EWI EV PREPAREDNESS INDEX 2022

European benchmark of electricity system preparedness to accommodate large-scale EV adoption

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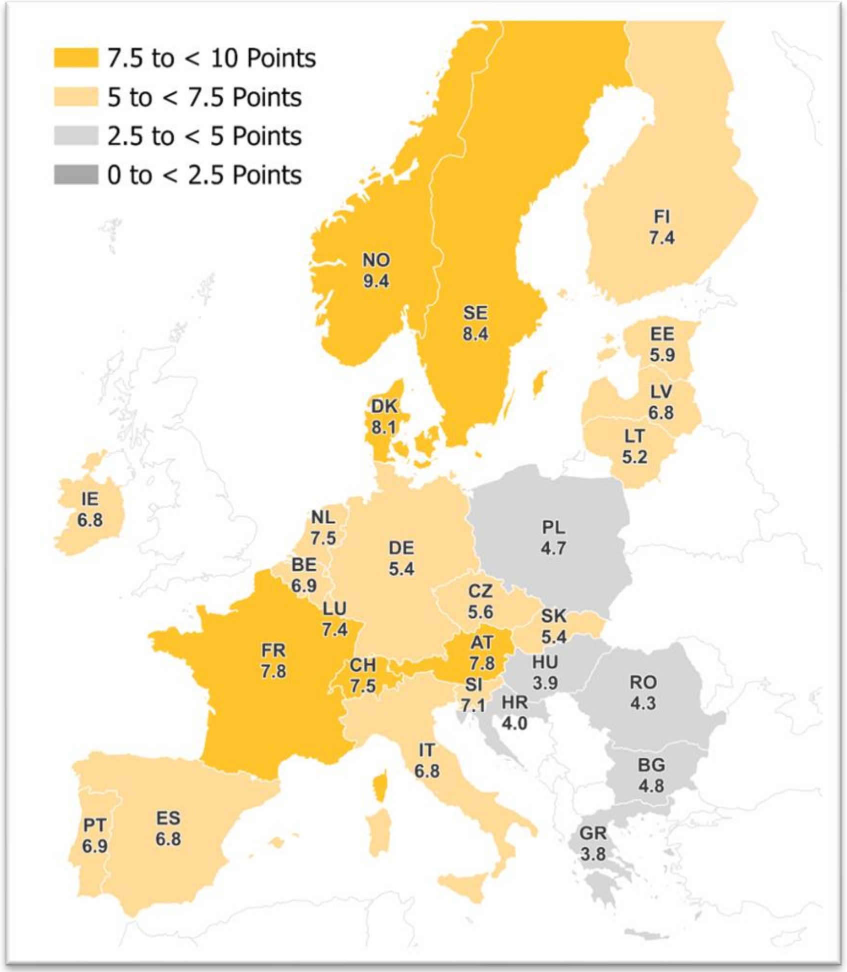
Executive Summary (1/3)
Motivation and Methodology

- Electric vehicle (EV) adoption is accelerating – in the EU, the passenger car electric vehicle (EV) fleet is targeted to reach up to 30 millions by 2030. In line with growing EV penetration and vehicle fleet electrification, investments in charging infrastructure has picked up speed, as well. The electrification of transportation has immediate and significant repercussions for national electricity grids (sector coupling), leading to several challenges. These are: providing sufficient green electricity generation (and storage) to satisfy additional demand from the mobility sector, ensuring reliable electricity distribution under intensifying grid capacity constraints, and aligning increasingly intermittent non-dispatchable supply with dynamic charging needs. We refer to these interrelated challenges as the **EV Charging Coordination Task**.
- EWI has developed an index to systematically assess **energy system preparedness** along three **Challenges (C1, C2 and C3)** of the EV Coordination Task. Specifically, we look at **C1 Electricity Supply**, **C2 Charging & Grid infrastructure** and **C3 Flexible Charging**. In total, **8 specific quantitative indicators** build our **EV Preparedness Index**. The indicators measures on a scale from one to ten how well **27 European energy systems** are prepared for the increasing number of electric vehicles. The reference year is the year **2022**.
- The EWI Preparedness Index is being conducted for the **second time**, with the aim of measuring the continuous development of the electricity system's readiness for the ramp-up of EVs.

Executive Summary (2/3)

Nordic countries ahead, Southeast European countries are lagging behind

Combined EV Preparedness Ranking [2022]



Source: EWI analysis

- **Three Nordic countries are among the top prepared European energy systems for the electrification of transportation (NO, SE, DK)**
  - Leading countries typically have a strong renewable energy sector (with a focus on wind and hydro) including storage, generally a very capable grid and charging infrastructure, a strong focus on flexibility regulation and an advanced rollout of smart meters.
- **Eastern European countries such as Greek, Hungary, Croatia, and Bulgaria form the bottom cohort, implying that these countries are worse prepared for widespread EV adoption**
  - These countries might face problems supplying sufficient green electricity to flexible EVs.
- **The European energy crisis in 2022 led to significant (temporal) effects on EV preparedness parameters**
  - Electricity Supply: CO_2 emissions of electricity production increased due to higher coal power usage in the face of high gas prices and low dispatchability of renewable and nuclear power sources. As a result, the index value for CO_2 intensity of EV driving has decreased in many countries under consideration.
  - Flexible Charging: A higher share of flexible retail price components was driven by high power prices on the wholesale market and temporal regulatory measures. As a result, the index value for Retail price dynamics has increased in many countries under consideration.
  - Still, it is not clear yet which of these effects might impact EV preparedness in the long run.

Executive Summary (3/3)

Best and worst along three Challenges and eight indicators

Rank	Country	Electricity Production	Charging & Grid Infrastructure	Flexible Charging	EV Preparedness Index	Index Changes compared to 2021
1	NO	9.24	9.14	9.95	9.44	▲ 1.15
2	SE	6.44	9.53	9.29	8.42	▲ 0.66
3	DK	6.86	9.67	7.88	8.14	▲ 0.51
4	AT	6.61	9.54	7.39	7.85	▲ 0.99
5	FR	5.55	9.45	8.43	7.81	▲ 0.81
6	CH	7.85	9.37	5.41	7.54	▲ 0.06
7	NL	5.48	9.67	7.22	7.46	▲ 0.23
8	LU	3.44	9.83	9.08	7.45	▲ 2.60
9	FI	4.55	9.19	8.56	7.43	▼ -0.08
10	SI	6.31	6.54	8.41	7.09	▲ 0.40
11	PT	5.69	7.27	7.79	6.92	▲ 1.05
12	BE	5.80	9.73	5.17	6.90	▲ 0.58
13	IE	5.96	6.78	7.80	6.85	▲ 1.27
14	LV	6.04	5.14	9.35	6.84	▲ 0.53
15	IT	5.00	6.21	9.21	6.81	▲ 0.07
16	ES	5.55	5.71	9.09	6.78	▲ 0.46
17	EE	1.77	6.93	8.89	5.86	▲ 0.40
18	CZ	5.09	7.03	4.75	5.62	▲ 0.24
19	SK	5.16	6.94	4.23	5.45	▼ -0.46
20	DE	4.16	8.71	3.21	5.36	▼ -0.17
21	LT	4.05	6.86	4.71	5.21	▲ 0.86
22	PL	4.03	6.16	4.06	4.75	▲ 0.29
23	BG	5.73	3.03	5.68	4.81	▼ -0.10
24	RO	3.79	4.71	4.44	4.31	▼ -0.11
25	HR	2.63	4.45	4.89	3.99	▼ -0.34
26	HU	3.01	4.51	4.30	3.94	▼ -0.43
27	GR	2.90	3.44	5.13	3.83	▲ 0.93

Source: EWI analysis

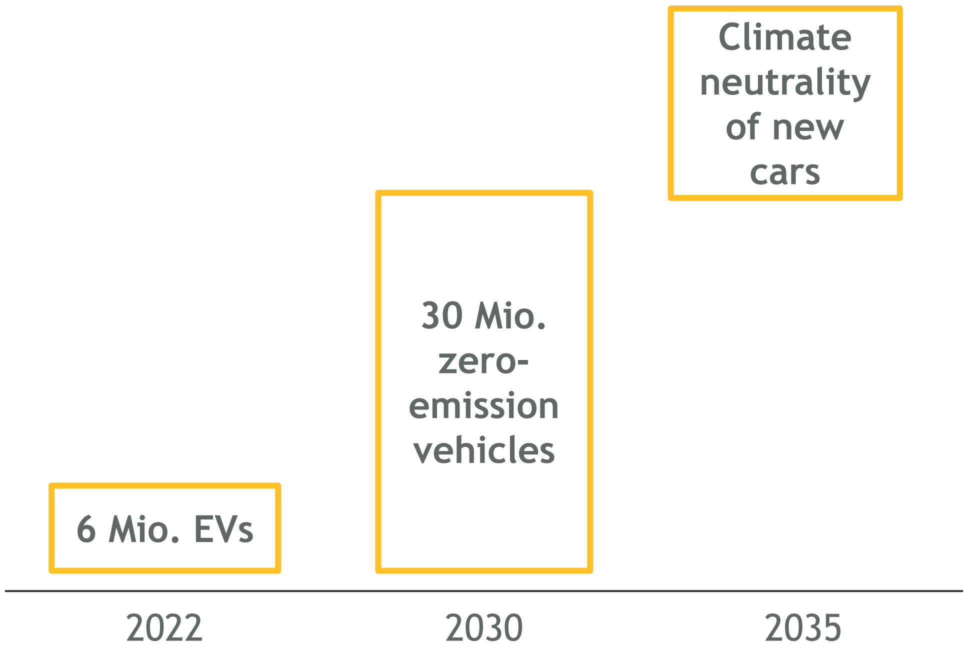
- **Most countries have improved in comparison to last years study**
  - The average EV Preparedness Index was 8% higher than in the previous year (2021: 5,9; 2022: 6,4). Expansion of renewable electricity generation, charging stations and Smart Meters contributed to higher index scores.
- **EU lacks green and firm electricity generation to meet future EV demand**
  - Most countries lack sufficient clean firm capacities to cope with higher electricity demand from EVs.
  - CO_2 emissions of EV electricity have increased in Europe in 2022.
- **All top countries meet their charger expansion targets**
  - Only Norway, Sweden, Denmark, Switzerland, Netherlands and Luxemburg meet AC (public) charger and DC (fast) charger targets, while most countries focus on one technology.
  - Germany is on track to meet its DC charger targets. However, it falls further behind in AC charging. Advancements might come from political initiatives and EV adoption.

1

Motivation

Dynamics of EV Adoption
30 million zero-emission vehicles by 2030 in the EU

EU's ambitious EV targets on a timeline

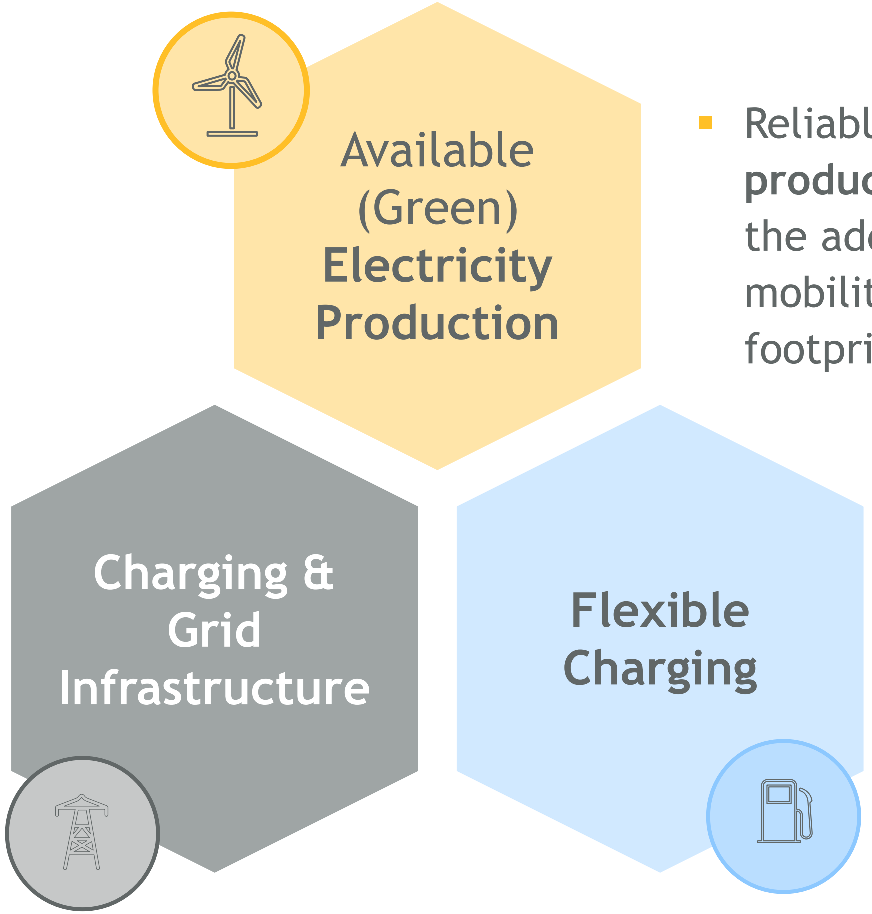


Source: European Parliament (2023), IEA (2023), Statista Market Insights (2023)

- In Europe, **a high dynamic of EV adoption** is expected. High fuel prices in 2022 might have impacted the public opinion on EVs in the long run.
- In comparison to last years edition of the index, EV targets have been intensified as part of the "Fit for 55" program. The EU has set the goal of reaching **30 million zero-emission vehicles by 2030**. To accelerate the transition from Internal Combustion Engines (ICEs) to EVs, the EU member states have also decided to prohibit the sale of new vehicles with combustion engines by 2035. In Denmark, Ireland, Austria, Netherlands and Slovenia new passenger cars have to be zero-emission vehicles by 2030, in Norway even by 2025.
- This wide-scale EV adoption **significantly transforms the transportation** and **the electricity sectors**. The two sectors will become more intertwined with an increasing ramp-up of EVs.
- The rapid transformation of the transportation sector in the future leads to **3 challenges** (EV Coordination Task) in the electricity sector concerning electricity production, grid infrastructure, and system flexibility.

Interrelated challenges of EV Integration
We refer to them as the EV Coordination Task

The EV Coordination Task



- Reliable **green electricity production** can provide the additional load of e-mobility with low carbon footprint.

- A reliable **grid infrastructure** and a nationwide **charging infrastructure** are prerequisites for the ramp-up of e-mobility.

- **Flexible charging** behavior can avoid higher load peaks compared to uncontrolled charging.

2

EWI EV Preparedness Index

EWI EV Preparedness Index:
Eight indicators along the three dimensions

Available (Green) Electricity Production

- **1.1** - CO_2 intensity of EV driving
- **1.2** - Demand increase attributable to EVs
- **1.3** - Firm generation capacities

To what degree does the energy system provide **abundant and clean electricity?**

Charging & Grid Infrastructure

- **2.1** - DC (fast) charger coverage
- **2.2** - AC (standard) charger coverage
- **2.3** - Grid quality

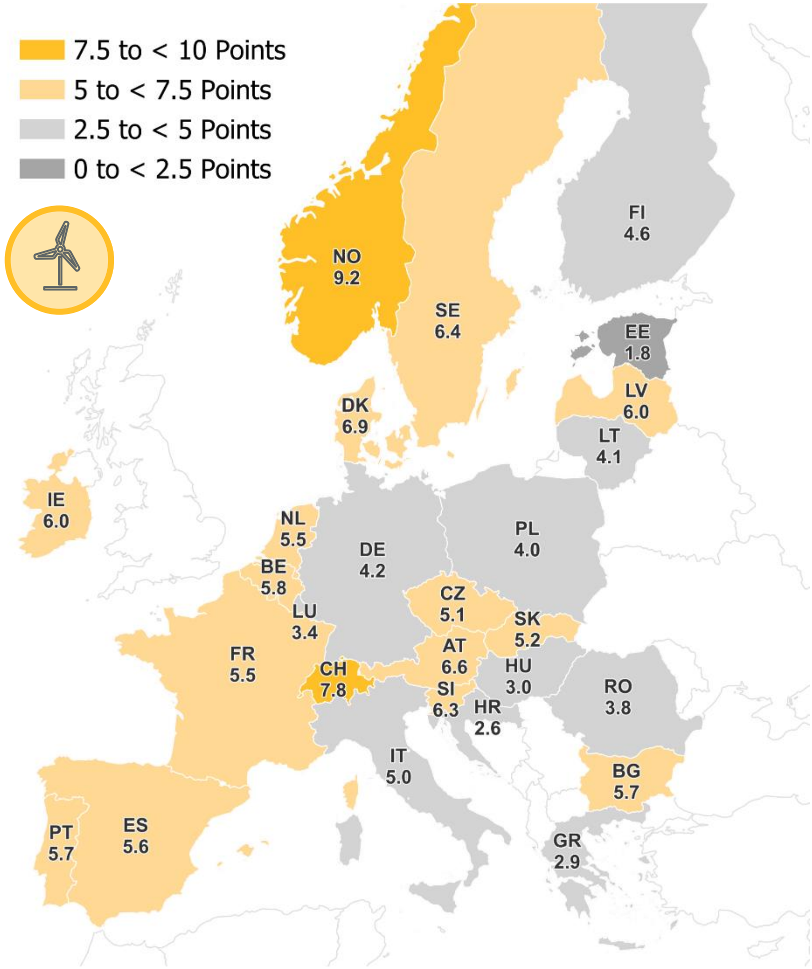
Can the energy system rely on a **capable charging and grid infrastructure** backbone?

Flexible Charging

- **3.1** - Smart Meter coverage
- **3.2** - Retail price dynamics

Are **price signals and technologies** in place that enable and encourage **flexible charging?**

C1 Available (Green) Electricity Production: High variability in terms of generation-based EV Preparedness across countries in scope



- The Index Available (Green) Electricity Production is formed by three equally weighted sub-indices. The value indicates, on a scale from 0 to 10, how well countries are prepared along the dimension of abundant, clean, and affordable electricity production for the ramp-up of EVs.
- Norway has caught up to Switzerland in the ranking compared to the previous year and is now the leading country in generation-driven EV preparedness. This is attributed to its high share of renewable energy in the electricity mix, high electricity demand relative to the population, and a significant portion of guaranteed capacity.
- Besides Norway, Switzerland and Austria are well-equipped to handle the increased demand for EV rollout. Both countries have, like Norway, a hydro-focused electricity system, producing a notably low average CO_2 generation intensity.
- The bottom quartile (HU, HR, GR, EE) performs comparatively poorly due to coal-based energy systems (EE and HU), the undersupply of secured capacity (HR), or the large demand increase from an EV rollout (GR).

Source: EWI analysis

C1 Electricity Supply:
Methodology of CO_2 intensity of EV driving

Available (Green) Electricity Production

1.1 CO_2 intensity of EV driving

Definition

- This indicator measures the emissions of an electric vehicle per 100 km based on the underlying countries' generation mix and assuming a consumption of 19.5 kWh/100km.

Rationale

- True sustainability footprint of EV over the course of its use cycle depends on the CO_2 intensity of the relevant electricity mix.

Boundaries

11.0 [kg CO_2/ 100km] — 0 ... 10 — **0** [kg CO_2/ 100km]

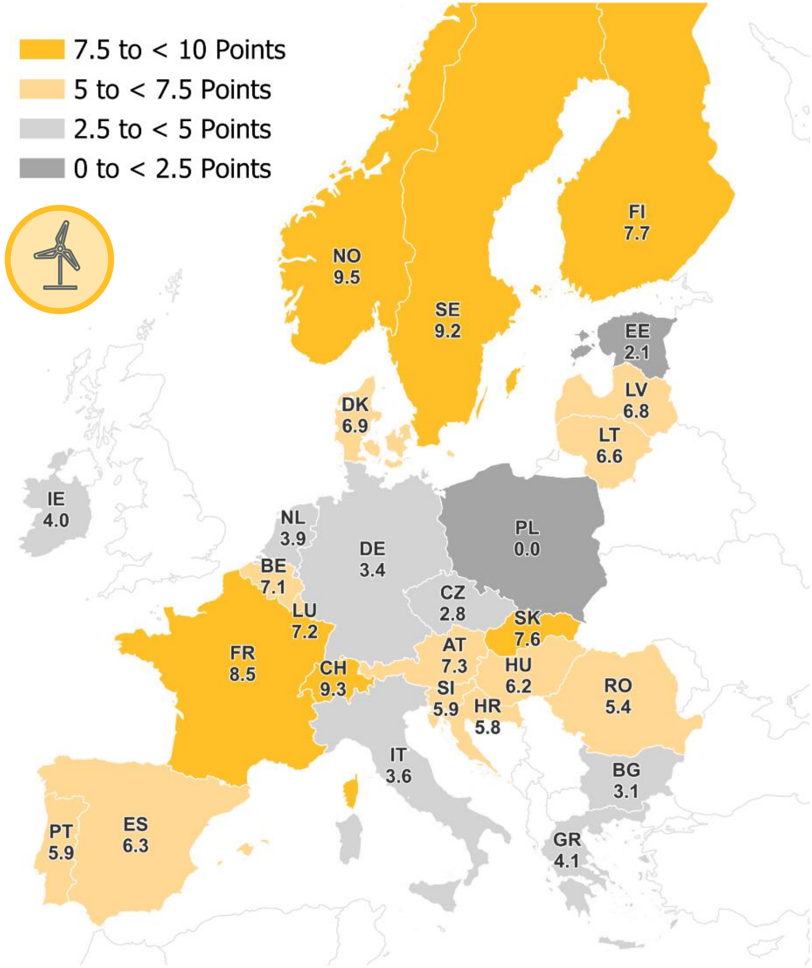
Translation

- 0 points for performance equal or worse than benchmark ICE vehicle (VW Golf 2018), 10 points for full CO_2 neutrality.

Sources: Our World in Data (2023); EV Database (2023)

1.1 Available (Green) Electricity Production:

CO_2 intensity of EV driving



- In Norway, the CO_2 footprint of electromobility is the lowest due to the high share of renewable energy at 98%. Countries with zero-emission nuclear power, such as Switzerland and France, also rank among the best in this category. Energy systems with a significant installed capacity of coal-fired power plants (PL, EE, CZ, and DE) perform worse in the score.
- There has been a slight decrease in the average CO_2 intensity of EV driving from 2021 to 2022, although the energy crisis and nuclear shutdowns in 2022 led to higher use of coal in the generation mix of some countries.
- Noteworthy is the significant reduction in the CO_2 intensity of electric vehicle driving in the Nordics (DK, LV, LT). This can be attributed to the substantial decrease in the share of electricity produced from fossil fuels (2021: 32%, 2022: 23%).
- The significant increase in natural gas prices since the energy crisis has led to the continued use of coal in Germany's energy mix at a consistently high level. For instance, the emission factor of electricity generation in Germany has risen from 364 g/kWh to 385 g/kWh.
- In the future, an overall downward trajectory is expected due to increasing RES capacity and CO_2-certificate prices and political ambitions to phase out coal generation.

Source: Our World in Data (2023); EV Database (2023)

Methodology of demand increase attributable to EVs

Available (Green) Electricity Production

1.2 - Demand increase attributable to EVs

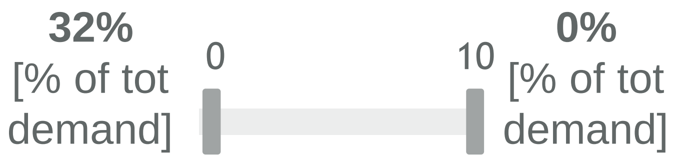
Definition

- This indicator assumes a 100% replacement of the (ICE) passenger vehicle fleet with EVs and calculates the increase in electricity demand resulting from this replacement.

Rationale

- Relatively larger energy systems will likely be able to cope better with increasing demand from the EV sector.

Boundaries

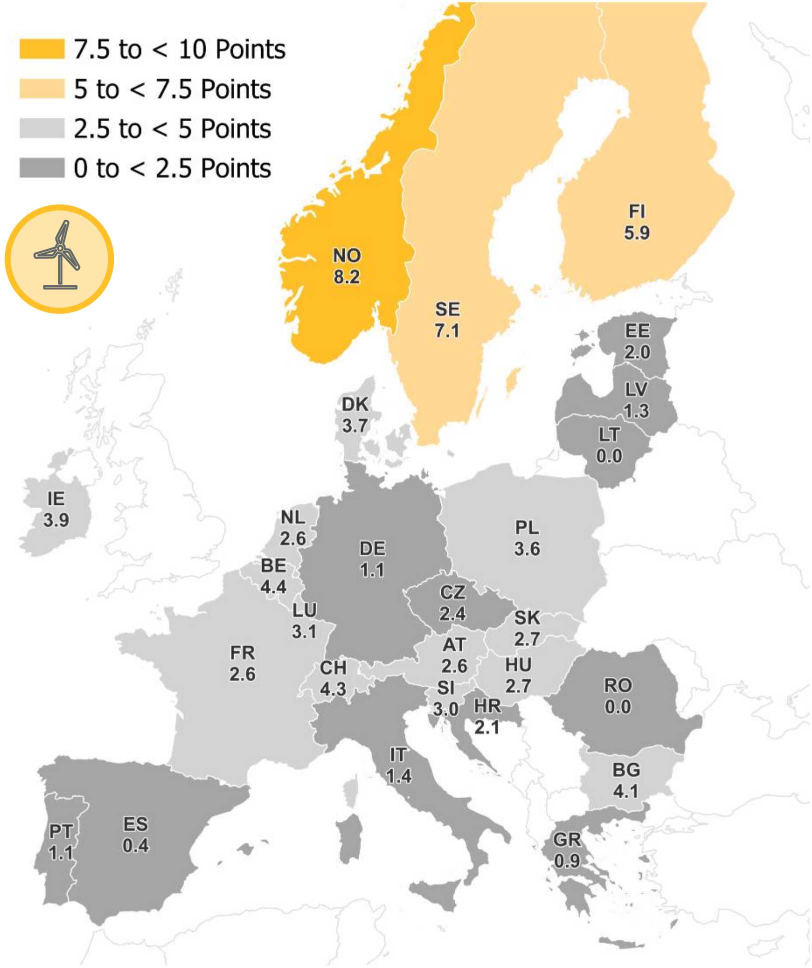


Translation

- 0 point for increase >= 32%, which is approx. the highest value observed in 2021, 10 points for no demand increase at all.

Sources: Entso-e (2023); EUROSTAT (2023a); Odyssee-Mure (2019)

1.2 Available (Green) Electricity Production:
Demand increase attributable to EVs



- Countries with high electricity consumption and a relatively small conventional vehicle fleet are likely to absorb the additional load from replacing ICE vehicles with EVs better than countries with lower electricity consumption.
- The rise in electricity demand attributable to EVs in overall sample countries is higher in 2022 than in 2021. This is due to an increase in the stock of passenger vehicles by approximately 1%.
- The ranking of best-in-class countries has not changed between 2021 and 2022. Leading countries remain Norway, Sweden, and Finland, with an increase in demand of up to 13% due to the electrification of private mobility. This is attributed to an already high specific base consumption (high electricity demand with low population) and/or a low motorisation rate.
- Apart from the three best-in-class countries, the other countries perform relatively poorly in the sub-index. In more than half of the sample countries, the electricity demand would increase by over 20% due to the complete replacement of ICE vehicles with EVs. These countries have large vehicle fleets (DE, IT, RO and ES) or relatively low specific base energy consumption (PT, LT, LV, EE).

Source: Entso-e (2023); EUROSTAT (2023a); Odyssee-Mure (2019); EWI analysis

C1 Electricity Supply:
Methodology of Firm generation capacities

Available (Green) Electricity Production

1.3 - Firm generation capacities

Definition

- This indicator analyses the share of the guaranteed capacity of a country's generation park compared to its peak demand.

Rationale

- Countries with high amount of secured capacity are well-prepared for possible demand peaks arising from EV-charging.

Boundaries

100% [% of peak load] — 0

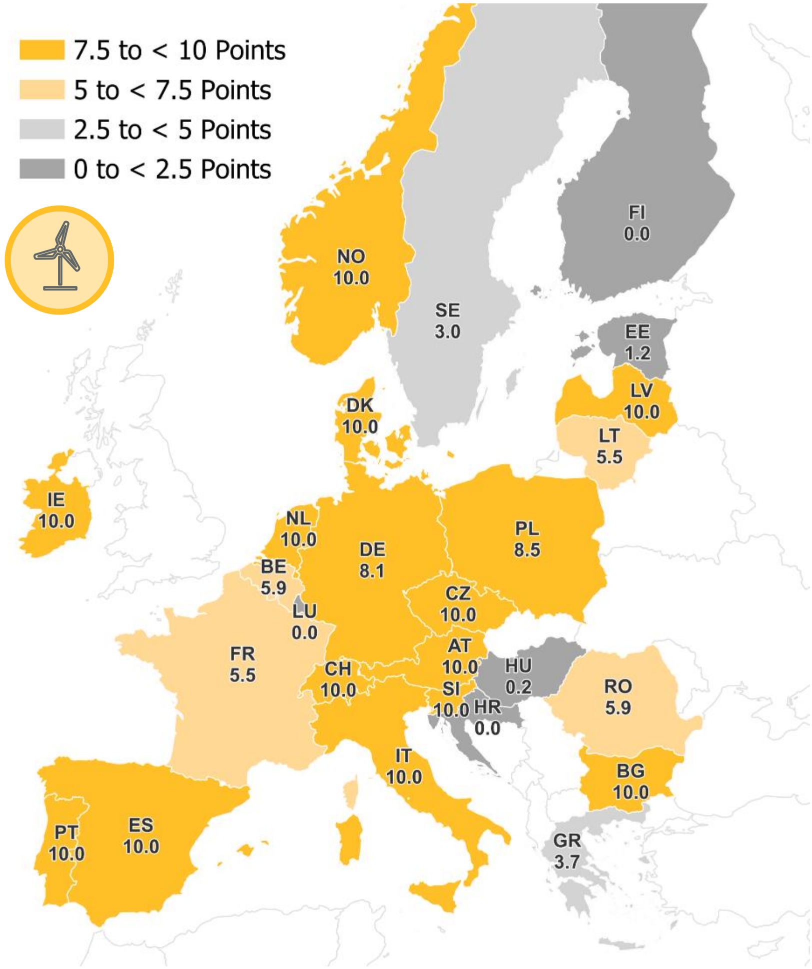
10 — **120%** [% of peak load]

Translation

- 0 point for capacity margin of 100% or less, 10 points for capacity margin of >= 120%.

Sources: Entso-e (2023)

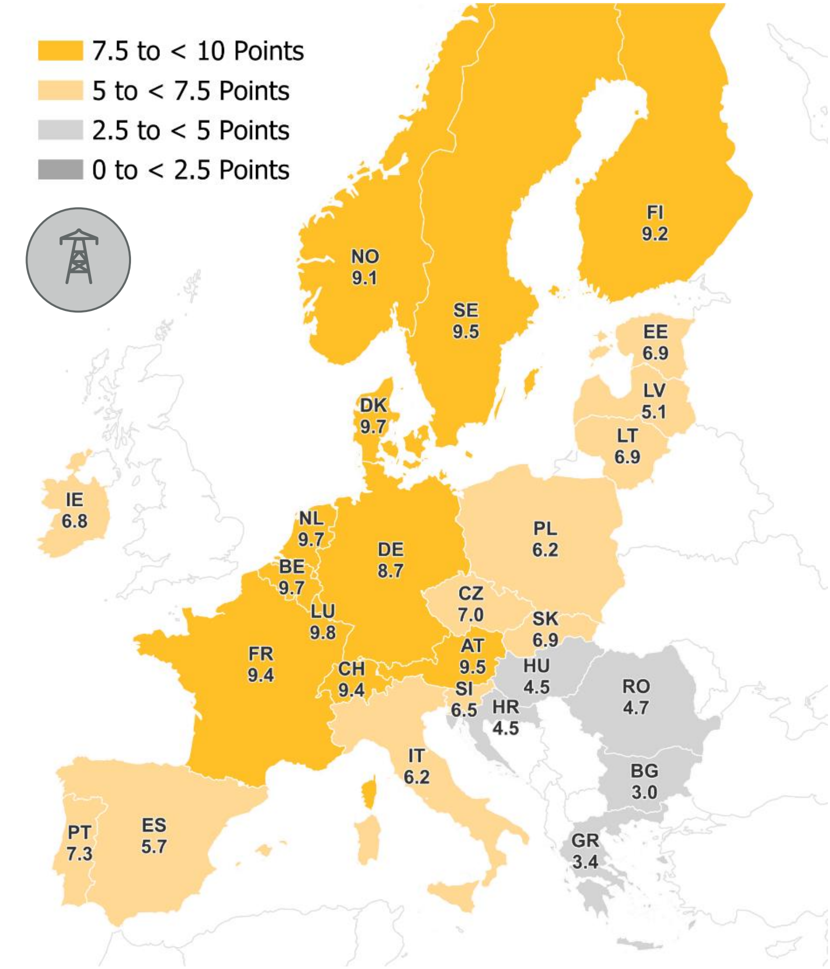
1.3 Available (Green) Electricity Production:
Firm Generation Capacities



Source: Entso-e (2023), EWI analysis, smartEn (2023)

- There are generally large reserve margins of generation capacities in Europe. Spain is the country with the highest margin due to its high installed capacity of gas-fired power plants, its hydro pump storages, and hydro water reservoir power plants.
- Many countries perform well in this category, achieving coverage of peak demand with a secured capacity of up to 120%. However, a few countries are not well-prepared for possible demand peaks from EV charging. In 2022, the secured capacity in Finland, Hungary, and Luxembourg was lower than its peak demand. This leads to high import dependencies in case fluctuating generation and peak demand hours do not correlate.
- Germany has dropped 6 ranks in the category due to the decrease in secured capacity by 11% in 2022 compared to the previous year. With the coal phase-out until 2038 and the already completed nuclear phase-out in 2023, the secured capacity in Germany is expected to continue to decline.
- To tackle a potential shortage of secured capacity during peak-demand hours, many countries (IE, FR, AT, IT) have introduced a peak-shaving product for residential users. For instance, Ireland developed a network tariff with peak pricing for small and large-scale consumers.

C2 Grid and Charging Infrastructure: Nordics and central Europe in control of the most promising charging infrastructure.



Source: EWI analysis

- Progress is evident across European countries as they work toward meeting future DC charging targets, with Norway already achieving its 2050 goal. This surge is instrumental for facilitating international transportation and signifies the commitment to electrified long-distance travel. The success of Nordics infrastructure development might serve as a model for other nations looking to accelerate their transition to electric mobility.
- The Netherlands establishes itself as a frontrunner in AC charging infrastructure, nearing its 2050 targets. Simultaneously, Belgium and Denmark witness significant expansion in their AC charging networks, showcasing the evolving dynamics of electric vehicle charging solutions in these regions.
- Germany demonstrates substantial progress in its charger expansion, reflecting the nation's commitment to advancing its electric vehicle infrastructure. Despite these advancements, Austria, Belgium, Denmark and France have outpaced Germany in terms of charging infrastructure expansion.
- Countries with robust grid infrastructure, such as Switzerland, Finland, and Germany, are strategically positioned to accommodate the anticipated surge in electric vehicle-induced pressures.

2.1 Grid and Charging Infrastructure:
Methodology of DC (fast) charger coverage

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Grid and Charging Infrastructure

2.1 DC (fast) charger coverage

Definition

- Sufficient DC (direct current) chargers per highway kilometer for the e-mobility rollout.

Rationale

- (Fast) highway charging is seen as an important enabler of (long-distance) e-mobility.

Boundaries

0 [% goal fullfillment] — 0

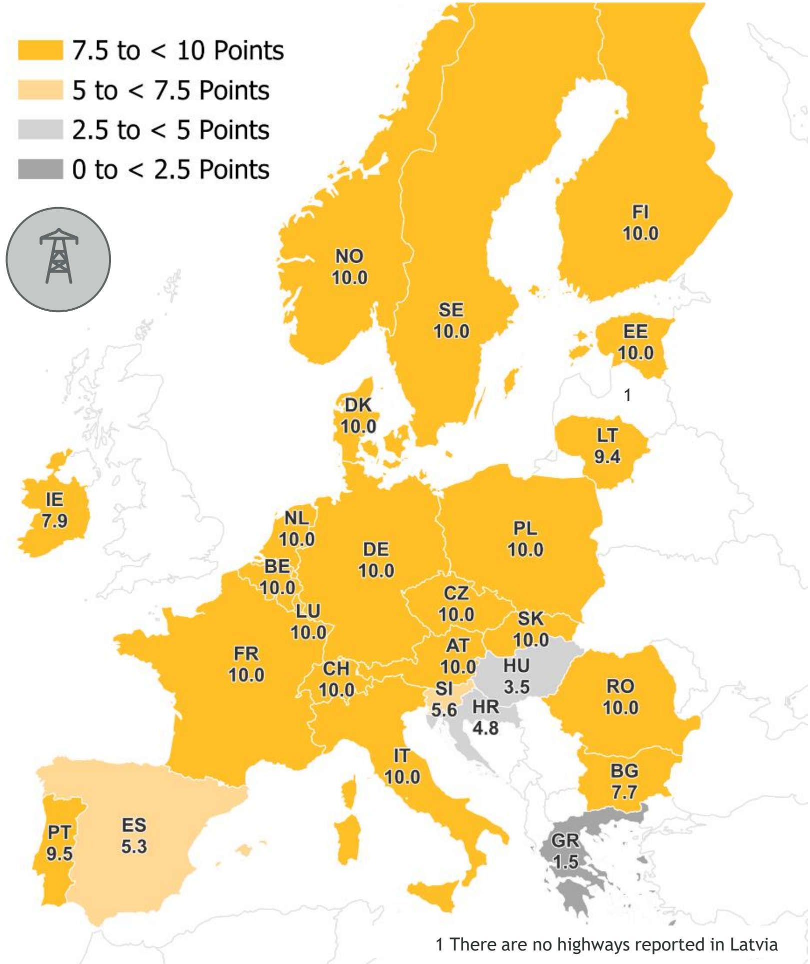
10 — **100** [% goal fullfillment]

Translation

- How consistent is the country's DC charger expansion with the goal of 8 DC chargers per highway kilometer in 2050 (linear investment path assumed)?

Sources: European Commission (2023), EUROSTAT (2023b)

2.1 Grid and Charging Infrastructure:
DC (fast) charger coverage



1 There are no highways reported in Latvia

- DC charging allows for fast charging of vehicles at a rate of typically 50kW and higher, often up to 150 – 300 kW. It is crucial to shorten charging periods and enable electrified long-distance transportation on highways.
- 18/27 European countries are on track to meet their DC charging targets in the future, facilitating international transportation in the future. Assuming constant growth rates, DC charger targets might be achieved before 2050.
- Norway has already achieved its DC charger target for 2050 and remains best in class in terms of DC charger coverage per kilometer of highway. This is due to the country's relatively small highway network as well as the relatively large number of DC charging stations.
- The share of newly registered EVs outweighs ICE cars in Norway, partly explaining the relatively fast DC charging infrastructure growth. Although this growth has slowed recently, the country's DC charging infrastructure is well prepared for the coming ban of emitting new vehicles.
- Germany has improved in comparison to last year's report, as the number of DC fast charger has more than doubled to 13,732. On track with its target, still more than 80% of DC chargers have to be built until 2050. France has overtaken 8 other countries in this category in 2022 while maintaining its extensive highway network.

Source: EWI analysis, European Alternative Fuels Observatory (2023), EUROSTAT (2023b)

2.2 Grid and Charging Infrastructure:
Methodology of AC (standard) charger coverage

Grid and Charging Infrastructure

2.2 AC (standard) charger coverage

Definition

- Sufficient AC (alternating current) chargers per car for the e-mobility rollout

Rationale

- Comprehensive public and destination AC charging station coverage is key to accommodating EV adoption and enable the integration of e-mobility in daily life.

Boundaries

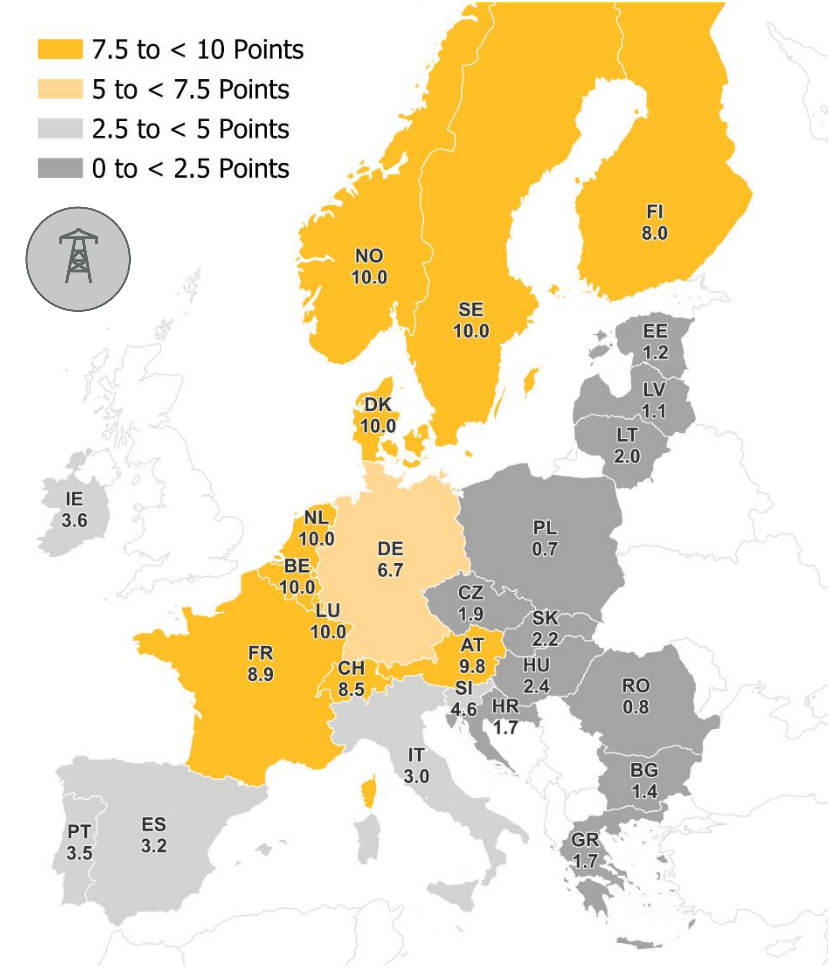
0 [% goal fullfillment] — 0 … 10 — **100** [% goal fullfillment]

Translation

- How consistent is the country's AC charger expansion with the goal of 1 AC charger per 25 EVs in 2050 (linear investment path assumed)?

Sources: European Commission (2023), EUROSTAT (2023a)

2.2 Grid and Charging Infrastructure:
AC (standard) charger coverage



- Public AC charging infrastructure refers to publicly accessible charging opportunities with standard charging capacity. Countries with a more comprehensive AC infrastructure enable EV drivers to charge conveniently without congestion and waiting times.
- Although AC charger expansion in the Netherlands has slowed down, the country remains on top of the list. Here the 2050 target is almost reached by half, there is one AC charger for 60 cars (any fuel). While the number of AC chargers has more than doubled in Belgium, it has even tripled in Denmark, so that both countries are on track to meet their coverage targets earlier than 2050.
- EVs in eastern and southern Europe lack sufficient AC charger infrastructure yet. However, in total terms the number of chargers has more than doubled in these countries, indicating a possible rapid advancement in future.
- France has passed Germany in terms of the total number of AC chargers. Still, the number of AC chargers has grown by 75% in Germany. Due to its vast car stock its score is only mediocre. In 2022, there was an AC charger for 538 vehicles.
- Germany will need almost 2 mio. AC chargers until 2050 to meet its coverage target. So far, only 3% of the planned AC chargers have been installed.

Source: EWI analysis, European Alternative Fuels Observatory (2023), EUROSTAT (2023a)

2.3 Grid and Charging Infrastructure:
Methodology of Grid quality (SAIFI)

Grid and Charging Infrastructure

2.3 Grid quality (SAIFI)

Definition

- A proxy for grid reliability which measures the average number of interruptions (outages) per load point

Rationale

- High quality (distribution) grid infrastructure is required to ensure local supply of EVs and ability to connect new chargers (private and public).

Boundaries

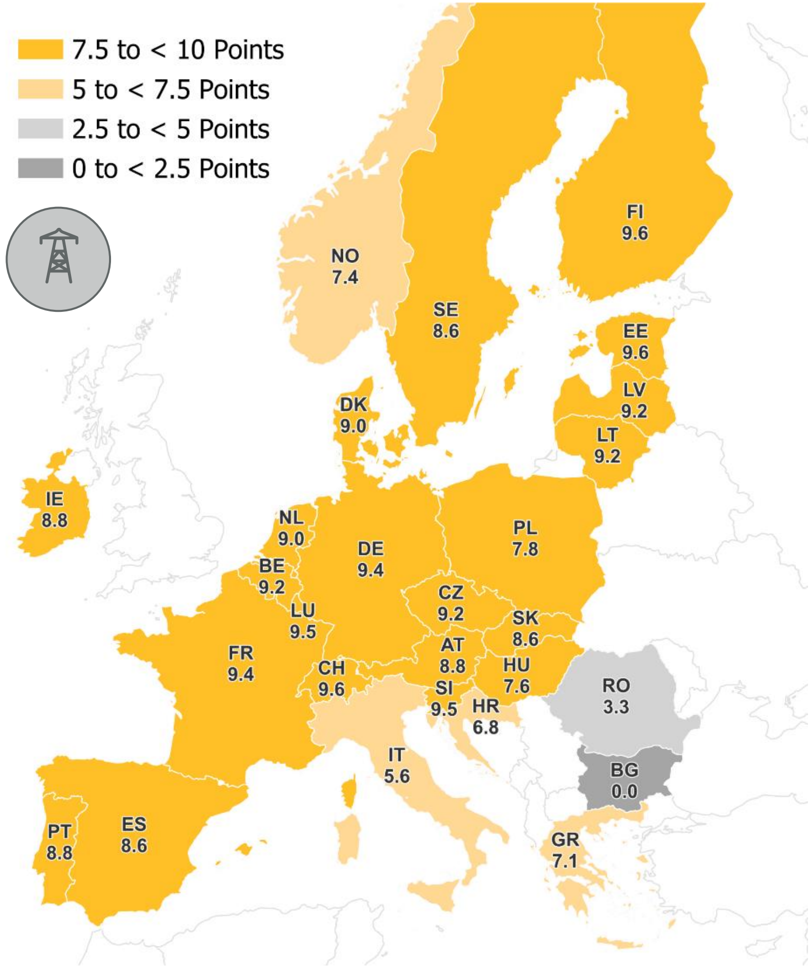
5.01 [most outages in sample] — 0 ——— 10 — **0** [no outages]

Translation

- A SAIFI score of 5.01 (worst in the sample of the previous year) is awarded 0 points, a SAIFI score of 0 (no interruptions at all) is awarded 10 points. Identical data was used in our previous report.

Sources: The World Bank (2020)

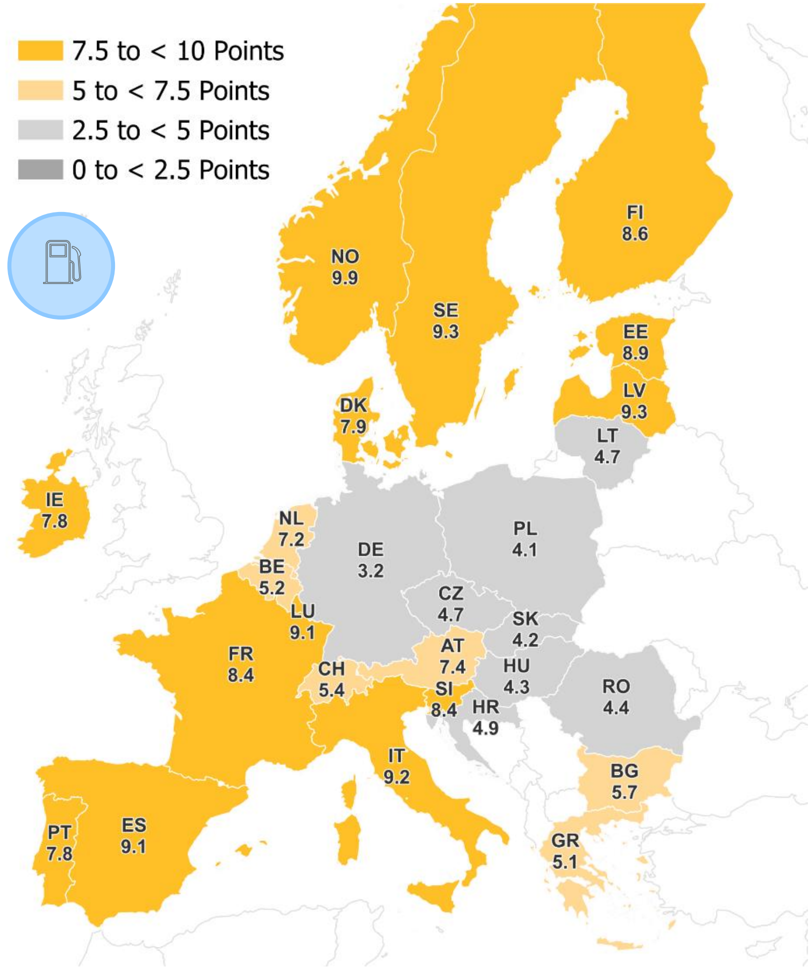
2.3 Grid and Charging Infrastructure:
Grid quality (SAIFI)



- SAIFI (System Average Interruption Frequency Index) quantifies average annual number of interruptions in the power supply per customer. It is a generally accepted utility reliability measure, specifically regarding grid reliability. Additional load from electric vehicles could stress the grid infrastructure and especially the distribution grid.
- Countries that perform well in this indicator show high grid resilience and are therefore more likely to cope with the increasing load originating from electric vehicles.
- SAIFI is largely stable across the sample with a slight downward trend, i.e., toward better grid performance. The applied SAIFI data is from 2020 and does not differ from our previous report.
- In high performing countries (CH, FI and DE) grids are well-provisioned and can likely cope with supply and demand-induced pressures.
- Data is presented for the year 2020, the latest year for which comprehensive data is available. Heavy grid investments in Europe, as undertaken and foreseen, might impact the score significantly in the future.

Source: EWI analysis

C3 Flexible Charging: Smart Meter rollout and lower electricity taxes catalyse EV readiness at least in the short term.



Source: EWI analysis

- Overall, Northern and southern European countries are better prepared to enable system flexibility in the future than most of their central and eastern European counterparts. Well prepared countries have in common that they meet the technological and regulatory requirements to set up effective incentive systems for flexible charging.
- Smart Meter are crucial components to enable higher charging flexibility through time-of-use (TOU) tariffs. This can potentially ease stress on the electricity system by redistributing loads in time and reducing peaks, also reducing the CO_2-footprint.
- Many countries have witnessed a substantial increase in Smart Meter adoption, yet some central and eastern European countries have not rolled out a sufficient metering infrastructure yet. This limits the opportunity to enhance charging flexibility. Future regulatory requirements might induce higher rollout rates in the future.
- Retail price dynamics have significantly changed in face of the European energy crisis in 2022. Higher procurement costs contributed to a significant increase in the flexible share of electricity costs. Simultaneously, regulatory interventions, including price caps and tax cuts, played a role in shrinking the share of fixed components.

3.1 Flexible Charging:
Methodology of Smart Meter coverage

Flexible Charging

3.1 Smart Meter coverage

Definition

- Percentage of households equipped with Smart Meters.

Rationale

- Smart Meters are core to measuring and managing demand flexibility in real time and are required to implement time-of-use (TOU) tariffs.

Boundaries

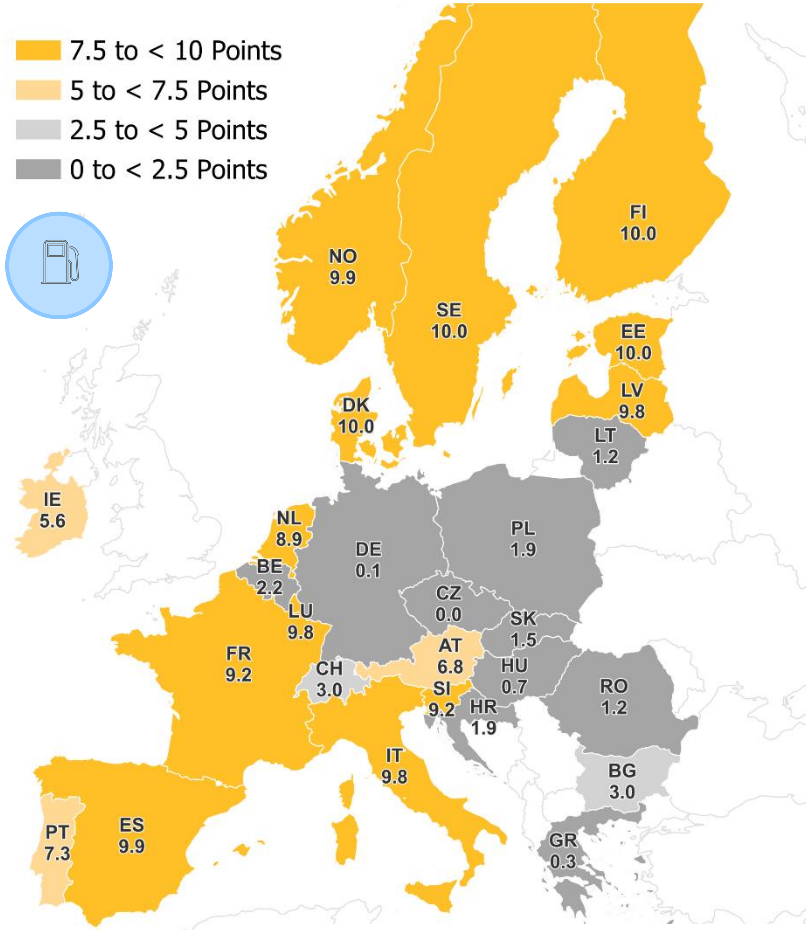
0 [% of HH]	0	10	**100** [% of HH]

Translation

- 10 points for full coverage (achieved by some countries in sample), 0 points for no coverage at all.

Sources: ACER & CEER (2023)

3.1 Flexible Charging:
Smart Meter Coverage



[1]Values for RO, BG and GR from Eurelectric (2020)

- Overall, a significant increase in Smart Meter penetration has been achieved during the last few years in many countries. Smart Meters are considered a technical prerequisite for time-of-use (TOU) tariffs and real-time energy pricing, which incentivize customers to employ flexible charging patterns. Flexible charging would relieve stress from the electricity system because the load could be shifted, and peaks could be reduced.
- In Nordic countries (SE, DK, FI, EE, NO), at least 99 % of households installed Smart Metering systems. In these countries, dynamic electricity prices are common practice. For instance, three-quarters of households in Norway have dynamic electricity contracts.
- The deployment of Smart Meters in Germany is progressing slowly so far. To advance the Smart Meter rollout, Germany aims for a mandatory introduction of Smart Metering systems from 2025 onwards for households with high annual electricity consumption. In addition to the Digitalization Act, energy providers will be required to offer all customers a dynamic electricity tariff starting in 2025.

Source: ACER & CEER (2023), Hofmann & Lindberg (2024), BMWK (2024), EWI analysis

3.2 Flexible Charging:
Methodology of Retail price dynamics

Flexible Charging

3.2 Retail price dynamics

Definition

- Share of electricity wholesale price (i.e., variable portion) in retail electricity price.

Rationale

- TOU tariffs only work if price variability is meaningful. If the variable portion on the final retail price is small, incentives for flexibility are insufficient.

Boundaries

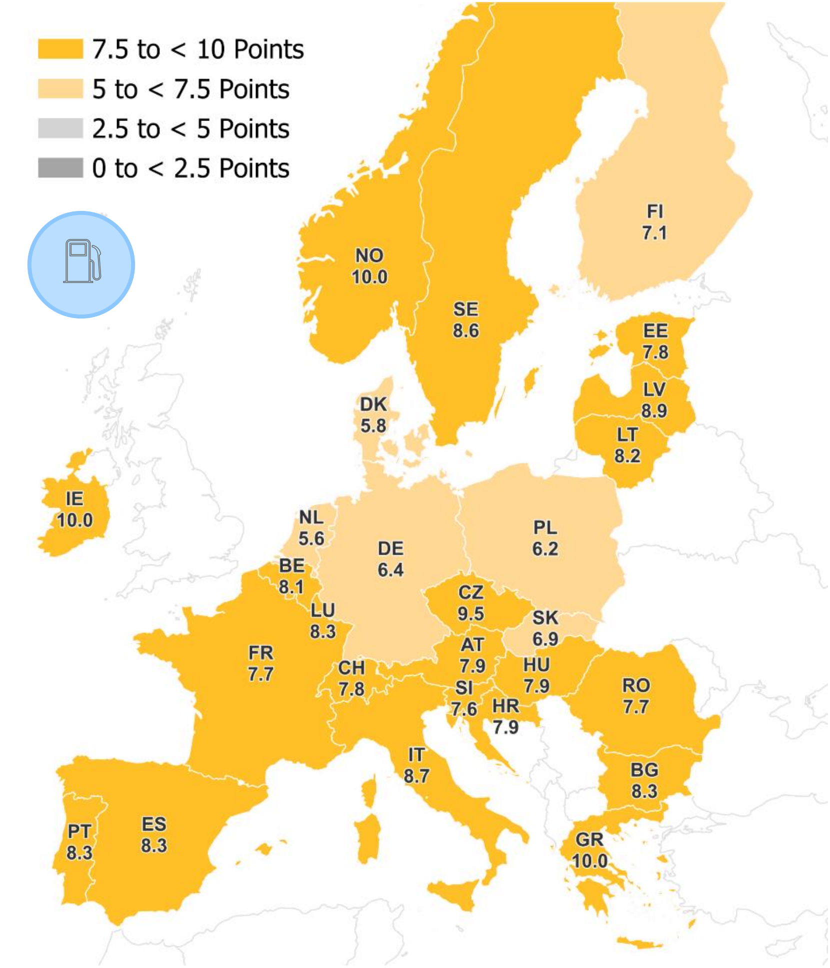
0 [flexible price components in %] — 0 … 10 — **100** [flexible price components in %]

Sources: EUROSTAT (2023c)

Translation

- A higher score reflects a higher share of flexible price components (percentagewise) of retail electricity prices.

3.2 Flexible Charging:
Retail price dynamics



Source: EWI analysis

- The retail price of electricity is subject to a range of taxes, fees, and surcharges that result in largely stable prices, even if time-of-use (TOU) electricity and grid tariffs were introduced. The reason being is that the actual procurement of electricity and grid fees often constitute only a small share of the retail price.
- The flexible share of electricity costs increased significantly in 2022 due to higher procurement costs in response to the energy crisis. On the other hand, heavy regulatory interventions (i.e., price caps and tax cuts) shrank the share of fixed components. Accordingly, the average share of flexible price components increased from 68% to 80%.
- Countries with the highest fixed fees and taxes were Denmark, Germany, Netherlands, and Poland. Here, the variable portion of the final price made up nearly half of the electricity prices. Potential TOU tariffing could create fewer incentives to shift electricity consumption in these countries.
- In Norway, Greece, Ireland, Czechia and Italy flexible components made up most of the electricity price (>89%). This implies that these countries are best prepared to design flexible TOU tariffs in the future. However, it cannot be ruled out that some this reduction is partly driven by (regulatory) crisis effects which might not last in future.

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