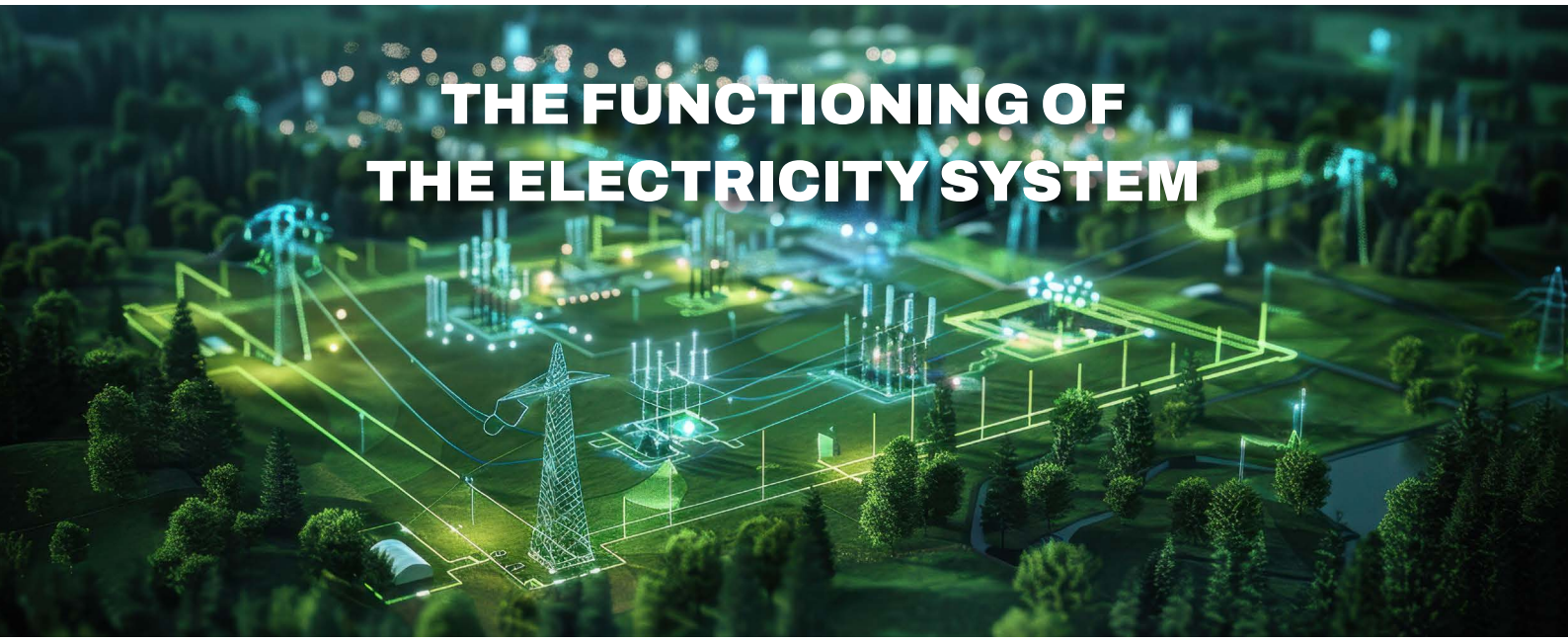
OIE

Notes from
the Observatory of the
French Electricity Industry

Uses of Electricity | **Electricity System** | Energy Policy

March 2025



THE FUNCTIONING OF THE ELECTRICITY SYSTEM

3 HOW DOES THE ELECTRICITY WHOLESALE MARKET WORK?

The electricity wholesale market covers several maturities:

1

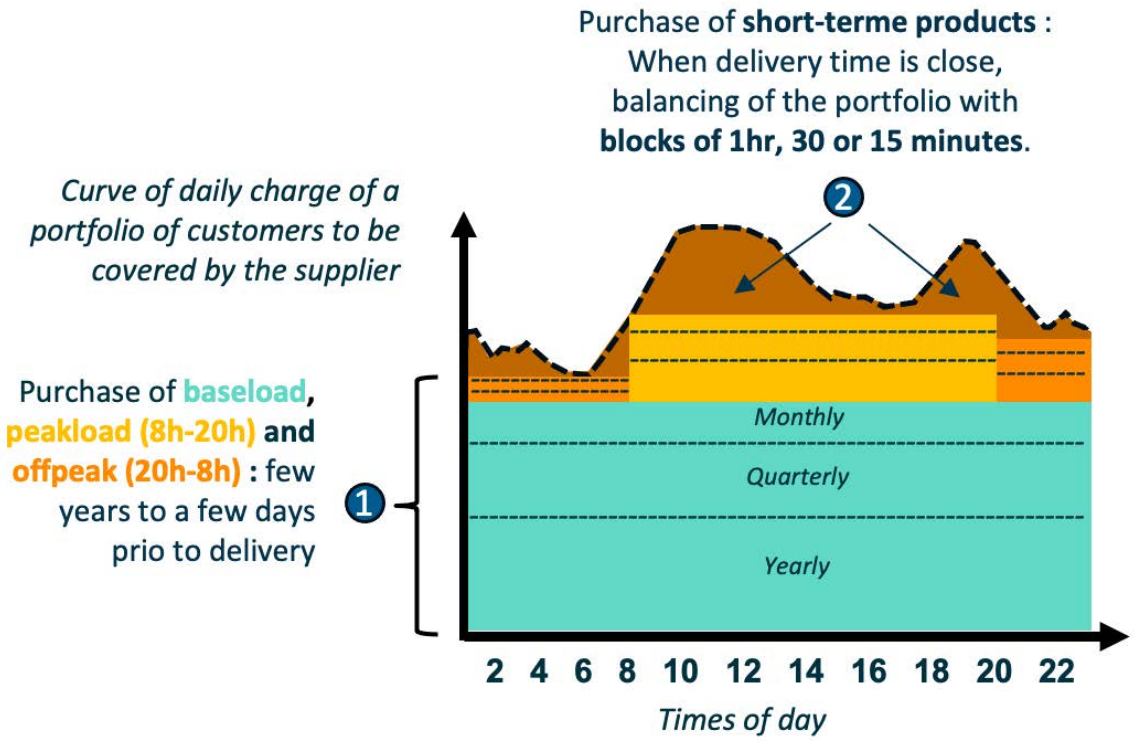
Futures markets: to secure their financial trajectory, electricity suppliers cover **most of their procurement** in advance, on futures markets (from a few years to a few days before the electricity is delivered), with "**forward**" products (tailor-made products that are traded as "OTD" - which stands for Over the Counter - or through an intermediary) and **"futures" products** (standardised products that are traded on electricity exchanges). The price of futures products corresponds to price forecasts of spot products at these different times. **Baseload** products ensure a constant supply of power (24/7), **peakload** products cover periods of high demand (8am - 8pm in the week) and **off-peak** products, periods of low demand (8pm - 8am on weekdays, at weekends and on public holidays).

In France, since 2011 and up to the end of 2025, and alongside futures markets, suppliers can benefit from the ARENH mechanism (Regulated Access to Historical Nuclear Electricity) which entitles them to purchase up to 100 TWh per year at a regulated tariff. For each year of delivery Y, ARENH orders take place in November of the year Y-1.

2

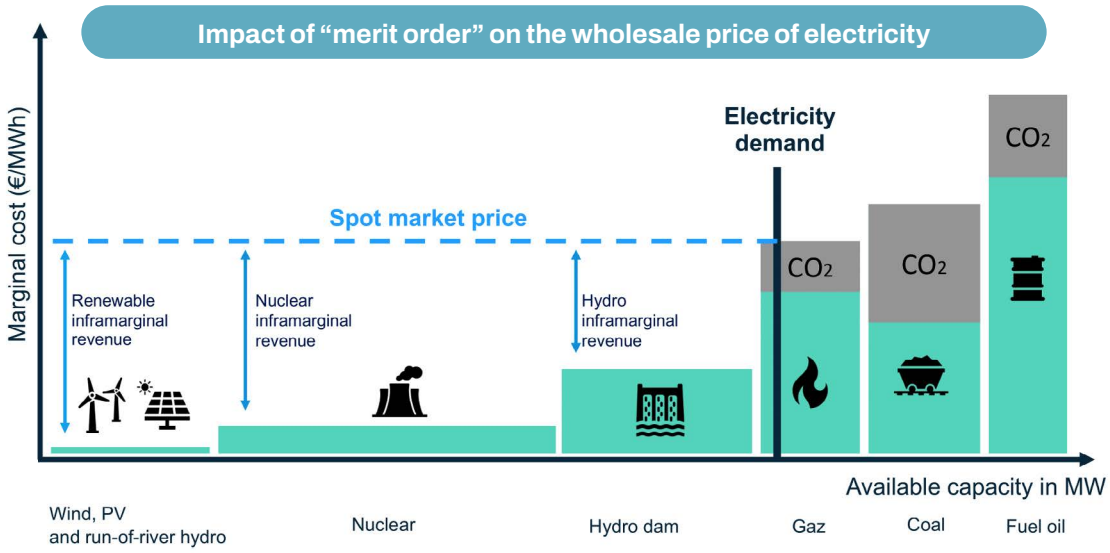
Spot markets: as delivery deadlines come closer, suppliers, that benefit from a greater visibility of their customers' consumption, balance their portfolio on spot markets by purchasing "**spot products**" (for nextday delivery) and "**intraday products**" (for same-day delivery and up to an hour before delivery). The prices of these spot products are extremely volatile and reflect the short-term supply-demand equilibrium (temperature variations, cloudiness, available capacity of power stations or interconnections...).

Simplified strategic planning of a French supplier



On the spot market, the price is set according to the merit order principle: the European power plants are ranked, for each hour, **from lowest to highest marginal cost (cost of producing an additional kilowatt-hour)**. The cheapest power units are selected until the entire aggregated European demand is supplied: the first power stations to be called on are the renewable ones with zero marginal costs (wind, solar and run-of-river hydro). Next in line are nuclear power stations with a low marginal cost, hydropower plants, and finally fossil-fuelled power stations (gas, coal and fuel oil) with high marginal costs. The marginal cost of fossil-fuelled power stations is indeed dependent on the cost of combustible fuels and the CO_2 price per ton.

Transactions are settled at the marginal cost of the last production unit needed to cover the aggregated European demand. The margins made by the producers compared with the marginal cost of their plant (also known as "inframarginal revenue") means that they can, in theory, amortise their fixed costs.



The wholesale electricity market, by making optimal use of interconnections, **can therefore benefit from the most competitive and least carbon-intensive power plants that are available for a given hour:**

- When the interconnections are not saturated, **the wholesale electricity price is the same for all the interconnected countries in the European Union.**

- **European demand is met at a reduced production cost, which would not be the case if the markets of each Member State were not integrated:** economies are made if cheaper production is available elsewhere.

- As the main exporter of electricity, France supplies interconnected European countries with low-cost and low-carbon electricity, thus contributing to bringing down the electricity prices and the CO_2 emissions across Europe and to reduce France’s trade deficit caused by fossil fuel imports .

However, due to its limited horizon (3 years for France and up to 5 years for Germany) and the high prices volatility[1], **the wholesale electricity market is not designed to ensure investments in new low-carbon generation assets, ensure their sustainability, and to allow consumers to benefit from stable and predictable prices.** Publicly subsidized support schemes to develop the generation of renewable energies have been gradually set up, in addition to capacity mechanisms, aimed at safeguarding the security of supply.

[1] Electricity prices are referred to as “volatile” because they can fluctuate significantly depending on a number of factors such as the amount of electricity generated and the consumption of electricity, as well as the cost of the fuel and the price of CO2 for thermal fossil-fuelled power stations.

CAPACITY MECHANISMS IN EUROPE...

The electricity generation sector faced major financial difficulties at the beginning of 2010: the inframarginal revenues collected from the electricity market, that were needed to meet peak demand in winter, did not allowed certain power stations to cover their operating costs and investments, leading to potential closure and posing a threat to the security of supply in electricity.

In addition to the wholesale market, which remunerates the quantity of electricity generated (in MWh), **capacity mechanisms** have been introduced in Europe to enable Member States to remunerate operators (producers, storage and demand responses companies) **for their capacity** (in MW) that is available during peak hours.

... AND IN FRANCE

The French capacity mechanism has been approved by the European Commission in November 2016 for a period of 10 years and came into force in 2017. Studies carried out on the national and European security of supply underline the need for a new capacity mechanism in France from November 2026.

The European Union was forced to adapt, in the aftermath of an unprecedented crisis on energy prices in 2021-2022 - notably due to soaring gas prices which were exacerbated by the conflict in Ukraine - by reforming the **European electricity market design** in 2024. This reform aimed at reducing the volatility of electricity prices for consumers and to offer greater visibility for investors in low-carbon sources of electricity, notably by encouraging the development of long-term contracts[2].

[2] Long-term contracts that are either private (such as Power Purchase Agreements) or contracted with the State (such as Contracts for Difference) guarantee a price over a larger timescale (several decades) than wholesale long-term/futures markets.