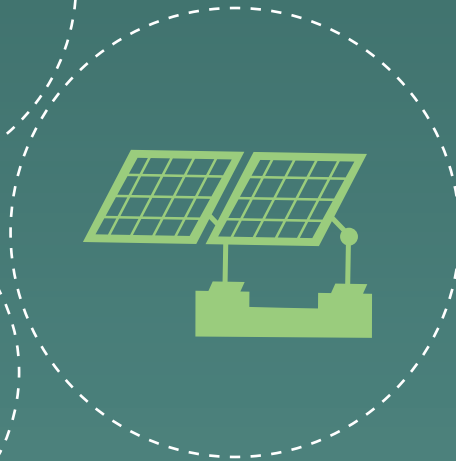




European
Commission

Quarterly report

On European electricity markets



Market Observatory for Energy
DG Energy

Volume 17

(issue 2, covering second quarter of 2024)

Energy

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.

Copyright notice: Reproduction is authorised provided the source is acknowledged.
© European Commission, 2024

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

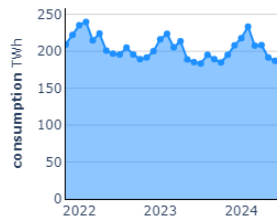
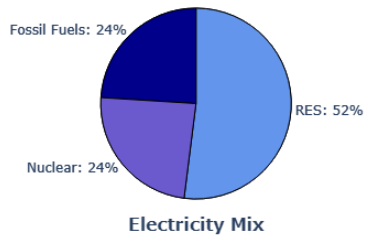
Commission Européenne, B-1049 Bruxelles / Europese Commissie, B-1049 Brussel – Belgium
E-mail: ENER-MARKET-OBSERVATORY-QUARTERLY-REPORTS@ec.europa.eu

CONTENT

HIGHLIGHTS OF THE REPORT	5
ELECTRICITY MARKET FUNDAMENTALS.....	6
1.1 Demand side factors	6
1.2 Supply side factors	8
EUROPEAN WHOLESALE MARKETS	10
1.4 Traded volumes and cross border flows.....	17
RETAIL MARKETS.....	20
1.5 Retail electricity markets in the EU	20
1.6 International comparison of retail electricity prices.....	24
ANNEX.....	26
REGIONAL WHOLESALE MARKETS	26
1.7 Central Western Europe (Austria, Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland)	26
1.8 British Isles (GB, Ireland)	27
1.9 Northern Europe (Denmark, Estonia, Finland, Latvia, Lithuania, Sweden, Norway).....	28
1.10 Apennine Peninsula (Italy, Malta)	29
1.11 Iberian Peninsula (Spain and Portugal).....	30
1.12 Central Eastern Europe (Czechia, Hungary, Poland, Romania, Slovakia, Slovenia).....	31
1.13 South-Eastern Europe (Bulgaria, Croatia, Greece and Serbia)	32
GLOSSARY	34

Key figures of the quarter (Q2 2024)

Electricity generation and consumption in Q2 2024 and year-on-year comparison



Electricity consumption

564 TWh

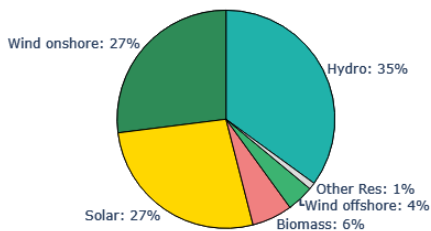
▲7 TWh



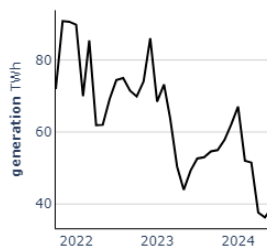
Electricity generation

577 TWh

▲14 TWh



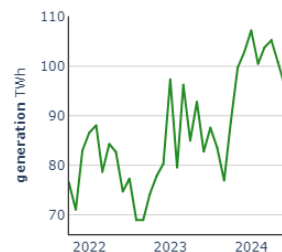
RES generation



Fossil fuel generation

139 TWh

▼-31 TWh

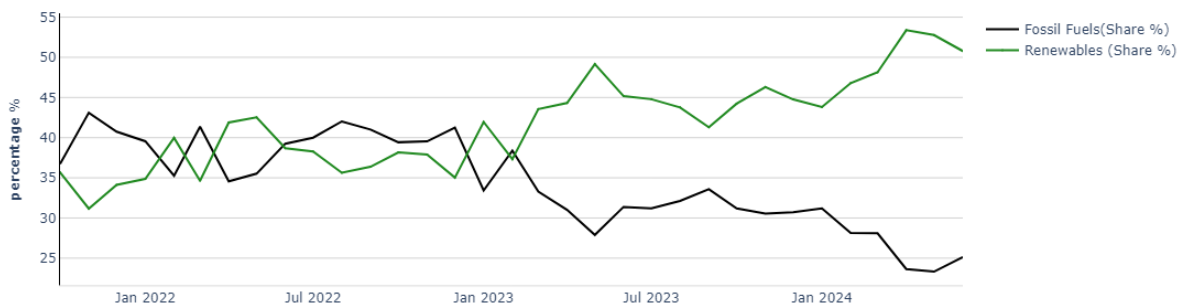


RES generation

302 TWh

▲42 TWh

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



Average Generation Share of Fossil Fuels

24 %

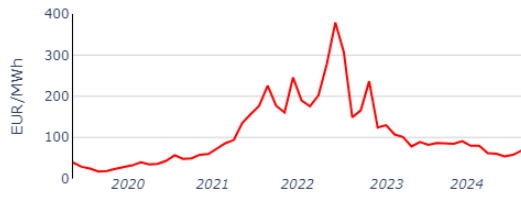
▼-6 pp.

Average Generation Share of Renewables

52 %

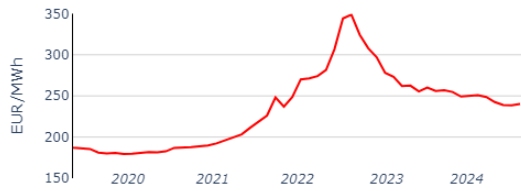
▲6 pp.

Prices in Q2 2024 and year-on-year comparison



Wholesale prices
60 €/MWh

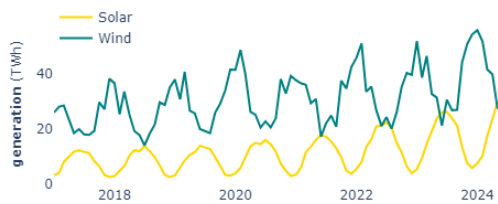
Change y-o-y
-33%
▼ -30 €/MWh



Retail prices
239 €/MWh

Change y-o-y
-7%
▼ -19 €/MWh

Focus of the Quarter: Renewable energy generation and year-on-year comparison



Renewable energy generation: +16 %

Hydro
105 TWh
▲ 18 TWh

Solar
83 TWh
▲ 14 TWh

Wind onshore
80 TWh
▲ 5 TWh

Wind offshore
13 TWh
▲ 4 TWh

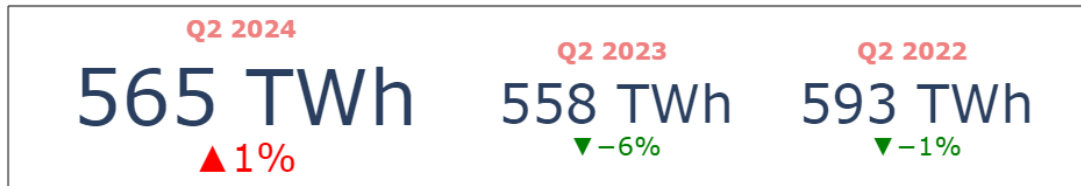
HIGHLIGHTS OF THE REPORT

- **The second 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, slightly rising 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 Q2 2024. The European Power Benchmark averaged 60 €/MWh in Q2 2024, 33% lower than in the same quarter last year (Q2 2023), and a decrease of 11% compared with the previous quarter (Q1 2024).** In Q2 2024, prices decreased among all Member States, the largest year-on-year price decreases were registered in France (-66%), Portugal (-59%) and Spain (-58%). The lowest decreases were in Latvia (-6%) and Estonia (-2%). Prices ranged from a quarterly average of 31 €/MWh in France to 101 €/MWh in Ireland.
- **Electricity consumption in Q2 2024 in the EU rose only slightly (+1%) compared with last year's levels in Q2 2023**, still 5% lower than two years ago (Q2 2022). Consumption has not fully recovered yet, compared with pre-crisis levels. The main factors are reduced industrial demand due to the aftermath of the energy crisis, combined with reduced demand due to warmer-than-average temperatures. Consumption only rose 1% in the first half of 2024, compared with last year's levels.
- **The share of renewables increased to 52% in Q2 2024** (from 46% in Q2 2023), while **the share of fossil fuels fell significantly to 24%** (from 30% in Q2 2023). In the first half of 2024, the share of renewable generation grew to 49% compared with 43% in 1H 2023.
- **Solar and wind yearly generation increased by 14% in Q2 2024 (+18 TWh).** Solar generation rose by 20% (+14 TWh) and wind offshore generation surged by 37% (+4 TWh). Hydropower improved its output by 21% (+18 TWh) while onshore wind generation rose by 6% (+5 TWh). Additional installed capacity supported higher levels of renewables generation during the reference quarter.
- **Fossil fuel yearly generation dropped by 18% in Q2 2024**, supported by lower demand and sustained renewables generation. In total, coal-fired generation fell by 7% (-12 TWh), whereas less CO₂-intensive gas generation dropped by 24% (-19 TWh). Nuclear output rose by 2% (+3 TWh) in Q2 2024.
- **Carbon prices increased during most of Q2 2024, reaching a high of around 73 €/tCO₂ in the beginning of June 2024. However, the average quarterly price at 69 €/tCO₂ decreased by 21% from the same quarter last year (Q2 2023).** Prices moved mainly between 60 and 75 €/tCO₂ in Q2 2024. High carbon prices, combined with lower gas prices have supported the shift from coal to gas generation, reverting the trend observed during the energy crisis where gas-fired generation was much more expensive than coal-fired generation. The average spot price of CO₂ in 1H 2024 (64 €/tCO₂) was 26% lower than in 1H 2023.
- **Retail electricity prices for households in EU capital cities were down by 8% in Q2 2024 (239 €/MWh)**, compared with the same quarter of last year (Q2 2023), and a decrease of 3% compared with the previous quarter (Q1 2024). The average retail price stood at 243 €/MWh in the first half of 2024, a decrease of 10% from 1H 2023 prices.
- **More than 567 thousand new electric vehicles (EVs) were sold in the EU during Q2 2024**, a yearly decrease of 5%. In Q2 2024, EV sales translated into a 20% of market share of new vehicles sold. This slight decrease in volumes and the share of EVs, does not change the fact that EV shares in Europe is still two times the market share registered in the United States, yet lower than in China. Overall, more than 1.1 million new EVs were sold in the EU during 1H 2024, comparable to 1H 2023 figure.
- **The number of hours with negative wholesale prices in Q2 2024 (4166) across all bidding zones was almost double (+189%) than in the same quarter last year (Q2 2023).** Most of hours with negative prices occurred in May (1573), mainly distributed across Northern Europe, Central Western Europe and Central Eastern Europe. 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

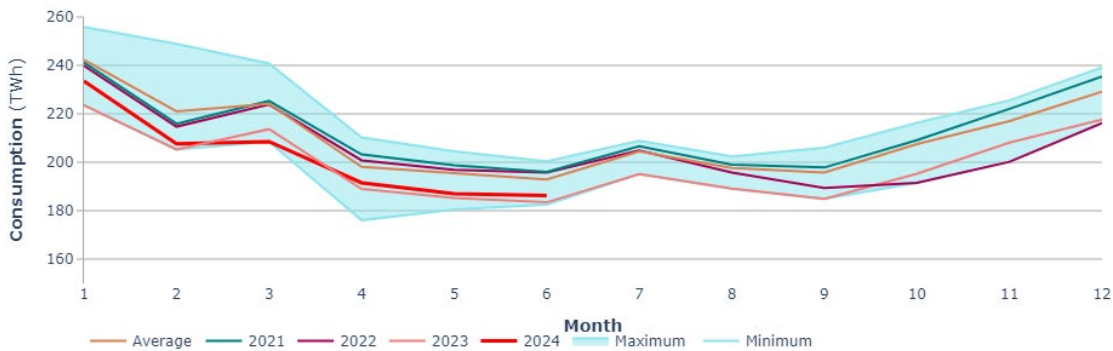
1.1 Demand side factors



Electricity consumption in Q2 2024, Q2 2023 and Q2 2022

- In Q2 2024, the total electricity consumption in the EU rose only 1% compared with last year's levels, still 5% lower than in Q2 2022. Consumption has not fully recovered yet, compared with pre-crisis levels. The main factors are reduced industrial demand due to the aftermath of the energy crisis, combined with reduced heating demand due to warmer-than-average temperatures. Demand levels for the second quarter of 2024 were still close to the lower bound of the 2019-2023 range.
- In the second half of 2024, the total electricity consumption in the EU rose only 1% compared with last year's levels, as demand is recovering at a moderate pace after the impact of the energy crisis.

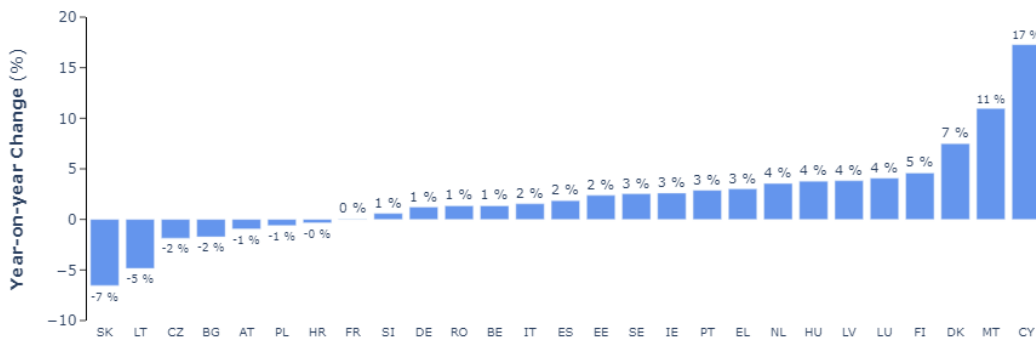
Figure 1 – Monthly EU consumption of electricity



Source: Eurostat

- **Figure 2** sums up changes in electricity consumption in Q2 2024, compared to Q2 2023. EU electricity consumption rose during the reference quarter, in nineteen Member States. The biggest increases were registered in Cyprus (+17%) and Malta (+11%), followed by Denmark (+7%) and Finland (+5%). The largest decrease was reported in Slovakia (-7%) and Lithuania (-5%), while Czechia and Bulgaria reported smaller reductions (-2%).
- In the first half of 2024, electricity consumption increased in 19 Member States when compared with 1H 2023. The largest increases took place in Cyprus (9%) and Denmark/Finland (-8%). Conversely, Slovakia (8%) reported significant decreases in consumption during 1H 2024, while France, Croatia, Czechia and Austria reported decreases of 1%.

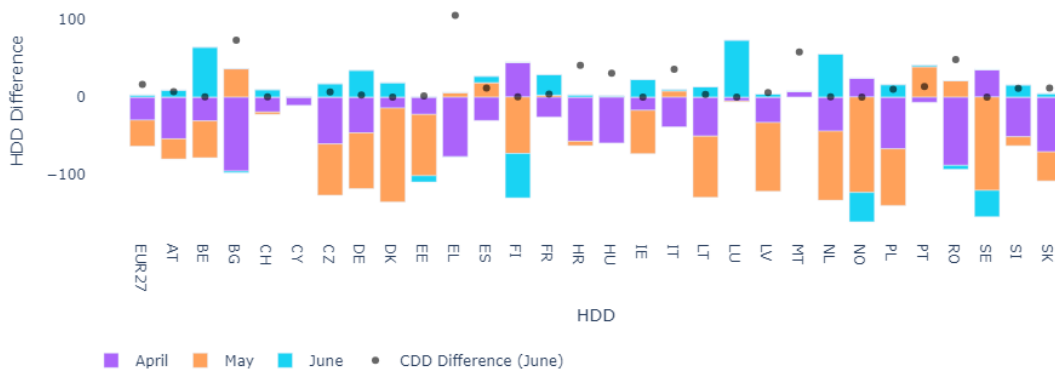
Figure 2 – Yearly changes in electricity consumption by Member State in Q2 2024 compared with Q2 2023



Source: Eurostat

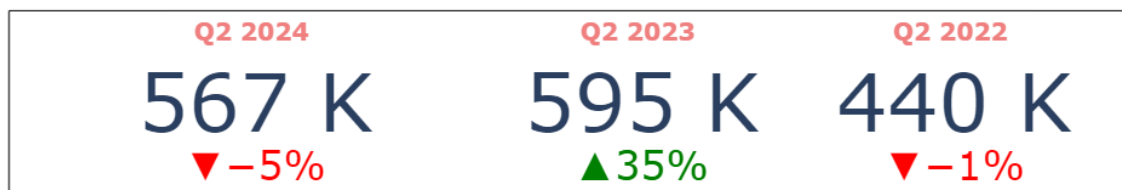
- Figure 3** illustrates the monthly deviation of actual Heating Degree Days (HDDs) from the long-term average (a period between 1979 and the last calendar year completed) in Q2 2024. EU-wide, the reference quarter was warmer than the historical range. Both April and May were particularly less cold than the historical average. Overall, Q2 2024 registered 61 HDDs below the long-term average. Most of the European countries registered warmer-than-average temperatures, apart from the Benelux countries in June. In June, Cooling Degree Days (CDDs) generally followed the historical average, except for a significant increase in Southern Eastern Europe (Cyprus, Greece, and Bulgaria).

Figure 3 - Deviation of actual heating days from the long-term average in April-June 2024



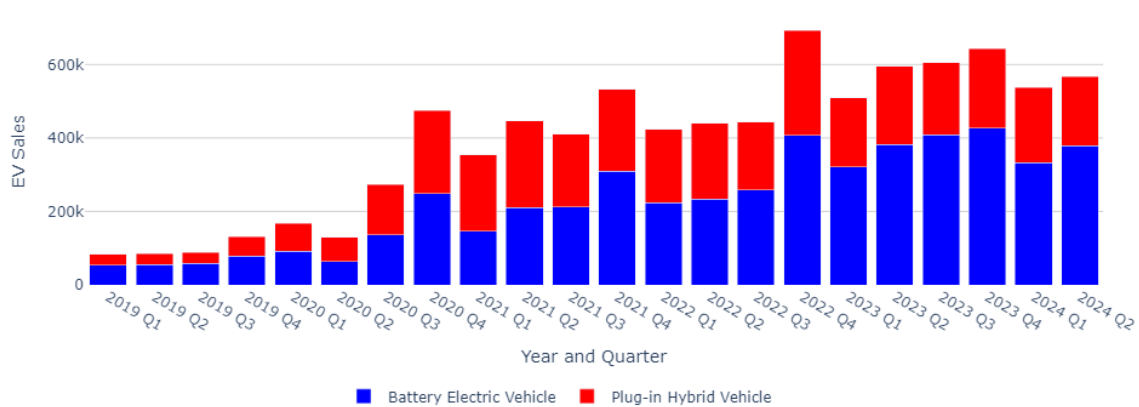
Source: JRC. The colder the weather, the higher the number of HDDs. The hotter the weather, the higher the number of CDDs

- Figure 4** shows that more than 567,000 new EVs were registered in the EU in Q2 2024 (-5% compared with Q2 2023). This figure represents a 20% market share of EV sales; lower than in China (51%), but double that of the United States (10%). The battery electric vehicles segment slightly declined (-1% year-on-year to 380,000), while the demand for plug-in hybrid vehicles contracted (-11% year-on-year to 188,000). Hybrid electric vehicles (not chargeable) sales amounted to 860,000, registering an increase of 25% compared with Q2 2023.
- Overall, more than 1.1 million new EVs were sold in the EU during 1H 2024, comparable to 1H 2023 figures.



EVs sold in Q2 2024, Q2 2023 and Q2 2022

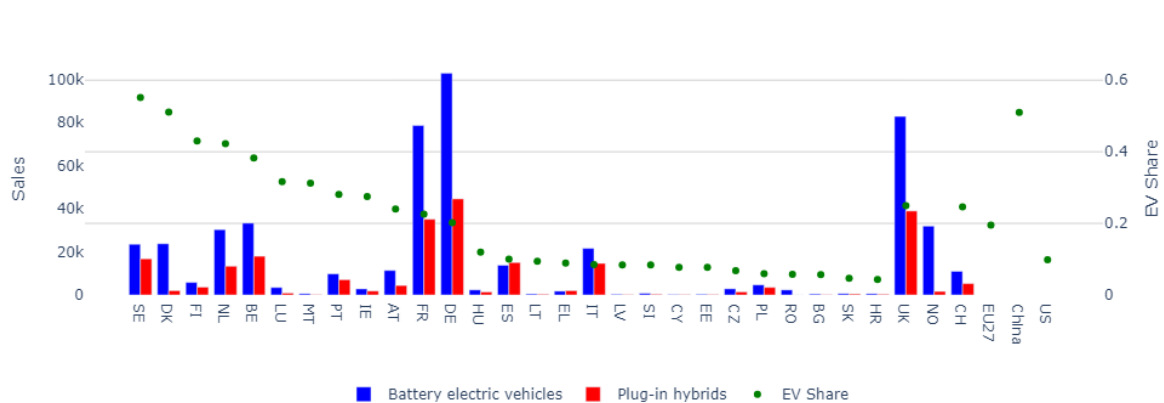
Figure 4 – Quarterly EV sales in the EU



Source: ACEA

- The largest share of sales of new EVs was observed for another quarter in Sweden, where 55% of all cars sold in Q2 2024 were EVs. Moreover, in Denmark, 51% of all passenger cars sold could be plugged, followed by Finland (43%), the Netherlands (42%) and Belgium (38%). Germany retained the position of the largest individual market (more than 147,000 EV sales in Q2 2024) followed closely by France, where sales amounted to more than 113,000 new EVs in the reference quarter.

Figure 5 – Electrically chargeable passenger vehicle (EV) sales in selected countries in Q2 2024

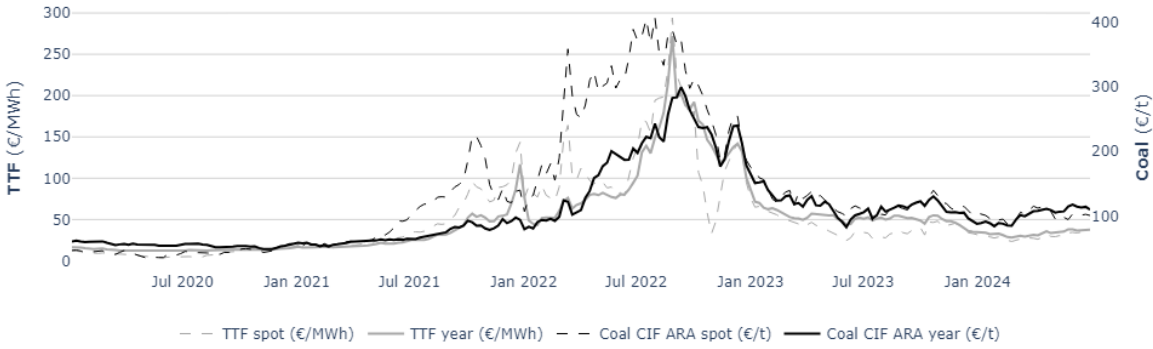


Source: ACEA, CPCA, BloombergNEF

1.2 Supply side factors

- Figure 6** reports on developments in European coal and gas prices. In Q2 2024, prices remained at lower levels than in 2022, and at similar levels as in 2023, supported by improved market fundamentals (i.e. high storage levels, reduced demand and additional LNG regasification capacities in Europe). Spot gas prices averaged 32 €/MWh in Q2 2024, 9% lower than prices in Q2 2023. TTF day-ahead prices remained at a discount to TTF forward contracts (month and year ahead) during Q2 2024. Year-ahead prices averaged 36 €/MWh in Q2 2024, 31% lower than in Q2 2023. Thermal coal spot prices, represented by the CIF ARA contract, fell to 103 €/t in Q2 2024 (from 116 €/t recorded in Q2 2023). After peaking in summer 2022 (above 400 €/t), coal prices were in a downward trend that ended in 2023, before rising again during the autumn. Coal prices continued rising again in Q2 2024 peaking roughly at 117 €/t in the second half of June.
- Moreover, in 1H 2024, spot gas prices averaged 30 €/MWh, 35% lower than in 1H 2023 (and 70% lower than in 1H 2022). Spot coal prices declined to 101 €/ton, which is 22% lower than in 1H 2023, and 60% lower than in 1H 2022.

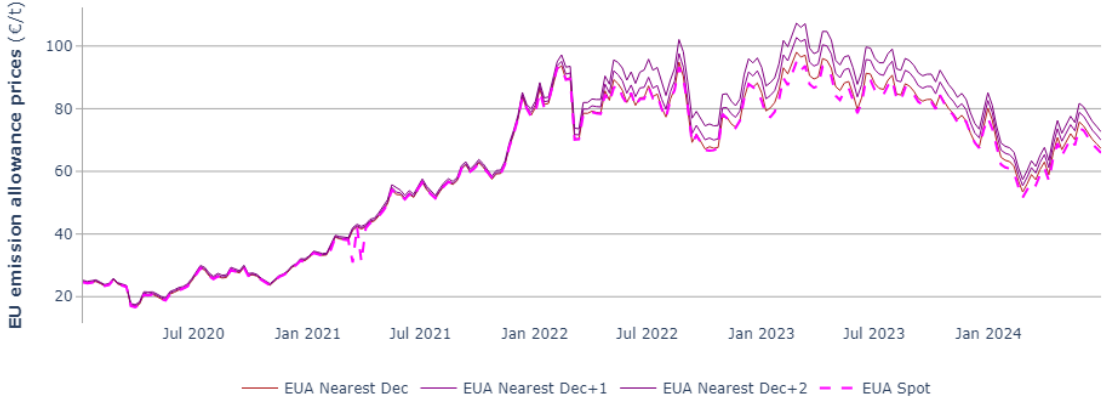
Figure 6 – Weekly evolution of spot and year-ahead coal and gas prices



Source: S&P Global Platts

- The European market for emission allowances, shown in **Figure 7**, decreased more markedly since summer 2023 reaching lows around 50 €/tCO₂ in the end of February 2024. Despite this decrease, emission prices have been rising steadily from the end of February into Q2 2024. However, this increasing trend reversed in June. The average spot price of CO₂ in 1H 2024 (64 €/tCO₂) was 26% lower than in 1H 2023. ETS Spot prices, moved roughly between 50 and 75 €/tCO₂ in Q2 2024. The average spot price of CO₂ in Q2 2024 (67 €/tCO₂) was 19% lower than in Q2 2023.

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



Source: S&P Global Platts

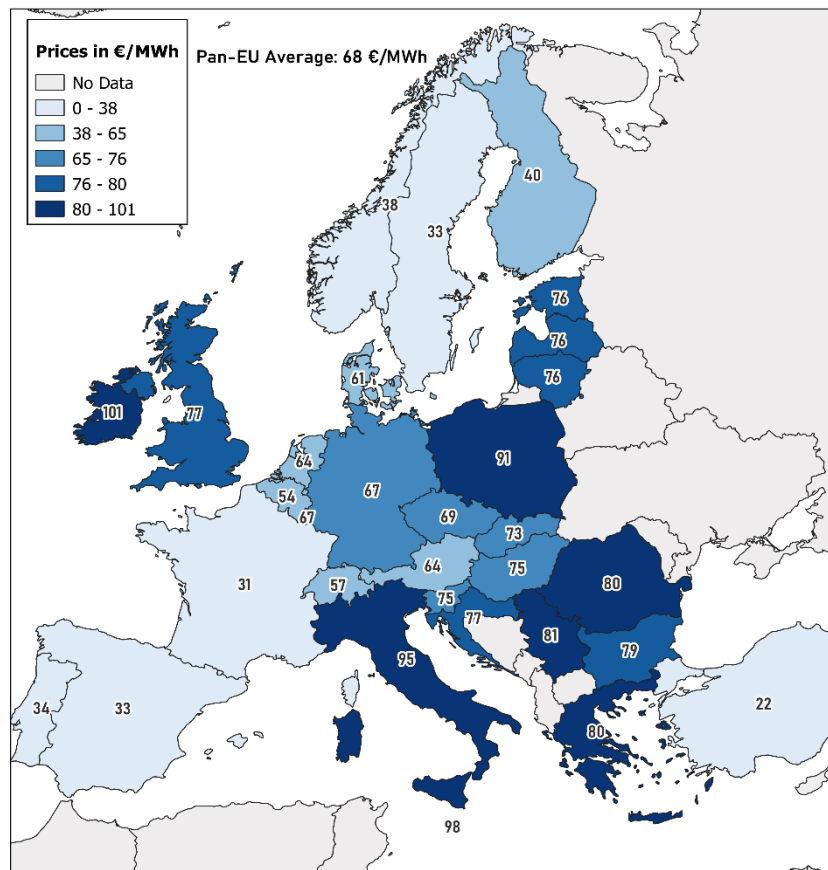
European wholesale markets

1.3 European wholesale electricity markets and their international comparison



- The European Power Benchmark averaged 60 €/MWh in Q2 2024, 33% lower on yearly basis. Compared to Q1 2024, the quarterly average price decreased by 10%. Prices ranged from a quarterly average of 31 €/MWh in France to 101 €/MWh in Ireland. On a yearly basis, European markets experienced a general decline in wholesale electricity prices in Q2 2024, ranging from -66% to -2%. The largest year-on-year price decreases among Member States were registered in France (-66%), Portugal (-59%) and Spain (-58%). The lowest decreases were recorded in Latvia (-6%) and Estonia (-2%) in Q2 2024, compared with Q2 2023 prices.
- The map below (**Figure 8**) shows the average day-ahead wholesale electricity prices in Europe in Q2 2024. Average day-ahead wholesale electricity prices in Europe were 25% lower than in Q2 2023. Good market fundamentals increased solar, wind and hydropower energy generation, a recovery in nuclear generation and moderate electricity demand 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, whereas hydropower continues to recover its generation levels.
- In the first half of 2024, average day-ahead wholesale electricity prices in Europe were 33% lower than in 1H 2023, averaging at 70 €/MWh. On a half-yearly basis, European markets experienced a decline in wholesale electricity prices, ranging from a half-yearly average of 39 €/MWh in Spain/Portugal to 96 €/MWh in Ireland. The largest year-on-year price falls in Member States were registered in France (-58%), Portugal (-56%) and Spain (-56%).

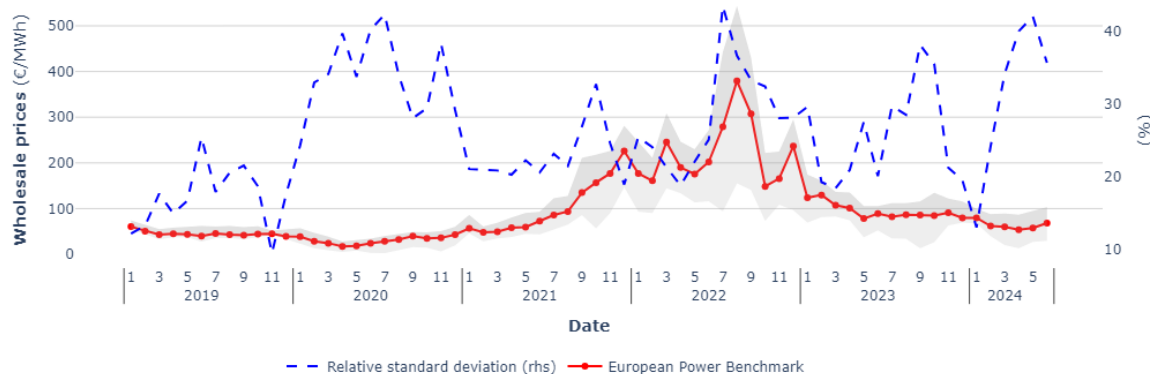
Figure 8 – Comparison of average wholesale baseload electricity prices, Q2 2024



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 new upward trend in Q2 2024 as prices have started to diverge again in certain regions across Europe, following a decline over the last months of 2023 and a low in January. The **Annex** provides graphics of the monthly and daily evolution of regional prices in Europe.

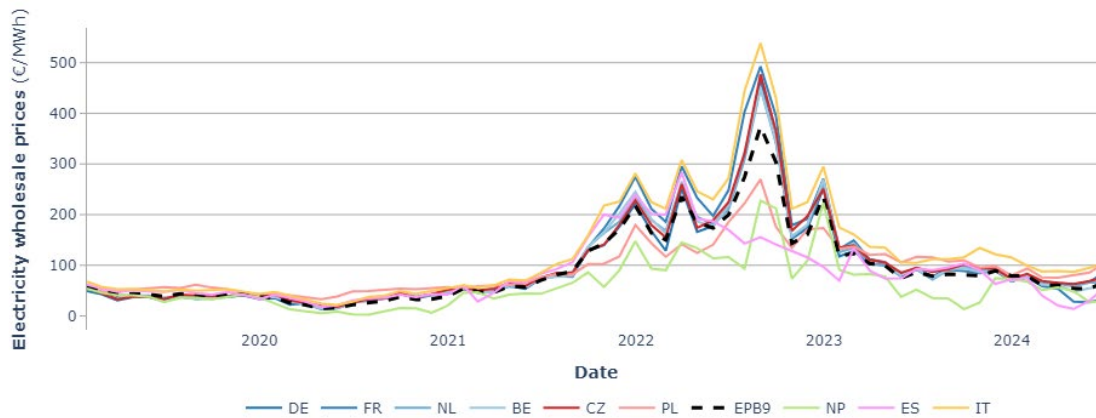
Figure 9 - The evolution of the lowest and the highest regional wholesale electricity prices in the European day-ahead markets and the relative standard deviation of the regional prices



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. Despite an overall positive trend in renewable energy and nuclear generation, slight increases in electricity prices were observed in Q2 2024 compared to Q1 2024, particularly in Poland, Italy, and Germany. This uptick in prices can be attributed to an increase in gas prices during this period.
- Germany, France and the Netherlands average prices in Q2 2024 were 72, 30 and 63 €/MWh, respectively from 92, 92 and 90 €/MWh in Q2 2023. The French market discount can be attributed to high year-on-year levels of nuclear fleet availability, supporting electricity exports and keeping prices low. Italy registered an average yearly price in Q2 2024 of 94 €/MWh, the highest of the nine selected markets. However, Italian prices decreased by 21% compared to Q2 2023.
- Strong renewable generation supported lower prices in Spain, averaging 33 €/MWh in Q2 2024 (-58% compared with Q2 2023, average of 80 €/MWh). At 35 €/MWh, prices in Northern Europe remained lower than in most parts of the continent, falling by 37% compared with Q2 2023.
- Central Eastern Europe markets followed prices at a higher level than in Central Western Europe, with prices at 90 and 69 €/MWh in average in Q2 2024 in Poland and Czechia, respectively. Poland and Czechia also registered yearly price decreases compared to Q2 2024 (-21% and -27% respectively).

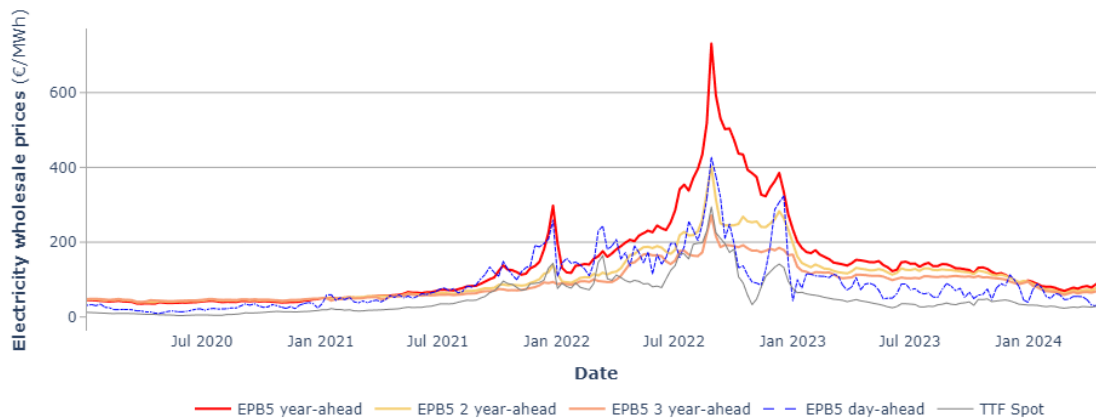
Figure 10 – Weekly average electricity wholesale prices in nine selected European markets



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. During this period, we roughly observed a high correlation between gas and electricity prices, with a two-fold leverage effect (proportionality factor induced by gas power plants efficiency and gas being the marginal power plant in electricity price setting). This correlation is fading away since summer 2023.
- In Q2 2024, the average electricity year-ahead, two-year ahead and three-year ahead contracts were respectively 88 €/MWh, 77 €/MWh and 70 €/MWh. The premium of the weekly average between the year-ahead contract and the spot price ranged around 15 €/MWh and 63 €/MWh during Q2 2024.

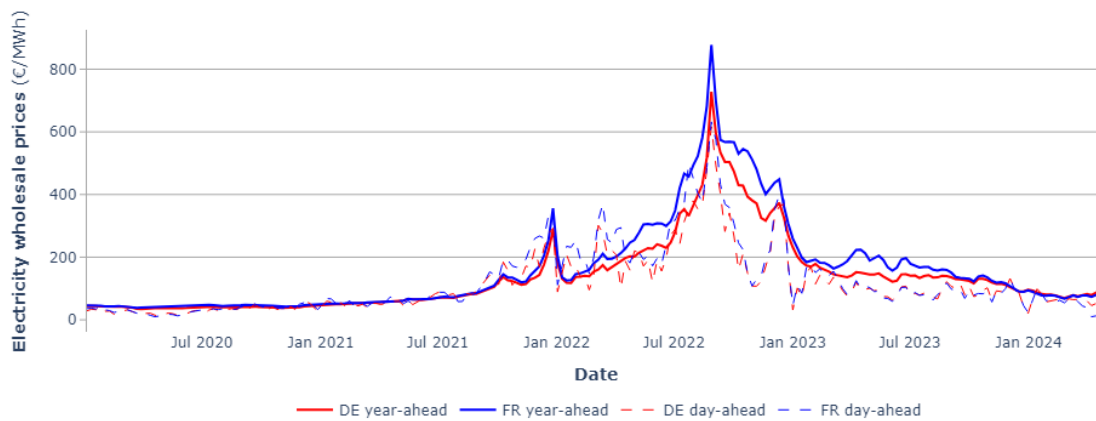
Figure 11 – Weekly futures baseload prices – weighted average of selected European markets



Source: S&P Global Platts.

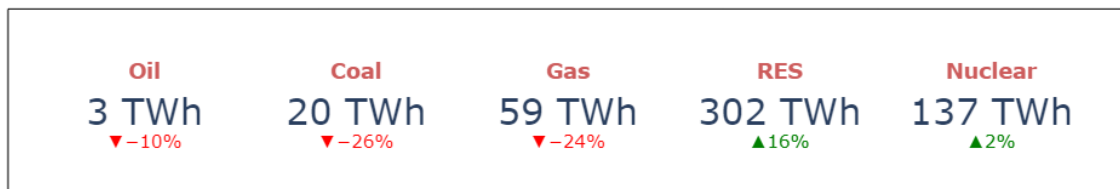
- **Figure 12** shows the evolution of year-ahead contracts of Germany and France, together with their equivalent spot (day-ahead) prices. The divergence between the two forward contracts decreased in Q2 2024 when compared with Q2 2023. During the energy crisis, the divergences reflected some structural 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 Q2 2024 there was a shift in the trend, with a premium of the German contract over their French equivalent, which ranged around 6-23 €/MWh during Q2 2024.

Figure 12 – Weekly German and French year-ahead contracts



Source: S&P Global Platts.

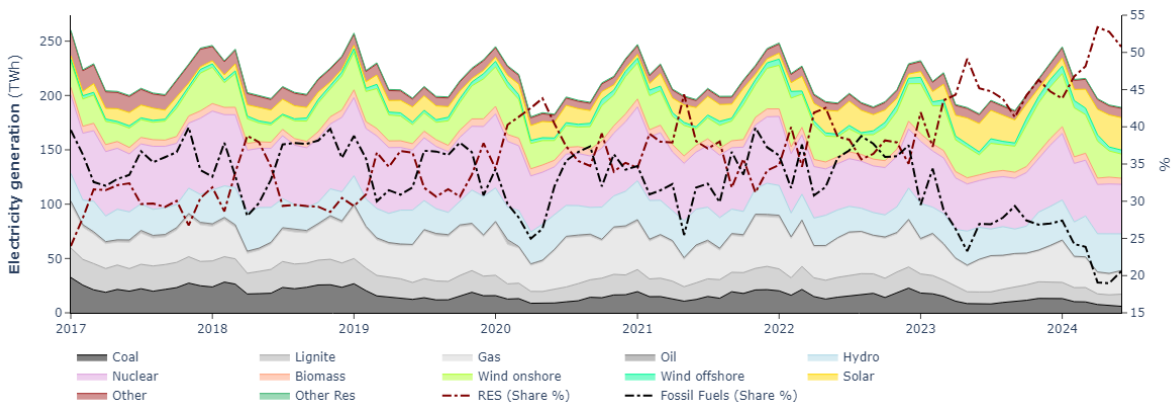
1.4 Electricity mix in the EU



Electricity generation in Q2 2024 compared to Q2 2023. Source: ENTSO-E

- **Figure 13** shows the monthly evolution of the electricity mix in the EU. In Q2 2024, RES generation reached 302 TWh (+16% compared with Q2 2023) constituting, on average, 52% of the electricity mix (up from 46% in Q2 2023). Overall, electricity generation increased by 2%, reaching 577 TWh in Q2 2024 compared to 564 TWh in Q2 2023.
- In the first half of 2024, the share of renewable generation grew to 49% compared with 43% in 1H 2023. The increase was supported by additional +20% in solar generation (+20 TWh), +36% in wind offshore (+9 TWh), +6% in wind onshore (+12 TWh) and by a +24% increase in hydropower generation (+41 TWh). Wind and solar generation together (360 TWh) registered an increase of +13% (+40 TWh).
- In Q2 2024, the share of the electricity produced from fossil fuels declined to 24% from 30% in Q2 2023 due to a decrease of the electricity generated through coal (-19%), gas (-24%) and oil (-10%). Electricity generated by nuclear increased by 2% (equivalent to +3 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 Q2 2024 compared to Q2 2023 was supported mainly by a remarkable increase of 21% in hydro generation (+18 TWh), as well as an increase of 20% and in solar generation (+14 TWh). Renewable electricity generation from offshore wind increased by 38% (+4 TWh). This was also the case for onshore wind generation, which increased by 6% (+5 TWh). Wind and solar generation (176 TWh) registered a year-on-year increase of 15% (+22 TWh).

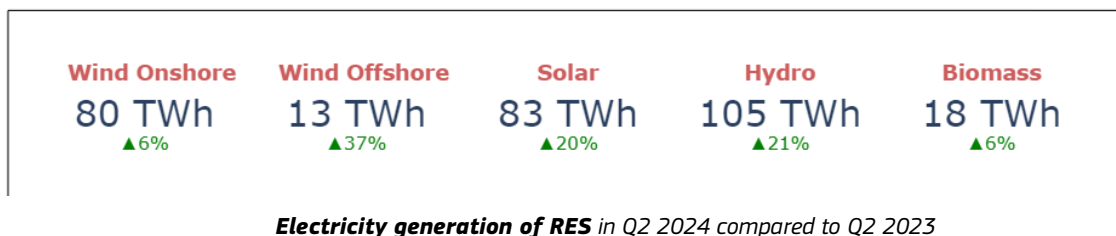
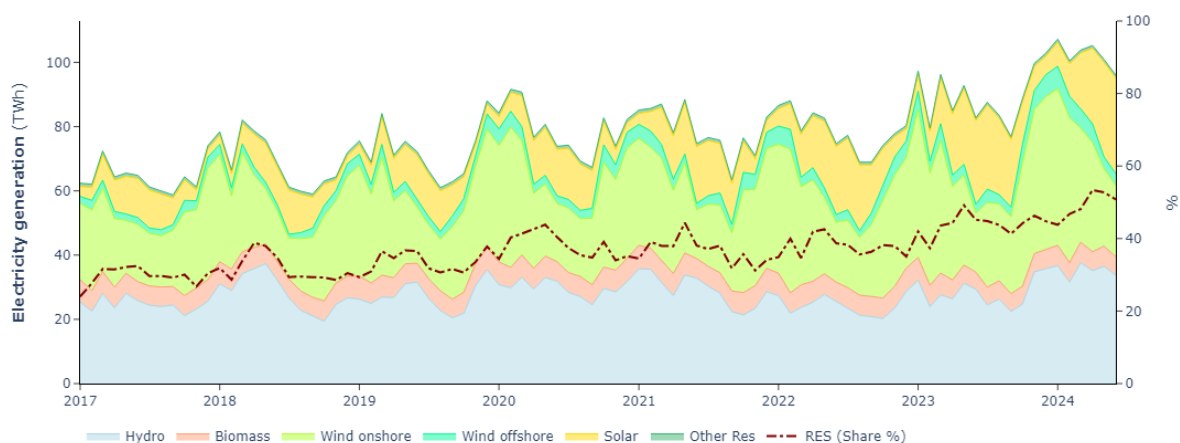


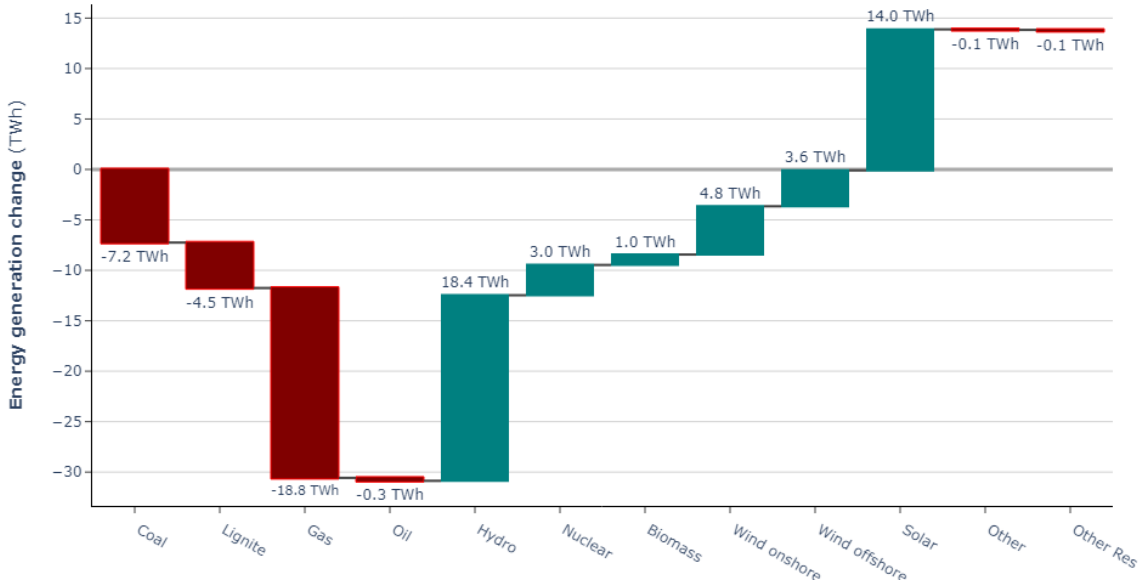
Figure 14 – Monthly renewable generation in the EU and the share of renewables in the power mix



Source: ENTSO-E. Data represents net generation.

- Figure 15** visualises changes in the EU27 electricity generation in Q2 2024 compared to Q2 2023. Between 2023 and 2024, fossil fuel generation dropped by 18% (-31 TWh), supported by coal, lignite, gas, and oil generation falling by 7 TWh (-26%), 5 TWh (-13%), 19 TWh (-24%), and 0.3 TWh (-10%) respectively. Hydro generation registered the biggest absolute increase (+21%, equivalent to +18 TWh) compared to Q2 2023. Wind offshore generation registered the biggest relative increase (+38%, equivalent to +4 TWh).

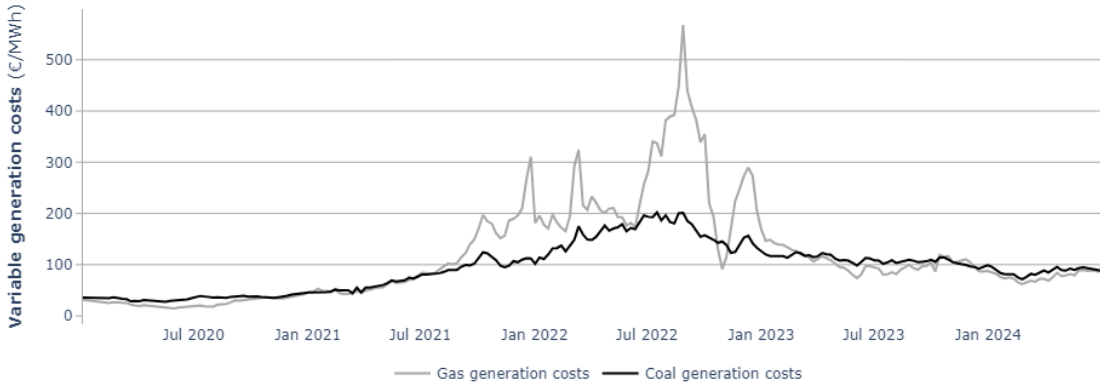
Figure 15 – Changes in power generation in the EU between Q2 2024 and Q2 2023



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 Q2 2024. However, this trend began to wane due to an increase in gas prices towards the end of the quarter, which narrowed the gap between coal and gas fuel switching. This trend continued into the third quarter of 2024.

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

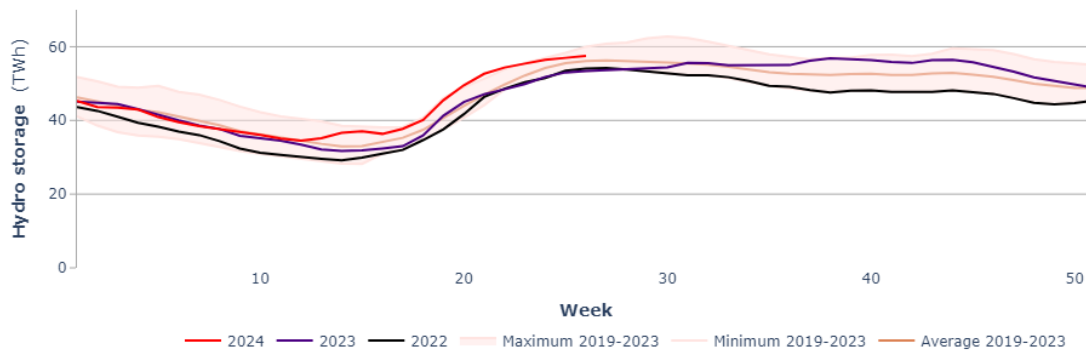


Source: S&P Platts, ENER.

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 Q2 2024 levels of hydro reservoirs in the reported markets. In Q2 2024, the overall sum of hydropower reservoirs was noticeable higher than in Q2 2023 (+11%).

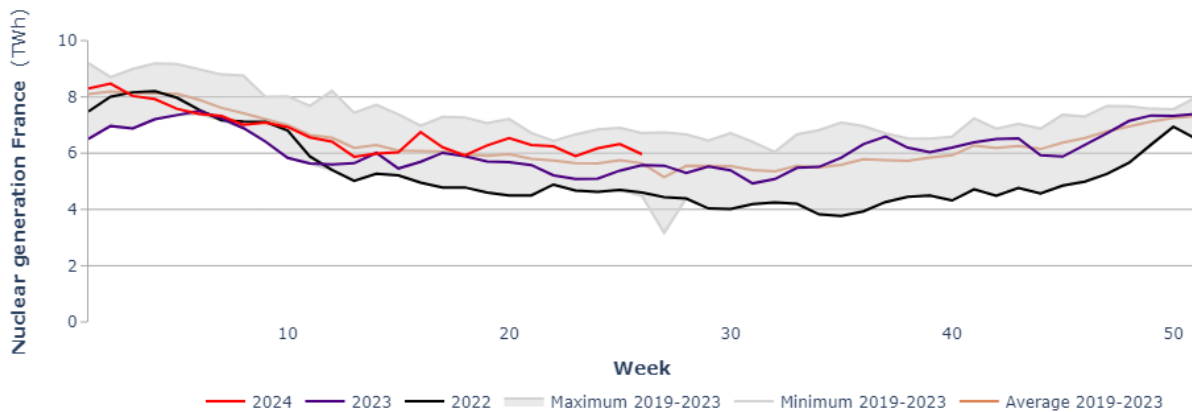
Figure 17 - Aggregated EU hydropower reservoirs – weekly



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 81 TWh in Q2 2024 and was up by 11% compared to Q2 2023.

Figure 18 – Weekly nuclear electricity generation in France



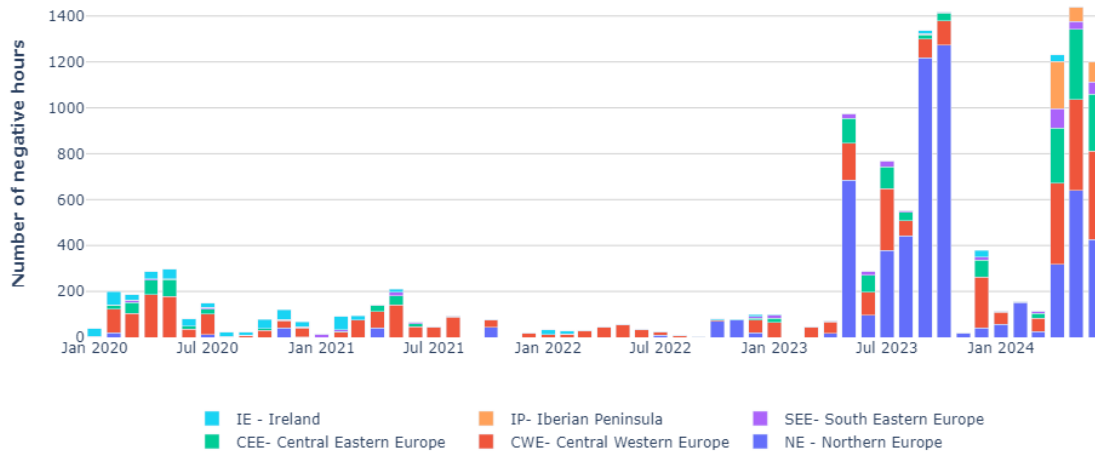
Source: ENTSO-E



- **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 Q2 2024, the number of negative hours reached 4166 in selected European markets, compared to 1441 in Q2 2023 (+189%). This is the highest second quarterly figure since the record set in Q2 2023 (1441). The highest number of occurrences of negative price took place in May of the reference quarter (1578), with most negative prices occurring 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.

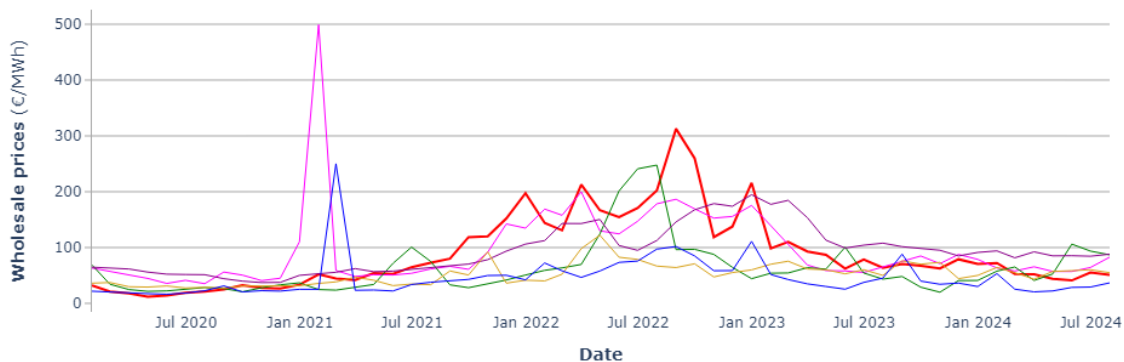
Figure 19 – Number of negative hourly wholesale prices on selected day-ahead trading platforms in Europe.



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 Q2 2024 between -55% (CAISO) and +6% (NYISO) year-on-year. In Q2 2024, the estimated US average price of selected markets (27 €/MWh) was 14% lower than in Q2 2023.
- In Japan, year-on-year prices rose by 6% in Q2 2024 to 61 €/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 21% during the reference quarter.
- In Australia, wholesale electricity prices rose by 20% year-on-year in Q2 2024 to 87 €/MWh. Prices in India remained roughly stable registering only a modest year-on-year increase of 2% in Q2 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.

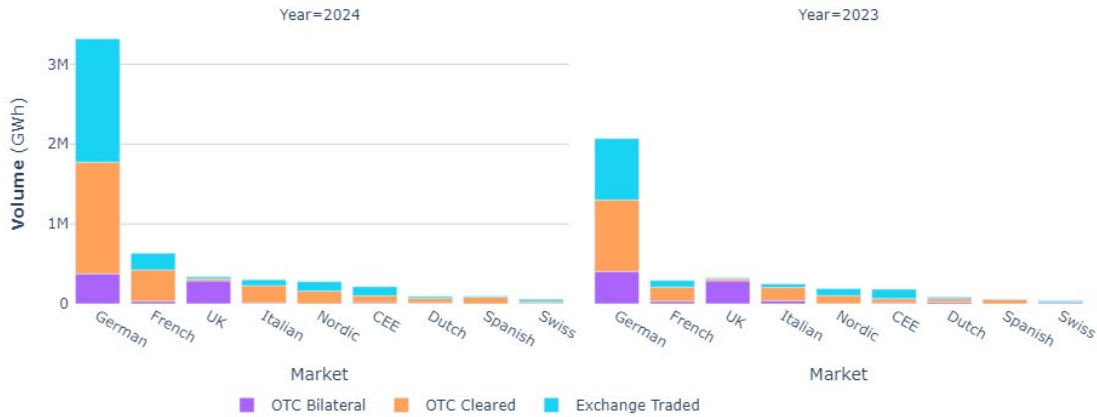
1.5 Traded volumes and cross border flows

- **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 Q2 2024 and Q2 2023. Activity grew significantly in exchange traded (+87%) and OTC cleared contracts (+61%) in Q1 2024, while decreasing in OTC bilateral contracts (-9%).

- In Q2 2024, Germany was by far the largest and most liquid European market, as total volume was equivalent to 62% of the total traded volumes under observation. Notable year-on-year total volume increases were seen in France (+116%), Germany (+60%) and Spain (+59%).

Figure 21– Traded volume of electricity on the most liquid European markets in Q2 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 Q2 2024 and Q2 2023. France continues to position itself as the main net exporter in the EU with 22 TWh of net exports in Q2 2024. The improved situation of the French nuclear fleet supported a rise in export flows.
- Sweden was the second largest net exporter (7 TWh), thanks to a significant discount in wholesale electricity prices vis-à-vis the neighbouring and other continental European markets. In Q2 2024, the other important EU exporters were Austria and Spain (3 TWh).
- Germany (-11 TWh) surpassed Italy (-10 TWh), as the main EU importer. The list was followed by Portugal (-3 TWh) and Hungary (-2 TWh) during the quarter.

Figure 22 – Member States’ net scheduled commercial export/import positions within the EU in Q2 2024 and Q2 2023

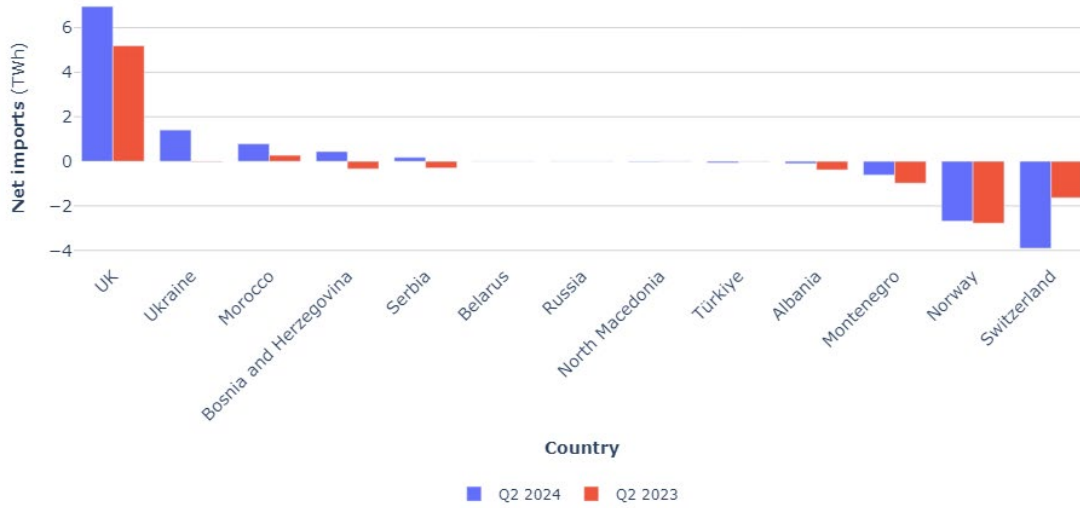


Source: Scheduled Commercial flows ENTSO-E, TSOs

- **Figure 23** shows netted electricity exchanges with EU neighbours in Q2 2024. Great Britain registered a fall in its export balance, increasing net imports from the EU in Q2 2024 (7 TWh). Switzerland (-4 TWh) surpassed Norway (-2 TWh) as the largest net exporter to the EU in Q2 2024.
- Net exports from the EU to Ukraine rose to 1.4 TWh in Q2 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. Since then, the TSOs of Continental Europe have gradually increased the capacity available for trading.

Figure 23 – Extra-EU electricity commercial scheduled exchanges in Q2 2024 and Q2 2023 – netted



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

Retail markets

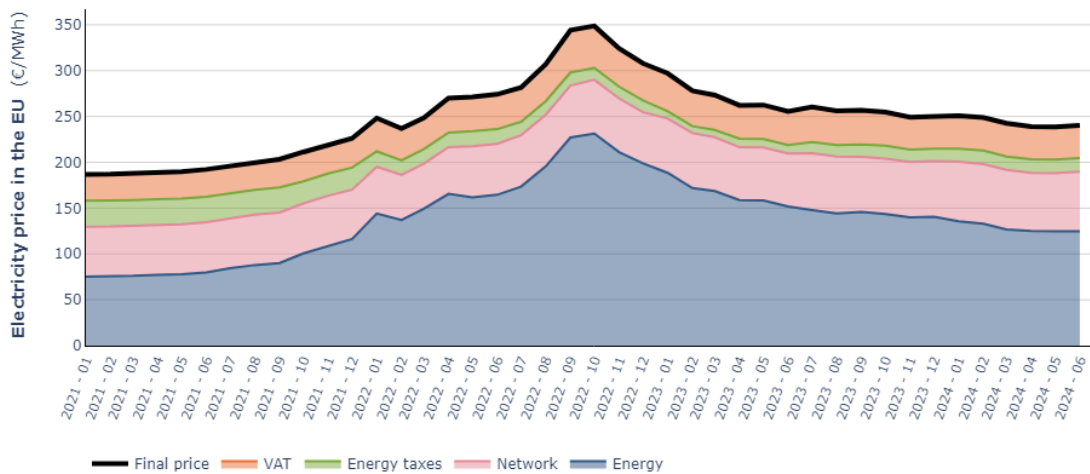
1.6 Retail electricity markets in the EU



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

- Q2 2024 saw a decrease of 8% in household retail prices compared to Q2 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 April to June 2024, from 239 €/MWh to 240 €/MWh. The average retail price stood at 243 €/MWh in the first half of 2024, a decrease of 10% when compared with 1H 2023 prices.

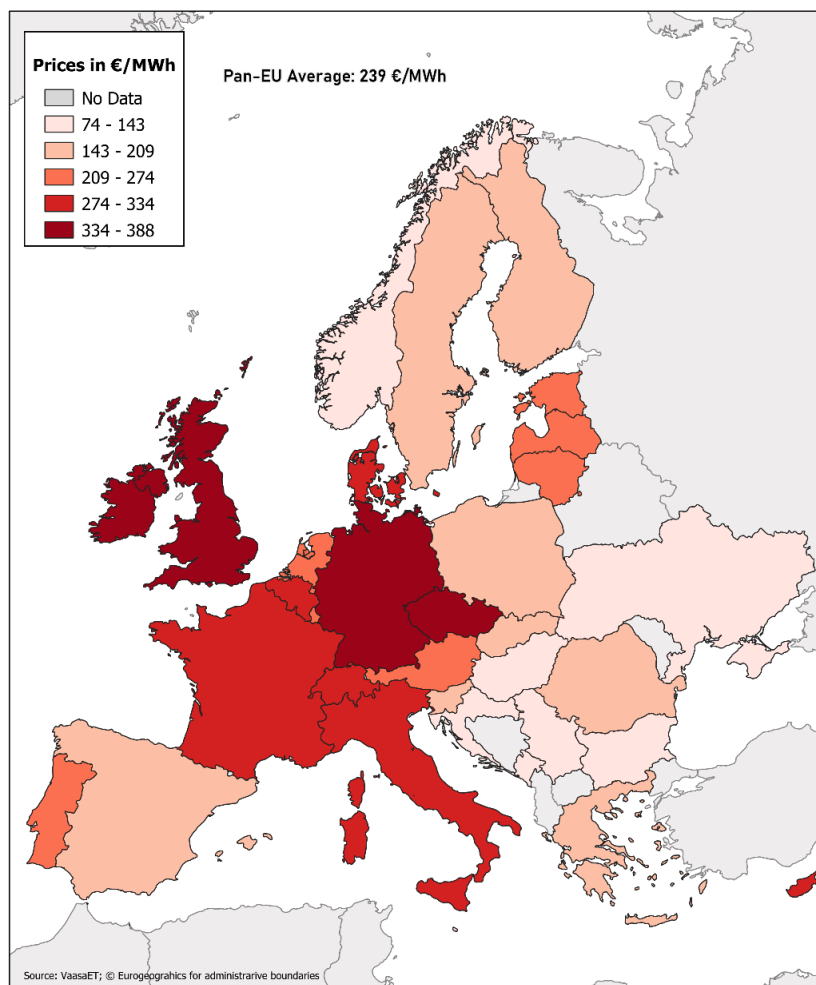
Figure 24 - Monthly average electricity price in the EU, paid by typical household customers



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, Q2 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 Q2 2024, the highest average prices were observed in Germany, Czechia and Ireland (388, 378 and 373 €/MWh, respectively). The lowest ones had been observed in Hungary, Malta and Bulgaria (94, 123 and 132 €/MWh respectively).
- In Q2 2024, the energy component share fell to 52%, a decrease of 8 percentage points compared to Q2 2023. The share of VAT, TAX and Network components increased by 1, 2 and 5 percentage points respectively.

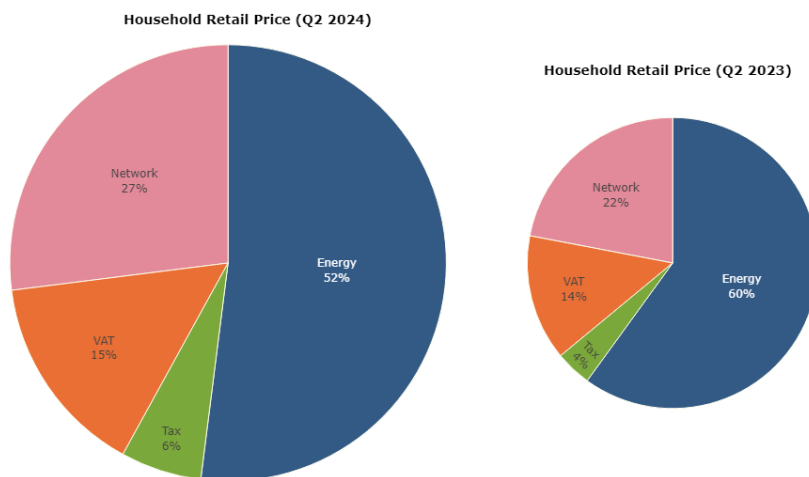
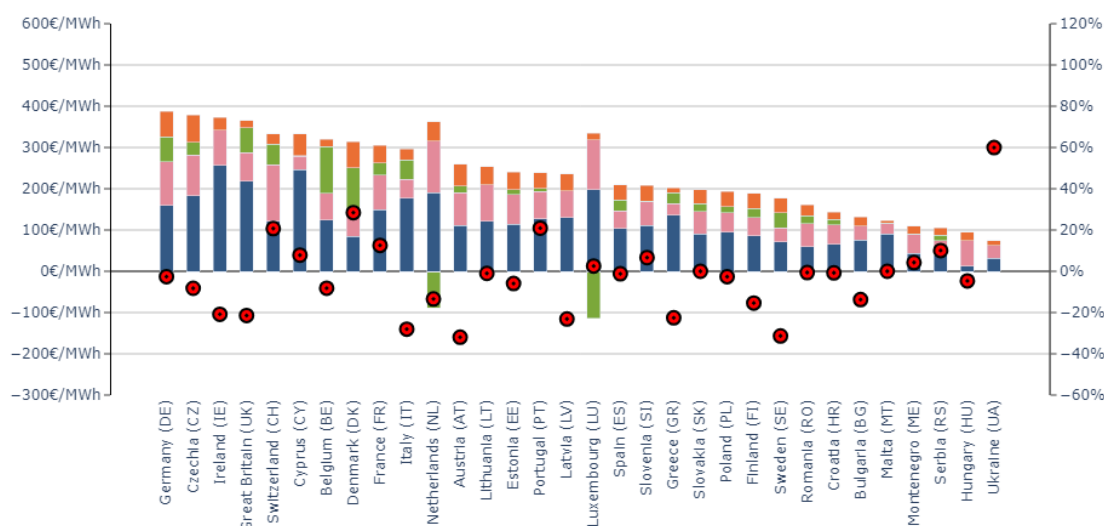


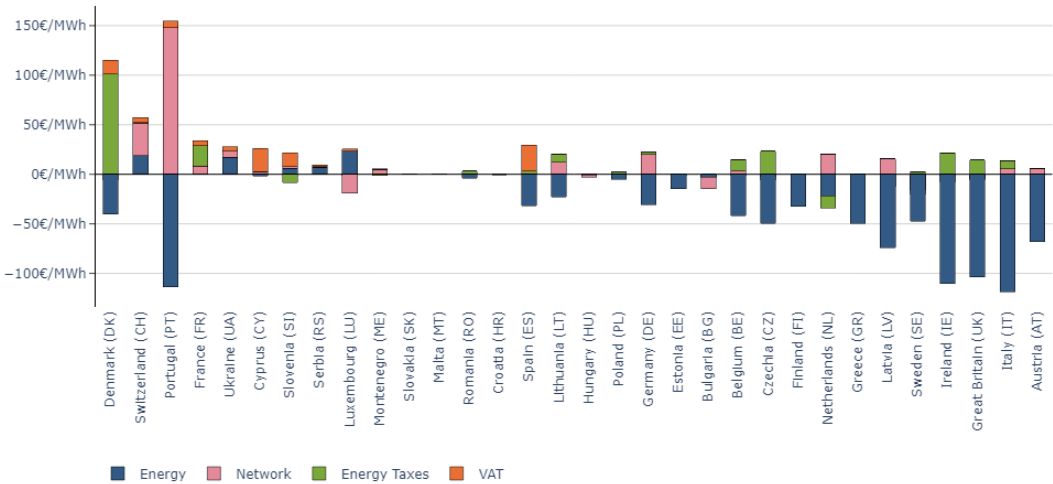
Figure 26 – The Household Energy Price Index (HEPI) in European capital cities, Q2 2024



Source: Vaasaett

- Compared to the same quarter of the previous year, the largest price decreases in absolute terms in the EU in Q2 2024 were observed in Austria (-122 €/MWh), Italy (-115 €/MWh) and Ireland (-98 €/MWh). Denmark, Portugal and France saw the largest increases in retail prices of +69 €/MWh, +41 €/MWh and +34 €/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.

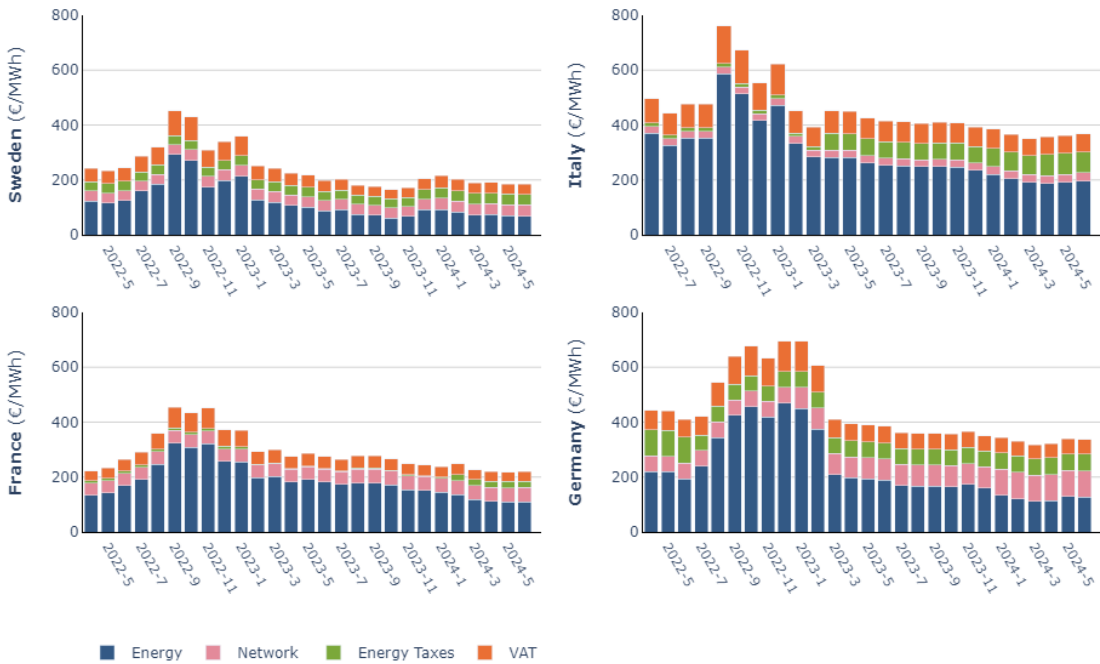
Figure 27 – Year-on-year change in electricity prices by cost components in the European capital cities comparing Q2 2024 with Q2 2023



Source: Vaasaett

- **Figure 35** shows industrial SMEs (IB Band) electricity prices for selected Member States in Q2 2024. Average end user prices in Italy were at 362 €/MWh, which is more than in Germany (332 €/MWh), France (219 €/MWh) and Sweden (187 €/MWh).
- Some differences between countries are noticeable. In France, energy taxes were increased in Q2 2024, but they still contribute significantly less to the end user price (10% of the final price, compared to around 20% for other countries). In Italy, the network cost is significantly lower compared to the end user prices, as its share is of only 8% compared to 29% in Germany.
- These variations highlight the complex interplay of factors shaping industrial electricity prices for small and medium consumption in different regions of the EU. The low level of taxes in France, contrasting with Italy's substantial contribution, and the divergent distribution cost structures among the selected Member States, underscore the nuanced nature of pricing dynamics. These disparities are influenced by a combination of market dynamics, regulatory policies, and the energy mix.

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



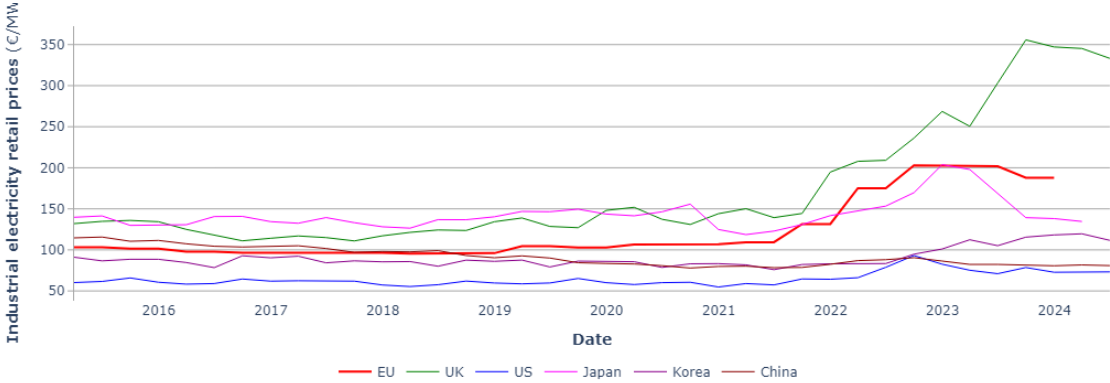
Source: Vaasaett

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.
- Electricity prices for industrial users in the EU registered a year-on-year decrease in the second half of 2023 compared to the second half of 2022 (-7%). These are the first signs of falling electricity prices at industrial level since 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.

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.

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



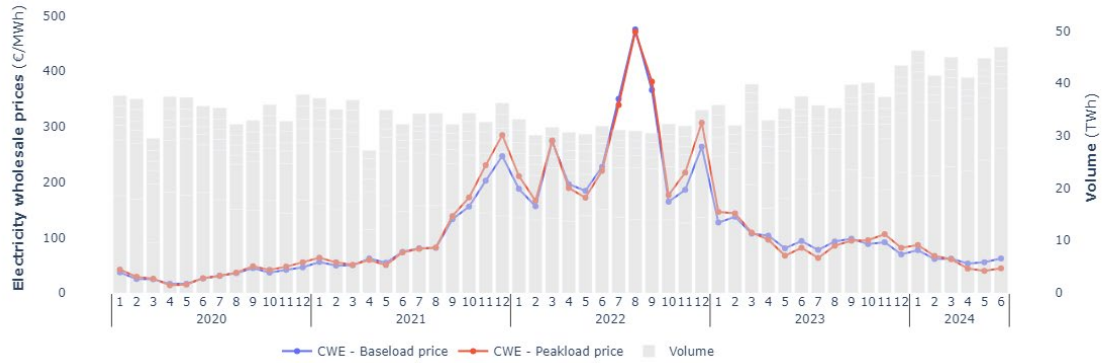
Source: Eurostat, EIA, DESNZ, IEA, DG ENER computations. Industrial prices in the EU are represented by the ID consumption band for the purposes of international comparison.

Annex

Regional wholesale markets

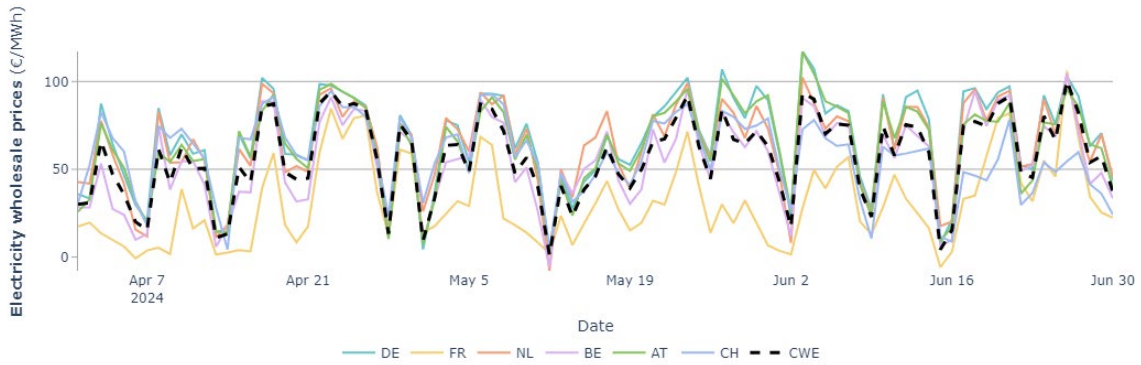
1.8 Central Western Europe (Austria, Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland)

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

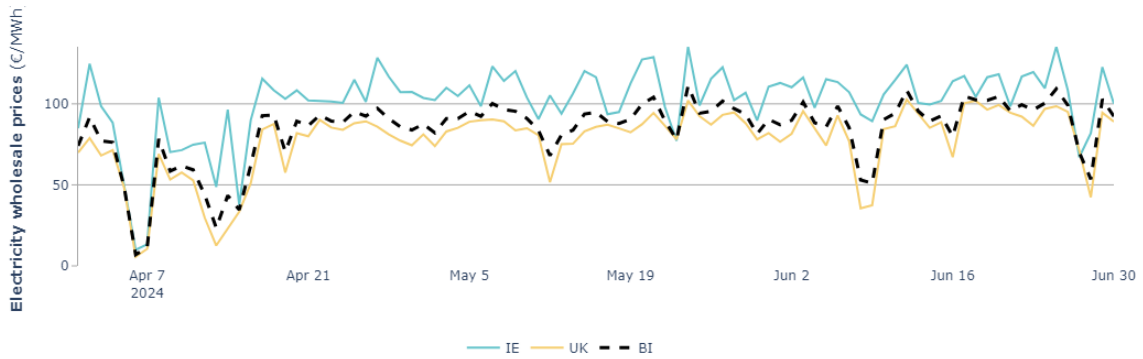
1.9 British Isles (GB, Ireland)

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

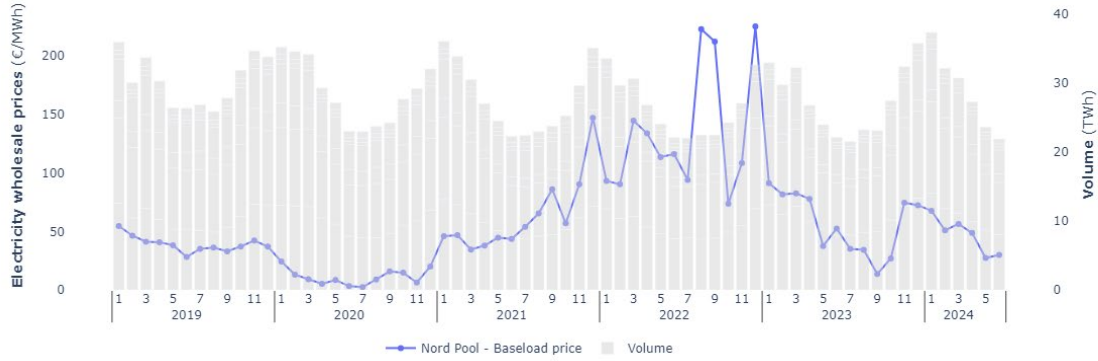
Figure 33 – Daily average electricity prices on the day-ahead market in Great Britain and Ireland



Source: Nord Pool N2EX, SEMO

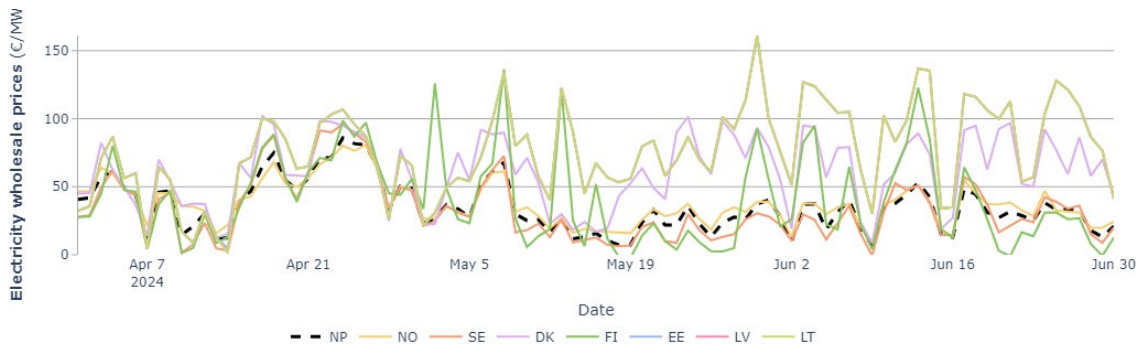
1.10 Northern Europe (Denmark, Estonia, Finland, Latvia, Lithuania, Sweden, Norway)

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

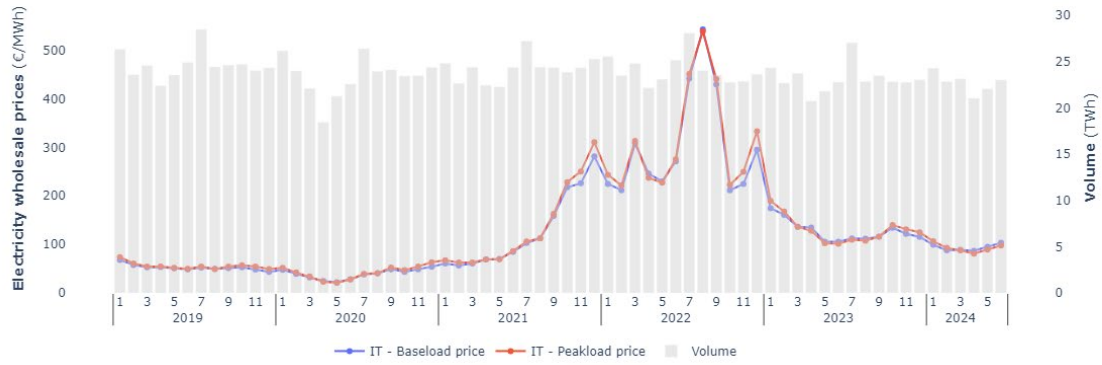
Figure 35 – Daily average regional prices and the system price on the day-ahead market in the Nordic region



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

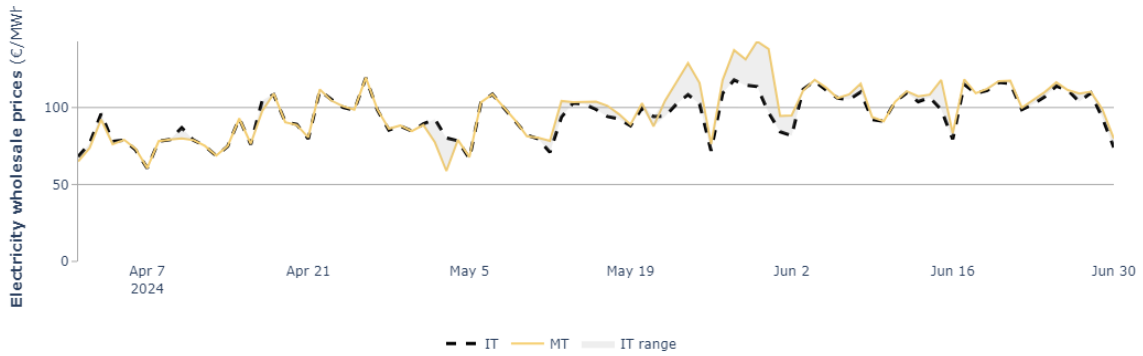
1.11 Apennine Peninsula (Italy, Malta)

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)

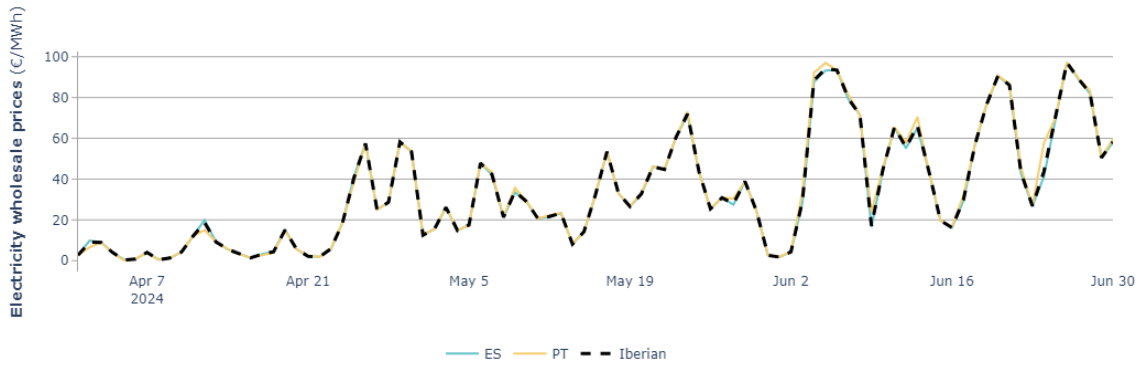
1.12 Iberian Peninsula (Spain and Portugal)

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



Source: S&P Global Platts, OMEL, DGED

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



Source: S&P Global Platts, OMEL, DGED

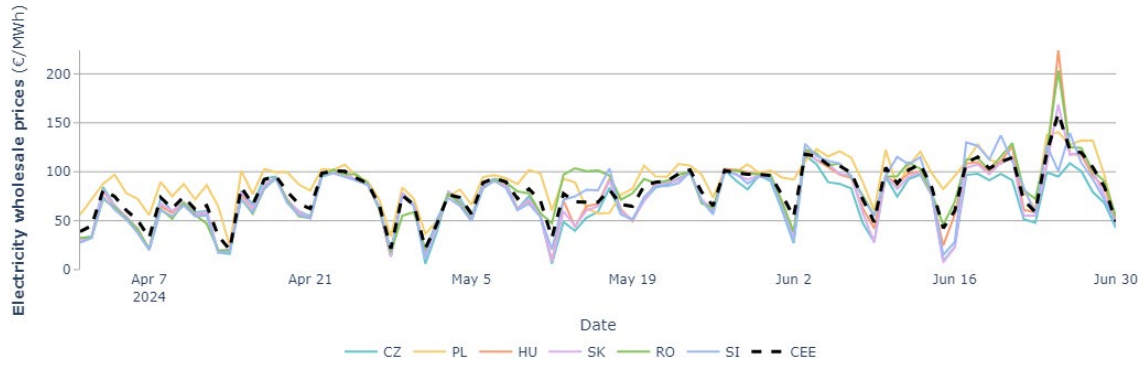
1.13 Central Eastern Europe (Czechia, Hungary, Poland, Romania, Slovakia, Slovenia)

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

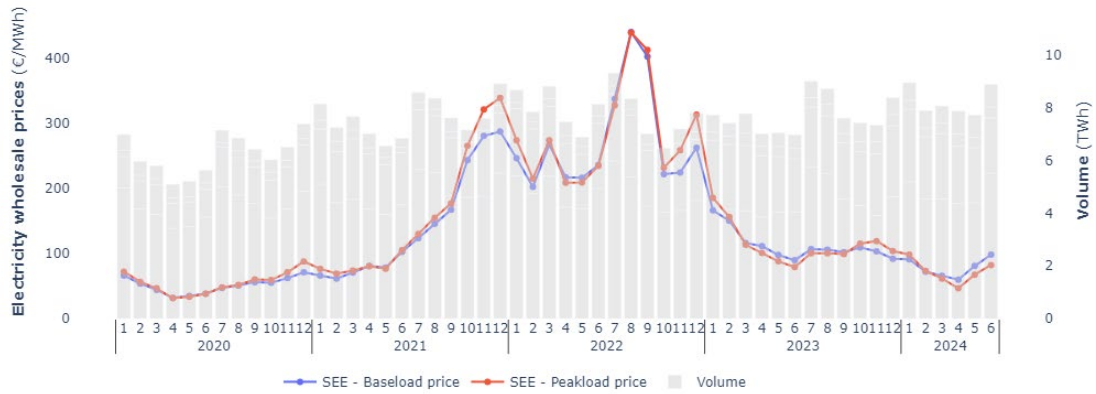
Figure 41 – Daily average power prices on the day-ahead market in the CEE region



Source: Regional power exchanges

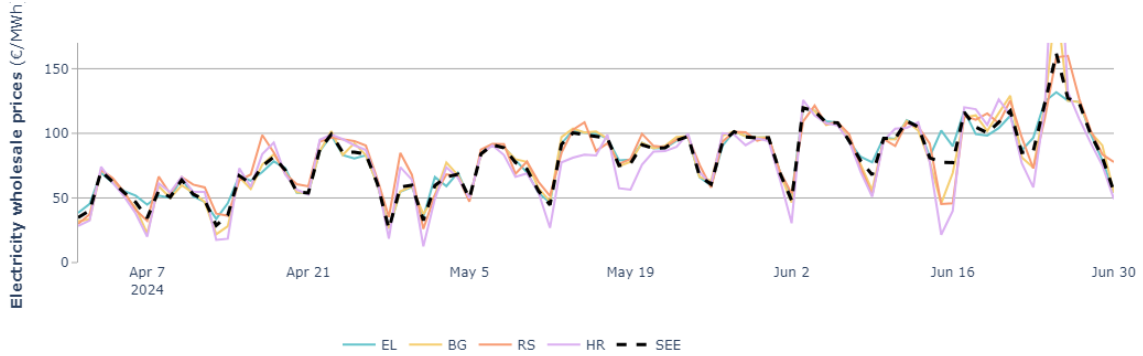
1.14 South-Eastern Europe (Bulgaria, Croatia, Greece and Serbia)

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



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

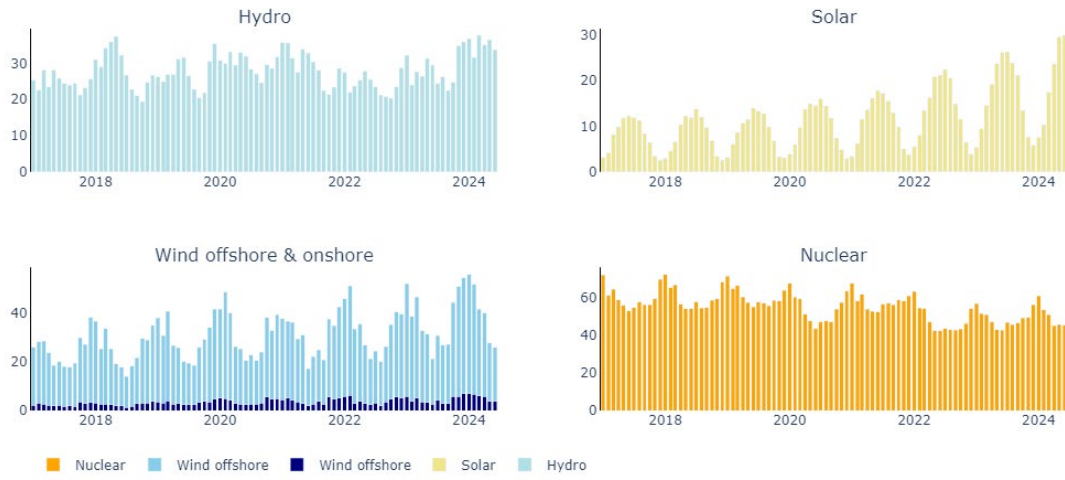
Figure 43 – Daily average power prices on the day-ahead market in Bulgaria, Croatia, Greece and Serbia



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

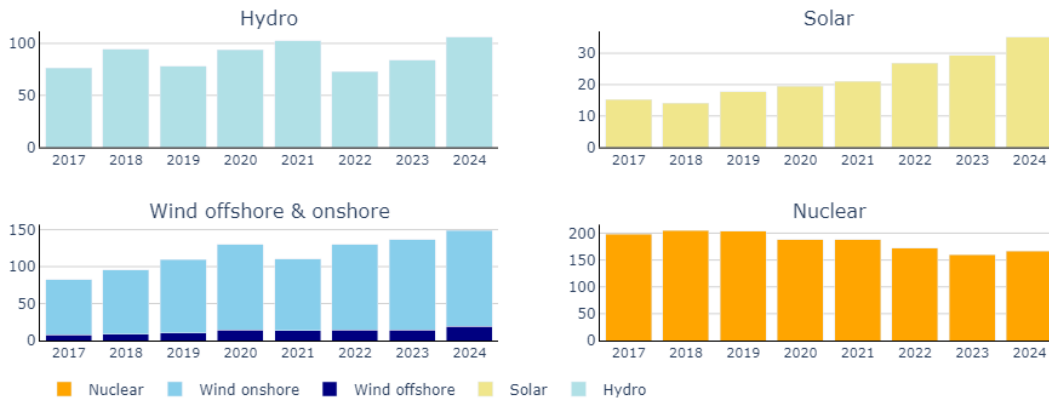
1.15 Electricity generation

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 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.