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Fast forwarding the green transition in just and socially responsible way – cases of industry, energy and transport sectors

TREND REPORT

ON THE ENERGY SECTOR

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Content

Energy security, sustainability and affordability

The energy sector plays the key role in the EU pursuit to become a climate neutral economy by 2050 While a recently sped up increase of renewables has been observed in the European energy mix as a result of the implementation of climate change mitigation policies and measures, the EU remains heavily dependent on imports of fossil fuels, which holds a declining but still considerable share in supplying its needs. Both Europe's dependency on natural gas imports and the ambitious decarbonisation agenda have had their impacts on energy prices. The sectoral trends and challenges need to be considered with respect to and acknowledging the interplay and tensions between three objectives: energy security, sustainability (comprising climate change mitigation and resilience), and last but not least, affordability, which directly impacts the competitiveness of the EU economy.

In the last decade the inland consumption and production of hard coal in the EU has followed a consistent downward trend, with an exception of a temporary increase in 2021 (not reaching 2020 levels) following a steep decline in 2020 caused by the COVID-19 pandemic. A largely similar trend was observed regarding lignite. From 2018 to 2023, the EU reduced its consumption of hard coal by 42% and of lignite by 40%[1].

Consistent with the above, the trends observed in **electricity generation** in the EU over the last years (from 2015 to 2023) show a declining reliance on fossil fuels (by 372 TWh), with biggest falls in coal generation observed in Germany (-140 Twh i.e. -38%), Spain (-48TWh, Italy (-29 TWh), and Poland (-28 TWh), and a dynamic increase of wind and solar generation (by 211 TWh), with the largest additions in Germany (+60 TWh wind, +24 TWh solar), France+27 TWh wind), and Spain (+15 TWh wind, +146 TWh solar). Those were paralleled with a moderate decline in nuclear: -83 TWh in Germany (due to closures) and -102 TWh in France (due to maintenance) since 2015, and hydro (due to draughts and unfavourable hydrological conditions).

Of the total 2710 TWh generated in the EU in 2023, as much as 45% was contributed by renewable sources, as wind and solar energy collectively surpassed fossil fuels, while the latter accounted for 32.5% of total production, natural gas 14.7% and coal 12.7%. Nuclear electricity accounted for 20%.

While in the last years **electricity demand** has largely been stable amounting to 974 TWh in 2023 (with some disparities among Member States), an increase can be expected with the proceeding electrification of energy consumption.

An unprecedented surge in renewable power generation brought a record annual decline of 19% in the EU power sector **emissions** ($MtCO_2$) in 2023**,** consistent with the downward trend with average annual decreases of 5.2% since 2015. (As much as 59% of the EU emissions were contributed by three countries: Germany (29%, 188 $MtCO_2$), Poland (17% 112 $MtCO_2$) and Italy (13%, 87 $MtCO_2$), representing only 37% of the EU electricity demand).[2]

[1] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Coal_production_and_consumption_statistics

[2] https://ember-energy.org/latest-insights/european-electricity-review-2024/eu-electricity-trends/]

The promise of the European Green Deal has been not only the one of clean energy but also of **affordable energy.** The EU commitment to decarbonisation has been seen as an opportunity for the European economy to build its competitive advantage on taking the lead in new clean technologies and benefitting from low-cost clean energy sources. Meanwhile, however, electricity prices are 2-3 times higher than those in the US, and natural gas prices paid are 4-5 times higher, as indicated by the Mario Draghi report which provides a comprehensive analysis of the causes and offers possible remedies.[3]

The report points to the fact, that energy retail prices for consumers (including industry) are significantly influenced by various **taxes, levies, and charges**, each designed to fulfil specific functions, with significant variation among Member States in tax rates. In 2022, the EU amassed around EUR 200 billion in total taxes and network charges from all electricity and gas consumers, with approximately EUR 40 billion coming from the industrial sector alone. At the same time the EU's fragmented approach to State aid risks is undermining the Single Market and puts smaller Member States that can't afford to participate in a subsidy race in a disadvantageous position.

Important factors impacting electricity prices are: carbon pricing (as the energy sector is covered by **the EU Emissions Trading System**), which makes carbon part of energy generation cost inevitably embedded in electricity price, and the way marginal prices are set. In 2023 carbon cost represented approximately 10% of the EU industrial retail electricity price. In the EU carbon cost is volatile and also high, compared to less than EUR 10/MWh in China or EUR 10-15/MWh in California in the US (other US states do not have carbon pricing systems).

Natural gas share in the EU power mix remains relatively high, while the share of coal is diminishing, with differences between Member States. Fossil fuels secure the flexibility in power supply to consumers, compensating the intermittent nature of wind and solar sources, but at the same time, they operate as **a marginal-price setters**, driving electricity prices up, all the more so, when the natural gas or coal prices soar, as in the energy crisis of 2022. The beneficiaries are wind and solar plants, which, generating electricity at very low costs, can cover their very high investment costs. In 2022 natural gas was the price-setter 63% of the time in 2022, despite being only 20% share in the electricity mix. It is projected that high prices of gas will continue translating into high electricity prices at least for ten years on, until gas is displaced in the EU power energy mix.

Back in 2021, the EU imported 155 bcm of Russian natural gas, representing 45% of its gas imports and almost 40% of its total gas consumption[4]. The EU's heavy reliance on fossil fuel imports enabled Russia to weaponize gas supplies, which led to a significant reduction in pipeline gas flows to Europe. The gas flows had to be re-directed to predominantly West-East routes channelling LNG imports. **The intra-EU competition**, combined with g**as congestion** caused by

[3] "The future of European competitiveness" September 2024 https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en

[4] Leigh Hancher (2024) EU Energy Market Regulation after the 2022 Energy Crisis: the reforms so far and the challenges ahead, European Policy Analysis, Swedish Institute for European Policy Studies, January 2024 https://www.sieps.se/globalassets/publikationer/2024/2024_1epa.pdf

limited LNG import infrastructure and cross-border interconnections, contributed to an excessive rise in gas prices, which and were driven much higher than in Asia (in July-August 2022, TTF averaged EUR 40/MWh above the Japan Korea Marker (JKM)[5]. Spreads between different EU markets rocketed above EUR 100/MWh in the summer of 2022 from the level of less than EUR 1/MWh regularly observed in the past). The Agency for the Cooperation of Energy Regulators reported that EU Transmission System Operators (TSOs) congestion revenues skyrocketed beyond regular network tariffs from EUR 55 million in 2021 to EUR 3.4 billion in 2022, as a result of competition for scarce capacities[6].

To address the energy crisis, the EU adopted the **'REPowerEU'** plan with the interconnected aims of ending dependence on Russian fuels and speeding decarbonisation of the EU energy mix. It provided a framework for a solidary action of Member States in reducing energy demand, diversifying energy supplies, and accelerating replacement of fossil fuels. A number of measures to contain prices were also initiated such as the UE Energy Platform for collective gas purchase, an obligation to use two-way contracts for difference (CfD), and promotion of power purchase agreements (PPAs).

During the energy crisis all Member States introduced **national measures to mitigate risks** to energy supply and shield citizens and companies from high prices with subsidies amounting to several billions of euros, with the three largest economies accounting for 70% of the total support: Germany (40%), Italy (14%) and France (14%). Interventions were for the most part made unilaterally and in a non-coordinated manner.[7]

In 2023, as a result of the EU efforts to **diversify its gas trade**, the Russian gas share in supplying the EU demand dropped to 8%, paralleled by an **increased share and demand of LNG** (which is more expensive not only due to liquification and transportation costs, but also because the EU needs to compete with other destinations) and by increased **dependence on spot markets**. The EU is the biggest global importer of gas and LNG, but its **collective market power** remains underutilised.

The integration of electricity and gas markets in the EU has already brought significant cost savings for consumers (including industry), estimated for electricity only at EUR 34 billion a year, but numerous **physical network bottlenecks** need to be removed so that full benefits from it can be realised. The EU's power network infrastructure also needs to be adapted to operate in a more interconnected, decentralised, and flexible system, capable to address the challenges posed by the electrification of the economy as well as pressures involved in an unbalanced

[5] As net importers of gas, Japan and Korea exhibit similarities with the EU, however Korean gas imports are monopolized through the state-owned Korea Gas Corporation (KOGAS) which is in the position to negotiate import prices and reduce costs throughout the value chain, while the state-owned Japan Organization for Metals and Energy Security (JOGMEC) engages in global investments in the upstream production of fossil fuels and minerals and is able to ensure access to energy at prices closer to production cost.

[6] https://www.acer.europa.eu/document/10th-acer-report-congestion-eu-gas-markets-and-how-it-managed

[7] Leigh Hancher (2024)

deployment of wind and solar technologies (which otherwise have complementary intermittent production profiles) or resulting from geographical gaps between demand and renewable electricity supply. While grid investments related to transmission and distribution will predominantly be carried out within national borders, the European Network of Transmission System Operators for Electricity (ENTSO-E) estimates in its Ten-Year Network Development Plan (TYNDP) that cross-border transmission should double by 2030. It is projected that addressing system needs should bring in a reduction of costs of EUR 9 billion/year in 2040, significantly outweighing the investment cost of EUR 6 billion/year for 2040. By 2050 more than 7 million km of distribution and transmission lines at all voltage levels will need to be replaced, as well as more than 43,000 km of additional transmission cables.[8]

The decarbonisation of the energy system and the green transition can massively contribute to decreasing UE fossil fuel import dependency and contribute to lower energy prices by bringing the massive deployment energy sources such as renewable and nuclear, which have low marginal generation costs and are in line with Europe's climate ambitions. However, this is not going to happen if the network infrastructure turns out to be the bottleneck to accelerated renewable energy deployment and if zero-emission flexibility and storage solutions are not developed, all of which will be needed to address the electrification related demands.

[8] "The future..."

Employment

As a result of structural changes linked to decarbonization three trends can be observed impacting **the workforce and employment** in the energy sector: progressing disappearance of jobs related to operations dependent on fossil-fuel production (such as coal mining and coal-fired plants), creation of new jobs in the renewable energy sources, as well as technologically driven changes redefining the jobs characteristics.[9]

JRC in their report[10] estimated job losses in coal-fired plants and mines in the period of 2020 - 2030 to range from 54,000 to 112,000 (depending on a phase-out scenario applied) with an impact concentrated in selected EU regions, among which Upper Silesia in Poland stands out with up to as many as 45,000 jobs at risk. As of 2020 direct employment in coal activities in Europe was estimated at 208,000 people, with 76% in the mining sector, and the highest job numbers in Poland, Germany, Czechia, Romania and Bulgaria. Around 86,000 coal mining jobs were assessed as facing a high risk of redundancy due to the potential closure of the least competitive mines.

If the promise of just transition is to be kept, the regions where fossil fuel related jobs are concentrated need to be able to diversify their economies to create new jobs in time to absorb workers from coal related sectors as they are made redundant, and re-skilling and upskilling need to be provided for so workers can adapt to new demands and remain in employment.

As the EU transits to renewable energy production and increasingly electrified energy use, new employment opportunities have started to arise in such energy related fields as renewable energies, electromobility, energy storage, energy efficiency, and smart metering, as well as in grid infrastructure modernisation and expansion.

[9] Greening the Economy: Employment and Skills Aspects, BusinessEurope, October 2021 https://www.businesseurope.eu/sites/buseur/files/media/reports_and_studies/2021-10-15_employment_and_skills_aspects_of_greening_-_final.pdf

[10] Alves Dias, P. et al. (2021). Recent trends in EU coal, peat and oil shale regions. EUR 30618 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-30987-1, doi:10.2760/510714, JRC123508.

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