



European Electricity Network

Extend and impact of the European electricity network, with a focus on France

Our objective is to provide a clearer understanding of how electricity functions across Europe and to share our insights with you.

We aim to explore :

- how electricity is generated,
- in what quantities, and
- through which sources.

We will examine current trends:

- The composition of the energy mix,
- The impact of renewable energy on the grid,
- The evolution of the electrical infrastructure.

Additionally, we will explain how **electricity prices** are determined in different countries and offer a brief overview of the **electricity market**.

MAIN Question: What are the Consequences of a shared european network that we can trace in the data?

To look into these assumptions we use several dataset from differents sources:

- Eurostat
- French government
- RTE (French High Voltage grid operator)
- Enedis (French Medium Voltage grid operator)
- Open Data Réseaux Energies (ODRE)

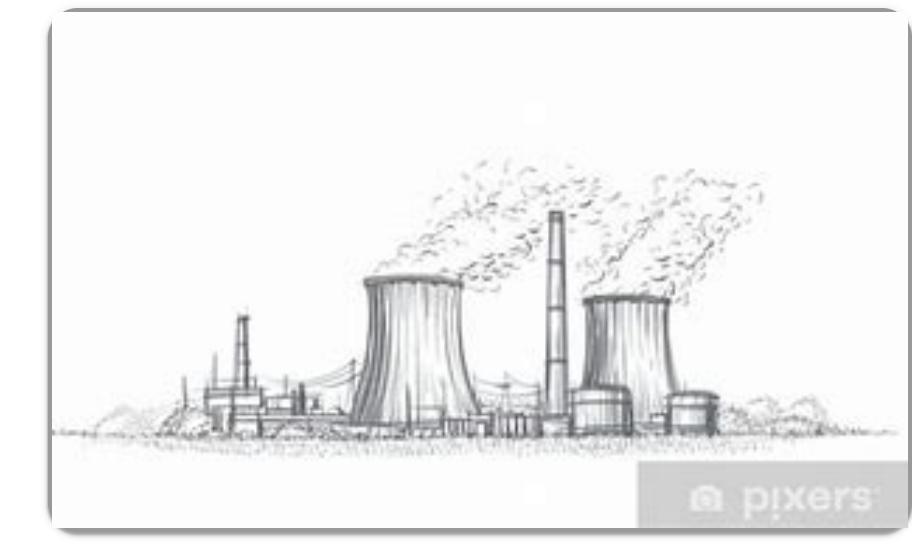
$$1 \text{ TWh} = 1000 \text{ GWh} = 1\,000\,000 \text{ MWh}$$



Average yearly consumption in EU :
0,000007 and 0,000011 TWh/year



Average yearly production in EU of
a wind turbine of approx 4,2 MW:
Btw 0,009 and 0,013 TWh/year



Average yearly production in EU of
a nuclear power plant of approx
1,3GW:
Btw 7 and 13 TWh/year



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01.01.2024 - 31.12.2024

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Total consumption (TW)

Details ansehen

Total production (TW)

Details ansehen

AVG production/consum...

Details ansehen

Min/Max production

Details ansehen

Min/Max consumption

Details ansehen

Production &
Consumption

Production and consumption of electricity in Europe (TWh)



Kein Zugriff auf den Datenpool

Unzureichende Berechtigungen für den zugrunde liegenden Datenpool.

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Consequence #1: Enhanced Energy Security & Balancing Through Sharing

Production/consumption proportions by country (TW)



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Top 10 electricity producers (TW)



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Asset Composition

Assets composition in TW



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Production by asset comparison between countries (TW)



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Consequence #2: Geographic Specialization Based on Ressources

Evolution of production by asset (Tw)

Cumulation of installations by asset (Tw)



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Trend of renewables energies in the energy mix of European countries

Evolution European energy production of non-renewable energy by sector (TWh)



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Evolution European energy production of renewable energy by sector (TWh)



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Consequence #3: EU-wide Shift Toward Clean Energy

Evolution of renewable - non-renewable energy production and emissions



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Emissions mt 2024



Unzureichende Berechtigungen für den zugrunde liegenden Datenpool.
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while renewable energies increase, greenhouse gases emissions decrease.



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Prediction of the production evolution of renewable energies in Europe until end of 2026 (TWh)



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The model predicts a constant increase of
renewable energies in Europe in future



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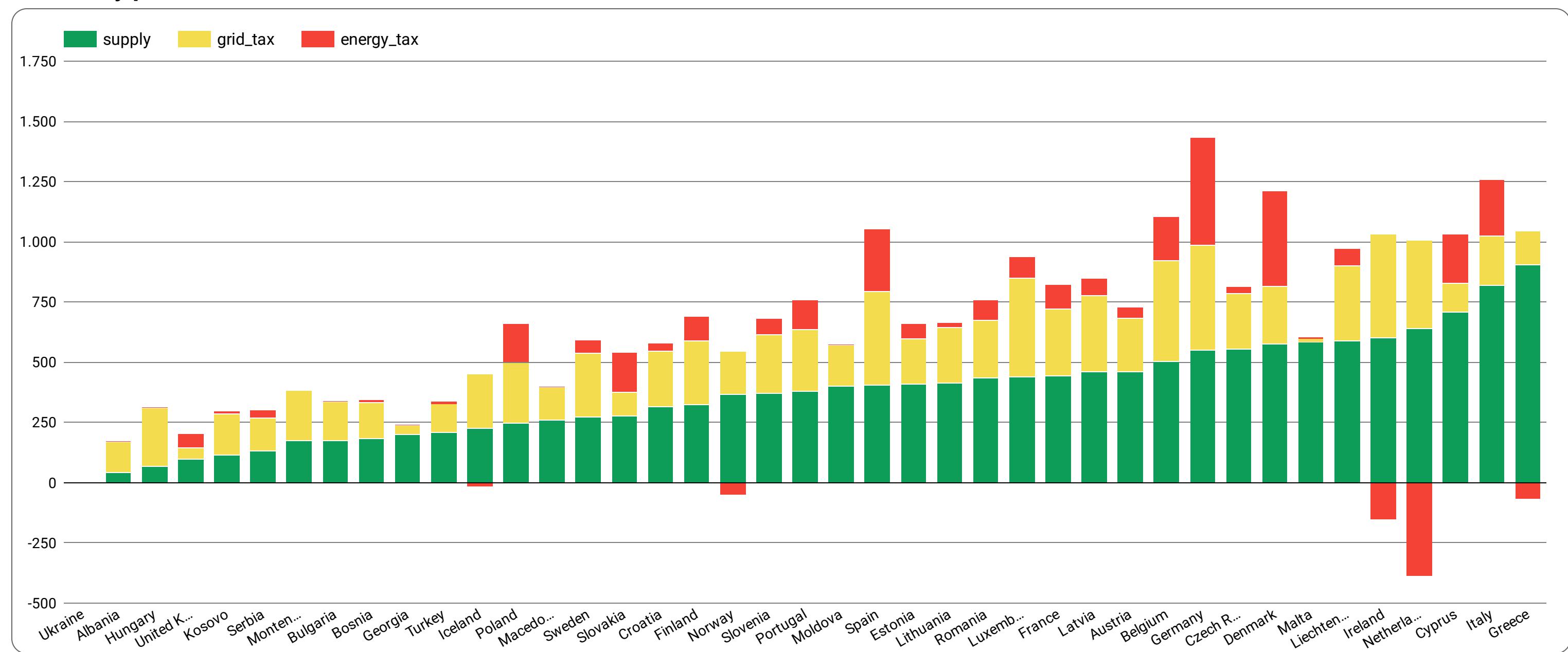
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time: 01.01.2019 (1)



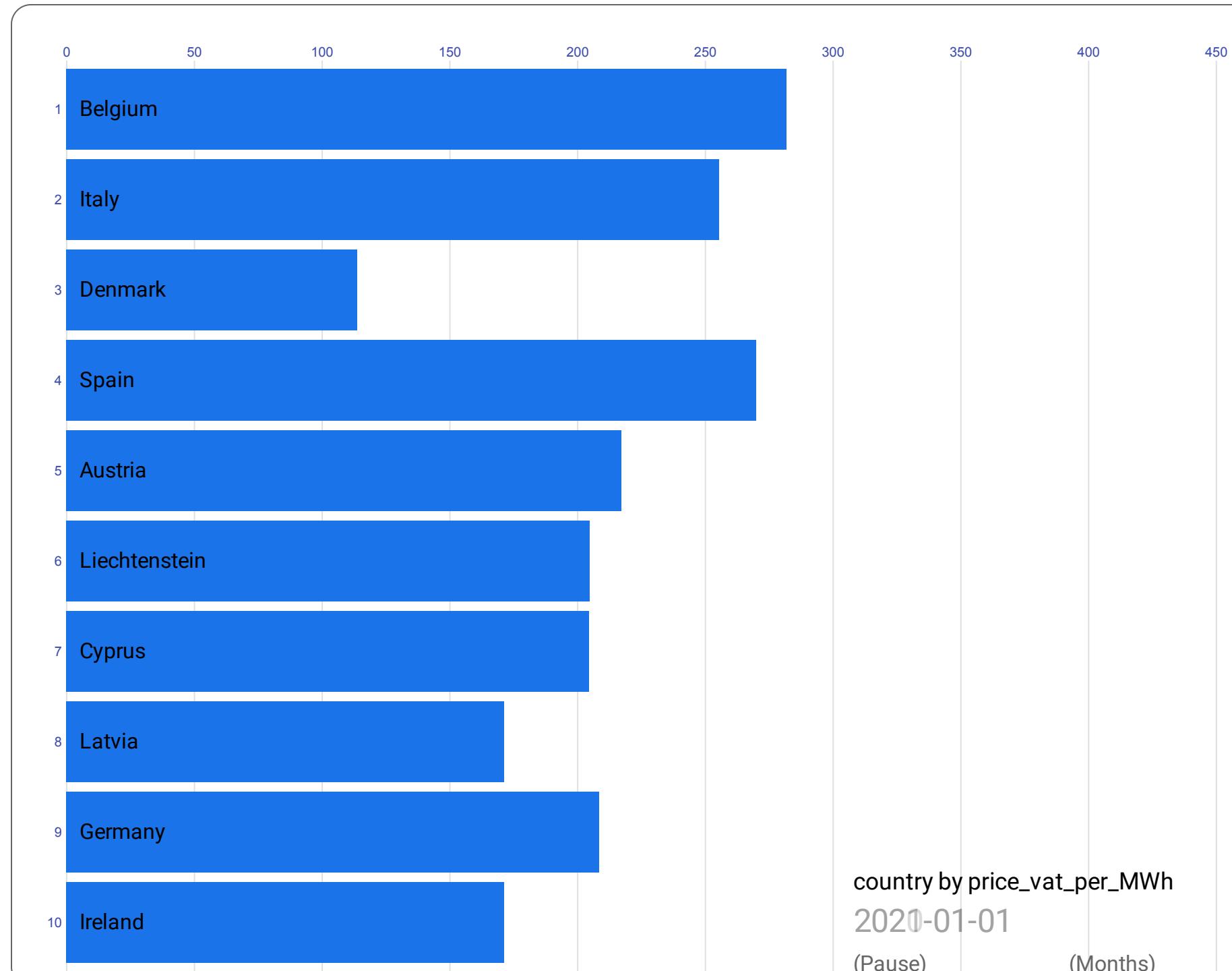
what is the
price of
electricity
made up of?

Electricity price construction for residential

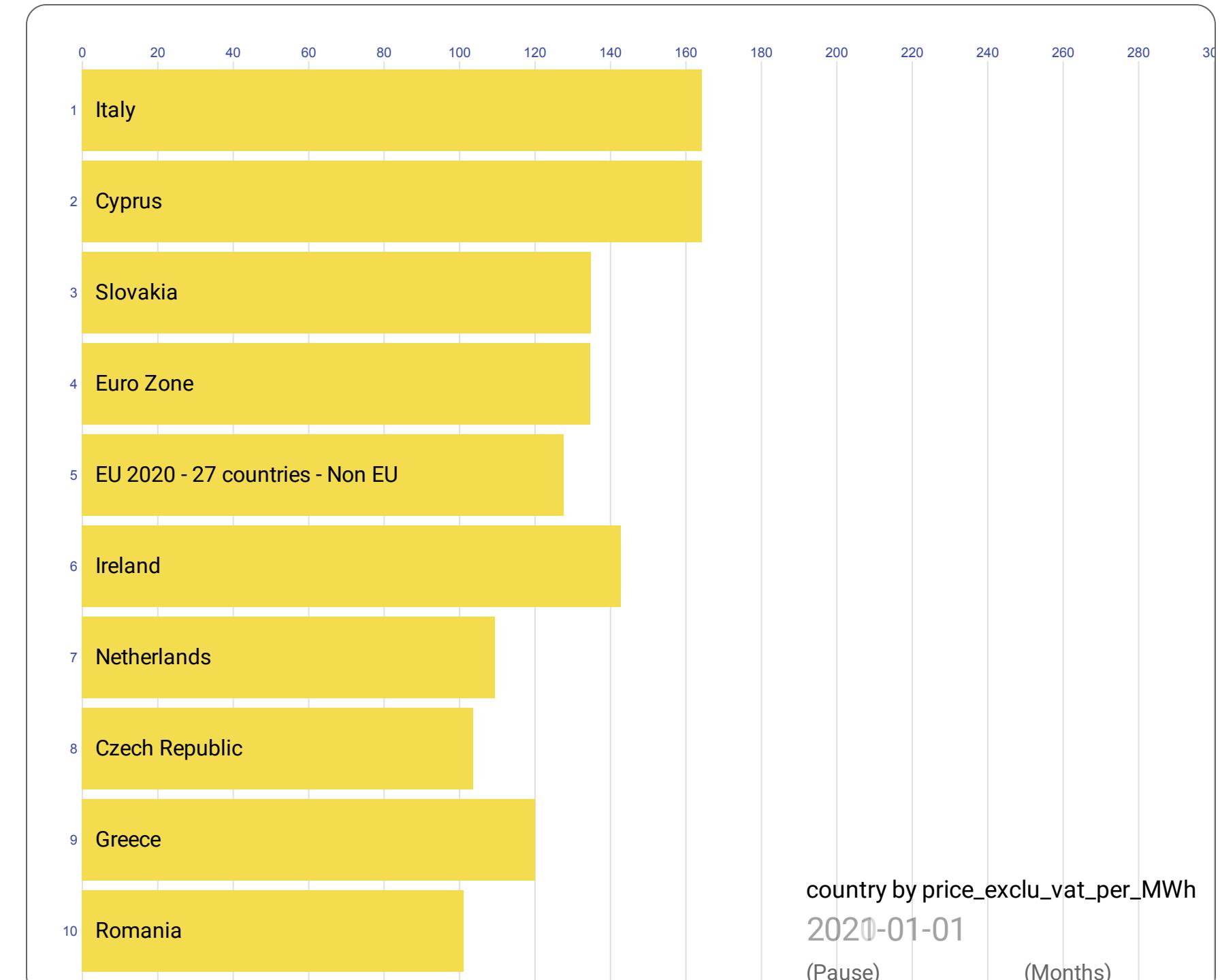


Consequence #4: State tax & grid becomes major factor in price differences

Evolution of electricity price for RESIDENTIAL over time



Evolution of electricity price for NON-RESIDENTIAL over time



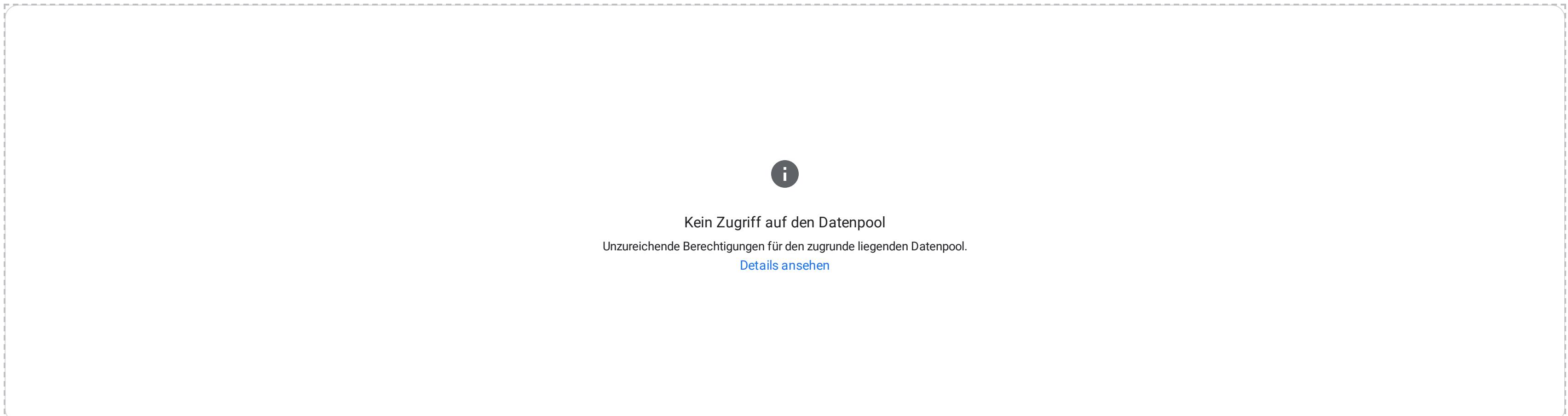


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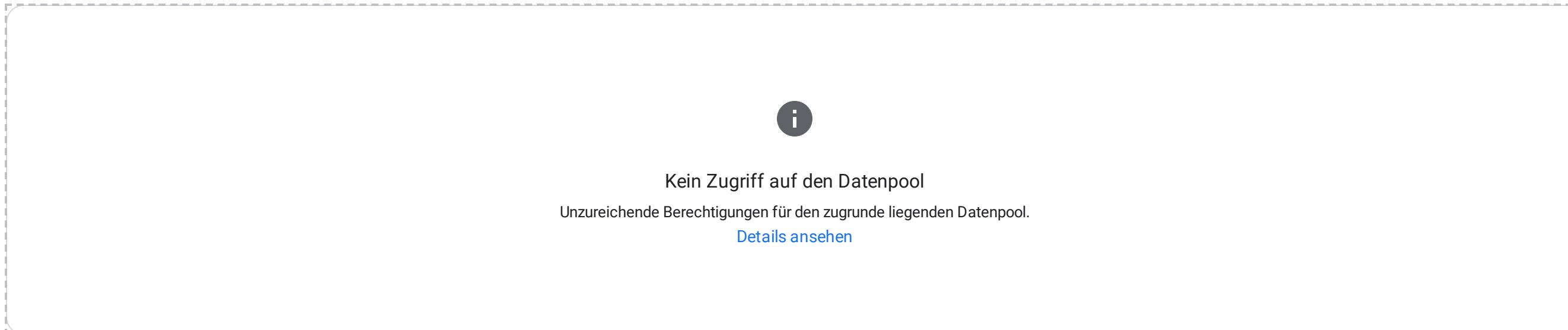
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How much energy comes from France?

Exportation/Importation from France in TWh

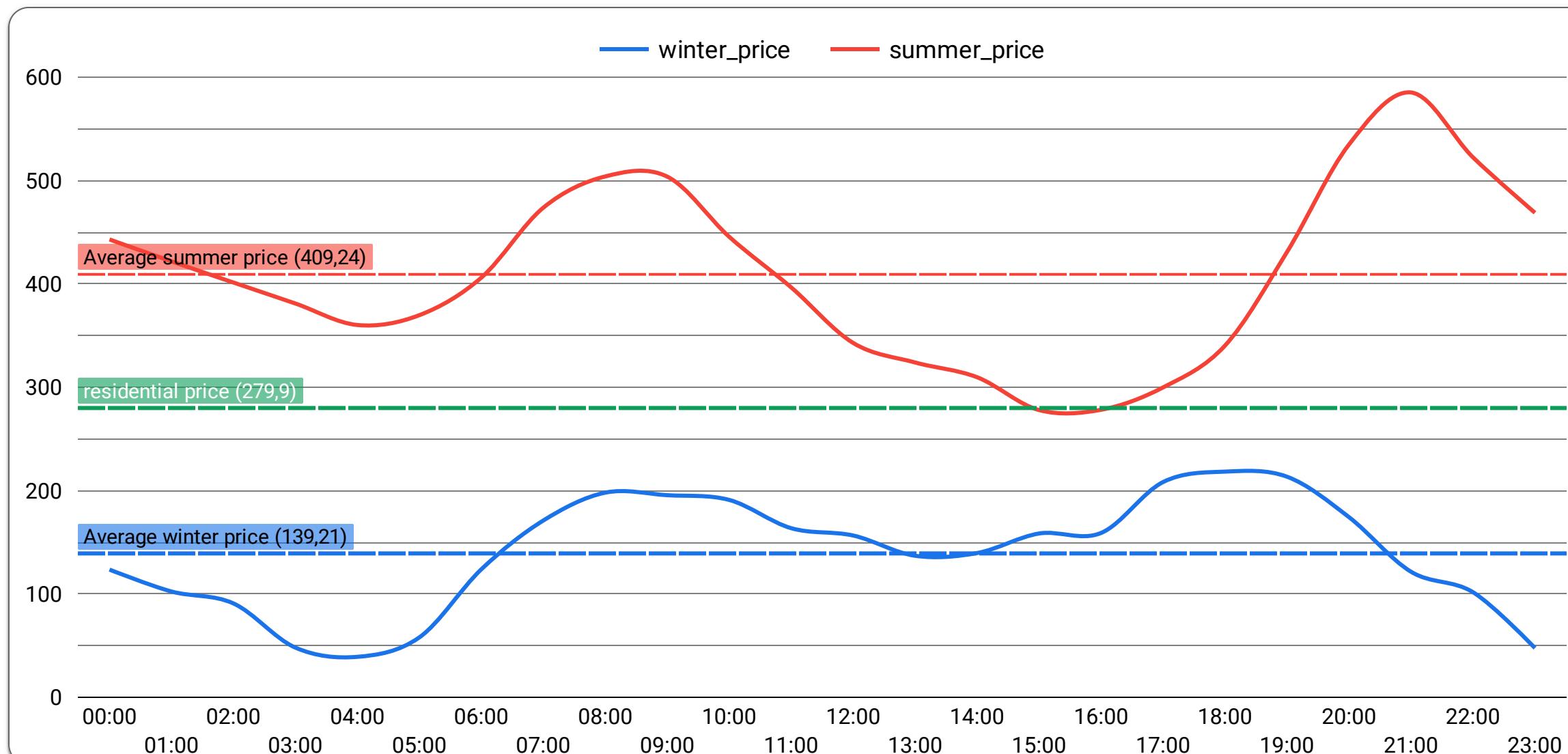


Monthly evolution of the price on the market



when availability of the nuclear falls, being part of the European Network is a chance and a strength for France

Daily evolution price on the market versus price paid



Paid price is fair compared to the market



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How does the electricity network look like in France?

Consequence #5:
Infrastructure adjusts to decentralized and interdependent network

Network length and power capacity evolution

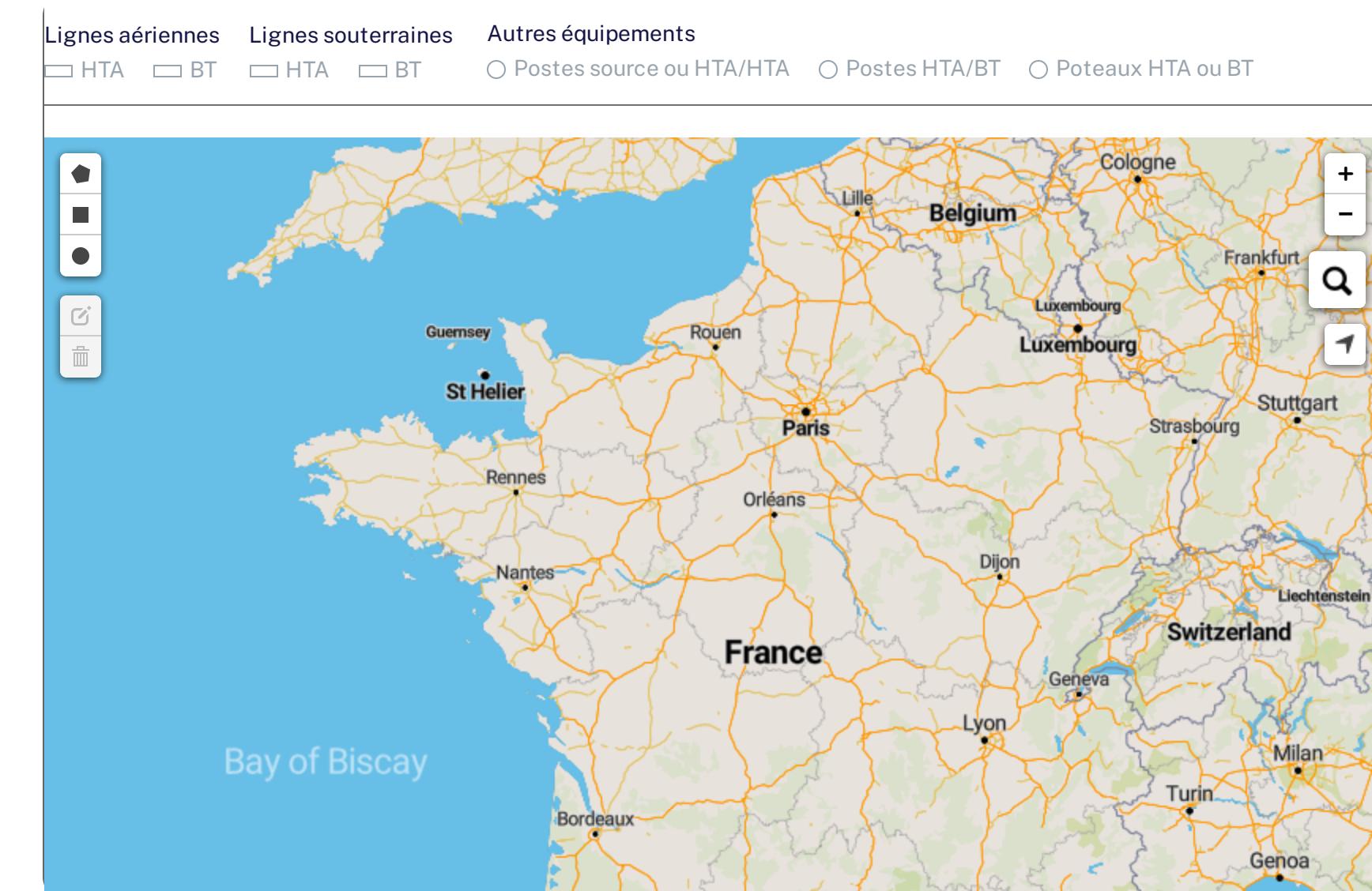


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Total km of network lines over time



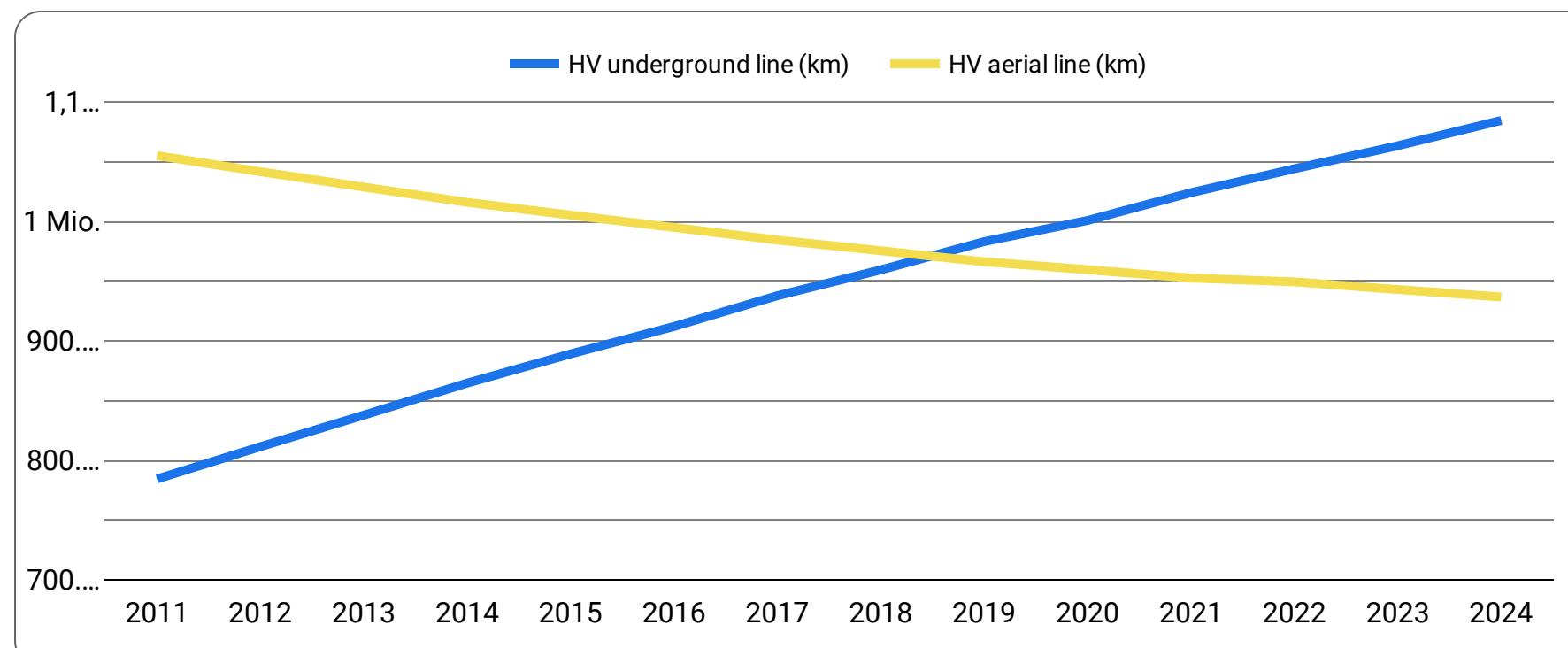
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France: increasingly buried mesh network

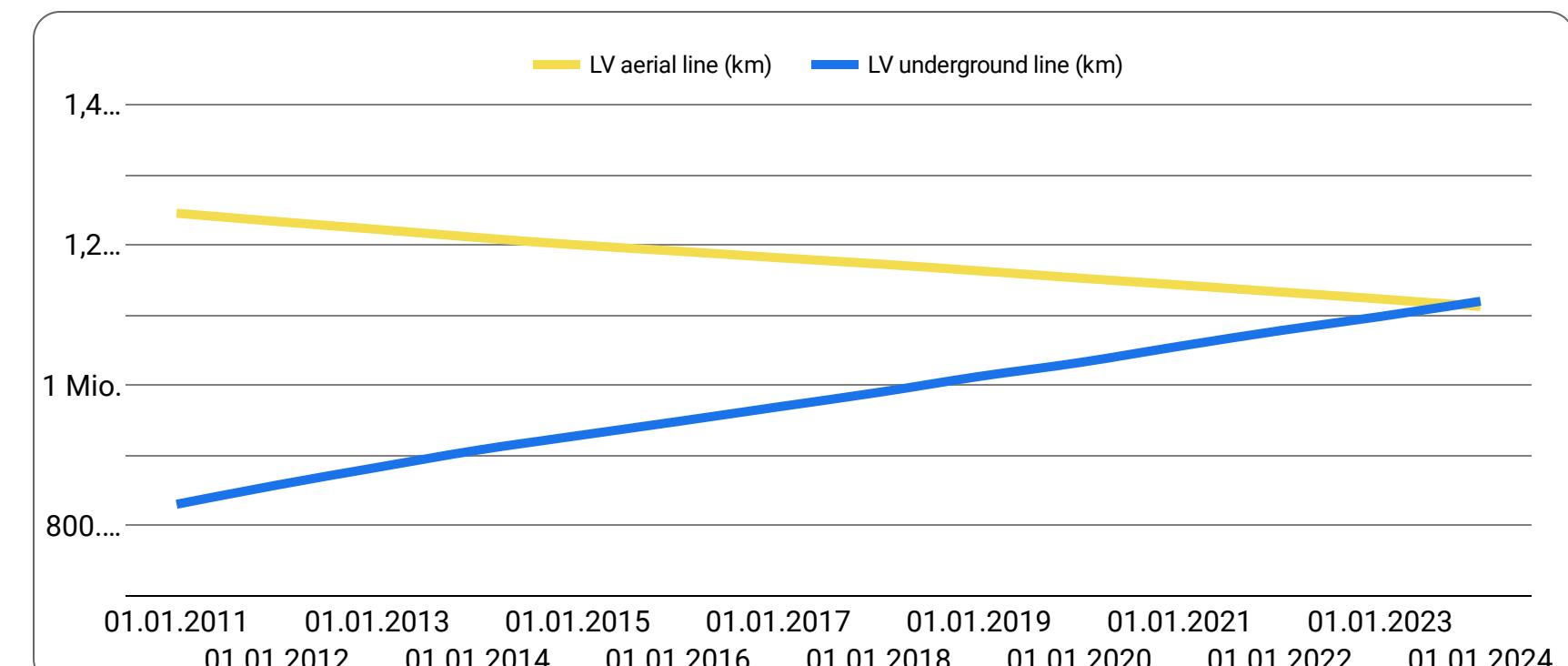
HV line total in km

27.003.662



LV line total in km

30.198.186





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Key Take-Aways:

- Security through diversity - shared resources prevent shortages
- Specialization by geography - countries leverage natural advantages
- Policy independence persists - national choices still drive prices
- Adaptive infrastructure - networks evolving for renewables and EVs and adapt to climate change
- Resilience requires balance - integration brings benefits and vulnerabilities

The European Electricity Network

