

value

Energy outlook: Insights into future market trends and volatility



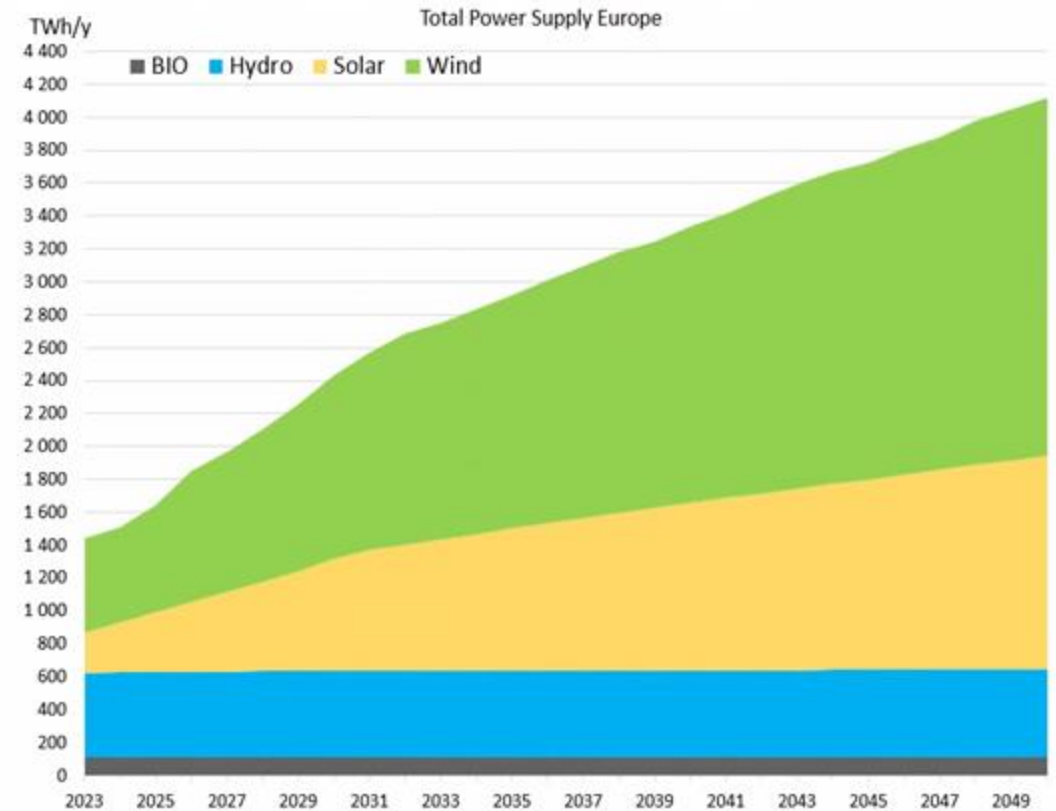
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Agenda:

1. Helicopter view on the green transition
2. How does Volue Insight plan to **enable our customers to navigate the transition**

European new renewable production:

Value assumptions see double volumes after the next 12 years and we might reach 50% share of the consumption in 2026

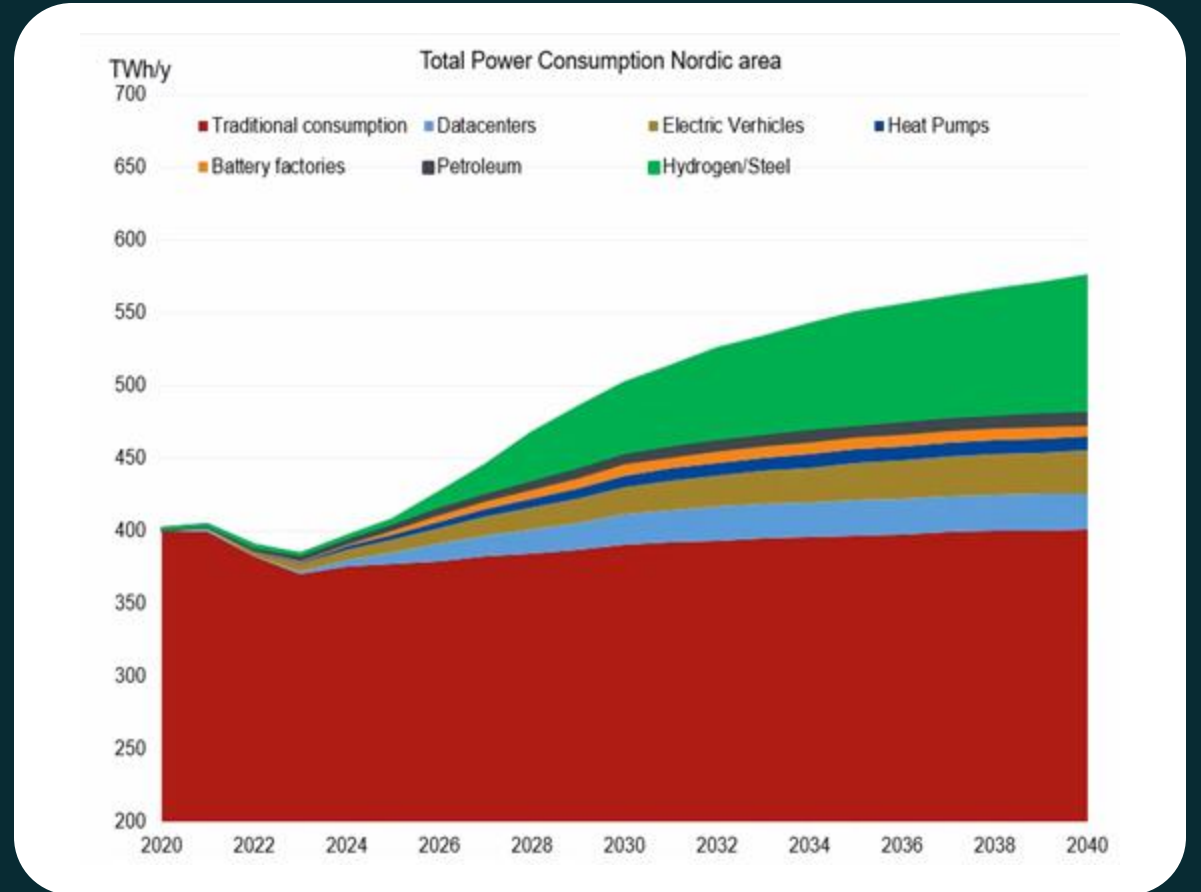


Weather dependant wind and solar will be the driving factor!

European new green industry consumption:

Value assumptions see more than a 50 % increase in consumption towards 2050!

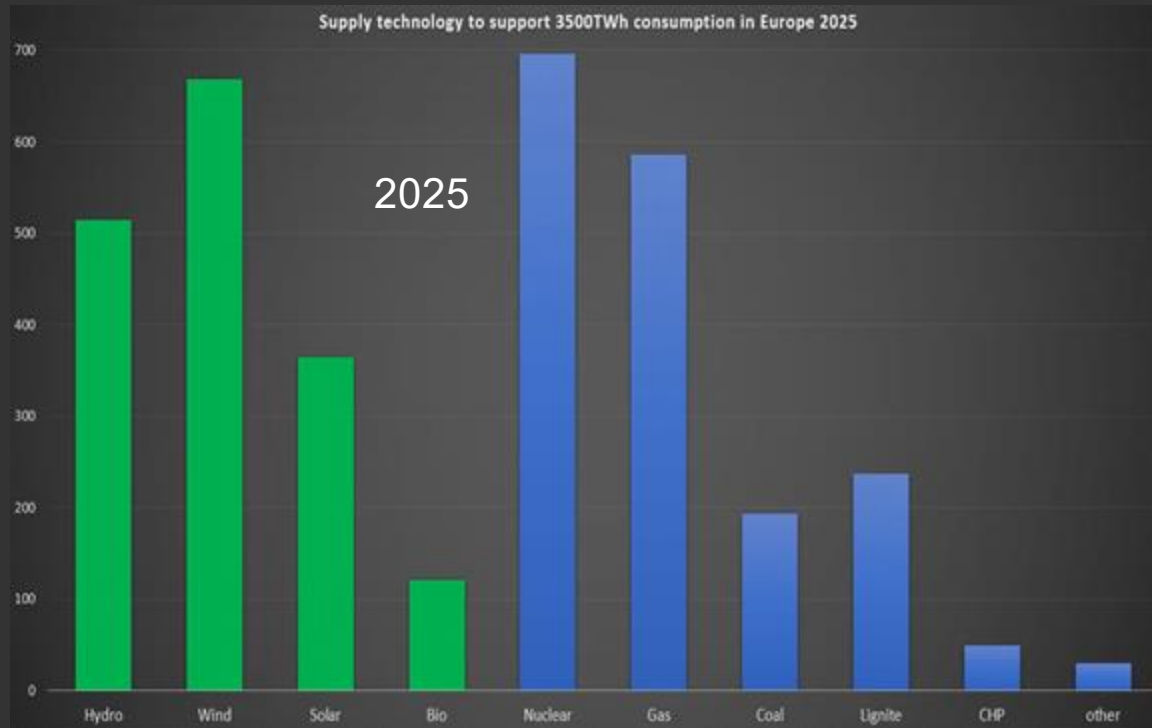
On average, 70 TWh per year.



Electrification and the new green consumption will be the driving factor

European power Balance 2025:

The green shift will soon reach 50% new renewable share!



It's getting greener year by year!

Supply in Europe:

- Renewable production will exceed 1700TWh in 2025 and cover close to 50% of total consumption
- Nuclear production is challenged by wind generation to be the highest contributor in Europe in 2025 with close to 700TWh production
- Solar production has the highest % growth increase of almost 15% from last year
- We still see 400TWh coal/lignite production left.
- Gas is a strong contributor and very important for flexible production and will be one of the most important price signals in the future

Increasing Demand for Balancing Power

- Rapid growth in renewable energy sources
 - Growth of distributed energy sources
 - Growing volumes in short-term power market
-
- Need to minimise curtailment and optimise utilisation to ensure grid stability
 - Unlocking consumption flexibility
 - Gas as a crucial flexible power source
 - Batteries will play a pivotal role
 - Hydrogen as both, a seasonal energy storage solution, and a versatile resource





How do Volue Insight
realize the Green
Transition?

"To revolutionize short-term power forecast with the power of AI"

- Leveraging the technological advancements in AI
 - New weather source and fundamental models for better forecast accuracy
 - More frequent forecast closer to decision hour
 - Possibility of local asset optimisation
- SpotEx in 15 min resolution to improve bids and optimization
- Imbalance support and price forecasts for operational usage
- First recipient of unforeseen unavailability (Reactive Technologies)
- Increased usability of the application
- Strengthen data and model platform for assuring quality, performance and robustness

InsightBeyondZero

"To revolutionize long-term power forecast in a renewable driven power system"

- Power market simulator made for a renewable driven power system (codename "VESPA")
- Decision support for investment strategies in mid- and long-term perspective including emerging markets
- Model-as-a-Service (MaaS) capabilities
- Better consumption models based on grid limitations and behavioral changes

value



We enable our customers to navigate the transition to a more sustainable, green and profitable future.

Insight2Zero

Now

Next

Later

Volue Insight Strategic Roadmap

Main trends in the European markets



Silvia Messa
Head of Analysis
Continental Europe & Japan

Agenda:

1. Industrial production
2. About consumption
3. Increasing volatility
4. Conclusions

Main trends in the European markets

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Europe, where are you heading to?

Data from EUROSTAT

- stagnating industrial production
positive trend in 2025, up in Feb +1% m-o-m
- steady expansion of the production in services: +3.3% in Jan, new historical high
- decline of inflation down to 2.5% (France min level at 0.9%)
- declining economic sentiment (the south of Europe being more optimistic than DACH) and the consumers confidence
- unemployment rate at its minimum: 5.7%
- GDP at 115.5 taking 2015 as 100/benchmark

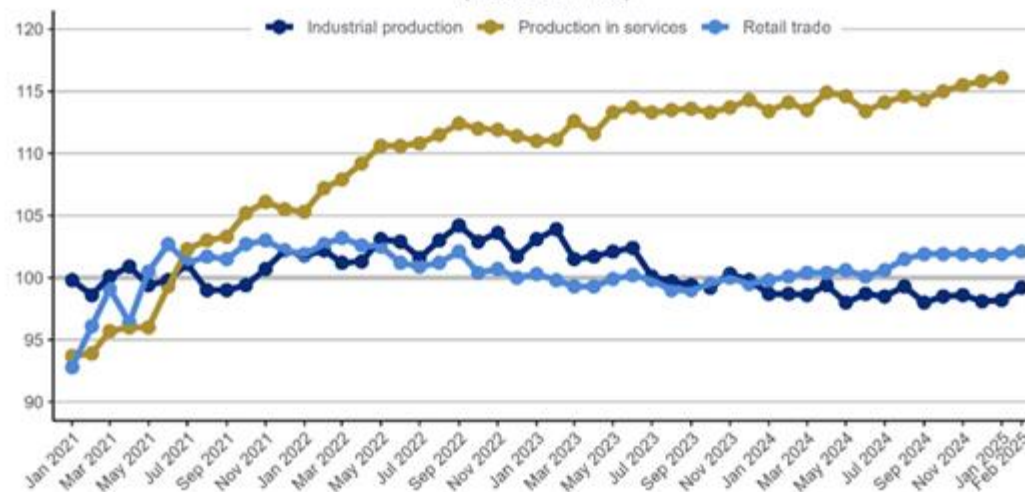
eurostat 

16 April 2025

The EU economy stabilises and labour markets remain positive, however economic sentiment declines

According to the latest monthly data, the EU economy shows signs of stabilisation. In February 2025, industrial production continued its recovery, while retail trade remained broadly stable. The services sector maintained its steady expansion, reaching a new historic high in January 2025 (see Figure 1). Nevertheless, overall economic sentiment dropped in March 2025, driven by lower confidence in services, retail trade and among consumers.

Figure 1: Industrial production, production in services and retail trade in the EU
(index 2021=100)



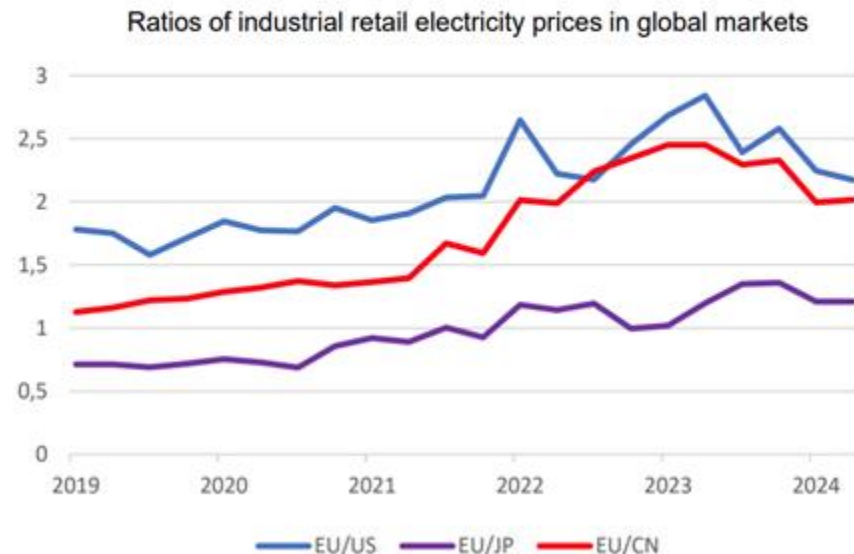
Comparison of electricity costs in the global markets

Europe pays one of the highest prices of electricity in the world.

The price of CO2 embedded in the thermal generation's SRMC is currently around 73 euro/ton

Ratio of the electricity costs

High EU energy prices



Source: European Commission

**European
Industrial
Energy Days**
BY ENLIT

CO2 prices

Price of a tonne of carbon in the EU Emissions Trading System (EU ETS)

Chart 2.1

In €, monthly averages



Sources: ARIVA.DE AG and Bundesbank calculations.
Deutsche Bundesbank

Source: Deutsche Bundesbank

value

Focus on Germany, the locomotive of Europe

Data from DESTATIS

Energy-intensive industrial production dropped by roughly 20% after the energy crisis in 2022

The chemical sector is the largest in terms of power and gas demand and it is the mainly affected.

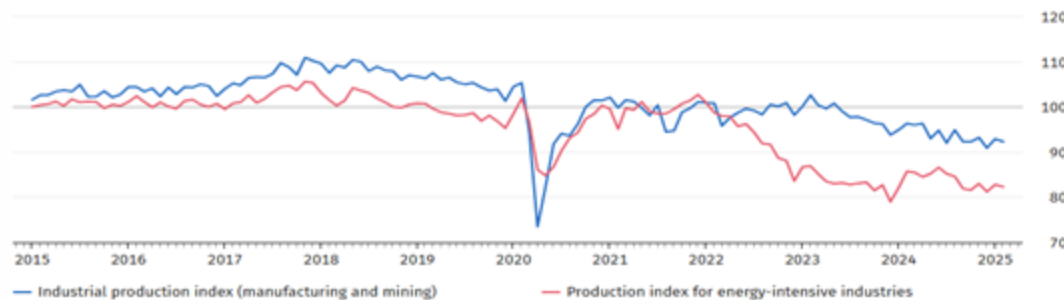
Price of electricity are still well above the pre-energy crisis levels.

Production of energy-intensive industries has been declining almost continuously since the beginning of 2022

In order to observe the monthly development of industrial production in the energy-intensive sectors, the Federal Statistical Office compiles a production index for energy-intensive industries.

Graphics (5)

Production development in energy-intensive industries
2021 = 100



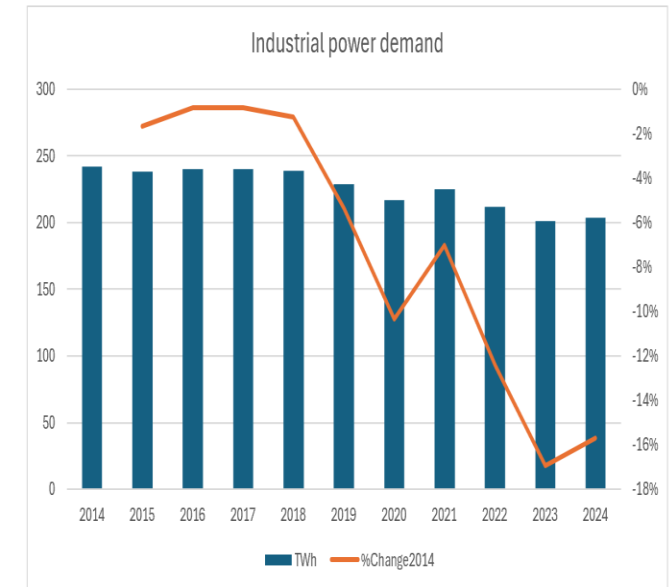
Seasonally adjusted according to the X13JDemetra+ method. Indices of production for industry (EVAS No. 42153).

© Federal Statistical Office (Destatis), 2025

Industrial demand Germany

Year	TWh	%Change	%Change2014
2014	242		
2015	238	-2%	-2%
2016	240	1%	-1%
2017	240	0%	-1%
2018	239	0%	-1%
2019	229	-4%	-5%
2020	217	-5%	-10%
2021	225	4%	-7%
2022	212	-6%	-12%
2023	201	-5%	-17%
2024	204	1%	-16%

[Strom: Verbrauch nach Verbrauchergruppen | BDEW](#)



The trade war

The reciprocal tariffs between the US and EU are currently on hold for 90 days: “ the EU wants to give negotiations a chance” U.vdL.



“How a \$1.4tn Trump trade war could unfold”

MONTEL

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Oil continues fall as Trump tariff tension dents demand

(Montel) Oil prices were falling on Tuesday – for a second consecutive session – as investors continued to assess global economic jitters and the impact on oil demand amid a possible trade war.

Le contromisure

Dazi: farmaceutica, energia e aerospazio i settori più esposti all’import dagli Usa
[ridurre gli effetti](#)

GAS – Prices rise on 90-day tariff agreement

(Montel) European gas prices rose on Monday as an agreement between the US and China on a 90-day pause on reciprocal tariffs buoyed market sentiment about energy demand.



	Share of US imports	Previous rate	Updated total
European Union	18.5%	20%	10%
China	13.4%	34%	145%
Japan	4.5%	24%	10%

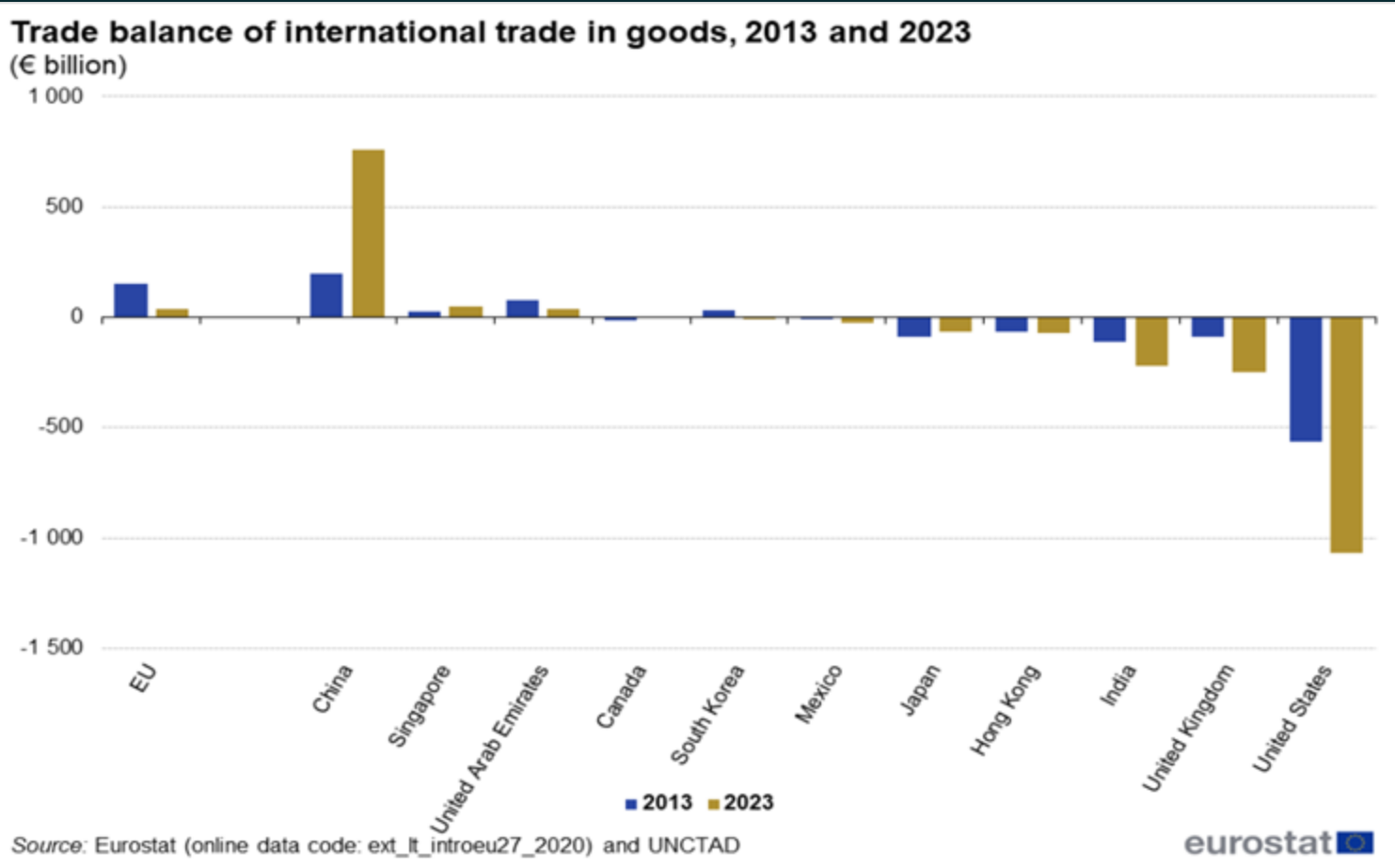
The trade balance of international trade in goods

Data from EUROSTAT

Balance of trade is the difference of the value of a market’s exports minus imports.

The trade balance of international trade in goods shows the surplus / deficit of the macro areas in the world.

Main trading partners - EU						
Bn €, monthly change compared to previous year						
	Exports		Import		Trade balance	
	Dec 24	Growth rates	Dec 24	Growth rates	Dec 24	Dec 23
United States	41.6	5.6%	26.1	-10.8%	15.4	10.1
China	16.6	-8.8%	40.2	10.3%	-23.6	-18.3



The trade balance of the Euro-area

Data from EUROSTAT

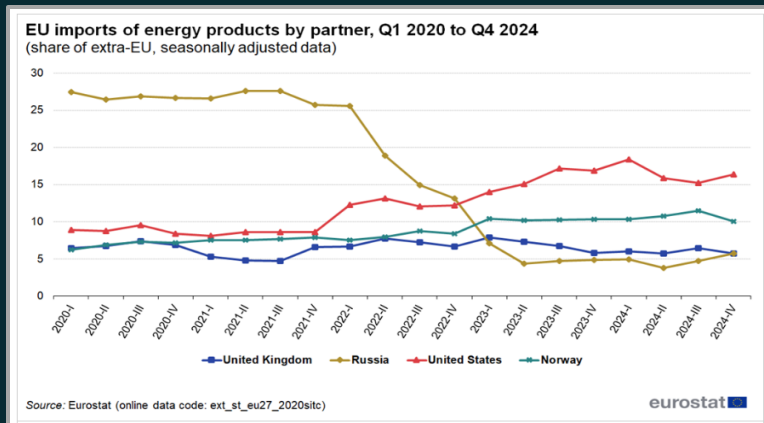
Over the past decade the total net position of Europe has mainly been in surplus.

Major contributor: Germany.

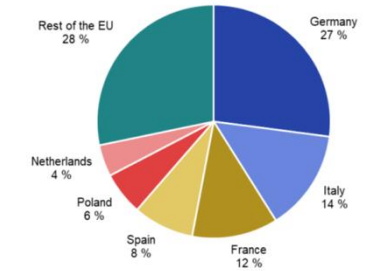
Net exports:

- machinery and vehicles
- chemicals and related products
- food and drink

Net import: energy



EU value of sold industrial production, by country, 2023
(% of total value of sold production)

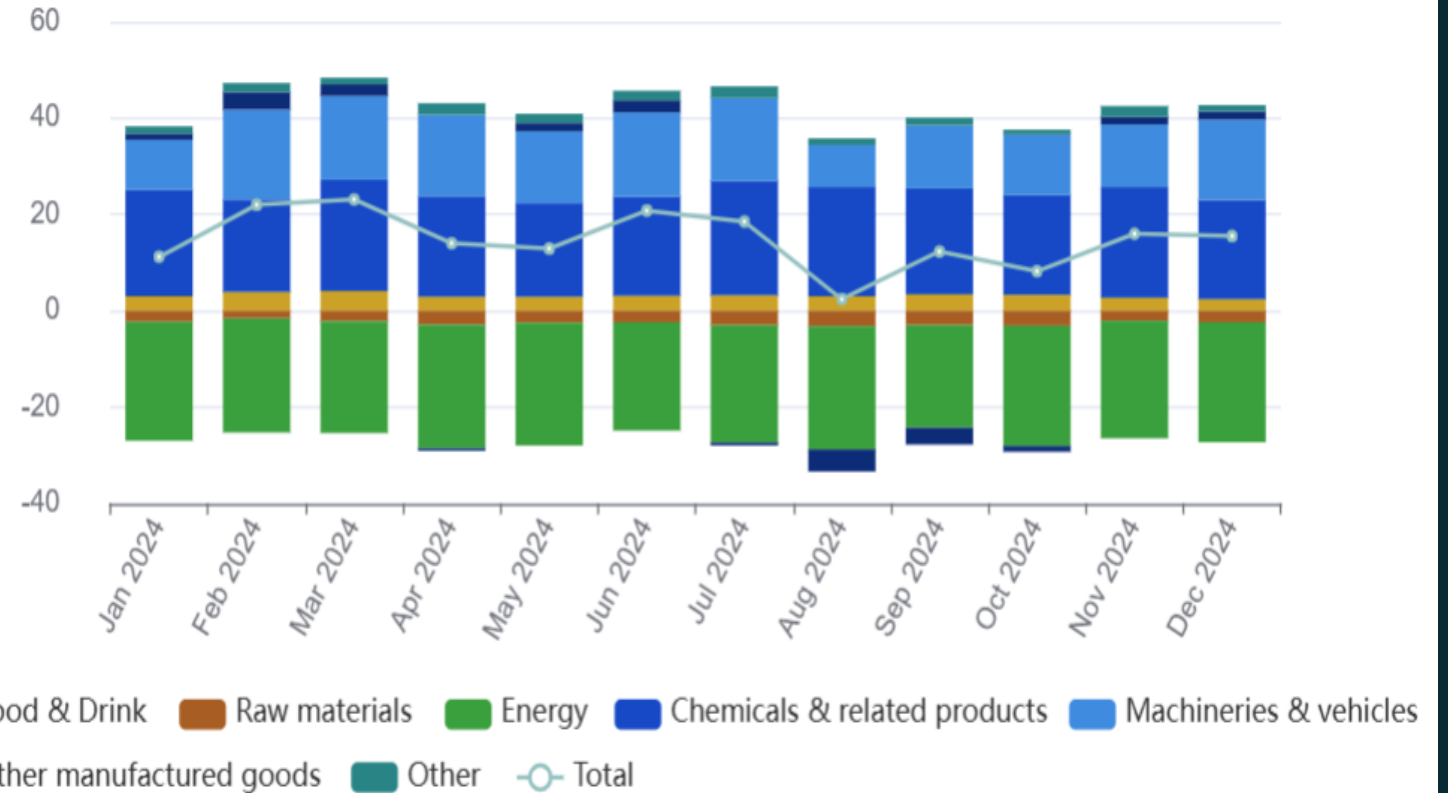


Note: EU except Cyprus, Luxembourg, Malta
Source: Eurostat (online data code: DS-056120)
Size of this preview: 618 x 600 pixels. Other resolutions: 247 x 240 pixels | 812 x 788 pixels.

eurostat

Euro area balance by product group

(bn)



Global gas price crashed - Outlook Bearish

Big price drop this spring: TTF front month: €58->€33

- Selling from speculators and investment funds
- Policy movement towards softening storage targets
- Trade war threatens world economy

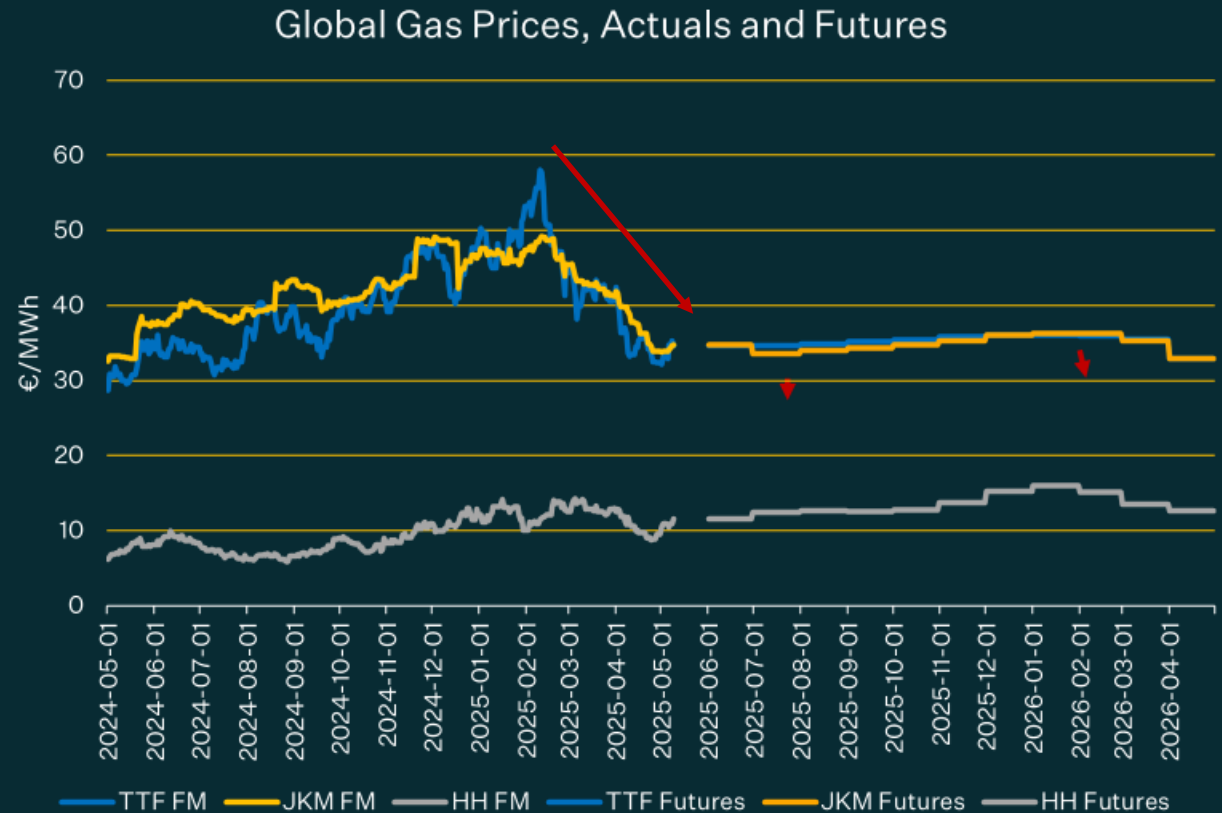
A little rebound lately

- EC Roadmap to phase out Russian gas
- Tariffs: UK, US deal; US-China negotiations and 90 day tariff reductions.

Henry Hub remains decoupled from other world markets. Domestic oversupply in the US.

Likely some more downside potential for TTF and JKM

- Trade war and economic slowdown?
- Ukraine-Russia peace progress?
- Softer storage targets, storage level improvement
- Global LNG supply on the increase (US, others)



Main trends in the European markets

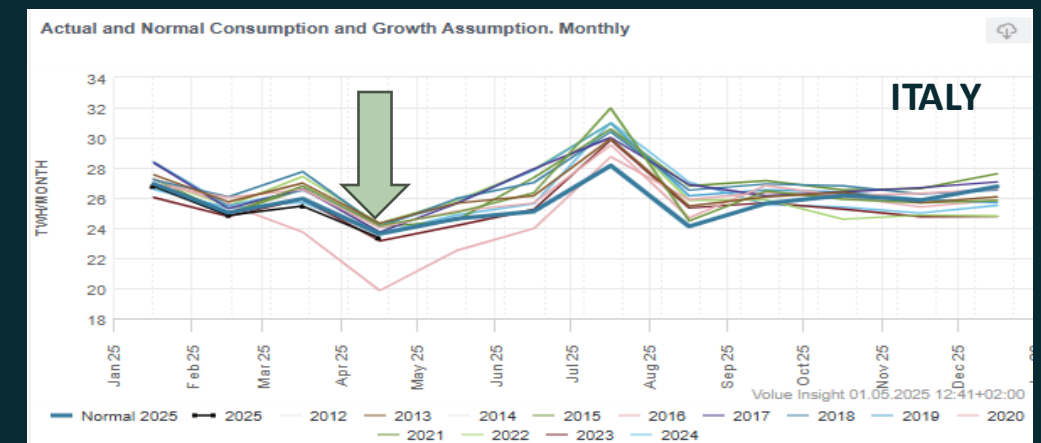
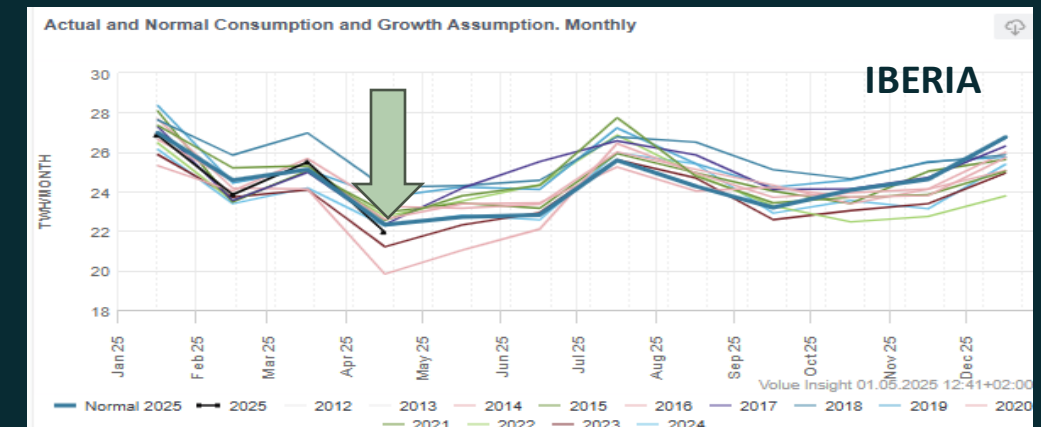
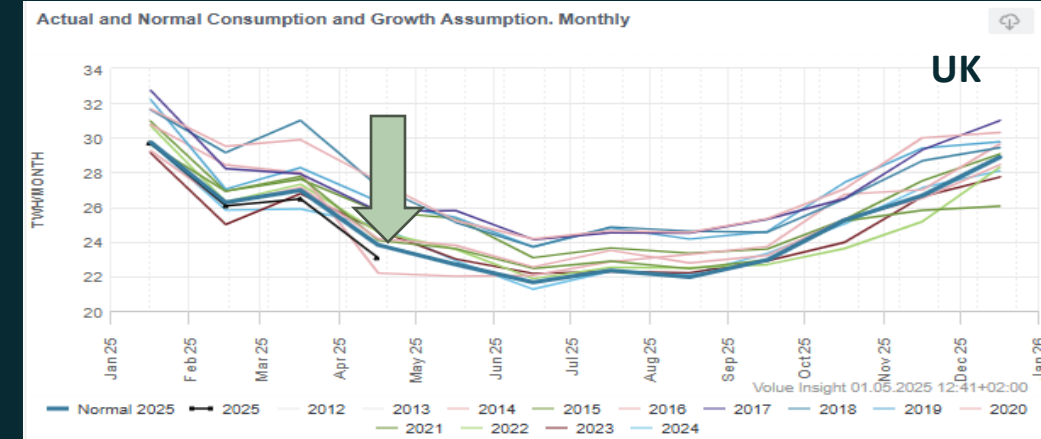
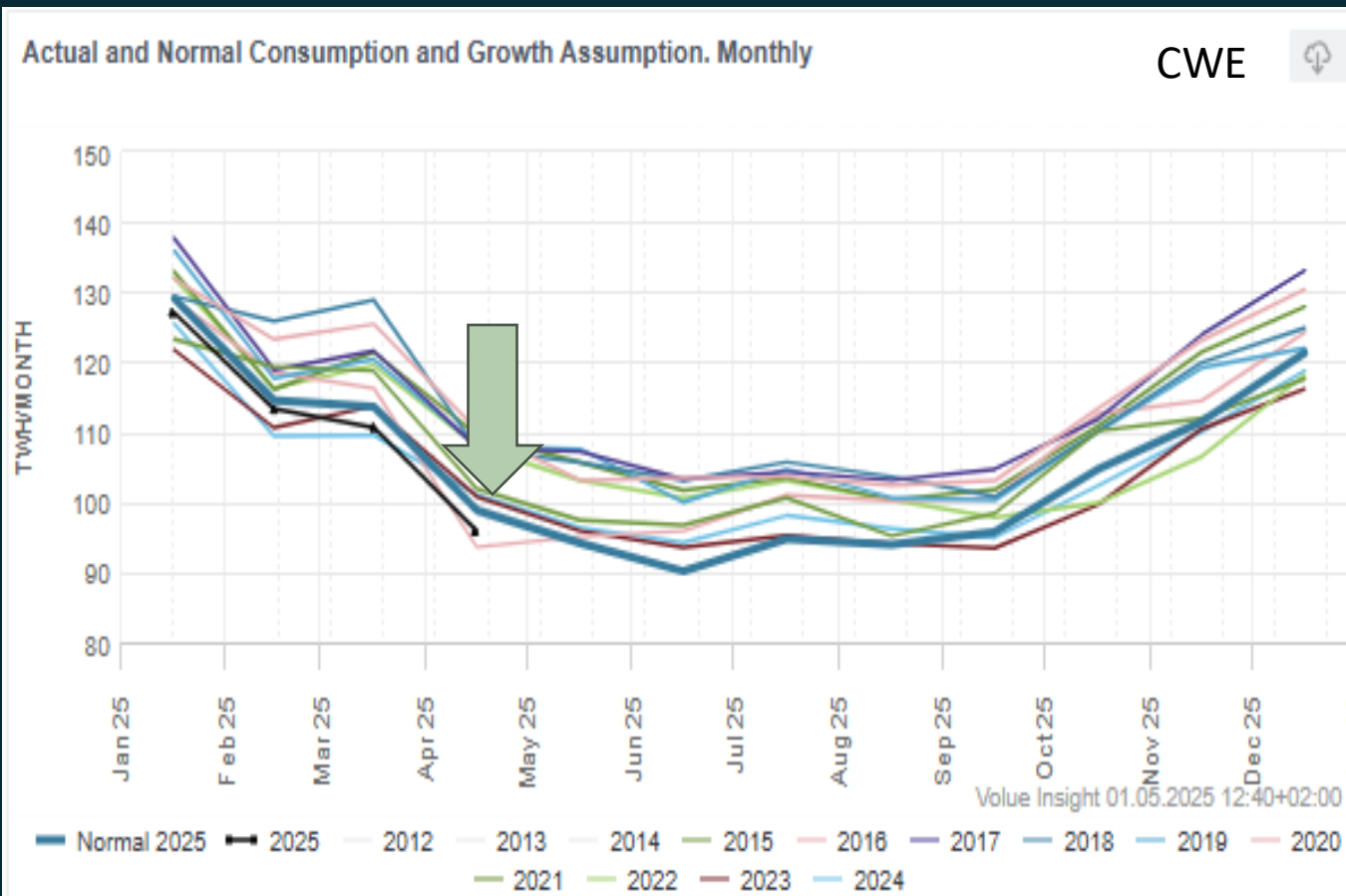
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A steady decline - HVG

Power demand in continental Europe

Major decline in power consumption for most of continental Europe. Main exceptions: Turkey, Hungary



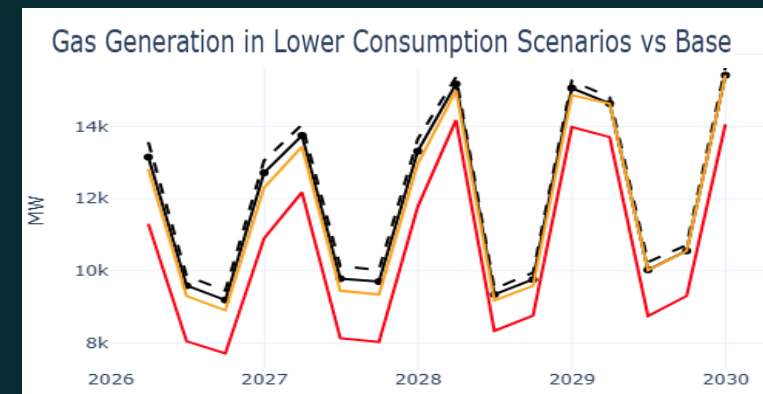
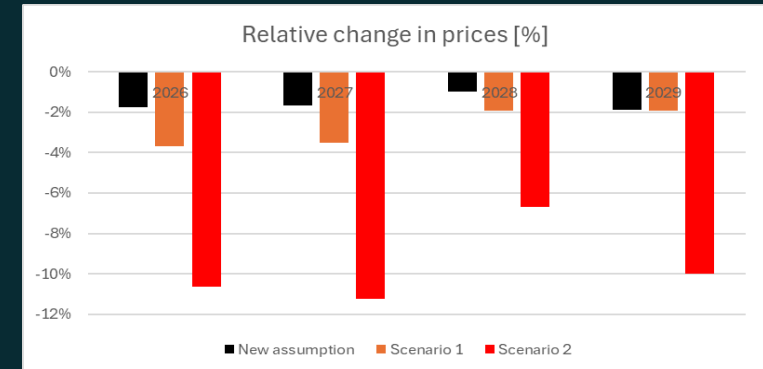
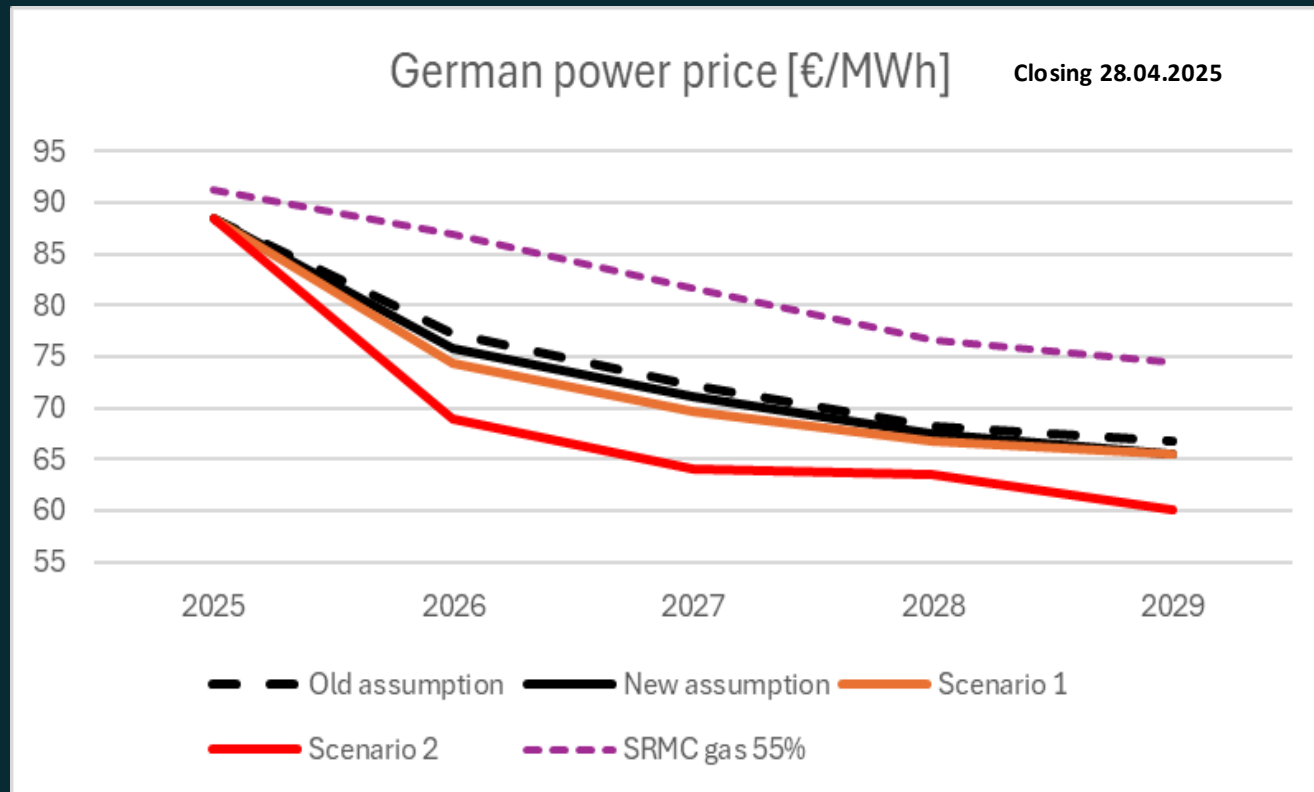
Assumptions on consumption decline & scenarios

We lowered our assumptions on consumption due to the impact of the trade war and reduced industrial output.

Pessimistic scenario down to -10% in prices and -15/20% in gas2power.
Different impacts for each market: Italy PUN-3%, Iberia down till -50%.

Year	Old assumption	New assumption	Scenario 1	Scenario 2
2025	512	489	489	489
2026	514	504	494	463
2027	524	514	503	472
2028	532	527	522	500
2029	548	542	542	515

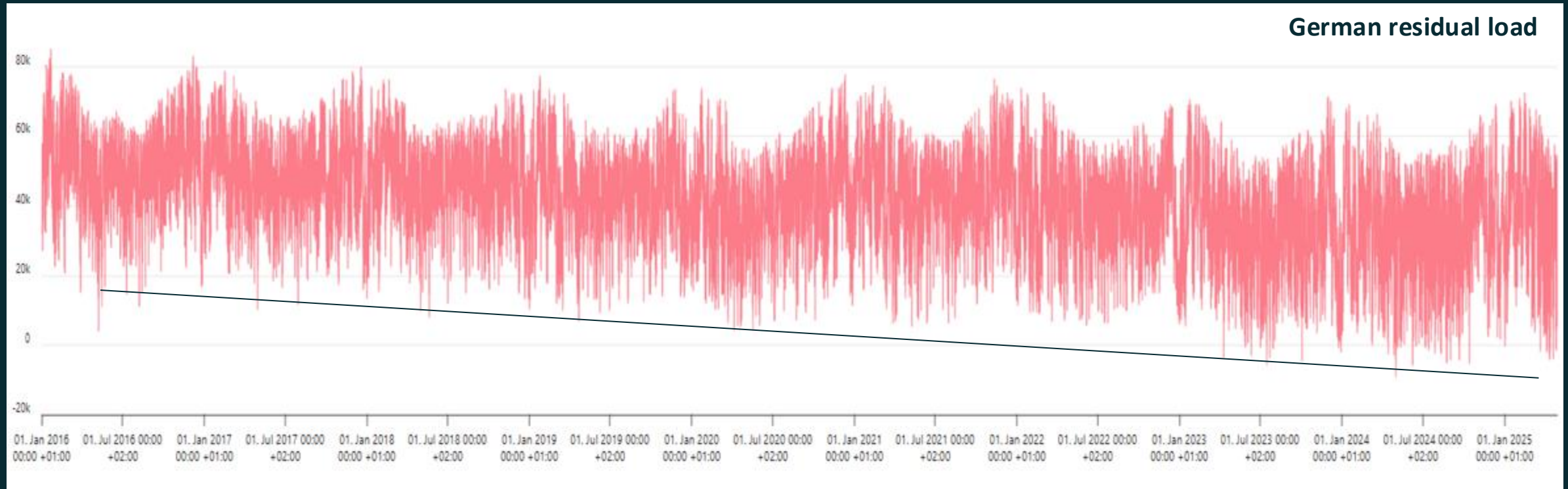
tot demand DE TWh/y



New challenges for TSOs

Residual load actuals GERMANY

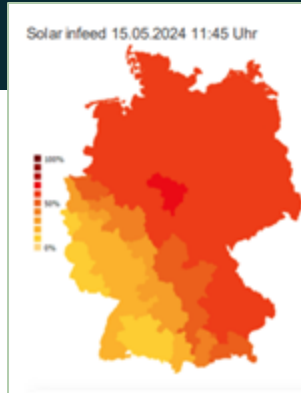
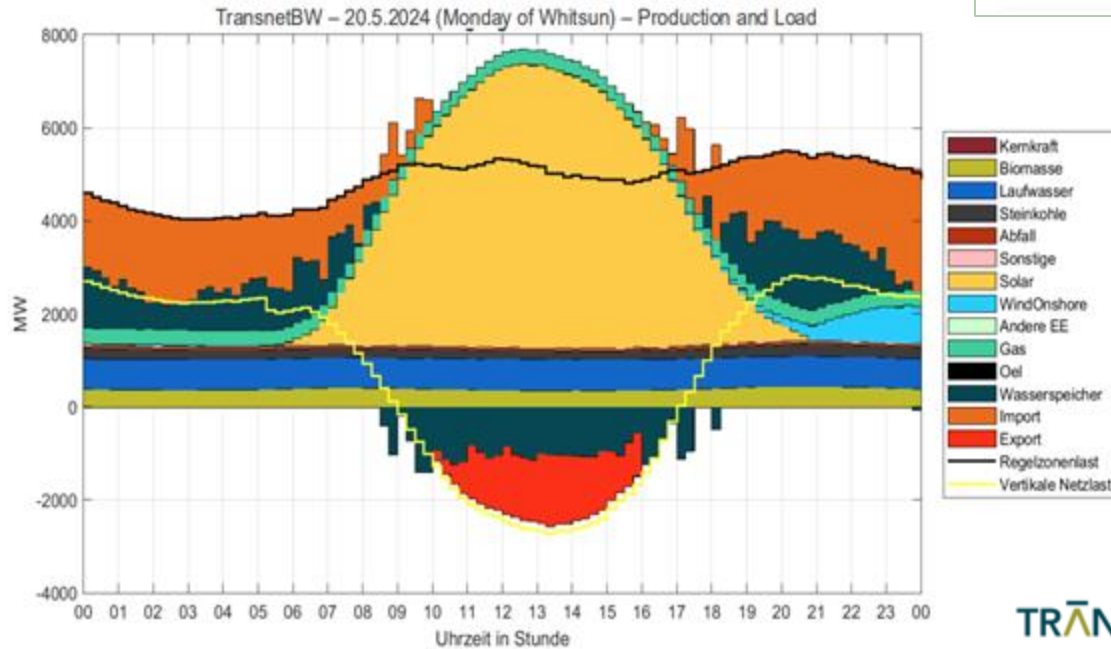
Residual load is defined as (Consumption – Wind – SPV) represents what needs to be covered by nuclear, hydro, thermal, XB. The yearly total as well as hourly min of the residual load in several markets of Europe has been changing dramatically over the past decade. Insight's calculation takes actuals: it includes redispatch, market driven reductions etc..



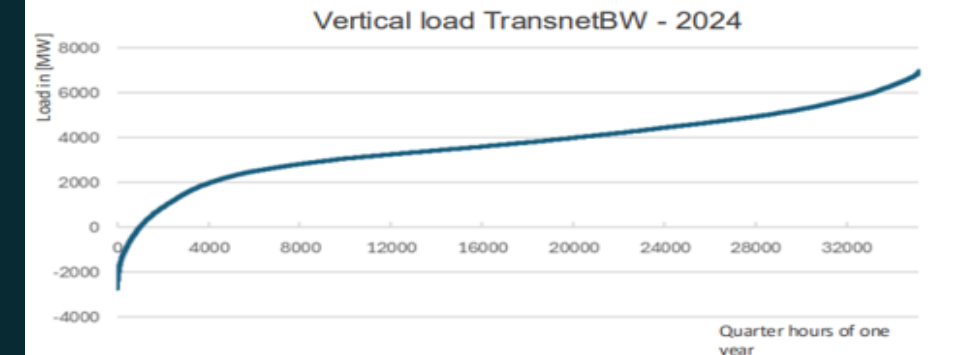
Case study -TRANSNET BW

The challenge of TSOs with roof-tops SPV

CASE STUDY TRANSNETBW - SITUATION



- / TransnetBW control area has roughly the following parameters:
 - / Highest load: 10.5 GW – lowest load: 3.9 GW (Whitsun)
 - / Installed capacity (12/24): Wind: 1.8 GW – PV: 12.3 GW
 - / Infeed records in 2024: Wind: 1.6 GW – PV: 6.5 GW
- / One key factor for system operation regarding high infeed days is the so called „vertical load“
 - / Vertical load: load the TSO transfers to the underlying DSO (positive if the flow is from TSO -> DSO, negative vice versa)
- / High infeed from the DSO results in overload situation of TSO-DSO transformers
 - / Close cooperation with DSO necessary to solve issues in the TSO and DSO grid in parallel
 - / Control of PV-infeed (reliable curtailment) is key
 - / Voltage issues in low load situation become less critical
- / PV-prognose error results in system balance issues
 - / 15 min ID-market, market design
- / Local PV-prognose error results in load flow problems
 - / PV-flows differ from the planning (DACF and IDCF) result in completely different load flows
 - / Adaptation of forecast, models and remedial actions takes long



Increasing volatility in frequency

Data TRANSNET BW

The structural changes in the power-balance and residual load determine a new volatility in the energy and ancillary services markets.

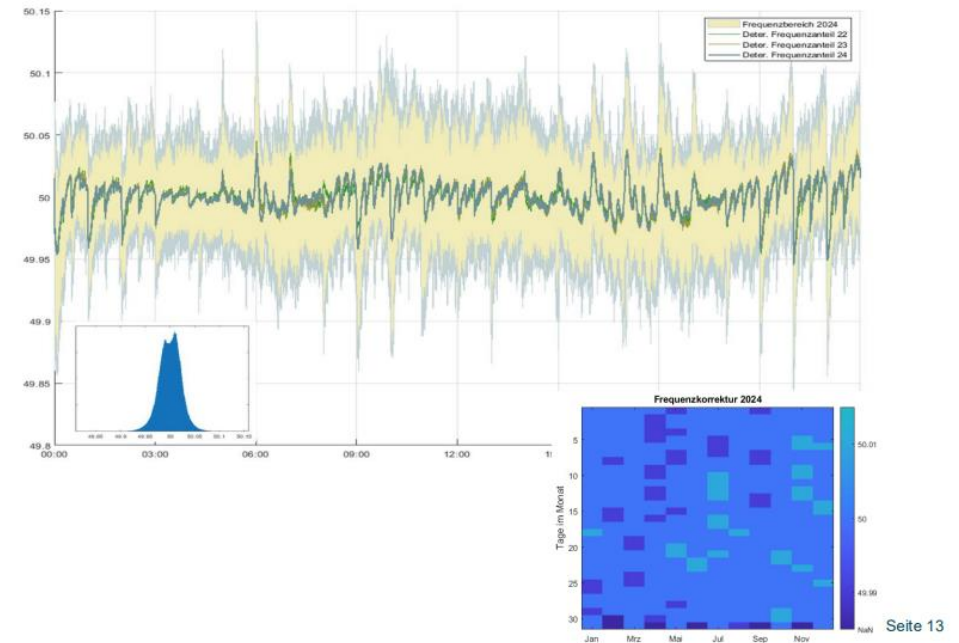
The goal of the TSOs to maintain both frequency and voltage of the grid is becoming more and more challenging, mainly in the SPV hours.

TRANSNET BW

RG CE - FREQUENCY IN 2024

Frequency in Europe 2024

- / Maximum and minimum values show a higher frequency range especially during morning and noon
- / High infeed of PV is already visible in the frequency
- / Frequency correction (49.99 Hz) especially (and frequently) during spring



Seite 13

Increasing modulation of the French nukes

20 GW of modulation regularly performed by the French nuclear fleet when the residual load in France/CWE is low since summer_24

MONTEL

Modulation puts pressure on reactors – EDF

safety chief (Montel) The modulation of nuclear reactor power linked to the intermittent production of renewable energies increases the pressure on EDF's teams and severely disrupts the planning of activities, EDF's Inspector General for Nuclear Safety told Montel.

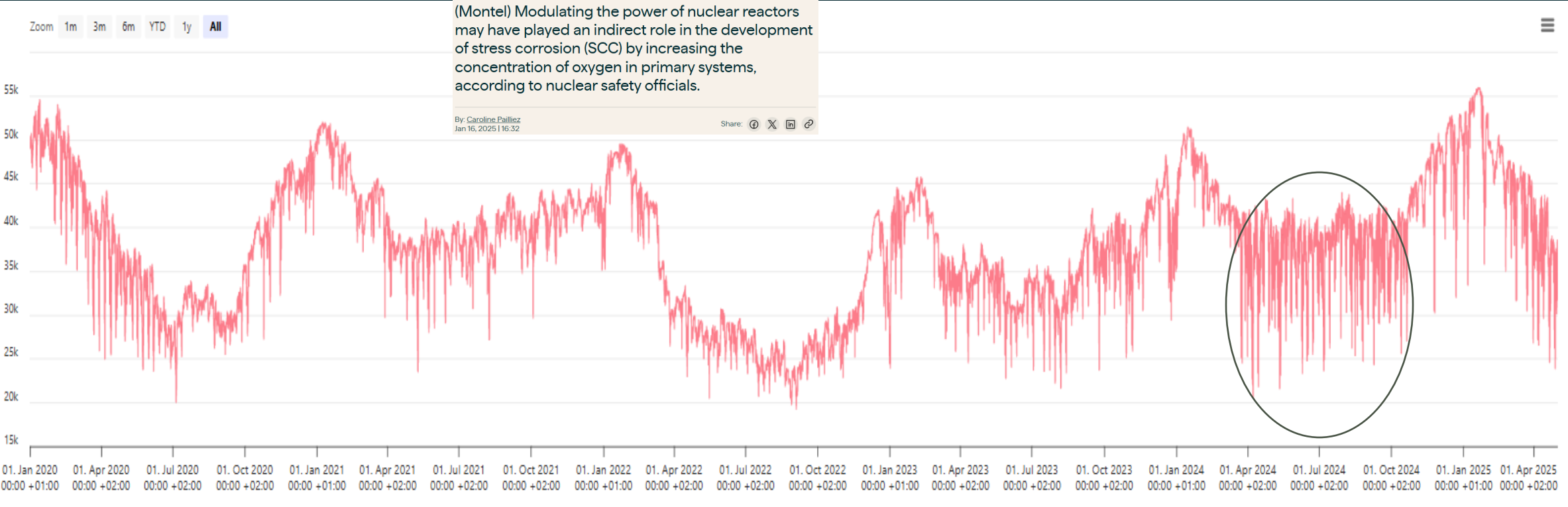
ELECTRICITY NUCLEAR

Nuclear safety examines the role of modulation in CCS

(Montel) Modulating the power of nuclear reactors may have played an indirect role in the development of stress corrosion (SCC) by increasing the concentration of oxygen in primary systems, according to nuclear safety officials.

By Caroline Palliez
Jan 16, 2025 | 16:32

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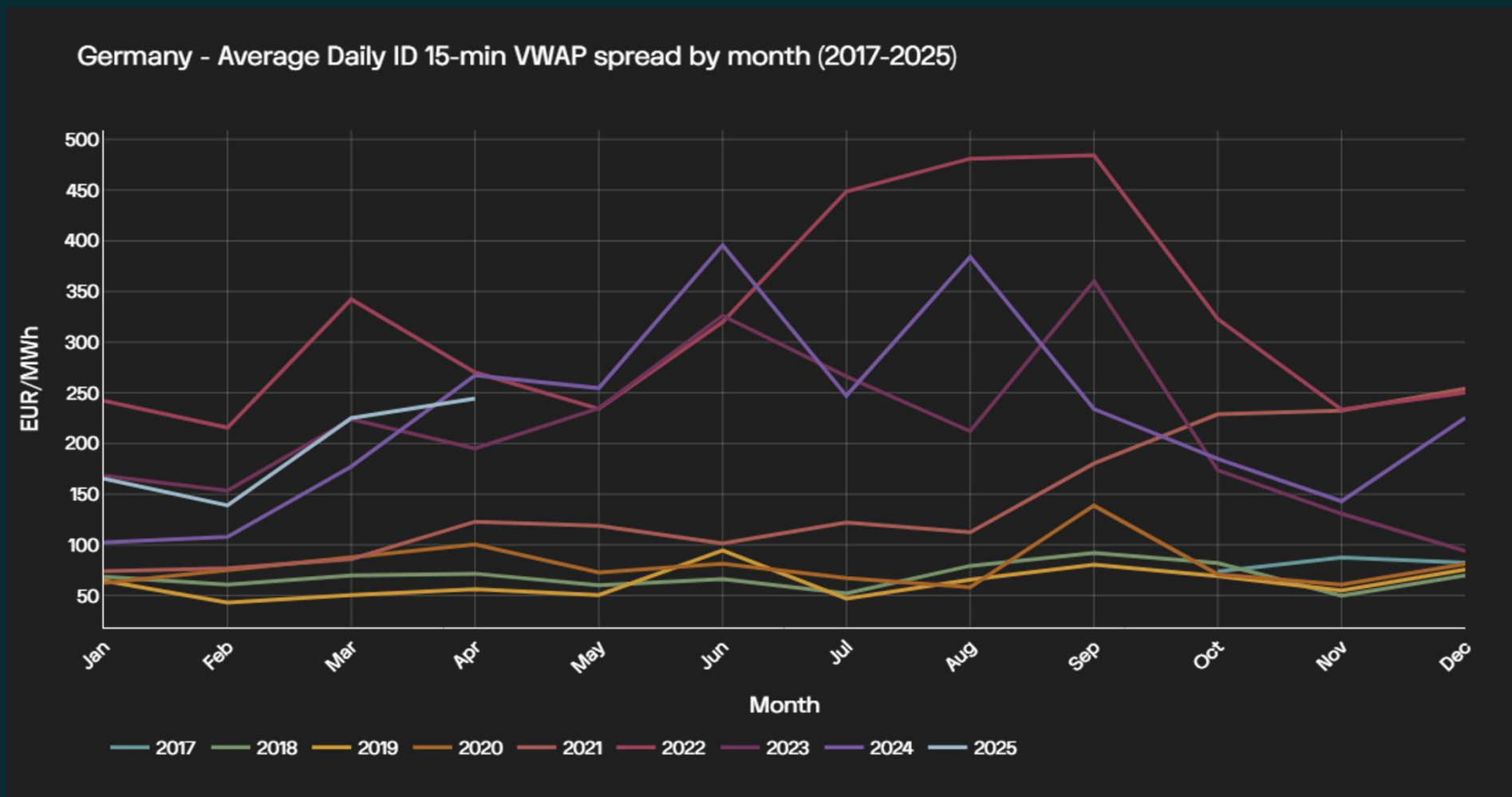
Main trends in the European markets

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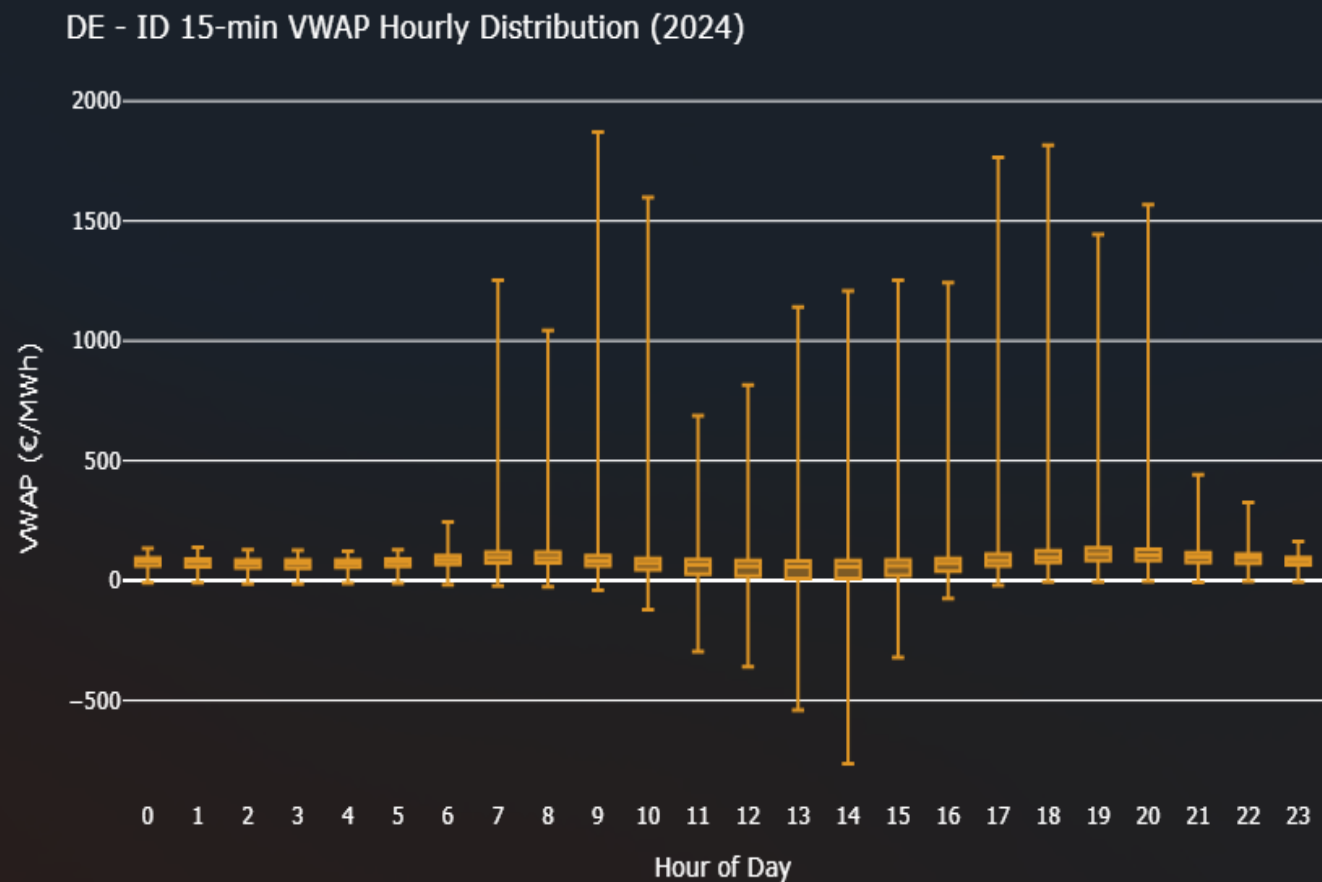
A zoom on prices

Increasing volatility in the last years starting with high gas prices in Q4_21.



A zoom on prices

High volatility for both spot and intraday, strongly correlated with SPV



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Conclusions

Major shifts in Europe which is passing from being mainly an industrial producer to a service producer.

Changes in traditional consumption

- decrease in energy intensive industries
- new emerging sectors like data centers
- penetration of low-voltage grid injection SPV

New challenges for grid operators to keep 'the light on'.

Extra volatility in prices and assets activations requires more data, forecasts, automatization.

