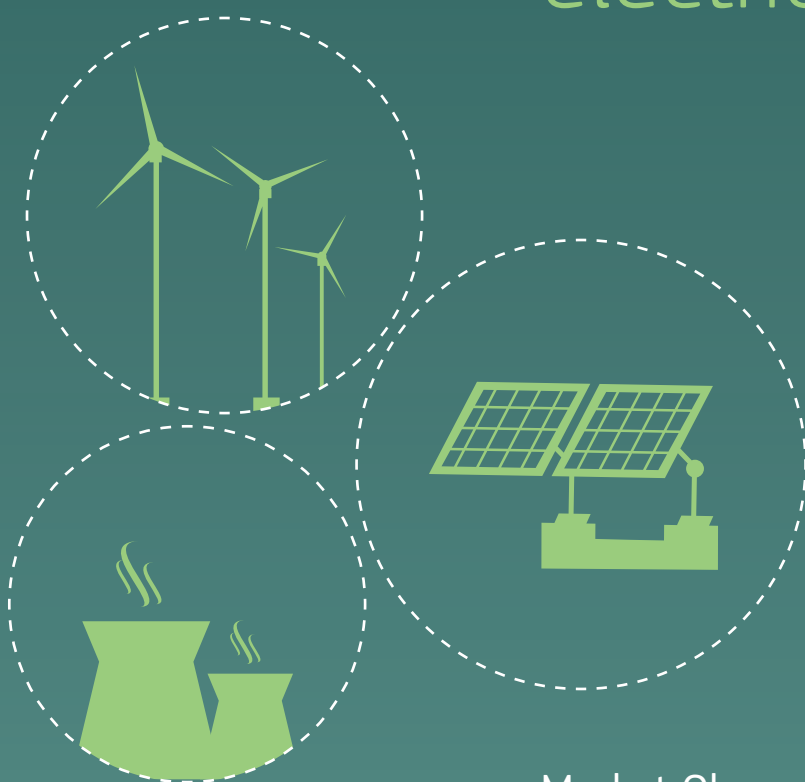


Quarterly report

On European electricity markets



Market Observatory for Energy
DG Energy

Volume 17
(issue 3, covering third quarter of 2024)

DISCLAIMER: This report prepared by the Market Observatory for Energy of the European Commission aims at enhancing public access to information about prices of electricity in the Member States of the European Union. Our goal is to keep this information timely and accurate. If errors are brought to our attention, we will try to correct them. However, the Commission accepts no responsibility or liability whatsoever with regard to the information contained in this publication.

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Directorate-General for Energy, unit A4, Market Observatory for Energy, 2024

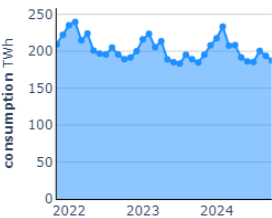
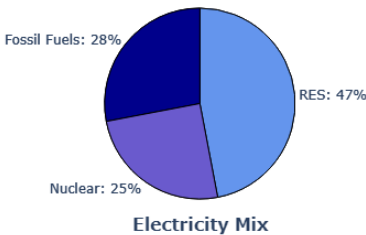
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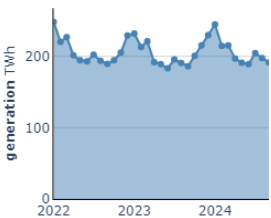
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Key figures of the quarter (Q3 2024)

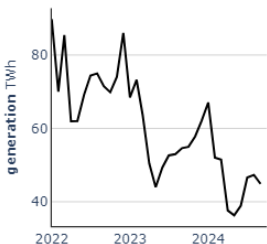
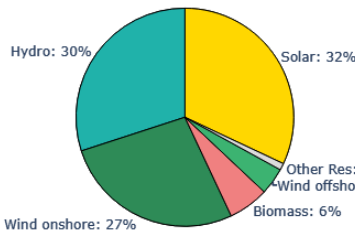
Electricity generation and consumption in Q3 2024 and year-on-year comparison



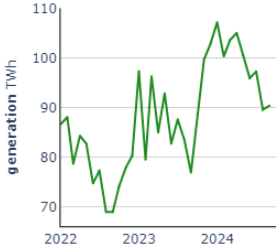
Electricity consumption
581 TWh
▲12 TWh



Electricity generation
593 TWh
▲21 TWh

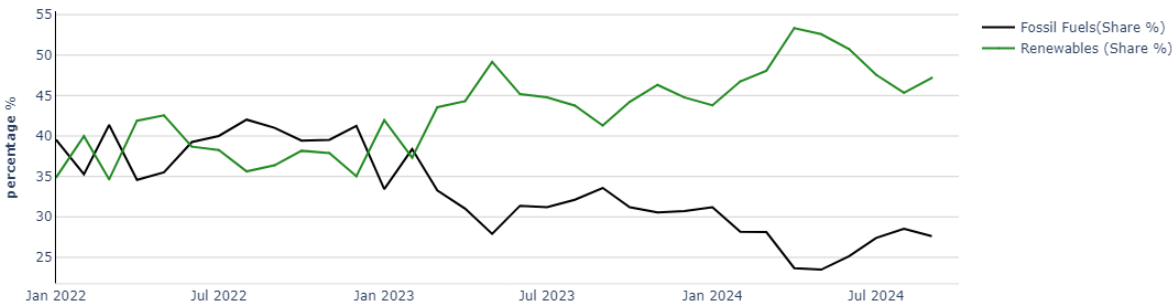


Fossil fuel generation
165 TWh
▼20 TWh



RES generation
277 TWh
▲30 TWh

Electricity Generation of Fossil Fuels vs Renewables: Quarterly Average and Y-o-Y Change



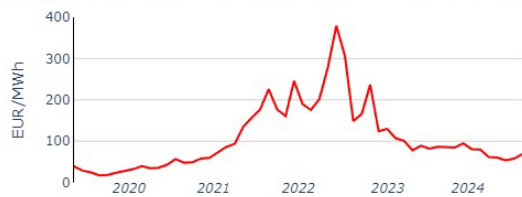
Average Generation Share of Fossil Fuels

28 %
▼4 pp.

Average Generation Share of Renewables

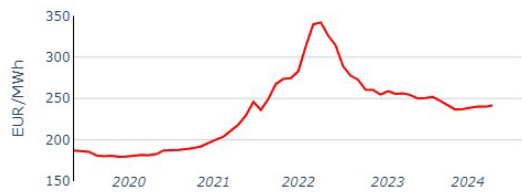
47 %
▲3 pp.

Prices in Q3 2024 and year-on-year comparison



Wholesale prices
78 €/MWh

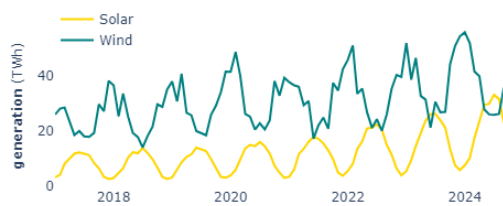
Change y-o-y
-8%
▼ -7 €/MWh



Retail prices
241 €/MWh

Change y-o-y
-6 %
▼ -15 €/MWh

Renewable energy generation and year-on-year comparison



Renewable energy generation: +16 %

Hydro
83 TWh
▲ 9 TWh

Solar
87 TWh
▲ 16 TWh

Wind onshore
76 TWh
▲ 1 TWh

Wind offshore
12 TWh
▲ 2 TWh

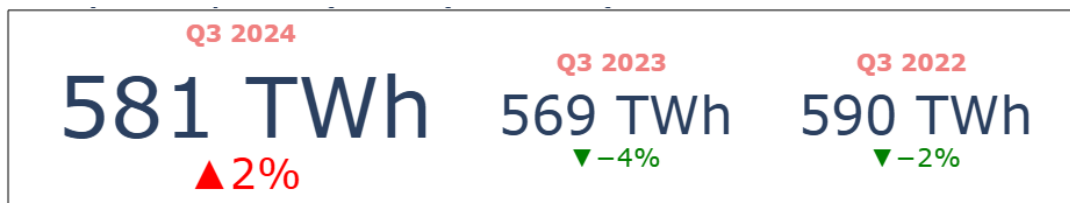
HIGHLIGHTS OF THE REPORT

- **The third quarter of 2024 was marked by a continuation of good market fundamentals that supported a year-on-year decrease in wholesale electricity prices**, driven by increased solar, wind and hydropower generation, higher nuclear generation, combined with lower gas prices and moderate electricity demand.
- **The improvements in market fundamentals supported a fall in wholesale electricity prices in European markets in Q3 2024. The European Power Benchmark averaged 78 €/MWh in Q3 2024.** Prices ranged from a quarterly average of 16 €/MWh in Sweden to 127 €/MWh in Romania and Malta. In Q3 2024, the largest year-on-year price decreases among Member States were registered in Sweden (-43%), France (-40%) and Finland (-35%). The largest increases were recorded in Romania (26%) and Bulgaria (23%) and Hungary (21%).
- **Electricity consumption in Q3 2024 in the EU rose only slightly (+2%) compared with last year's levels in Q3 2023**, still 1% lower than two years ago (Q3 2022). Consumption has not fully recovered yet, compared with pre-crisis levels, as demand has been growing at a moderate pace after the impact of the energy crisis.
- **The share of renewables increased to 47% in Q3 2024** (from 43% in Q3 2023), while **the share of fossil fuels fell to 28%** (from 32% in Q3 2023).
- **Solar generation hit a record high, reaching 87 TWh in Q3 2024. Solar and wind yearly generation increased by 11% in Q3 2024 (+18 TWh).** Solar generation rose by 23% (+16 TWh) and offshore wind generation increased by 21% (+2 TWh). Hydropower plants improved their output by 13% (+9 TWh) while onshore wind generation rose by 2% (+1 TWh). Additional installed capacity supported higher levels of renewables generation during the reference quarter.
- **Fossil fuel generation hit a historical low at 165 TWh in Q3 2024. Fossil fuel yearly generation dropped by 11% in Q3 2024**, supported by sustained renewables generation and moderate demand. In total, coal-fired generation fell by 13% (-9 TWh), and gas generation dropped by 14% (-13 TWh). Nuclear output rose by 8% (+11 TWh) in Q3 2024.
- **Carbon prices fluctuated around 60-70 €/tCO₂ in Q3 2024, with an average quarterly price of 67 €/tCO₂, 17% lower than the same quarter last year (Q3 2023).** Relatively high carbon prices provided price incentives for coal-to-gas fuel switching during most of Q3 2024. Rising gas prices offset the high carbon prices towards the end of the quarter.
- **Retail electricity prices for households in EU capital cities were down by 6% in Q3 2024 (241 €/MWh)**, compared with the same quarter of last year (Q3 2023). The retail price remained roughly the same compared to the previous quarter (Q2 2024).
- **More than 493 thousand new electric vehicles (EVs) were sold in the EU during Q3 2024**, a yearly decrease of 18% in the context of generally declining car sales to a two-year low. In Q3 2024, EV sales translated into a 20% of market share of new vehicles sold. This decrease in volumes and the share of EVs, does not change the fact that EV shares in Europe is more than two times the market share registered in the United States, yet lower than in China. Sweden, Denmark, Finland, the Netherlands, and Belgium led the way in EV adoption, with market shares of new EVs sold ranging from 42% to 58% during Q3 2024.
- **The number of hours with negative wholesale prices in Q3 2024 (3655) across all bidding zones was 26% higher than in the same quarter last year (Q3 2023).** August saw the largest occurrence of negative prices (1780), mainly distributed across Northern Europe, Central Western Europe and Central Eastern Europe. The increasing occurrence of negative prices signal the need for flexibility, increased interconnectivity, and incentives for demand-side response and storage solutions.

Methodological Note: The rapid changes in gas and electricity markets happening through the energy transition as well as the significant restructuring of the EU's energy supply following the energy crisis, call for reviewing the Quarterly Reports of the European Electricity and Gas Markets so as to make them best fit for purpose. The aim is to ensure a more timely publication, modernise presentation, increase data transparency and an easier access to the data used to produce the reports. All this should increase usability for readers. The process of the review is planned to be carried out gradually attending the feedback we receive on it. As the Commission advances with its review, the quarterly reports will progressively reflect the methodological, technical, and editing changes as well as the comments received from stakeholders.

Electricity market fundamentals

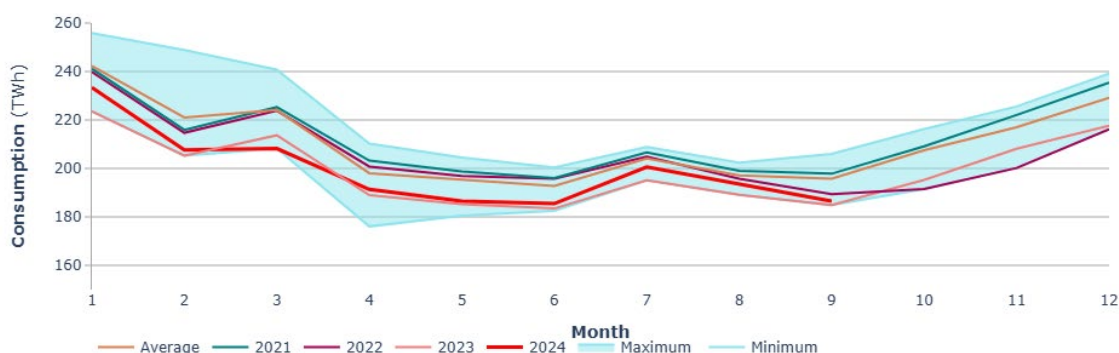
1.1 Demand side factors



Electricity consumption in Q3 2024, Q3 2023 and Q3 2022

- In Q3 2024, the total electricity consumption in the EU rose slightly by 2% compared with last year's levels, still 1% lower than in Q3 2022. Consumption has not fully recovered yet, compared with pre-crisis levels, as demand is recovering at a moderate pace after the impact of the energy crisis. Q3 2024 consumption values are within the range of the minimum to average levels registered between 2019 and 2023.

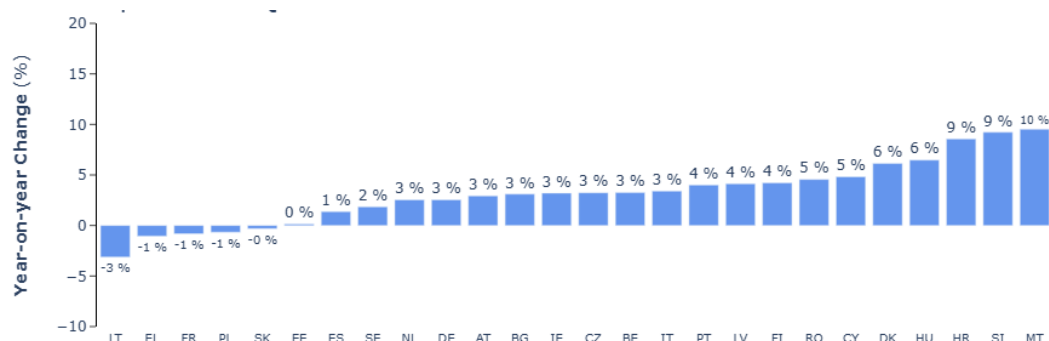
Figure 1 – Monthly EU consumption of electricity



Source: Eurostat

- Figure 2** sums up changes in electricity consumption in Q3 2024, compared to Q3 2023. EU electricity consumption rose during the reference quarter, in twenty Member States. The biggest increases were registered in Malta (+10%), followed by Slovenia and Croatia (+9%). The largest decrease was reported in Lithuania (-3%), while Greece, France and Poland reported smaller reductions (-1%).

Figure 2 – Yearly changes in electricity consumption by Member State in Q3 2024 compared with Q3 2023

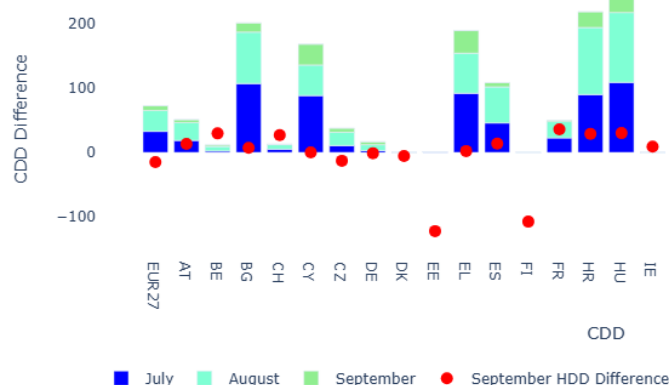


Source: Eurostat

- Figure 3** illustrates the monthly deviation of actual Cooling Degree Days (CDDs) from the long-term average (a period between 1979 and the last calendar year completed) in Q3 2024. EU-wide, the reference quarter was warmer than the historical range. Both July and August were particularly warmer than the historical average. During Q3

2024, Hungary, Croatia, Bulgaria, and Greece each reported around 200 CDDs. Overall, Q3 2024 registered 72 CDDs above the long-term average of the EU. Most of the European countries registered warmer-than-average temperatures. In September, Heating Degree Days (HDDs) were mostly in the negative area (i.e. warmer-than-average temperatures) especially in the Baltic countries and Finland.

Figure 3 - Deviation of actual heating degree days from the long-term average in July-September 2024



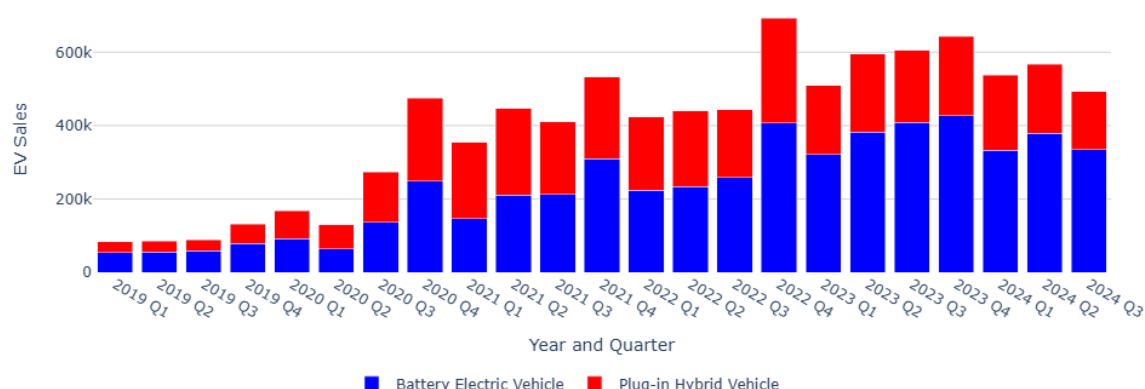
Source: JRC. The colder the weather, the higher the number of HDDs. The hotter the weather, the higher the number of CDDs

- **Figure 4** shows that more than 493,000 new EVs were registered in the EU in Q3 2024 (-18% compared with Q3 2023 and in the context of generally decreasing car sales to a two-year low). This figure represents a 20% market share of EV sales; lower than in China (52%), but more than double that of the United States (9%). The battery electric vehicles segment declined (-18% year-on-year to 335,000), while the demand for plug-in hybrid vehicles contracted (-16% year-on-year to 158,000). Hybrid electric vehicles (not chargeable) sales amounted to 740,000, registering an increase of 15% compared with Q3 2023.



EVs sold in Q3 2024, Q3 2023 and Q3 2022

Figure 4 – Quarterly EV sales in the EU

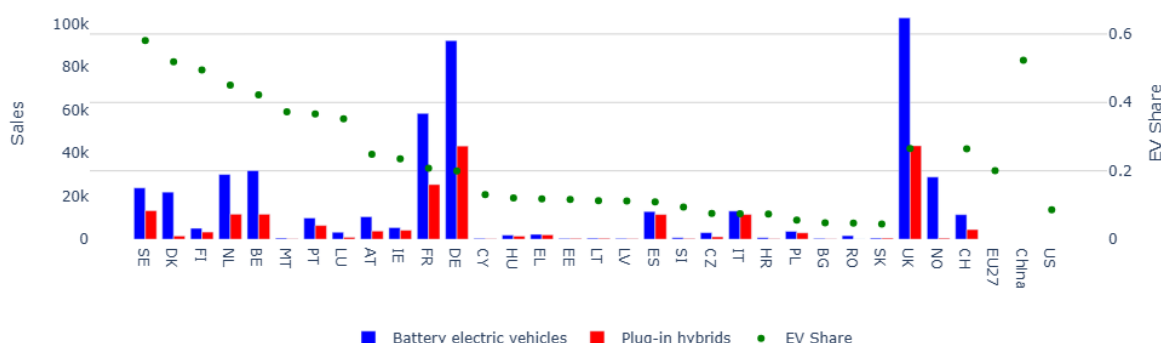


Source: ACEA

- The largest share of sales of new EVs was observed for another quarter in Sweden, where 58% of all cars sold in Q3 2024 were EVs. Furthermore, in Denmark, 52% of all passenger cars sold could be plugged, followed by Finland (50%), the Netherlands (45%) and Belgium (42%). Germany retained the position of the largest individual market

(more than 135,000 EV sales in Q3 2024) followed closely by France, where sales amounted close to 84,000 new EVs in the reference quarter.

Figure 5 – Electrically chargeable passenger vehicle (EV) sales in selected countries in Q3 2024

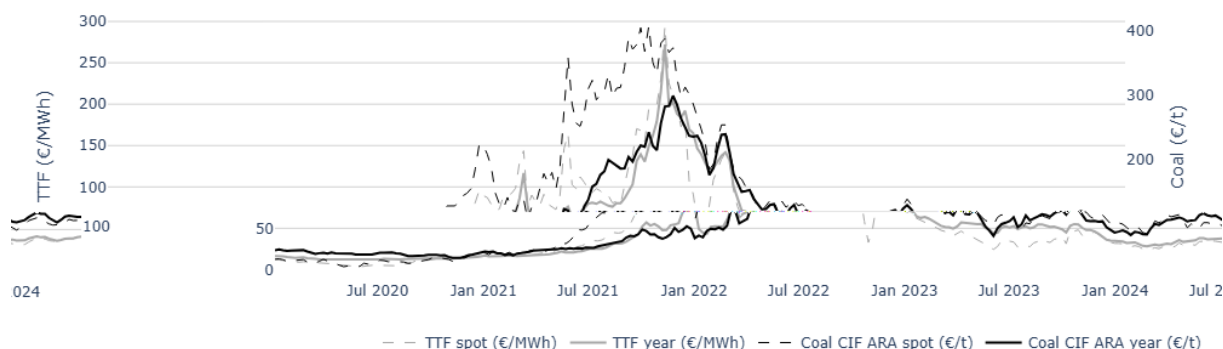


Source: ACEA, CPCA, BloombergNEF

1.2 Supply side factors

- Figure 6** reports on developments in European coal and gas prices. In Q3 2024, prices saw small increases, although they remained at lower levels than in 2022, and at roughly similar levels as in 2023, supported by improved market fundamentals (i.e. high storage levels, reduced structural demand and additional LNG regasification capacities in Europe). Spot gas prices averaged 35 €/MWh in Q3 2024, only 2% higher than prices in Q3 2023. TTF day-ahead prices remained at a discount to TTF forward contracts (month and year ahead) during most of Q3 2024. Year-ahead prices averaged 39 €/MWh in Q3 2024, 13% lower than in Q3 2023. Thermal coal spot prices, represented by the CIF ARA contract, fell to 103 €/t in Q3 2024 (from 108 €/t recorded in Q3 2023). Coal prices were in a marked downward trend since end-October 2023 until end of February 2024. Coal prices remained roughly stable around 100-110 €/t from May to September but have been increasing again since September 2024.

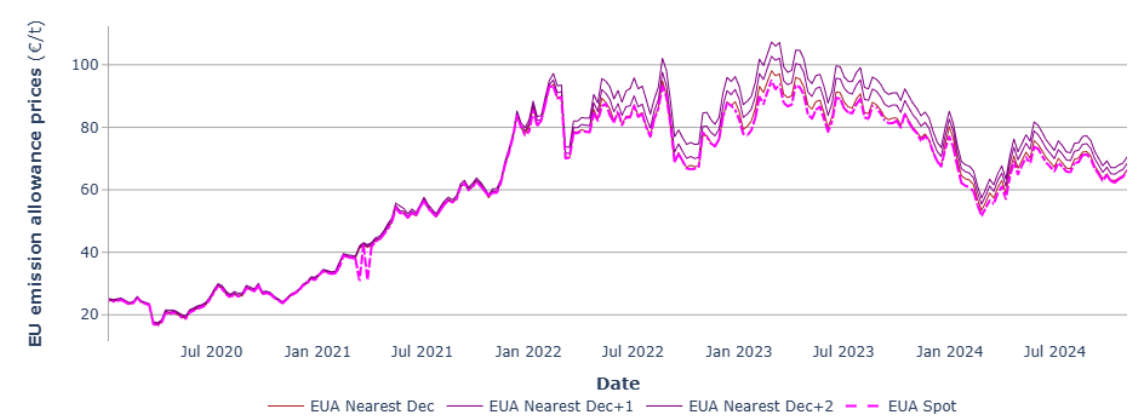
Figure 6 – Weekly evolution of spot and year-ahead coal and gas prices



Source: S&P Global Platts

- The European market for emission allowances, shown in **Figure 7**, fluctuated around 60-70 €/tCO₂, for most part of Q3 2024. This developments in prices followed a price increase from late February to late May 2024. The average spot price of CO₂ in Q3 2024 (67 €/tCO₂) was 17% lower than in Q3 2024. Prior to this, emission allowance prices were falling since summer 2023, reaching a low around 50 €/tCO₂ by the end of February 2024.

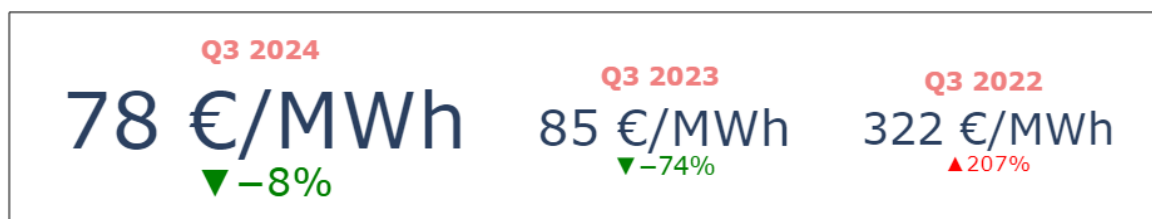
Figure 7 – Evolution of EU emission allowance spot and future prices from 2020



Source: S&P Global Platts

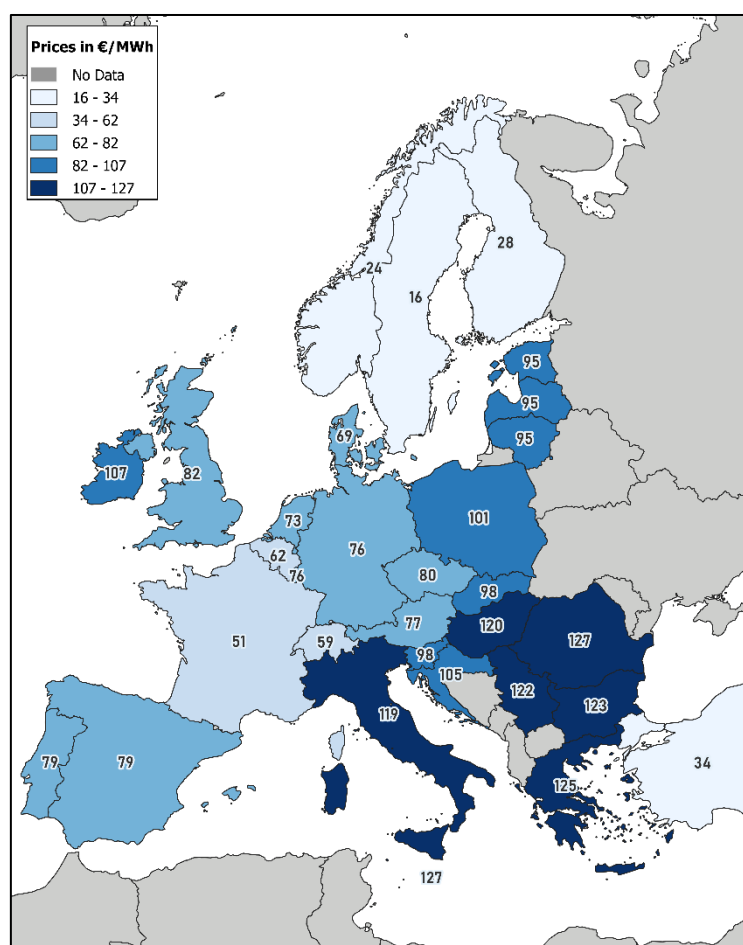
European wholesale markets

1.3 European wholesale electricity markets and their international comparison



- The European Power Benchmark averaged 78 €/MWh in Q3 2024, 8% lower on a yearly basis. Prices ranged from a quarterly average of 16 €/MWh in Sweden to 127 €/MWh in Romania and Malta. On a yearly basis, prices in EU markets ranged from -43% to +26%. The largest year-on-year price decreases among Member States were registered in Sweden (-43%), France (-40%) and Finland (-35%). The largest increases were recorded in Romania (26%) and Bulgaria (23%) and Hungary (21%).
- The map below (**Figure 8**) shows the average day-ahead wholesale electricity prices in Europe in Q3 2024. Average day-ahead wholesale electricity prices in the EU were -5% lower than in Q3 2023. Increased solar, wind and hydro-power energy generation, a recovery in nuclear generation have contributed to the fall in prices. The higher level of renewable energy generation (in particular, solar and wind) is supported by increased installed capacity.

Figure 8 – Comparison of average wholesale baseload electricity prices, Q3 2024

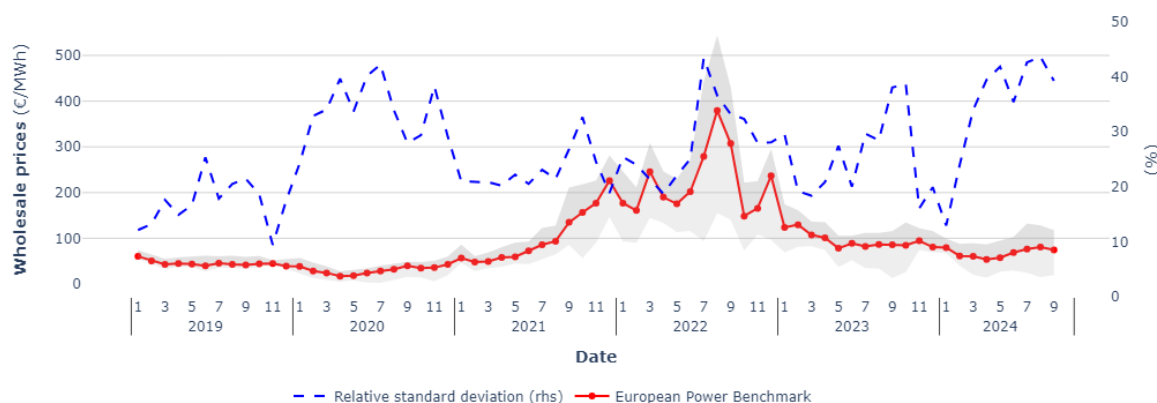


Source: European wholesale power exchanges, government agencies and intermediaries

- Figure 9** shows the lowest and highest regional prices in Europe represented by the two boundary lines of the shaded area, the weighted EU average of these regional markets (European Power Benchmark), as well as the relative standard deviation of regional prices. The relative standard deviation metric shows a high level in Q3 2024

as prices diverged in certain regions across Europe. The **Annex** provides graphics of the monthly and daily evolution of regional prices in Europe.

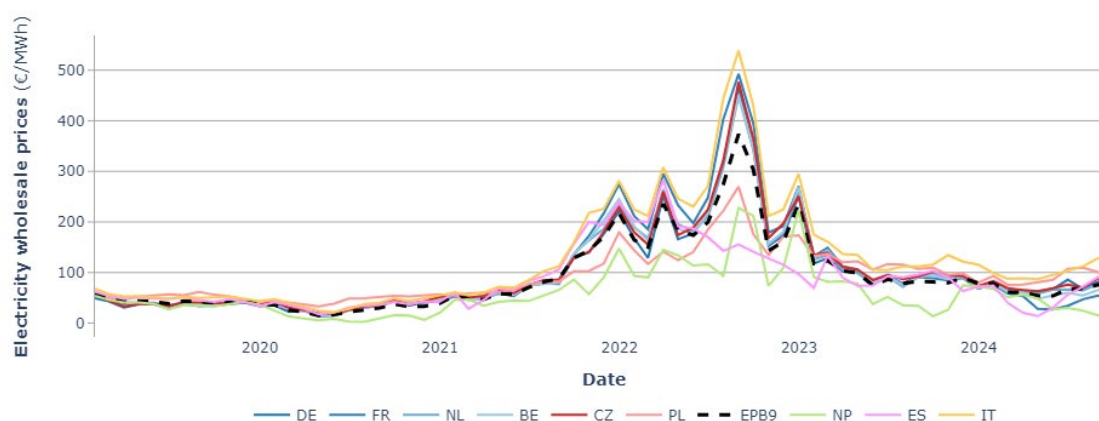
Figure 9 - The evolution of the lowest and the highest regional wholesale electricity prices in the European day-ahead markets and the relative standard deviation of the regional prices



Source: S&P Global Platts, European power exchanges. The shaded area delineates the spectrum of prices across European regions.

- **Figure 10** presents the evolution of weekly average electricity wholesale prices in nine selected European markets. Overall, prices decreased by -17% on average year-on-year.
- Germany, France and the Netherlands average prices in Q3 2024 were 76, 51 and 73 €/MWh, respectively from 90, 85 and 87 €/MWh in Q3 2023. The largest decrease year-on-year was registered in France (-40%), partly due to heightened nuclear availability and hydro output. Italy registered an average yearly price in Q3 2024 of 119 €/MWh, the highest of the nine selected markets and the only one which saw an increase in prices (+5% compared to Q3 2023)
- Strong renewable generation supported lower prices in Northern Europe averaging 20 €/MWh in Q3 2024 (-28% compared with Q3 2023, average of 28€/MWh).
- Central Eastern Europe markets followed higher prices than in Central Western Europe, with prices at 101 and 80 €/MWh in average in Q3 2024 in Poland and Czechia, respectively. However, Poland and Czechia also registered yearly price decreases compared to Q3 2023 (-9% and -14% respectively).

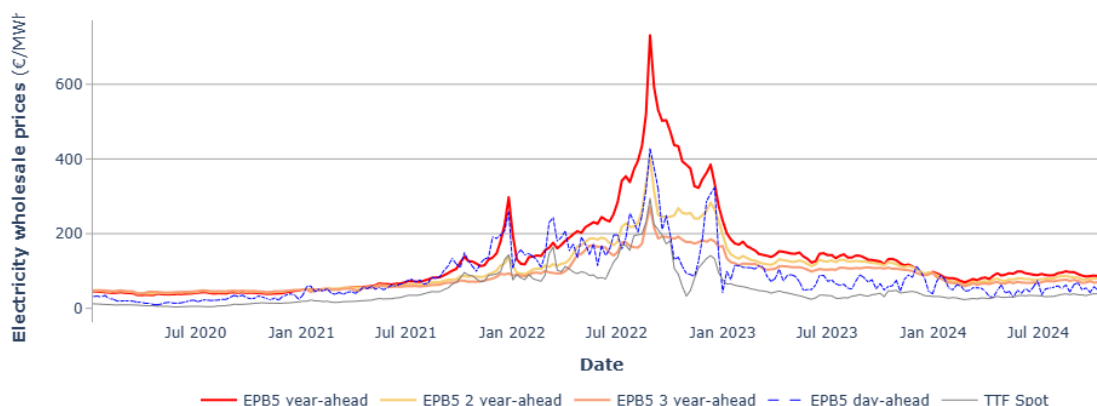
Figure 10 – Weekly average electricity wholesale prices in nine selected European markets



Source: S&P Global Platts, European power exchanges, ENER

- **Figure 11**, shows how gas prices (TTF spot prices) were a relevant factor driving future electricity prices during the energy crisis. In Q3 2024, the average electricity year-ahead, two-year ahead and three-year ahead contracts were respectively 92 €/MWh, 81 €/MWh and 73 €/MWh. The premium of the weekly average between the year-ahead contract and the spot price ranged around 25 €/MWh and 37 €/MWh during Q3 2024.

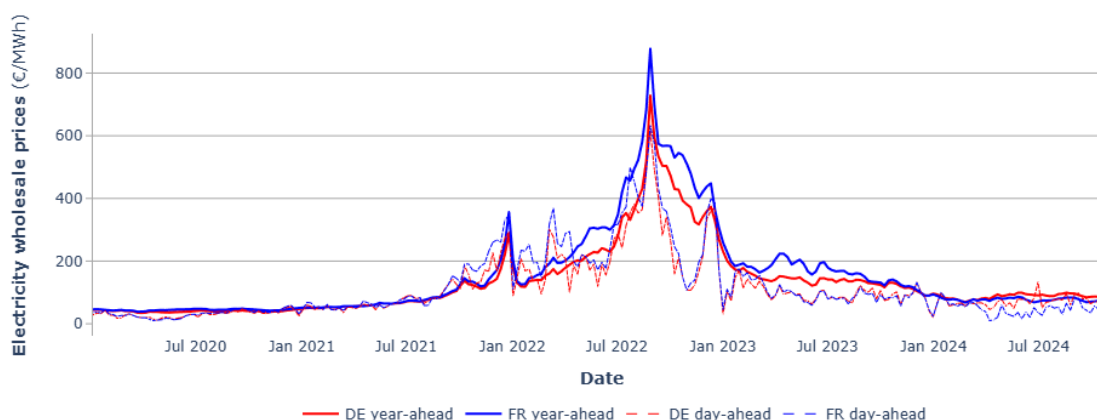
Figure 11 – Weekly futures baseload prices – weighted average of selected European markets



Source: S&P Global Platts.

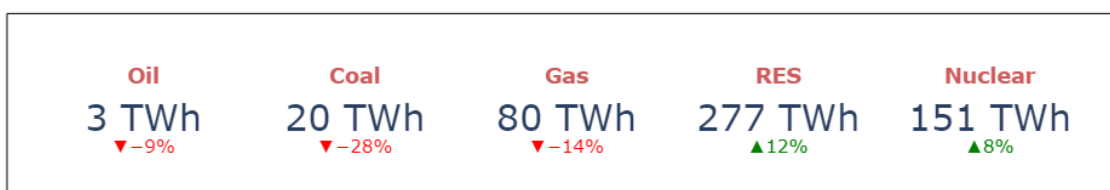
- **Figure 12** shows the evolution of year-ahead contracts of Germany and France, together with their equivalent spot (day-ahead) prices. The divergence between the two forward contracts decreased in Q3 2024 when compared with Q3 2023 and Q3 2022. During the energy crisis, the divergences reflected some structural differences between the two markets (i.e. the high proportion of French nuclear power plants under maintenance in and the relevance of wind generation when it can cover a significant part of the demand at times in Germany). However, in Q3 2024 there was a shift in the trend, with a premium of the German contract over their French equivalent, which ranged around 13-16 €/MWh during Q3 2024.

Figure 12 – Weekly German and French year-ahead contracts



Source: S&P Global Platts.

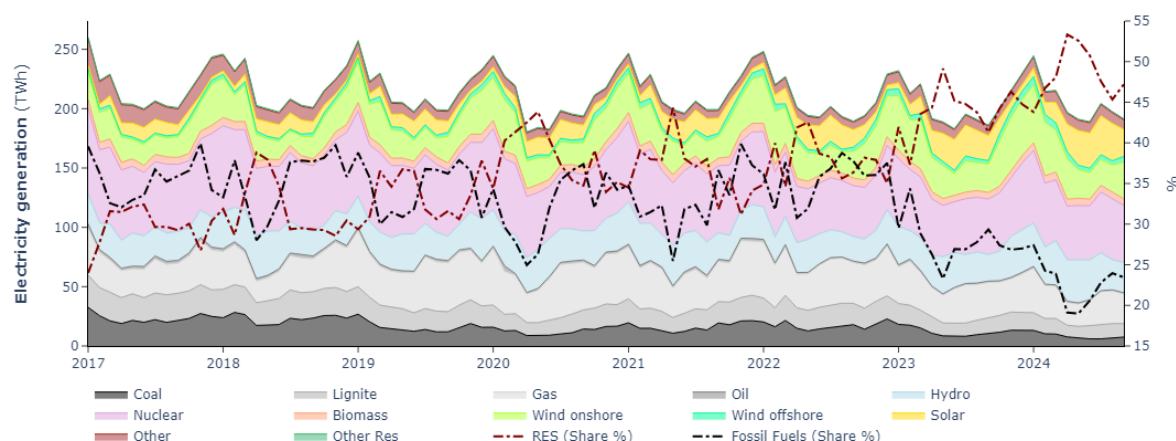
1.4 Electricity mix in the EU



Electricity generation in Q3 2024 compared to Q3 2023. Source: ENTSO-E

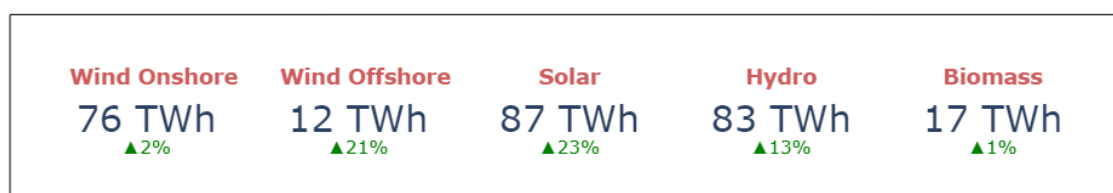
- **Figure 13** shows the monthly evolution of the electricity mix in the EU. In Q3 2024, RES generation reached 277 TWh (+12% compared with Q3 2023) constituting, on average, 47% of the electricity mix (up from 43% in Q3 2023). Overall, electricity generation increased by 4%, reaching 593 TWh in Q3 2024 compared to 572 TWh in Q3 2023.
- In Q3 2024, the share of the electricity produced from fossil fuels declined to 28% from 32% in Q3 2023 due to a decrease of the electricity generated through coal (-13%), gas (-14%) and oil (-9%). Fossil fuel generation dropped by 11% (-20 TWh) in Q3 2024. Electricity generated by fossil fuels (165 TWh) was the lowest in any third quarter period, and the second lowest on record (after Q2 2024). Electricity generated by nuclear increased by 8% (equivalent to +11 TWh).

Figure 13 – Monthly electricity generation mix in the EU



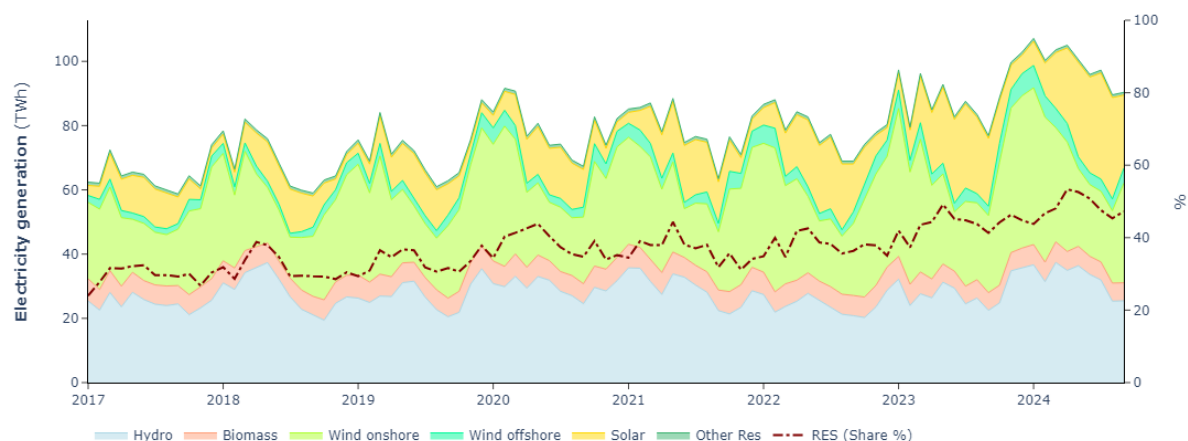
Source: ENTSO-E. Fossil fuel share calculation covers power generation from coal, lignite, gas, oil and others.

- **Figure 14** depicts the evolution of monthly renewable energy generation in the EU, alongside its share in the electricity generation mix. The growth of the share of renewable energy generation in Q3 2024 compared to Q3 2023 was supported mainly by a remarkable increase of 23% in solar generation (+16 TWh), combined with an increase of 13% and in hydropower generation (+9 TWh). Solar generation reached an all-time high in Q3 2024 of 87 TWh. This milestone marks the highest quarterly recorded solar generation to date. The largest contributors were Germany (24 TWh), Spain (17 TWh) and Italy (10 TWh).
- Notably, renewable electricity generation from offshore wind increased by 21% (+2 TWh), while onshore wind generation rose by 2% (+1 TWh). Overall, wind generation (onshore and offshore) increased by 4% (+3 TWh) in Q3 2024. Wind and solar generation (175 TWh) registered a year-on-year increase of 11% (+18 TWh).



Electricity generation of RES in Q3 2024 compared to Q3 2023

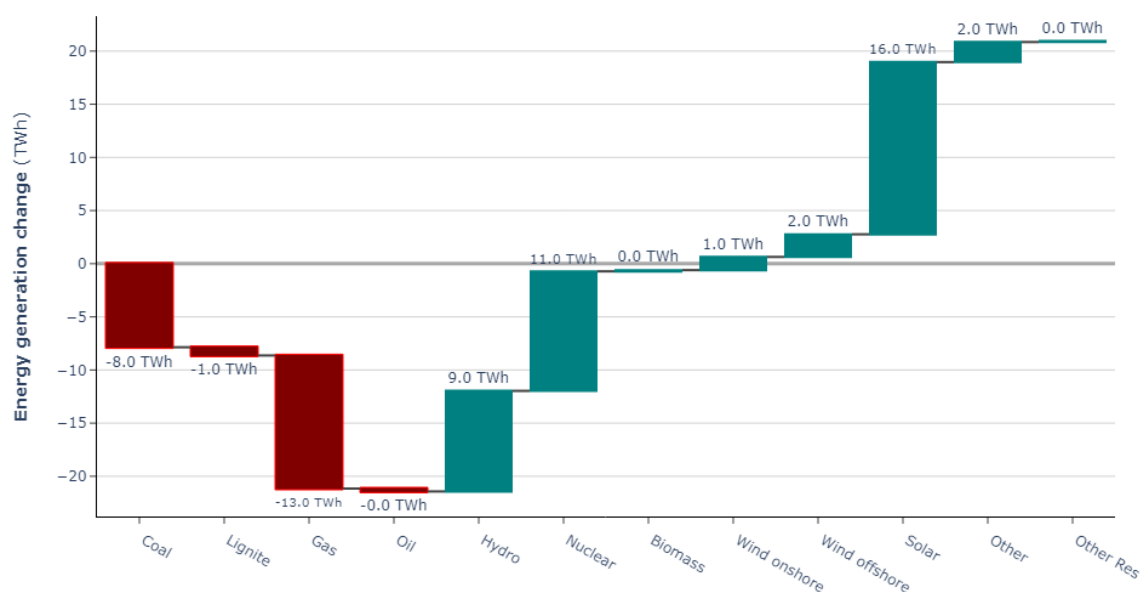
Figure 14 – Monthly renewable generation in the EU and the share of renewables in the power mix



Source: ENTSO-E. Data represents net generation.

- **Figure 15** visualises changes in the EU27 electricity generation in Q3 2024 compared to Q3 2023. Fossil fuel generation dropped by 11% (-20 TWh), supported by hard coal, lignite, gas, and oil generation falling by 8 TWh (-28%), 1 TWh (-2%), 13 TWh (-14%), and 0.3 TWh (-9%) respectively. Solar generation registered the largest absolute and relative increase (+23%, equivalent to +16 TWh) compared to Q3 2023. Nuclear generation registered the second largest absolute increase (+8%, equivalent to +11 TWh).

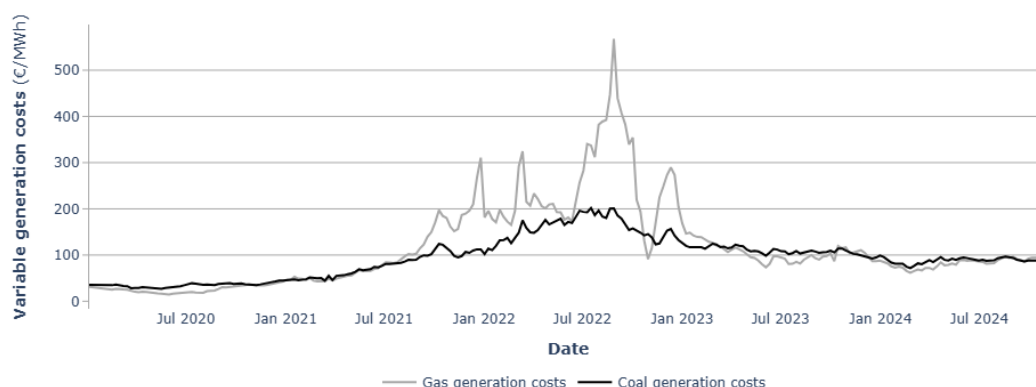
Figure 15 – Changes in power generation in the EU between Q3 2024 and Q3 2023



Source: ENTSO-E.

- **Figure 16** shows the impact of gas prices on estimated gas and coal-fired generation variable costs for estimated average power plants (fuel and emission allowances costs). Lower gas prices and relative high level of carbon prices (despite registering a decline followed by fluctuating prices since the end 2023) supported coal-to-gas fuel switching in most of Q3 2024. However, this trend began to fade away by the end of Q3 2024, as rising gas prices narrowed the gap between coal and gas fuel switching. This shift intensified into the fourth quarter of 2024, with gas-fired generation becoming slightly less profitable than coal-fired generation in October 2024.

Figure 16 – Estimated variable generation costs of coal- and gas-fired power plants.

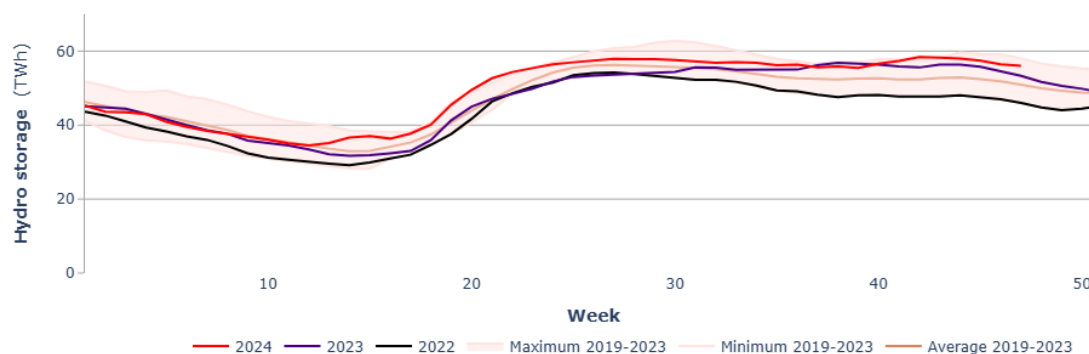


Source: S&P Platts, ENER.

Note: Thermal efficiency values used for coal- and gas-fired plants were 41% and 55% respectively. Emissions intensity values used were 0.85 and 0.37 tCO₂e/MWh respectively for coal- and gas-fired generation.

- **Figure 17** shows the sum of Q3 2024 levels of hydro reservoirs in the reported markets. In Q3 2024, the overall sum of hydropower reservoirs was higher than in Q3 2023 (+3%).

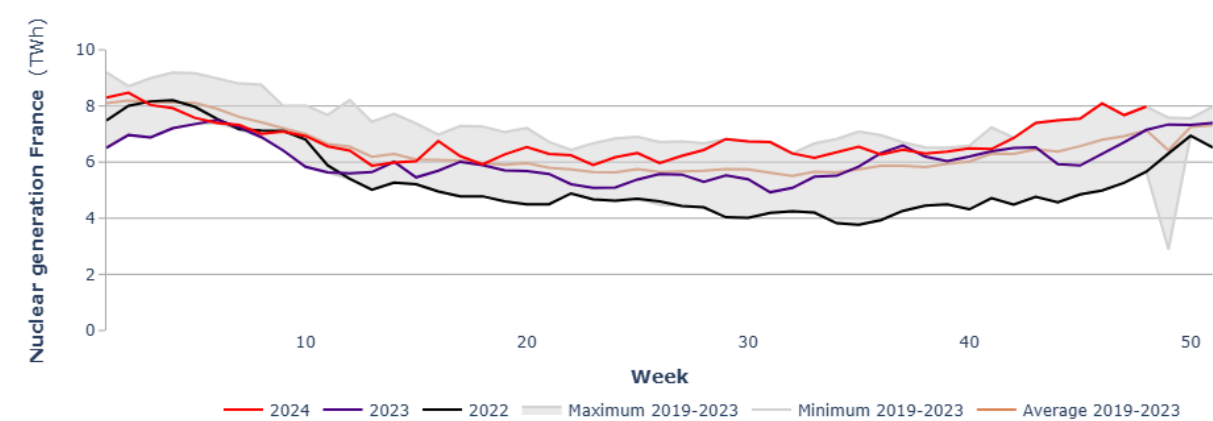
Figure 17 - Aggregated EU hydropower reservoirs – weekly



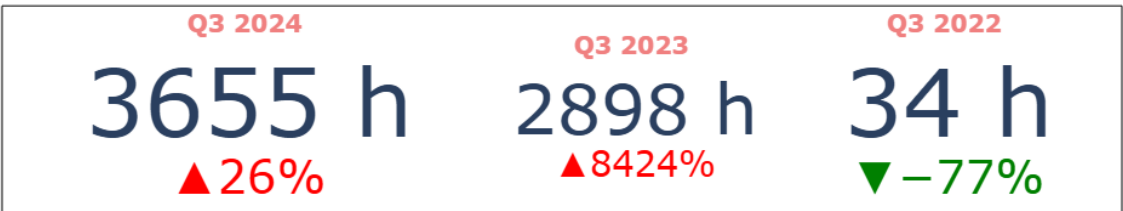
Source: ENTSO-E. Aggregated hydropower reservoirs for Austria, Bulgaria, Spain, Finland, France, Greece, Hungary, Italy, Lithuania, Latvia, Portugal, Romania and Sweden.

- As shown in **Figure 18**, French nuclear output amounted to 84 TWh in Q3 2024 and was up by 13% compared to Q3 2023.

Figure 18 – Weekly nuclear electricity generation in France



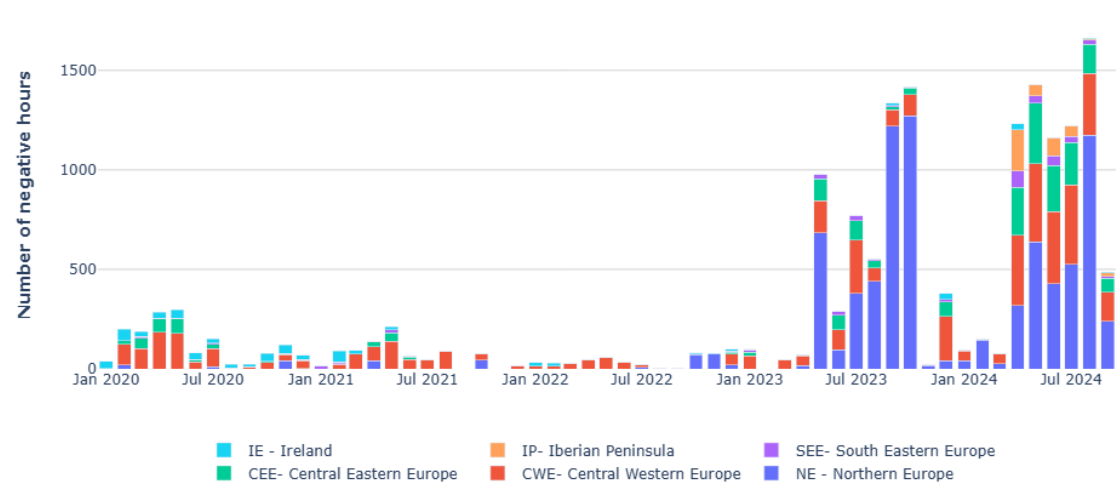
Source: ENTSO-E



Negative hours in Europe in Q3 2024, Q3 2023 and Q3 2022

- **Figure 19** shows the monthly frequency of the occurrence of negative hourly wholesale electricity prices in selected European markets. Negative hourly prices generally occur when electricity demand is lower than expected and when variable renewable energy generation is abundant, combined with large and relatively inflexible baseload electricity generation (e.g. nuclear or lignite). In such cases, conventional power plants offer their output for a negative price to avoid switching the unit off and having to go through the costly and high-maintenance operation of restarting the facility when they want to enter the market again.
- In Q3 2024, the number of negative hours reached 3655 in selected European markets, compared to 2898 in Q3 2023 (+26%). This is the highest third quarter figure since the record set in Q3 2023 (2898). The highest number of occurrences of negative price took place in August of the reference quarter (1780), registering the largest monthly occurrence of negative prices in 2024, so far. Most negative prices took place in Northern Europe, followed by Central Western Europe and Central Eastern Europe. Northern Europe is benefiting by the development of wind and solar power combined with good supply conditions of hydroelectric and nuclear power. Negative price signals intensify the search for market instruments that would find a proper value of flexibility, increasing incentives for demand-side response and storage solutions.

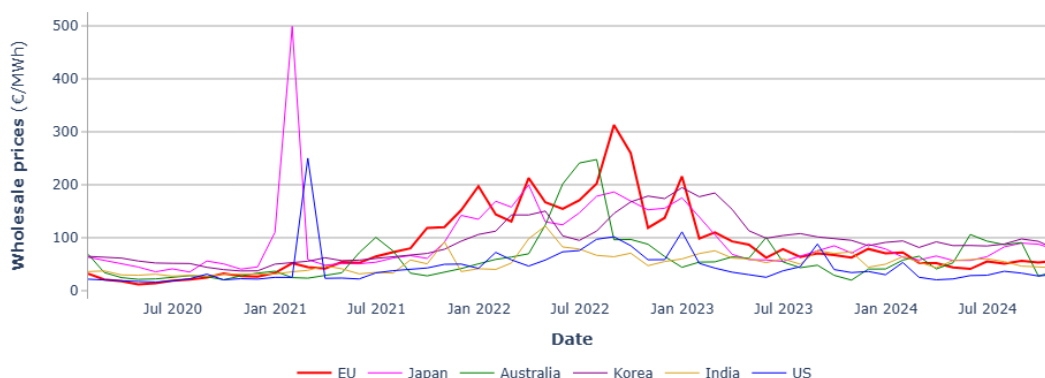
Figure 19 – Number of negative hourly wholesale prices on selected day-ahead trading platforms in Europe.



Source: ENTSO-E.

- **Figure 20** compares price developments in wholesale electricity markets of selected major economies. Most markets saw power prices easing due to year-on-year improved fundamentals in global energy markets.
- In the U.S., wholesale electricity prices in selected regional markets varied in Q3 2024 between -83% (ERCOT) and +14% (ISONE) year-on-year. In Q3 2024, the estimated US average price of selected markets (33 €/MWh) was 44% lower than in Q3 2023.
- In Japan, year-on-year prices rose by 16% in Q3 2024 to 87 €/MWh. Japan relies heavily on fossil-fuel power generation, and it is one of the three most important LNG buyers in the global market. Prices in Korea fell by 9% during the reference quarter.
- In Australia, wholesale electricity prices rose by 70% year-on-year in Q3 2024 to 69 €/MWh. Prices in India fell by 26% year-on-year in Q3 2024.

Figure 20 – Monthly average wholesale electricity prices in international markets (D-A markets)



Source: European Power Benchmark based on S&P Global Platts and ENTSO-E Transparency Platform, JPEX (Japan), AEMO (Australia), and the arithmetic average of selected PJM West, ERCOT, MISO Illinois, CAISO, NYISO Hudson Valley and ISONE Internal regional wholesale hubs in the United States.

1.5 Traded volumes and cross border flows

- **Figure 21** shows annual changes of traded volumes of electricity in the main European markets in 2024, including exchange-executed trade and over-the-counter (OTC) trade. Selected markets and regions witnessed a year-on-year improvement in trading activity. The level of trading in the electricity sectors increased considerably by 53% in total traded volumes between year-to-date Q3 2024 and Q3 2023. Activity grew significantly in exchange traded (+85%) and OTC cleared contracts (+53%) in Q3 2024, while increasing slightly in OTC bilateral contracts (+6%).
- In Q3 2024, Germany was by far the largest and most liquid European market, as total volume was equivalent to 61% of the total traded volumes under observation. Notable year-on-year total volume increases were seen in France (+122%), Spain (+66%) and Germany (+59%).

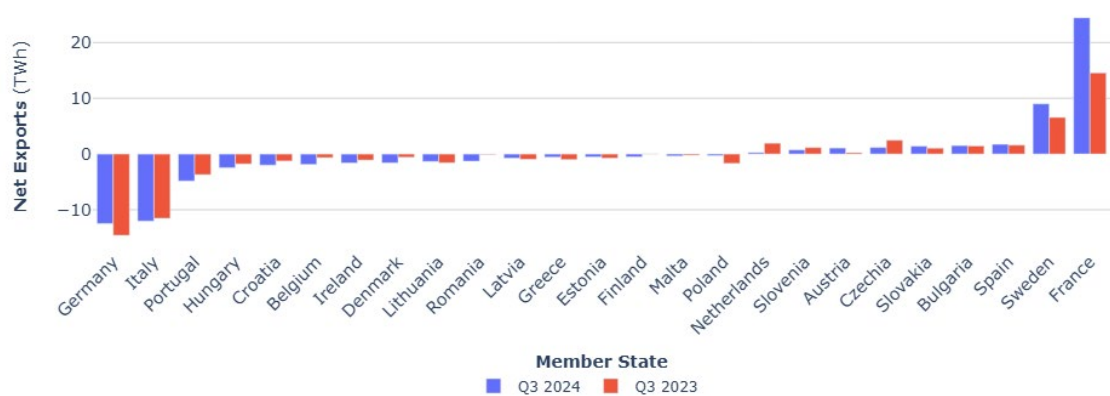
Figure 21– Traded volume of electricity on the most liquid European markets in Q3 2024



Source: Trayport, London Energy Brokers Association (LEBA) and DG ENER computations

- **Figure 22** compares net balances of electricity flows among EU Member States in Q3 2024 and Q3 2023. France continues to position itself as the main net exporter in the EU with 24 TWh of net exports in Q3 2024. The improved situation of the French nuclear fleet as opposed with previous years is supporting a rise in export flows.
- Sweden was the second largest net exporter (9 TWh), thanks to a significant discount in wholesale electricity prices vis-à-vis the neighbouring and other continental European markets. In Q3 2024, the other important EU exporters were Spain and Bulgaria (2 TWh).
- Germany (-12 TWh) remained the main EU importer in Q3 2024, narrowly surpassing Italy (-12 TWh). The list was followed by Portugal (-5 TWh) and Hungary (-2 TWh) during the quarter.

Figure 22 – Member States’ net scheduled commercial export/import positions within the EU in Q3 2024 and Q3 2023

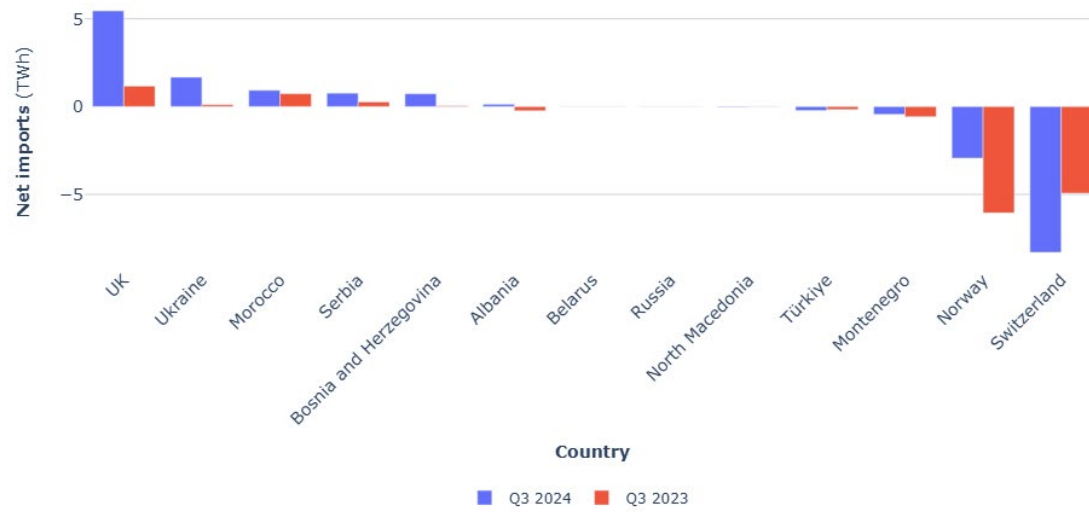


Source:

Scheduled Commercial flows ENTSO-E, TSOs

- **Figure 23** shows netted electricity exchanges with EU neighbours in Q3 2024. Great Britain registered another fall in its export balance, increasing net imports from the EU (5 TWh). On the other side of the graph, Switzerland (-8 TWh) remained the net exporter to the EU, surpassing Norway (-3 TWh) in Q3 2024.
- Net exports from the EU to Ukraine rose to 1.7 TWh in Q3 2024. Commercial exchanges of electricity between Continental Europe and Ukraine/Moldova started in June 2022, after the successful synchronisation of the power systems. Ukraine halted exports to Continental Europe after the massive Russian attacks of their energy infrastructure in October 2022. From December 2024, TSOs of Continental Europe will increase of export capacity from the EU to Ukraine and Moldova to 2.1 GW during the winter. From March 2025, TSOs will be able to reassess commercial capacity limit on a monthly basis.

Figure 23 – Extra-EU electricity commercial scheduled exchanges in Q3 2024 and Q3 2023 – netted



Source: Scheduled Commercial Flows ENTSO-E, TSOs. Negative values indicate net flows into the EU.

Retail markets

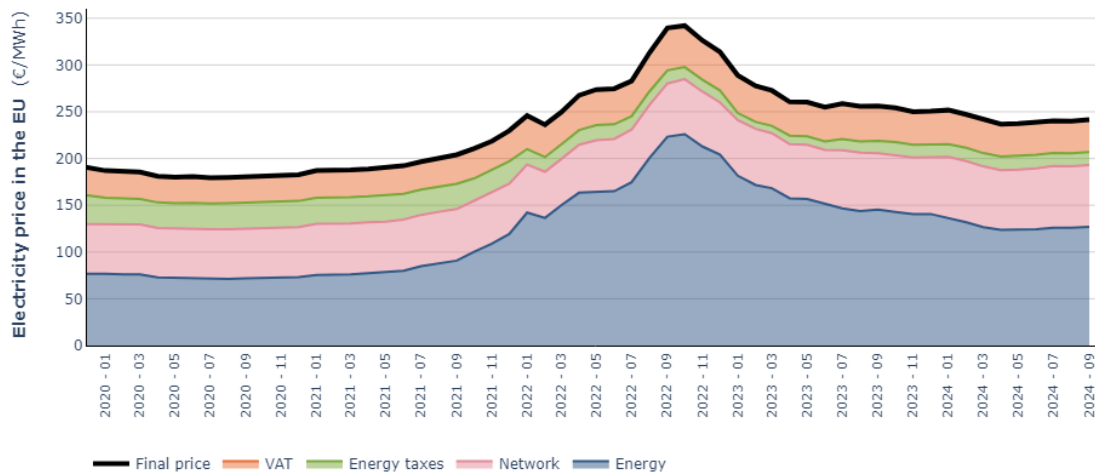
1.6 Retail electricity markets in the EU



Retail electricity prices in 2024, 2023 and 2022. Source: VaasaETT

- Q3 2024 saw a decrease of 6% in household retail prices compared to Q3 2023. **Figure 24** shows the monthly evolution of the EU average residential retail electricity prices over the last few years. The average retail electricity prices for household costumers in EU capital cities remained roughly stable from July to September 2024, ranging from 237-241 €/MWh.

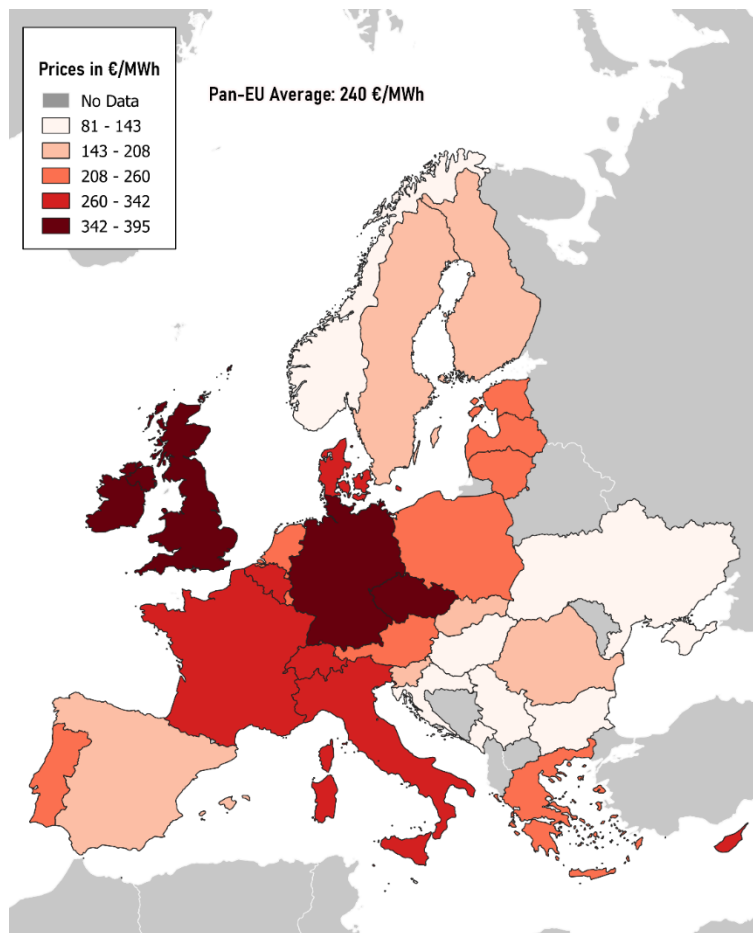
Figure 24 - Monthly average electricity price in the EU, paid by typical household customers



Source: Vaasaett

- Figure 25** shows the average yearly electricity prices paid by households in capital cities in EU Member States and other European countries with typical annual consumption.

Figure 25 –Average household retail electricity prices in European capitals, Q3 2024



Source: Vaasaett

- **Figure 26** shows retail electricity prices for representative household consumers in European capital cities, and their composition divided into four categories (energy, network charges, energy taxes and the value added tax). In Q3 2024, the highest average prices were observed in Germany, Czechia and Ireland (394, 365 and 360 €/MWh, respectively). The lowest ones were observed in Hungary, Malta and Bulgaria (94, 123 and 136 €/MWh respectively).
- In Q3 2024, the energy component share fell to 52.5%, a decrease of 4 percentage points compared to Q3 2023. The share of VAT decreased by around 1 percentage point, while the TAX and Network components respectively increased by 1 and 4 percentage points.

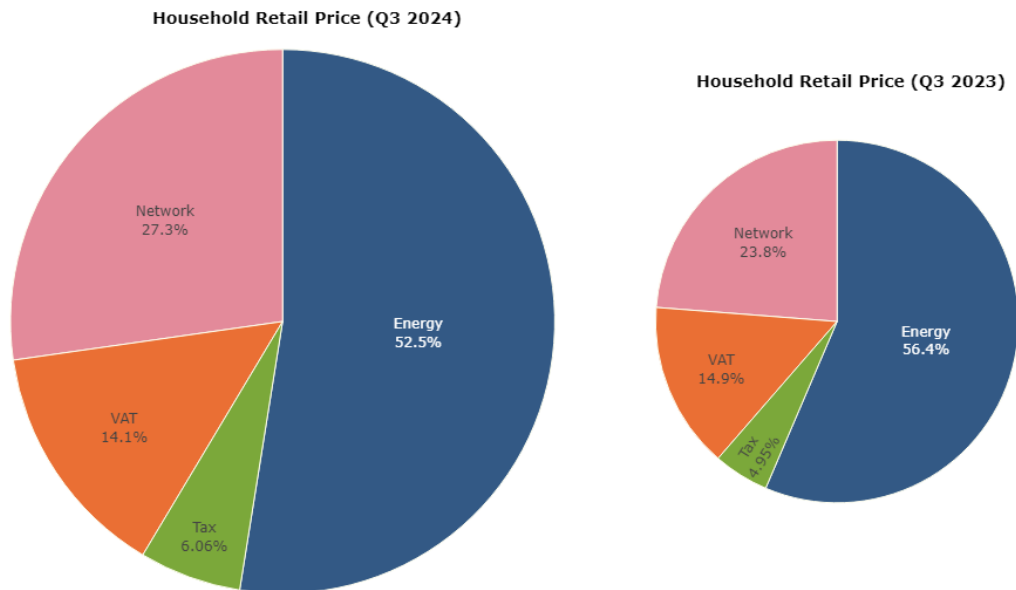
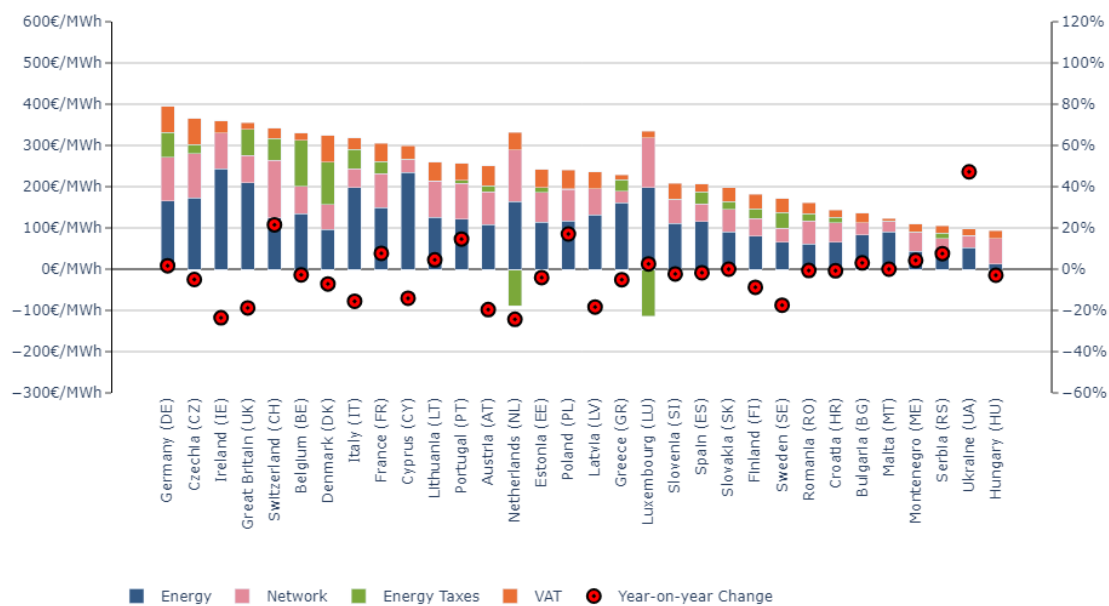


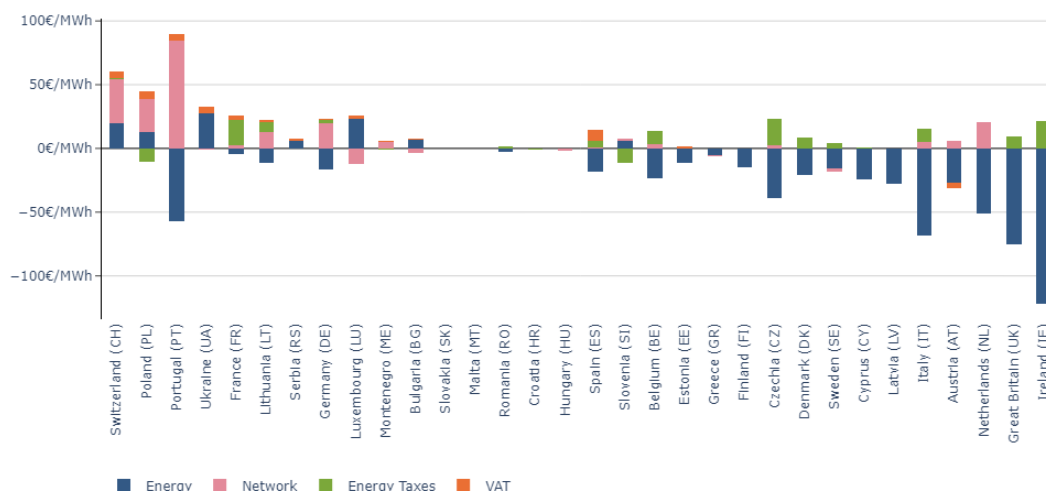
Figure 26 – The Household Energy Price Index (HEPI) in European capital cities, Q3 2024



Source: Vaasaett

- Compared to the same quarter of the previous year, the largest price decreases in absolute terms in the EU in Q3 2024 were observed in the Ireland (-111 €/MWh), the Netherlands (-78 €/MWh) and Austria (-61 €/MWh). Poland, Portugal and France saw the largest increases in retail prices of +35 €/MWh, +33 €/MWh and +21 €/MWh respectively.
- As shown in **Figure 27**, decreasing prices in EU member states were mainly driven by lower wholesale prices, while increases were mainly a result of increasing taxes and network tariffs in some Member States.

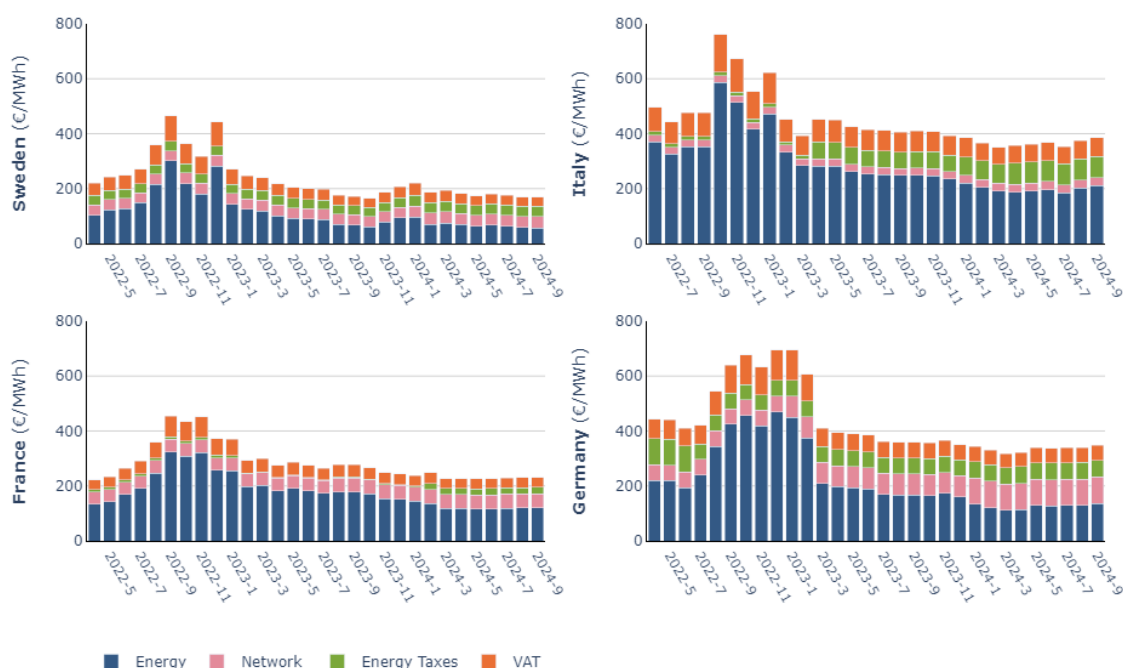
Figure 27 – Year-on-year change in electricity prices by cost components in the European capital cities comparing Q3 2024 with Q3 2023



Source: Vaasaett

- **Figure 35** shows industrial SMEs (IB Band) electricity prices for selected Member States in Q3 2024. Average end user prices in Italy were at 372 €/MWh, which is more than in Germany (342 €/MWh), France (230 €/MWh) and Sweden (172 €/MWh).

Figure 28 –Industrial retail prices for SMEs in selected EU countries

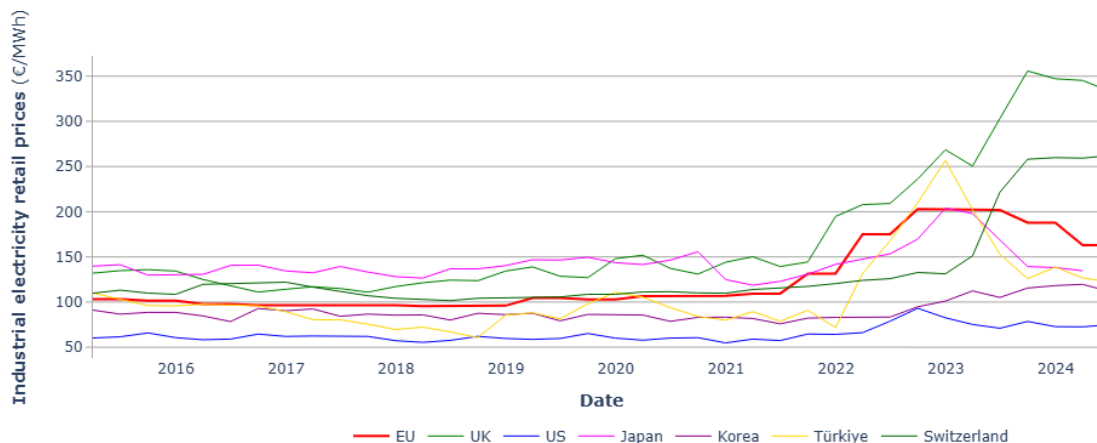


Source: Vaasaett

1.7 International comparison of retail electricity prices

- **Figure 29** displays industrial retail prices paid by consumers in the EU¹ and in its major trading partners. Prices include VAT (with the exception of US prices) and other recoverable taxes for the purpose of comparability.
- According to the latest available data, electricity prices for industrial users in the EU registered a year-on-year decrease in the first half of 2024 compared to the first half of 2023 (-19%), signalling an improvement of electricity prices at industrial level following the impact of the energy crisis. In Q2 2024, the US (+5%) registered year-on-year slightly higher prices, while remaining significantly lower than in the EU. The United Kingdom and Korea registered year-on-year increases of 10% and 6%, respectively.

Figure 29 – Retail electricity prices paid by industrial customers in the EU and its main trading partners



Source: Eurostat, EIA, DESNZ, IEA, DG ENER computations. Industrial prices in the EU are represented by the ID consumption band for the purposes of international comparison.

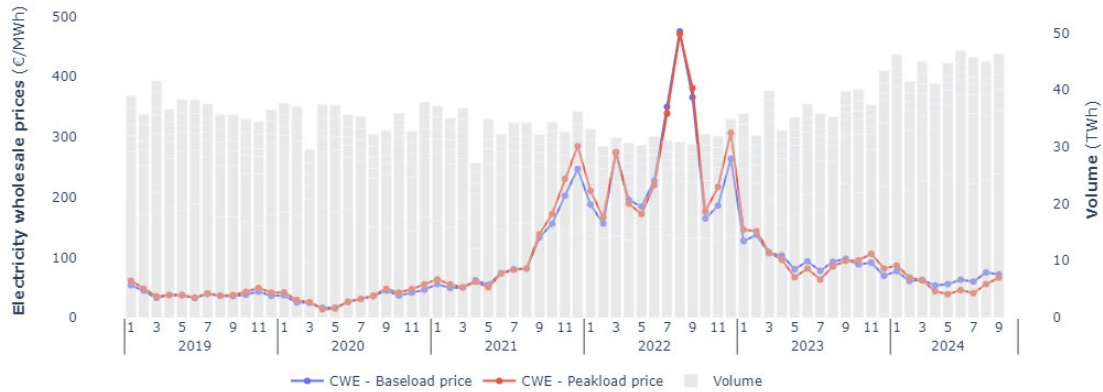
¹ The EU average is reported biennially in the [Eurostat database](#). The prices in the quarter reflect electricity non-household retail prices from 2H 2023 for the ID band.

Annex

Regional wholesale markets

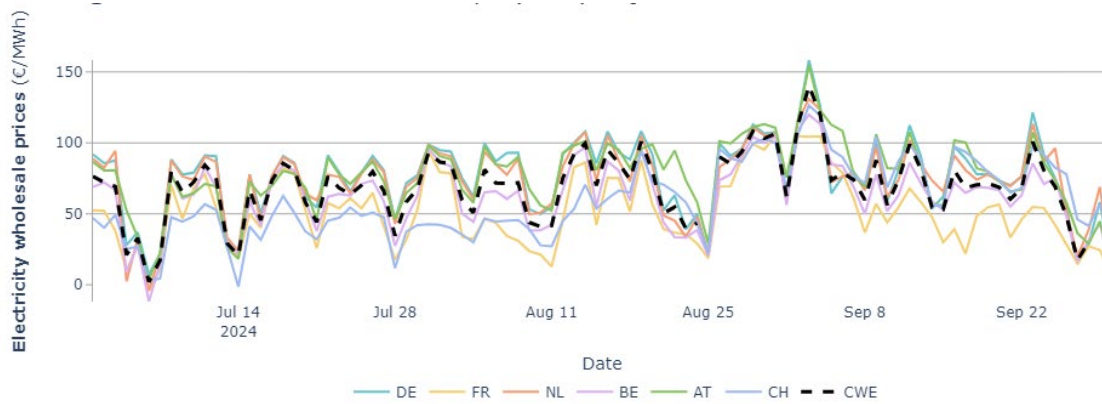
1.8 Central Western Europe (Austria, Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland)

Figure 30 – Monthly exchange traded volumes of day-ahead contracts and monthly average prices in Central Western Europe



Source: S&P Global Platts, ENTSO-E, EPEX.

Figure 31 – Daily average power prices on the day-ahead market in the CWE region



Source: S&P Platts, ENTSO-E, EPEX

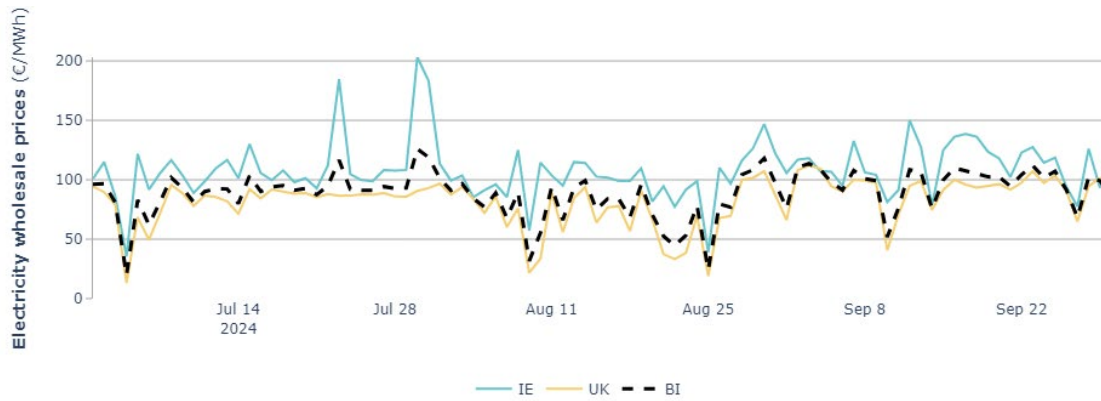
1.9 British Isles (GB, Ireland)

Figure 32 – Monthly exchange traded volumes of day-ahead contracts and monthly average prices in Great Britain and Ireland



Source: Nord Pool N2EX, SEMO, Utility Regulator

Figure 33 – Daily average electricity prices on the day-ahead market in Great Britain and Ireland



Source: Nord Pool N2EX, SEMO

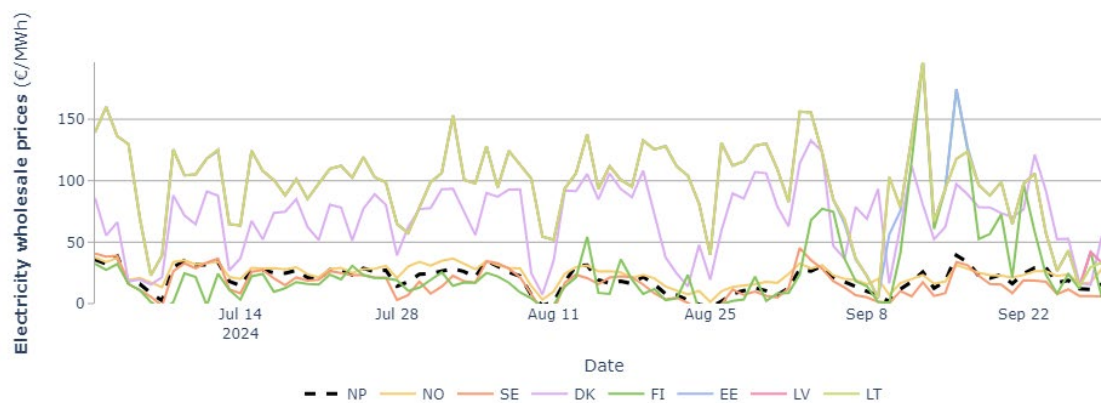
1.10 Northern Europe (Denmark, Estonia, Finland, Latvia, Lithuania, Sweden, Norway)

Figure 34 – Monthly electricity exchange traded volumes and the average day-ahead wholesale prices in Northern Europe



Source: S&P Global Platts, Nord Pool spot market

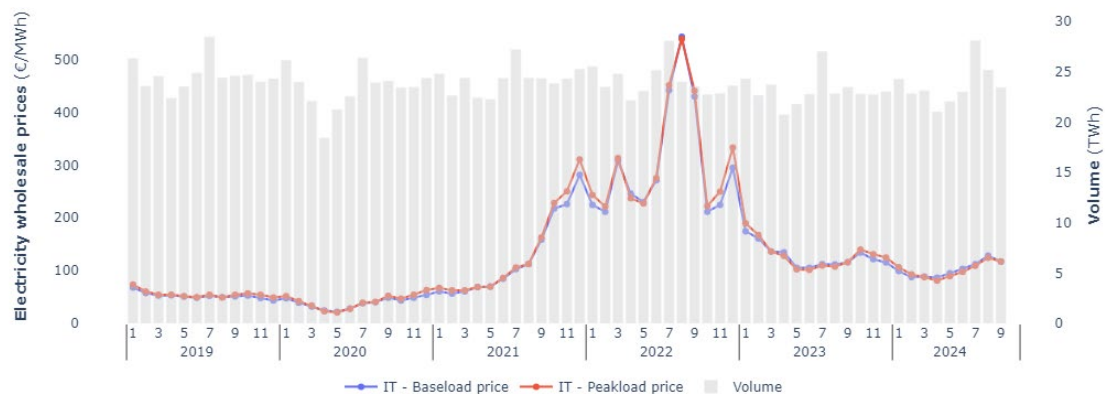
Figure 35 – Daily average regional prices and the system price on the day-ahead market in the Nordic region



Source: S&P Global Platts, Nord Pool spot market

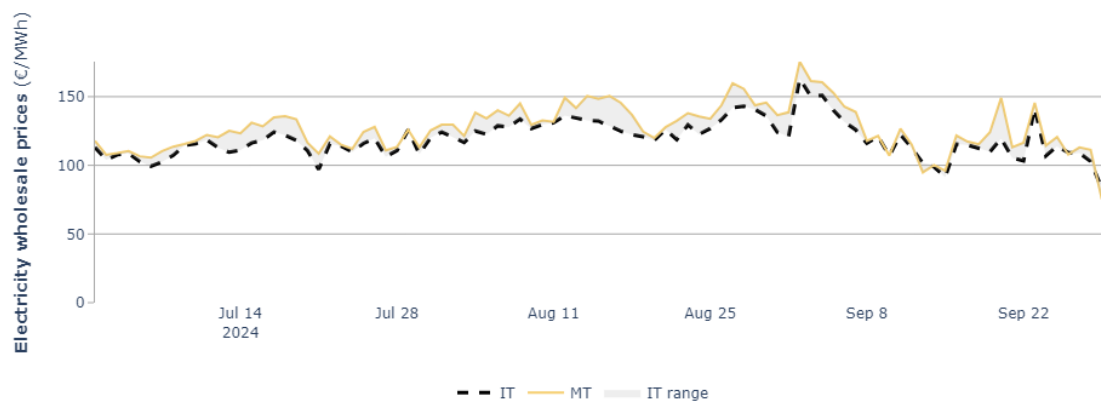
1.11 Apennine Peninsula (Italy, Malta)

Figure 36 – Monthly electricity exchange traded volumes and average day-ahead wholesale prices in Italy



Source: GME (IPEX)

Figure 37 – Daily average electricity prices in the Italian day-ahead market, within the range of different area prices



Source: GME (IPEX)

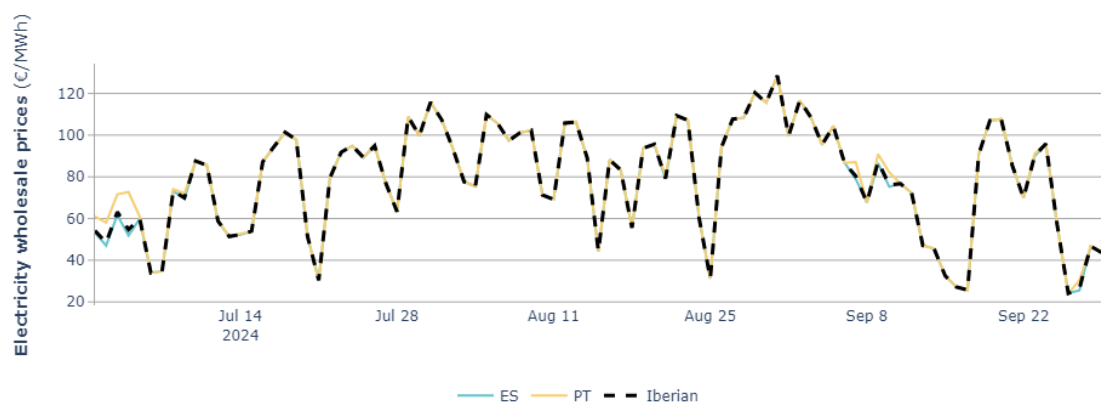
1.12 Iberian Peninsula (Spain and Portugal)

Figure 38 – Monthly electricity exchange traded volumes and average day-ahead prices in the Iberian Peninsula



Source: S&P Global Platts, OMEL, DGEG

Figure 39 – Daily average electricity prices on the day-ahead market in the Iberian Peninsula



Source: S&P Global Platts, OMEL, DGEG

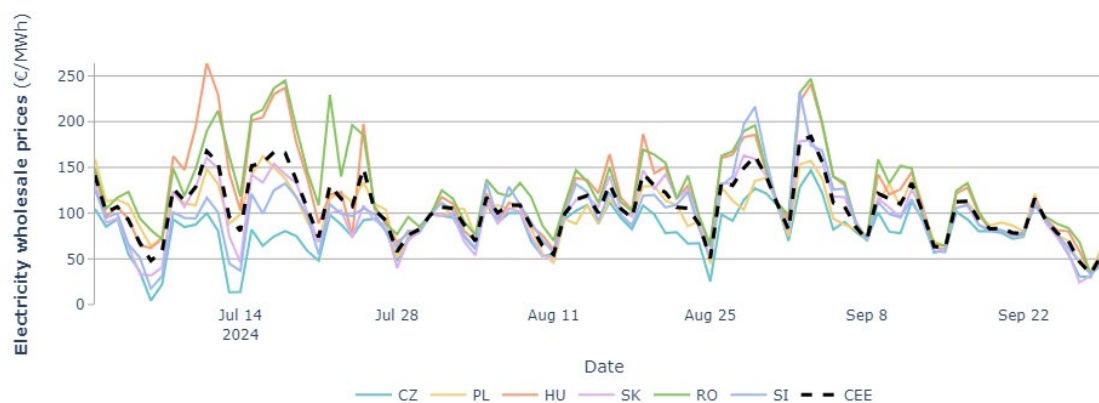
1.13 Central Eastern Europe (Czechia, Hungary, Poland, Romania, Slovakia, Slovenia)

Figure 40 – Monthly electricity exchange traded volumes and average day-ahead prices in Central Eastern Europe (CEE)



Source: Regional power exchanges, Central and Eastern Europe (CEE), CEE: CZ, HU, RO, PL, SK, SI

Figure 41 – Daily average power prices on the day-ahead market in the CEE region



Source: Regional power exchanges

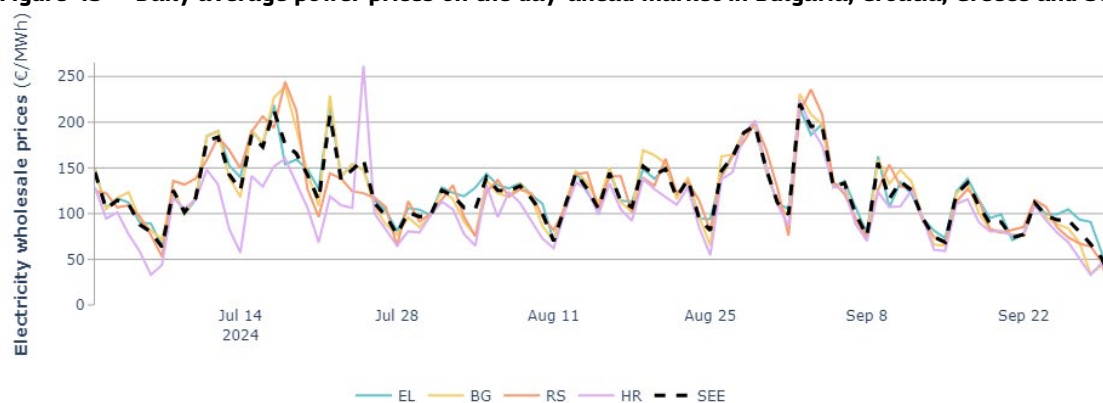
1.14 South-Eastern Europe (Bulgaria, Croatia, Greece and Serbia)

Figure 42 – Monthly traded volumes and baseload prices in South-Eastern Europe (SEE)



Source: ENTSO-E, IBEX, LAGIE, CROPEX, SEEPEX

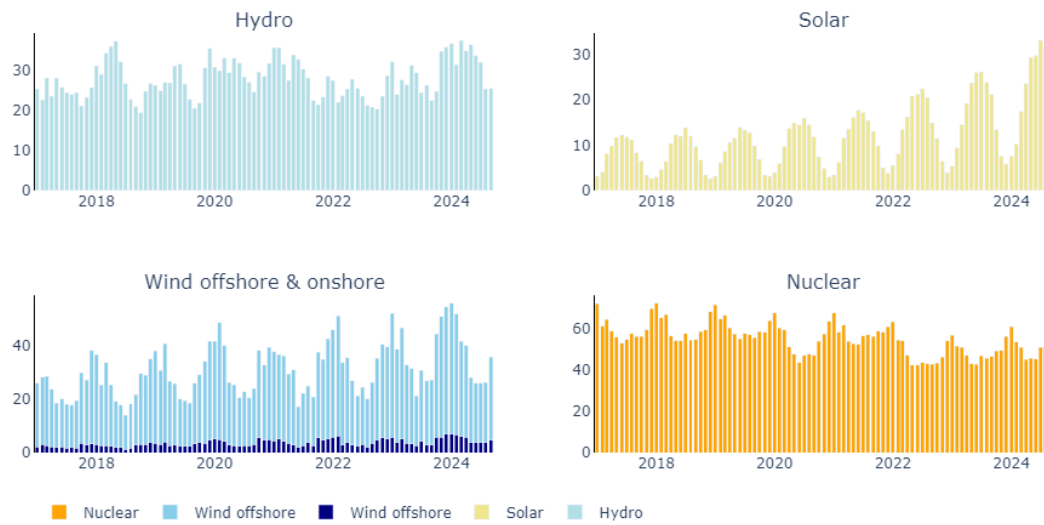
Figure 43 – Daily average power prices on the day-ahead market in Bulgaria, Croatia, Greece and Serbia



Source: ENTSO-E, IBEX, LAGIE, SEEPEX, CROPEX

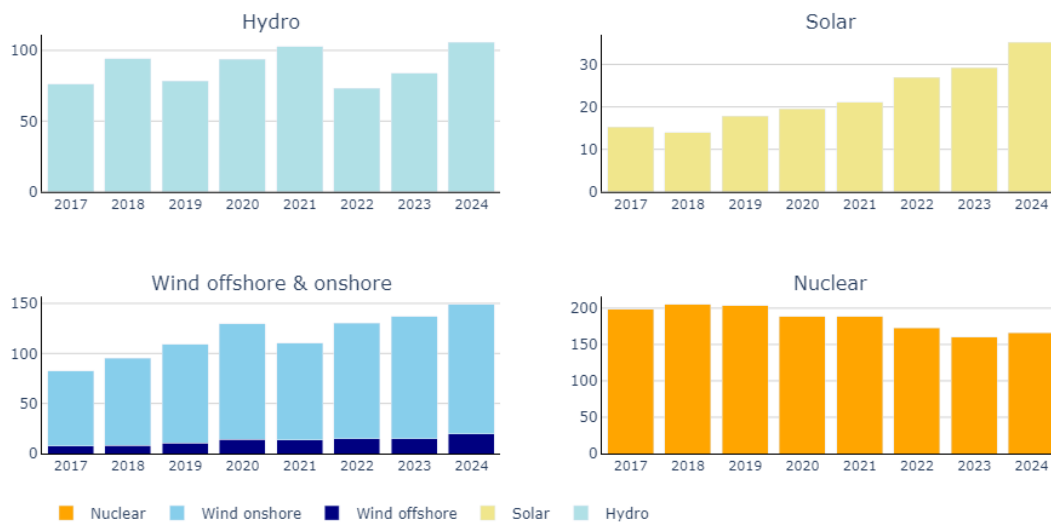
1.15 Electricity generation

Figure 44 - Monthly renewable and nuclear generation in the EU (TWh)



Source: ENTSO-E. Data represent net generation

Figure 45 - Yearly renewable and nuclear generation in the EU (TWh)



Source: ENTSO-E. Data represent net generation

Glossary

Backwardation occurs when the closer-to-maturity contract is priced higher than the contract which matures at a later stage.

Contango: A situation of contango arises in the when the closer to maturity contract has a lower price than the contract which is longer to maturity on the forward curve.

Emission allowances' spot prices are defined as prices for an allowance traded on the secondary market and with a date of delivery in the nearest December.

European Power Benchmark (EPB9) is a replacement of the former Platt's PEP index discontinued at the end of 2016, computed as weighted average of nine representative European markets' (Belgium, Czechia, France, Italy, Germany, Netherlands, Spain, the United Kingdom and the Nord Pool system price) day-ahead contracts.

EPS is a consumption-weighted baseload benchmark of five most advanced markets offering a 3-year visibility into the future Markets included in the benchmark are France, Germany, the Netherlands, Spain and Nord Pool. Prices are weighted according to the consumption levels in individual markets. Forward prices are rolled over towards the end of each year, meaning that the year-ahead benchmark in 2021 shows the price for 2022; and the year-ahead curve in 2022, in turn, shows baseload prices for delivery in 2023.

Flow against price differentials (FAPDs): By combining hourly price and flow data, FAPDs are designed to give a measure of the consistency of economic decisions of market participants in the context of close to real time operation of electrical systems.

With the closure of the day-ahead markets (D-1), the prices for each hourly slot of day D are known by market participants. Based on the information from the power exchanges of two neighbouring areas, market participants can establish hourly price differentials. Later in D-1, market participants also nominate commercial schedules for day D. An event named 'flow against price differentials' (FAPD) occurs when commercial nominations for cross border capacities are such that power is set to flow from a higher price area to a lower price area. The FAPD chart in this quarterly report provides detailed information on adverse flows, presenting the ratio of the number of hours with adverse flows to the number of total trading hours in a quarter.

Relative standard deviation is the ratio of standard deviation (measuring the dispersion within a statistical set of values from the mean) and the mean (statistical average) of the given set of values. It measures in percentage how the data points of the dataset are close to the mean (the higher is the standard deviation, the higher is the dispersion). Relative standard deviation enables to compare the dispersion of values of different magnitudes, as by dividing the standard deviation by the average the impact of absolute values is eliminated, making possible the comparison of different time series on a single chart.

Retail prices paid by households include all taxes, levies, fees and charges. Prices paid by industrial customers exclude VAT and recoverable taxes. Monthly retail electricity prices are estimated by using Harmonised Consumer Price Indices (HICP) based on bi-annual retail energy price data from Eurostat.

Tariff deficit expresses the difference between the price (called a tariff) that a *regulated utility*, such as an electricity producer is allowed to charge and its generation cost per unit.