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2050 energy mix scenarios

The impact of far-right and far-left governance

By Emeric de Vigan and Alessandro Armenia - 24 June

What would the power energy mix look like if far-right or far-left parties govern until 2050?

After the EU elections, Western Europe witnessed a rise of far-right parties gaining consensus. Contrary to the Green Deal, the emerging parties present a distinct vision of the current energy agenda in the EU. In this article, however, we take an agnostic approach and focus on France and Germany, presenting our assumptions about the potential power energy mixes that would arise if both left- and right-wing governments were elected.

Political energy agendas

As a reference to the far right and far left scenarios we followed the following parties' energy agenda:

- Rassemblement National (RN) and Nouveau Front Populaire (NFP) for France.
- Alternative für Deutschland (AfD) and Bündnis Sahra Wagenknecht (BSW) for Germany.

Firstly, let's have a look at the right-wing parties:

Rassemblement National

- Opposition to wind energy: halt new wind farm projects and decommission existing ones.
- Emphasis on nuclear and gas: Extend the lifespan of current nuclear plants and build 20 new nuclear plants.
- Focus on hydroelectric and geothermal power, considering them more reliable. Liberalisation of concessions for hydroelectric dams.
- No clear stance on solar energy.
- Reduction of VAT on fuels.

Alternative für Deutschland

- Abandon both the Paris Climate Agreement and the European Green Deal.
- Abandon the Renewable Energy Act used to fund renewable power expansion.
- Focus on resuming commercial relations with Russia: obtain cheap gas from Russia and immediately repair and commission the Nordstream pipelines (Nordstream 1 and Nordstream 2).
- Focus on returning to nuclear power.
- Focus on wind-farm decommissioning and "tighten licensing rules for wind power turbines."
- Abolish CO2 tax on heating oil, natural gas, gasoline, and diesel.

Moving opposite sides, here is a summary of the two left-wing parties:

Nouveau Front Populaire

- Raising France's climate ambitions - new emission reduction target of 65% by 2030 (instead of 40% today)
- 100% of the energy mix based on renewable energies by 2050
- Abandon coal-based energies
- Abandon nuclear energy
- Invest in hydropower, wind, solar and gas in the short term.

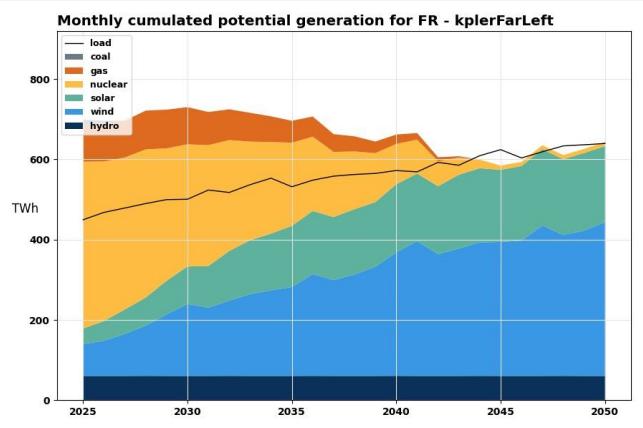
Bündnis Sahra Wagenknecht

- Phase-out from LNG, considered as an expensive gas source, and shift to cheap Russian oil and gas supply by signing long-term energy contracts.
- Expansion of gas-fired power stations
- Development of a hydrogen economy and heat storage plants
- Encourage R&D into storage solutions such as batteries
- No mention about renewable energies

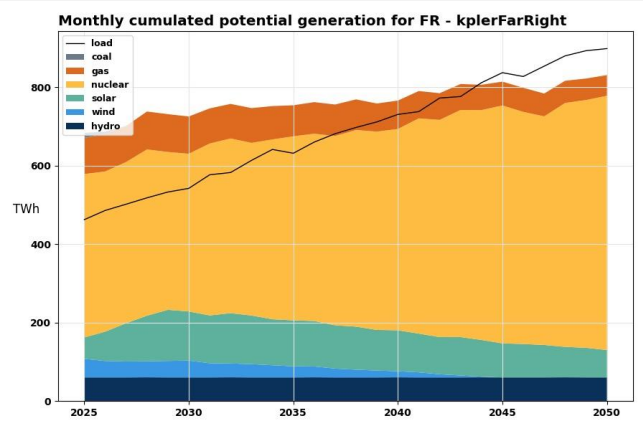
After analysing their energy agendas, we ran 6 very long-term energy mix scenarios: **2 "far-right" scenarios** and **2 "far-left" scenarios** based on the above assumptions. Finally, we present **two reference scenarios** for France and Germany by Kpler, based on current national policies and TSOs agendas as well as our expertise of market trends. Our models include the aggregation of all hourly supply-demand simulations and smaller sources of supply (biomass, geothermal, fossil oil) or interconnection flows, which are not directly shown here. It will not take into consideration installation costs (EPR, wind farms). Finally, volatility between years is due to the use of real weather conditions.

Scenarios for France

Far-left scenario



Far-right scenario



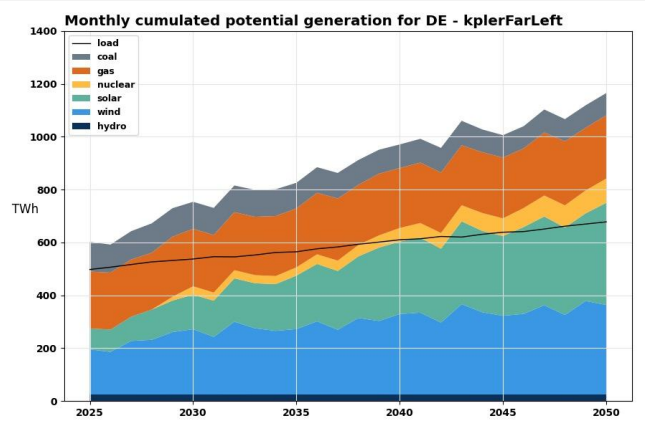
The two graphs above display France's monthly average potential energy mix from 2024 to 2050. The graph on the left corresponds to the **"far-left scenario"**, the one on the right corresponds to the **"far-right scenario"**. The charts are comparing monthly granularity demand and cumulative supply capacity.

The FarLeft scenario displays a 100 TWh decrease in supplies. Despite the steep increase rate of wind and solar, the overall decrease is mainly due to the gradual phase out from nuclear and any fossil fuel source which currently represent around 70% of the French energy mix.

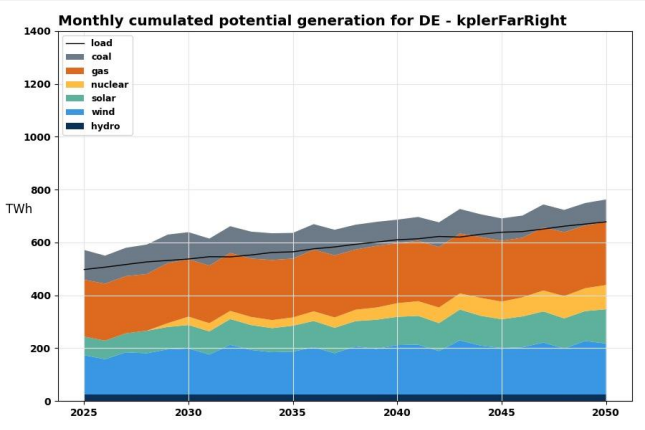
On the other hand, The "FarRight" shows a 100 TWh increase in total generation. The primary cause of this is the existence of nuclear energy, which maintains the nuclear share at roughly 75% by extending the lifespan of current units and adding new "EPR" nuclear plants (20 according to RN, 14 in this simulation). Moreover, it sees a gradual phase-out of wind power, with its share dropping to zero after 2044, and a modest increase in solar power. The total generation capacity reaches finally 820 TWh. This increase of supply does not compensate for the higher demand trend following the country's high electrification.

Scenarios for Germany

Far-left scenario



Far-right scenario

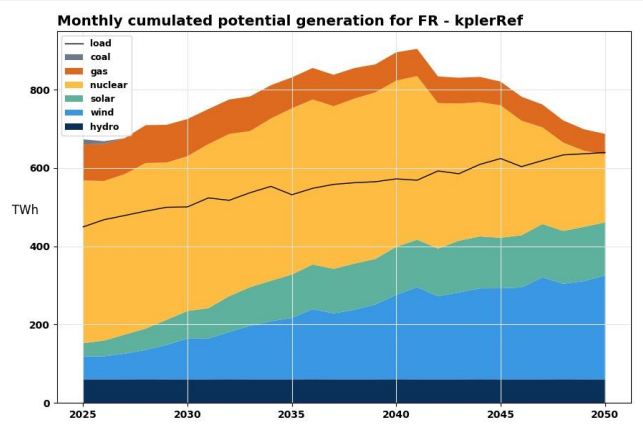


Compared to the Far-Right, the Far-Left scenario forecasts a sharper rise in solar and wind energy production. With a 50% share in the German energy mix, renewables surpass gas and become the most prevalent energy source.

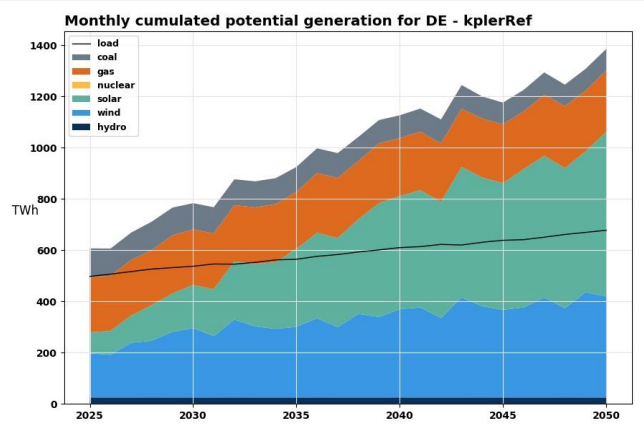
The Far-Right scenario retains a strong dependence on traditional fossil fuels (coal and gas), with a modest growth in renewable generation, leading to a moderate increase in overall potential generation. We can also observe that both introduce a modest nuclear production of around 50-70 TWh by 2050.

Reference scenarios by Kpler

Kpler scenario for FR



Kpler scenario for DE

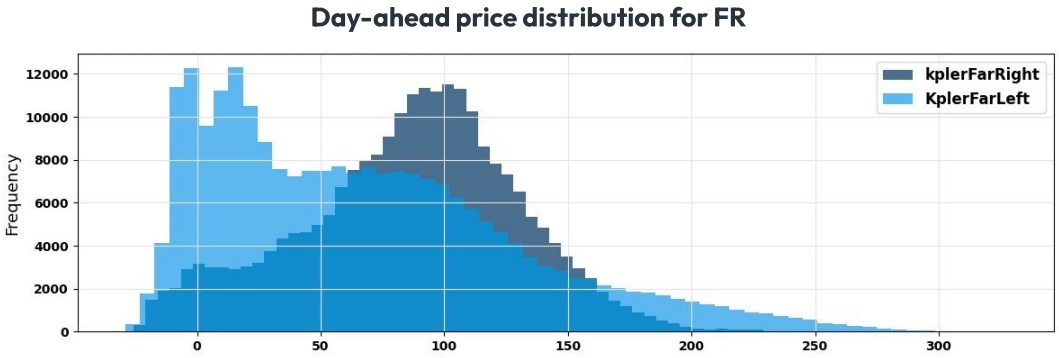


We present **2 reference scenarios for France and Germany by Kpler**, based on current national policies and TSOs agendas as well as our understanding of market trends.

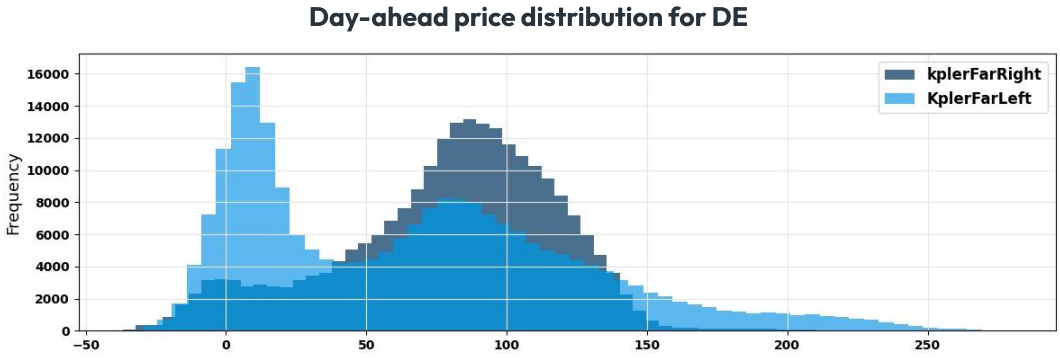
For France, we foresee a significant growth in renewable installed capacity, covering more than 50% of the energy mix. The scenario also displays a reduction in nuclear output with a steep decreasing rate starting from 2040. This is primarily due to the decommissioning of existing plants, while 6 to 8 new-generation reactors are added to the grid. The current scenario shows that renewable energy penetration will not offset the nuclear decommissioning of older units, and market conditions should become tight around 2050.

In the German context, we foresee a growing momentum towards renewable energy that will double the total potential generation capacity. A high renewable capacity will be necessary to face the intermittency of a full-renewables mix. Considering its geographical location, it is anticipated that wind energy will become the market share leader. The country's abundant renewable resources provide opportunities for hybrid solutions that combine renewables with storage technologies. By integrating energy storage solutions such as hydrogen or Battery Energy Storage Systems (BESS) with wind and solar farms, more flexible energy assets can be created to help balance the grid. It is not a coincidence that Germany is a strong promoter for a hydrogen economy. European clean hydrogen plans for 2030 focus on northwestern coastal Europe, with Germany playing a central role in the 31,000-km European Hydrogen Backbone pipeline network.

Energy price distribution

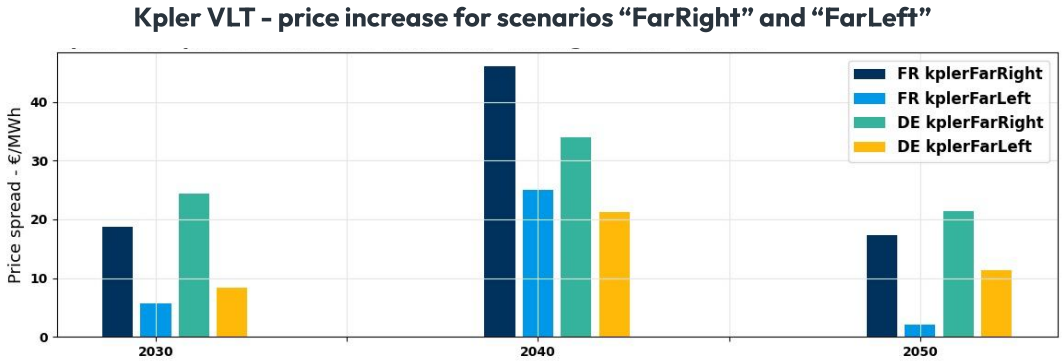


The histogram above illustrates the distribution of prices in the French day-ahead market (in €/MWh). In the far-right scenario, prices are concentrated around 100 €/MWh, mostly set by new nuclear and gas units. In the far-left scenario, renewables are often sufficient to meet the demand, resulting in a distribution with predominantly low prices. However, volatility is more prominent, as evidenced by the long tail. This is due to the fact that prices are occasionally determined by expensive peak load units in the absence of nuclear and gas units.



Likewise in Germany, the far left scenario prices are frequently fixed by renewables or thermal units. Higher volatility is observed because rising carbon prices make fossil energy sources increasingly expensive, leading to price spikes above 200 €/MWh. In the far-right scenario, thermal units ensure a steady baseload production, with fewer renewable hours and minimal price volatility.

Main takeaways and conclusion



In the far-right scenarios, energy prices are expected to rise due to two main factors: a low share of renewables and a highly inflexible energy mix. In France, the price surge is primarily driven by an overreliance on nuclear power, with little wind energy to balance out demand during peak hours. On the other side, the far left scenario promises low scenarios but extreme volatile events which could impact other linked markets such as the ancillary services one. Meanwhile, Germany's energy costs are heavily influenced by fossil prices, especially gas, in both scenarios.

France's right-wing scenario emphasises heavy investment in nuclear power, which could increase price volatility due to its inflexibility. The feasibility of building 20 EPR reactors or extending the lifespan to 80 years has not been proved yet. Insufficient generation to meet demand could be offset by a slight increase in hydro and investments in geothermal plants, as proposed by RN. The country currently has only two geothermal power stations, and its geothermal potential remains largely untapped. However, geothermal energy is a high-risk, capital-intensive investment, with uncertain outcomes during exploration. In the far-left scenario, there is an overreliance on renewables, with insufficient production to support the integration of energy storage solutions. This could lead to dependence on imports and expensive base load units when solar and wind sources are insufficient, resulting in significant price volatility, as seen in the price distribution graphs.

Germany's far-right undermines renewable energy growth, and with it energy storage solutions, and underscores the critical role of natural gas. The announcement of reactivating the Nordstream pipelines could renew dependence on Russian gas, risking supply disruptions amid geopolitical tensions. Conversely, the far-left approach faces similar concerns as in France. With 20-40% renewable energy in their mix and given their intermittent nature, renewables will cause significant price fluctuations. Additionally, the lack of abundant renewable energy hinders the development of storage solutions.

As a keynote, short-term storage solutions were not openly supported by the parties. The only party who mentioned this category on its political agenda was BSW, which timidly mentioned investing in research and development of storage solutions and planning long-term developments on hydrogen. However, these solutions are crucial already by 2030 and present mature solutions, especially in the area of BESS. NREL projects that BESS technologies might drop by an additional 32% by 2030. LFPs, the most common Li-ion battery, are expected to drop by $100 per kWh by 2025, while NMCs would reach the same threshold by 2027. For storage solutions to emerge, a lot of renewable energy is needed, and this could pave the way for other storage solutions to become prominent in the energy mix. This transition could improve the flexibility and stability of energy, potentially mitigating the price volatility seen in more inflexible energy scenarios.

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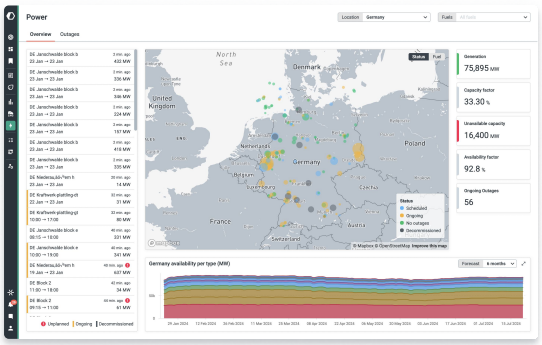

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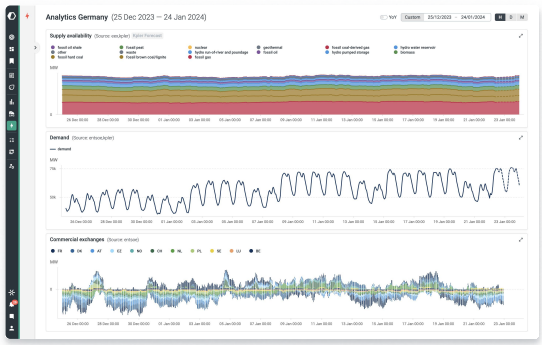

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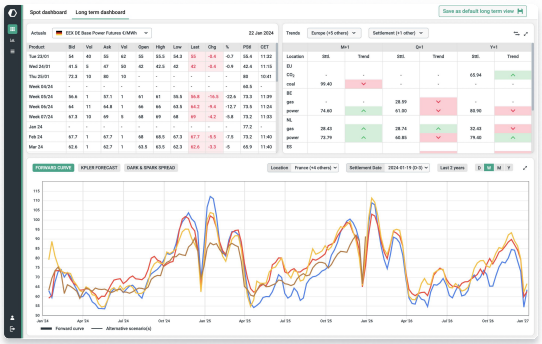

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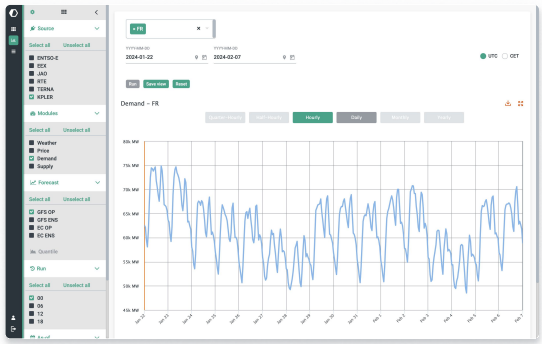

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