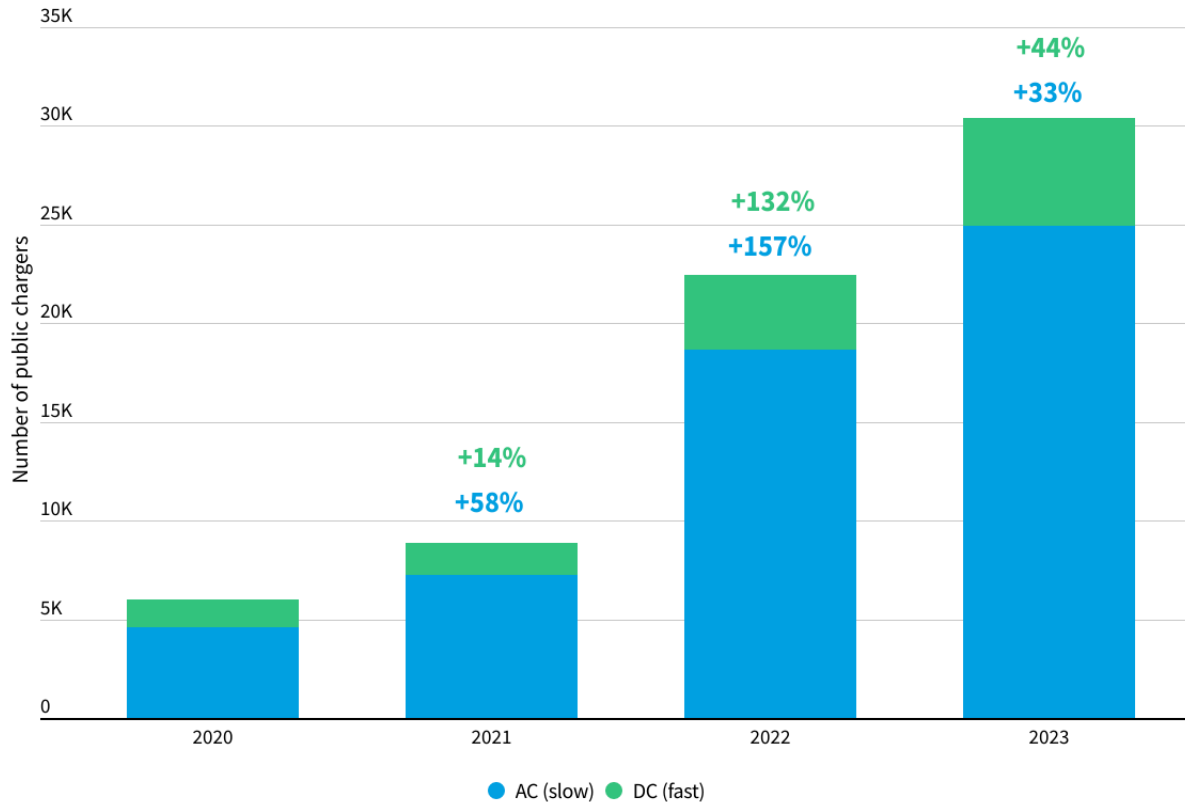
Figure 5: Number of public chargers (Germany) 2020-2023

Spain

Albeit starting from a much lower level, the growth rate of the Spanish public charging network is keeping pace with the rest of Europe. The slow charging infrastructure has expanded massively in the past 3 years growing by more than 440%, having now around 25,000 slow chargers in its borders. As a point of comparison this is similar to the numbers we've seen in Germany or France while they had a similar number of EVs registered. The Spanish fast charging network has almost quadrupled since 2020.

Number of public chargers (Spain) 2020- 2023

2020-2023: +279% +443%



Source: EAFO (2024).

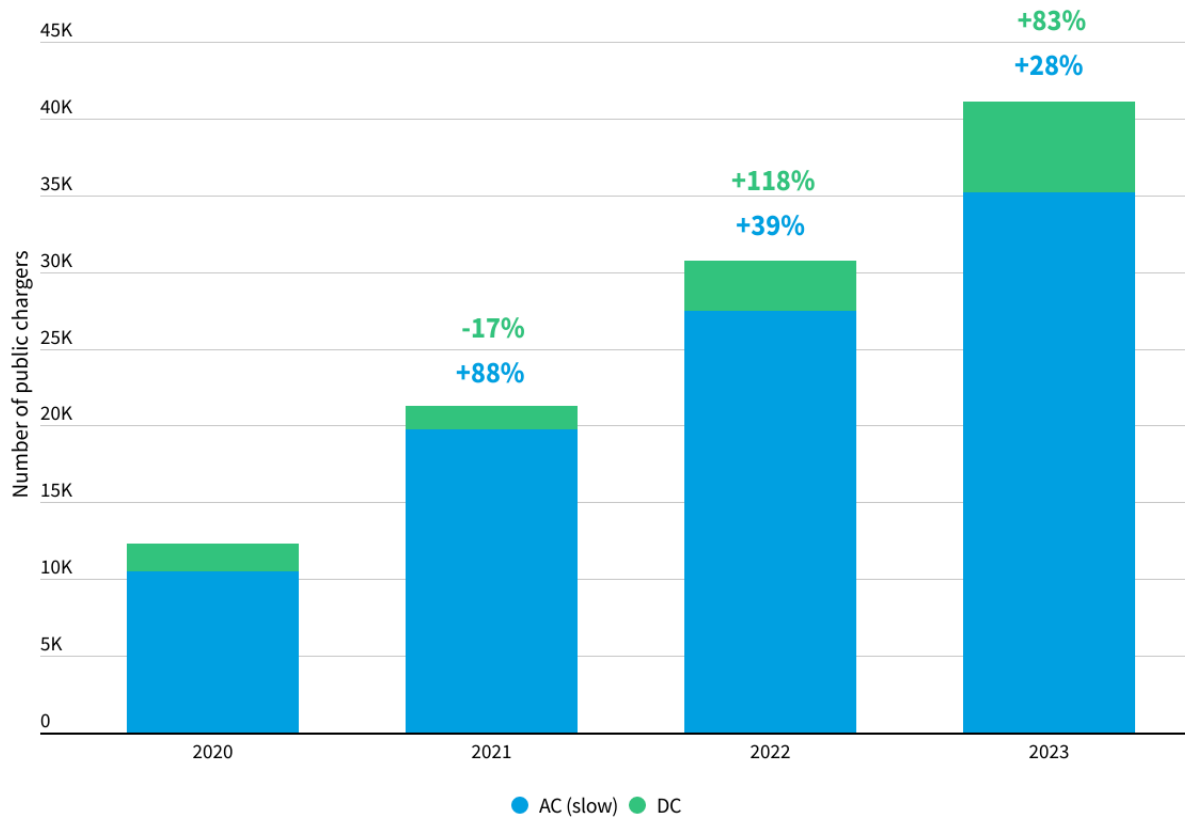
Figure 6: Number of public chargers (Spain) 2020-2023

Italy

The total number of chargers in Italy has more than tripled in the past three years, with similar growth from both slow and fast chargers, placing Italy at a similar level as Germany in 2020. It is important to mention, that back then Germany had already more BEVs than Italy has now, showing that Italy is well on track despite their relatively low EV uptake.

Number of public chargers (Italy) 2020- 2023

2020-2023: +230% +234%



Source: EAFO (2024).

Figure 7: Number of public chargers (Italy) 2020-2023

2. Europe's public charging infrastructure law: AFIR

AFIR was finally ratified in the latter half of 2023 and is set to be fully enforceable across all EU member states starting from April 13, 2024. AFIR delineates two primary objectives: highway coverage and the overall quantity of chargers.

Firstly, along Europe's busiest roads, including highways and significant national roads, member states must ensure the deployment of at least one fast-charging station every 60 kilometers in both directions by the year 2030. By 2025, member states are required to cover at least the busiest routes, known as the Trans-European Transport Network (TEN-T) core network, representing approximately 50% of the total network. An additional 50% of the remaining network must be covered by 2027.

Secondly, the most significant and transformative aspect, however, is the introduction of the mandatory 'fleet-based' target. This target mandates that each EU member state expand its national public charging infrastructure in direct correlation with the number of electric vehicles (EVs) registered within its jurisdiction. For every battery electric vehicle (BEV), 1.3 kW of charging capacity is required, while each plug-in hybrid electric vehicle (PHEV) accounts for 0.80 kW. Member states are obligated to meet this target annually. If the EV market within the respective member state reaches a significant level of maturity, defined as 15% of the total light-duty vehicle stock being battery electric, member states have the option to cease the application of the target. Subsequently, it is presumed that full minimum coverage will have been achieved, and private entities alone will be responsible for meeting the increasing demand while optimizing the utilization of the existing infrastructure.

3. Target tracker: where are we, where do we need to go?

While the Alternative Fuel Infrastructure Regulation (AFIR) is set to become fully applicable in all EU member states from April 13, 2024, and the first real assessment for the 'fleet-based target' can be conducted by the end of 2024, this briefing provides an insight into how the EU as a whole, as well as individual member states, would fare if the target were already enforced by the end of 2023.

To achieve this, we utilized up-to-date vehicle registration data for light-duty vehicles from the European Alternative Fuels Observatory (EAFO) to quantify the total number of registered BEV and PHEVs per country. Subsequently, we applied the respective AFIR targets to determine the required publicly installed charging capacity each member state would need to provide by the end of 2023.

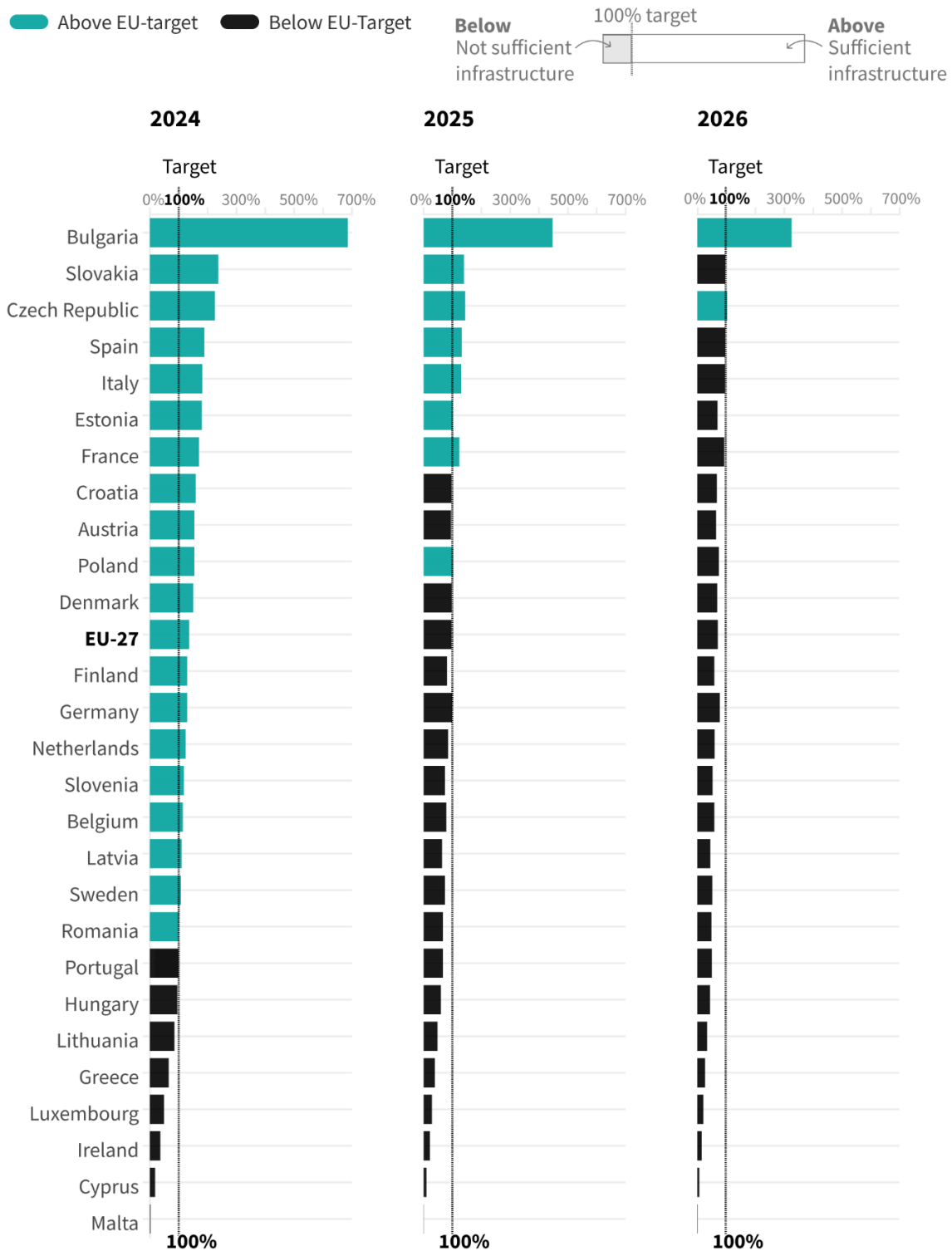
This information was then compared with data compiled from the European Alternative Fuels Infrastructure Observatory (EAFO)⁴, regularly updated by the Commission, and charging data from data provider eco-movement, which revealed the total number of publicly accessible charging points and the total installed publicly accessible charging capacity per country.

The results indicate that by the end of 2023, almost all EU member states would have complied with AFIR, with some exceptions. Malta would only reach 10% of the projected target and Cyprus 19, while Ireland falls slightly short of the envisaged dynamic national target, achieving 82% of the needed power output. The other extreme is Bulgaria that would overachieve its AFIR obligations by more than 12 times in 2023. The reason for that is that Bulgaria has seen a rapid growth in chargers in the past years. While the total number of charging points is still relatively modest, barely exceeding 1,500, the number of DC chargers has grown more than tenfold since 2020. At the same time Bulgaria is after Malta, Cyprus and Estonia the country with the lowest number of BEVs registered and in relation to its population it has by far the lowest EV per capita ratio of all EU countries. Hence, Bulgaria's overperformance is merely a side effect of the fact that approximately only 4,000 vehicles out of its more than 3 million light-duty vehicle stock are BEVs.

⁴ European Commission (2024). European Alternative Fuels Observatory. Retrieved from: <https://alternative-fuels-observatory.ec.europa.eu/>

Most EU countries already meet their 2024 charging target

% of public charging infrastructure deployed in 2023 in relation to projected EU-targets



Source: EAFO (2024), eco-movement (2024). Based on internal EV uptake projections.



Figure 8: Tracking the EU's public charging infrastructure target

We also assessed how many chargers the EU and its member states will need to deploy in the coming years to meet the ‘expected’ AFIR targets in 2024, 2025 and 2026. To estimate that we used an internal model that allows us to project the uptake of electric vehicles in the EU as a whole but also member states individually. Our modeling is based on analysis of EV uptake by BNEF⁵. This gave us the total number of publicly available charging capacity per member state that will be necessary in the coming years and compared it to the existing charging infrastructure.

The overall conclusion is that while the EU is moving in the right direction regarding public charging infrastructure, capacity needs to quadruple in the next six years. Malta, Cyprus, Ireland, Luxembourg, Greece, Lithuania, Hungary and Portugal, would today not meet their 2024 targets. 12 EU member states would in theory fulfill their 2025 targets already today. The currently deployed infrastructure will only be sufficient in two countries by 2026: Bulgaria and the Czech Republic. Bulgaria is the overall exception. Its present charging infrastructure is almost sufficient to meet its projected 2030 AFIR target. The explanation for that is the same as above: our model shows that the EV uptake in Bulgaria will be by far the slowest across the EU and Bulgaria will barely reach more than 50,000 BEV in 2030. As a point of comparison: Denmark, a country slightly smaller in terms of population and total light duty vehicle stock, is projected to have more than 1.5 million BEVs by then.

This analysis also reveals that, except for Bulgaria, charging infrastructure deployment has generally aligned with EV uptake across the EU. Thus, the often-cited East-West and North-South divide in fulfilling AFIR targets is not supported by the data as the targets account for the different EV uptakes.

Furthermore, despite ongoing debates about the relationship between charging infrastructure deployment and EV adoption, with claims of the latter being dependent on the former, the Bulgarian example, among others, shows little correlation between the two.

4. How to implement AFIR?

While AFIR stands out as one of the most ambitious charging infrastructure laws globally, its effectiveness hinges on meticulous implementation. With its broad applicability across 27 European countries, attention to detail is paramount to ensure a comprehensive rollout across Europe.

Forward-looking planning

National deployment strategies should take the anticipated long-term BEV uptake into account and also factor in the demand that will stem from heavy-duty vehicles (HDVs)—as many larger charging hubs might serve both light and heavy-duty vehicles at the same location⁶. It is crucial to anticipate this demand and integrate it into the deployment strategy predominantly to inform European, national, and regional grid planning to avoid grid bottlenecks.

⁵ ‘Hitting the EV inflection point’, T&E, 2021. Retrieved from:

<https://www.transportenvironment.org/discover/hitting-the-ev-inflection-point/>

⁶ Not the same chargers

Close the gaps in the network

The distance-based target, aimed at facilitating seamless travel for all EV drivers within the EU, marks a significant stride. However, member states should expedite its full implementation, avoiding delays until 2030 to achieve a seamless charging network along TEN-T roads: by 2025, every TEN-T road (including the TEN-T comprehensive network) should have a publicly accessible charging hub every 60 kilometers in each direction of travel. This is crucial to assure travelers that driving an EV within the EU from ‘Lisbon to Talin’ is possible without any range or charging anxiety.

Ensure homogeneous rollout

Conversely, the 'fleet-based' target, while fostering concurrent growth of EVs and charging infrastructure, falls short in guaranteeing a balanced, demand-driven rollout nationwide. Member states ought to decentralize their national targets to smaller administrative units, such as NUTS 3 regions. For every registered BEV or PHEV within a specific region or province, minimum charging infrastructure deployment should adhere to the prescribed 1.3 kW (0.80 kW for PHEVs), ensuring ubiquitous infrastructure coverage.

Interoperability and availability

Furthermore, member states should ensure that CPOs in their territory maintain a minimum uptime of at least 98% for the charging infrastructure under AFIR's publicly accessible infrastructure definition—to avoid the frustrating experience that many EV drivers face with chargers that appear on charging applications but aren't operational upon arrival.

It is also crucial that CPOs follow the minimum requirements AFIR sets out in terms of interoperability and user-friendliness, such as price transparency and easy (ad-hoc) payment and route planning.

Limit red tape, make sure financial public support is smart

Member states should strive for simple and fast administrative and permitting procedures, enabling CPOs to install new chargers as quickly as possible. Best practices on how to facilitate this have been compiled by the European Commission's Sustainable Transport Forum (STF)⁷. Member states should strive for the highest possible harmonization of these procedures.

Public funding should be prioritised for the deployment of a minimum basic network coverage and should primarily compensate for market failures, e.g., locations where charging infrastructure is needed to ensure a gapless network, but where the business case is not yet made for private operators to fill these gaps. Member states should always ensure that public funding stimulates competition and counterbalances mono- and oligopolistic tendencies in the charging markets. Once the initial network is established, the further charger deployment should be predominantly left to the market.

⁷ STF (2023). Best practices guide for permitting and grid connection procedures for recharging infrastructure. Retrieved from: <https://op.europa.eu/en/publication-detail/-/publication/96b7e60d-9efe-11ee-b164-01aa75ed71a1/language-en/format-PDF/source-302288246>

Further information

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