

Austria's hydro, Europe's weather: National choices in an interconnected, uncertain & weather-dependent market

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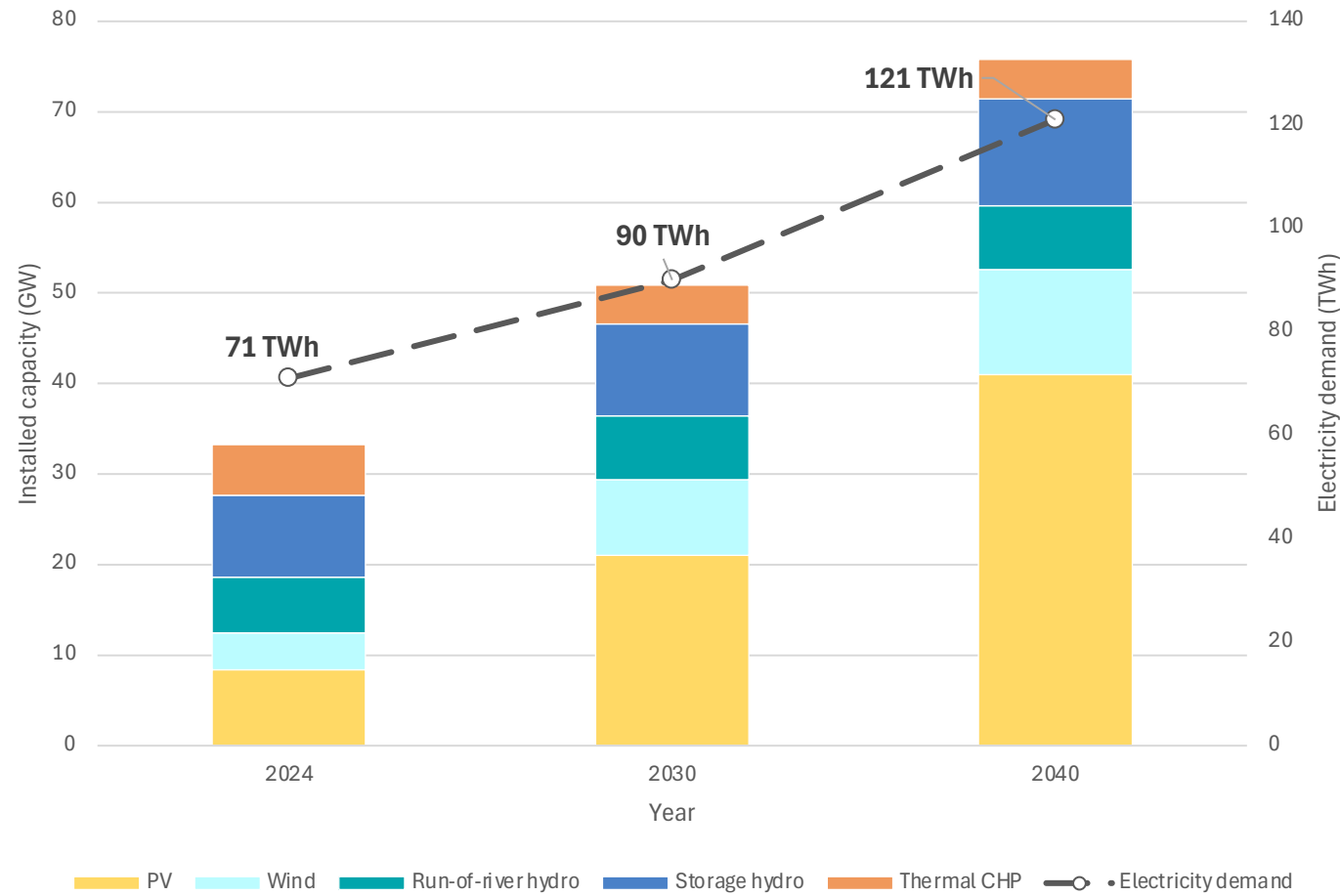
September 10, 2026

What will you learn about in this talk?

1. Key factors shaping Austria's electricity sector and market results
2. The role of hydro in the interconnected EU context
3. How national and regional factors shape balancing market outcomes
4. Tensions between national and regional dimensions of security of supply
5. What market parties need to carefully watch in the future

Where is Austria standing today and where is it headed?

Austria electricity capacity outlook and demand



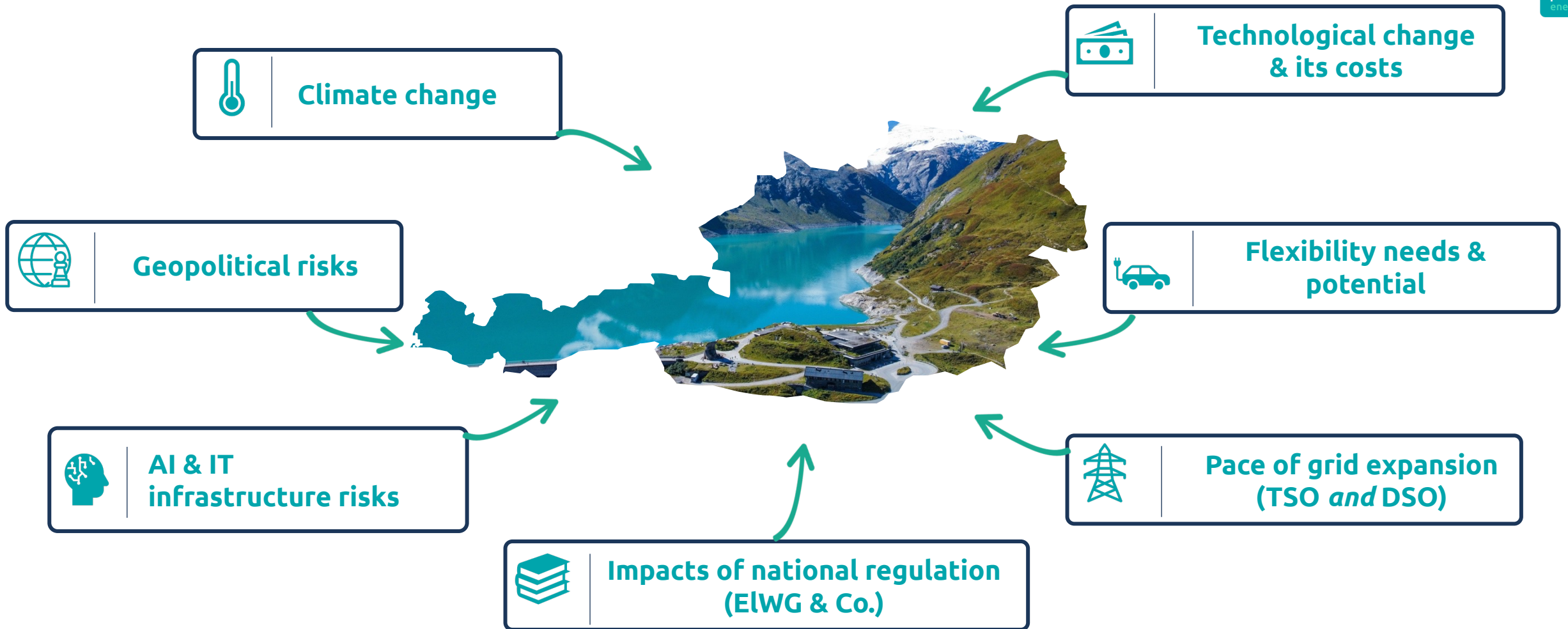
What other technologies are expected to play a role?

- Austria already has a growing **battery** fleet, but most reported capacity today is in residential and commercial PV-coupled systems. Around **2.2 GWh was installed by the end of 2024**. A comparable figure for large-scale BESS is not yet available.
- Utility-scale batteries are expected to grow rapidly, reaching **1.25 GW / 2.5 GWh by 2030** and **5.9 GW / 11.8 GWh by 2040**.
- In addition, ÖNIP expects **electrolyzers** to increase consumption to 5 TWh/year in 2030 and **15.96 TWh/year in 2040**

Are these expectations aligned with reality? And how electricity needs will be covered if demand would almost double?

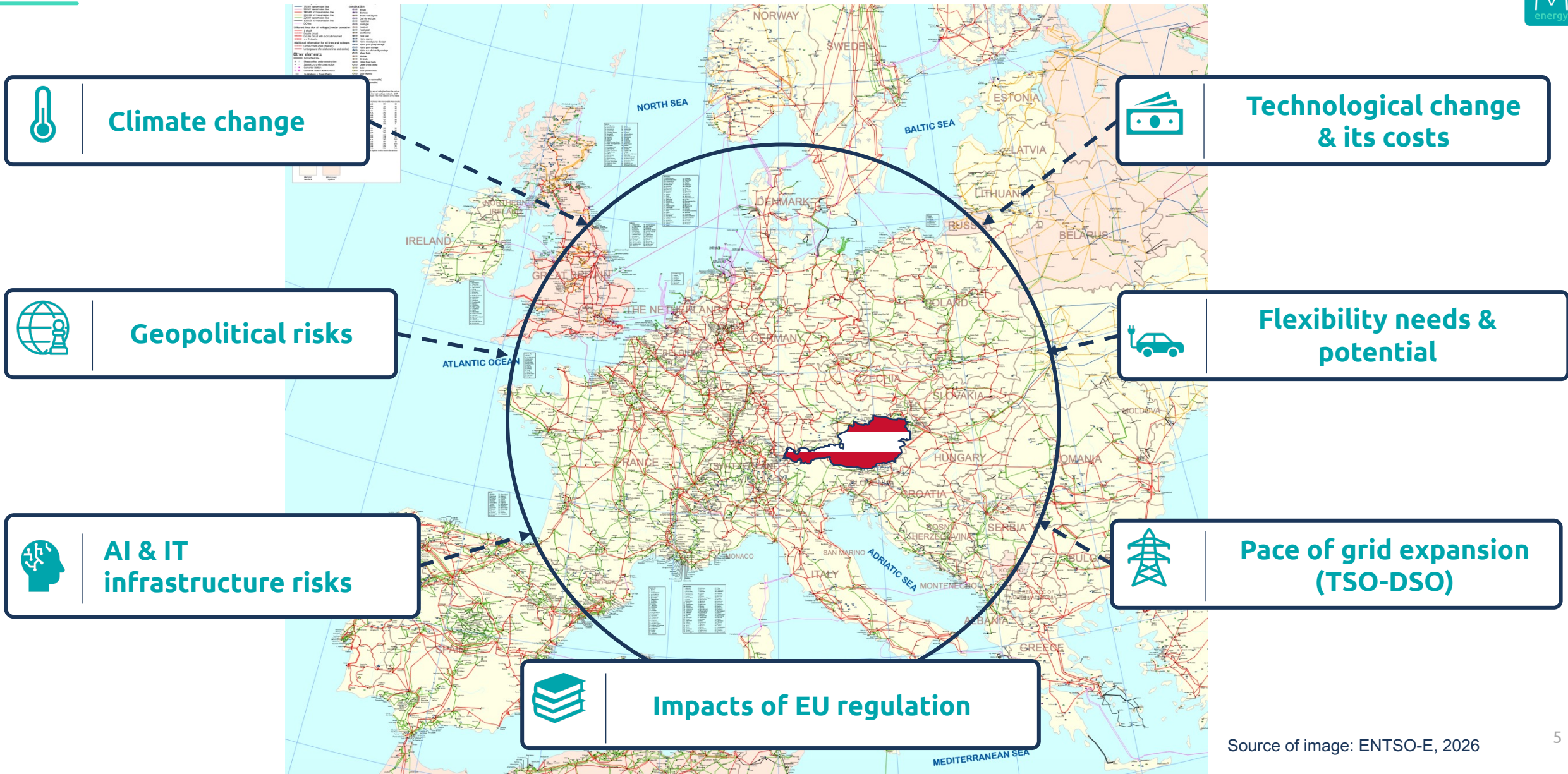
Source: ÖNIP (Austrian Integrated Network Infrastructure plan), 2024

So what will actually shape Austria's energy future? What are the moving parts?



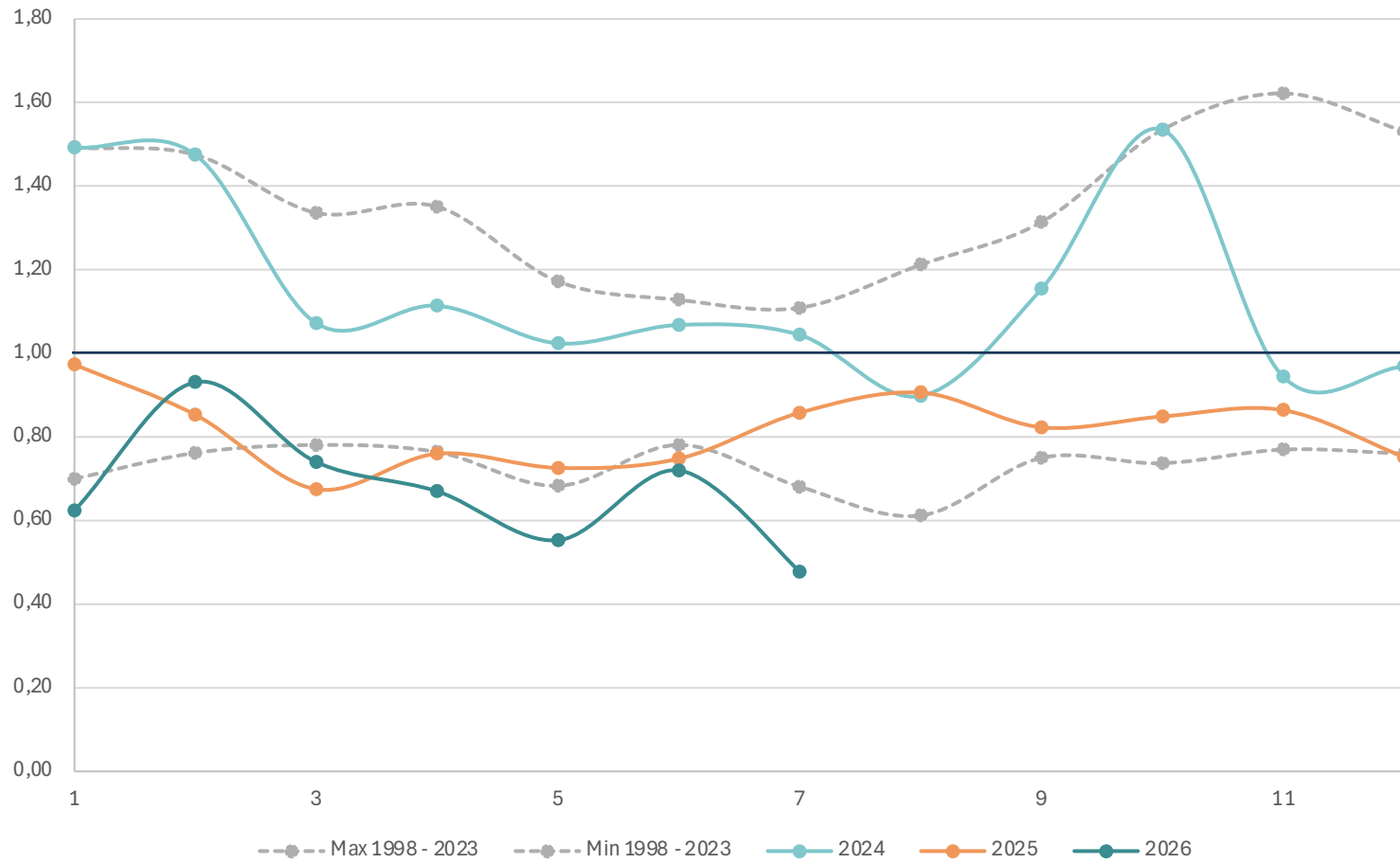
Austria's energy future will be shared by the interaction of weather, technology, regulation and regional system conditions and not by any single national choice

But Austria is not a microgrid or an energy island. The factors impacting Austria's future, **go way beyond its national borders** in a highly interconnected power grid and market setup in the EU



Hydro gives Austria a major flexibility advantage but its availability has been significantly impacted by regional weather & commercial strategies

Generation coefficient of run-of-river-plants



- **2024 → 2025** hydropower generation fell from **40.4 TWh to 30.4 TWh, a 24.8% decrease**, while electricity consumption increased only marginally (by 0.3%)
- **2026 has been challenging so far.** The run-of-river coefficient reached a record-low 0.62 in January and 0.55 in May.
- In **July 2026**, hydropower generation was **46% below July 2025**, with run-of-river generation close to seasonal record lows throughout the month

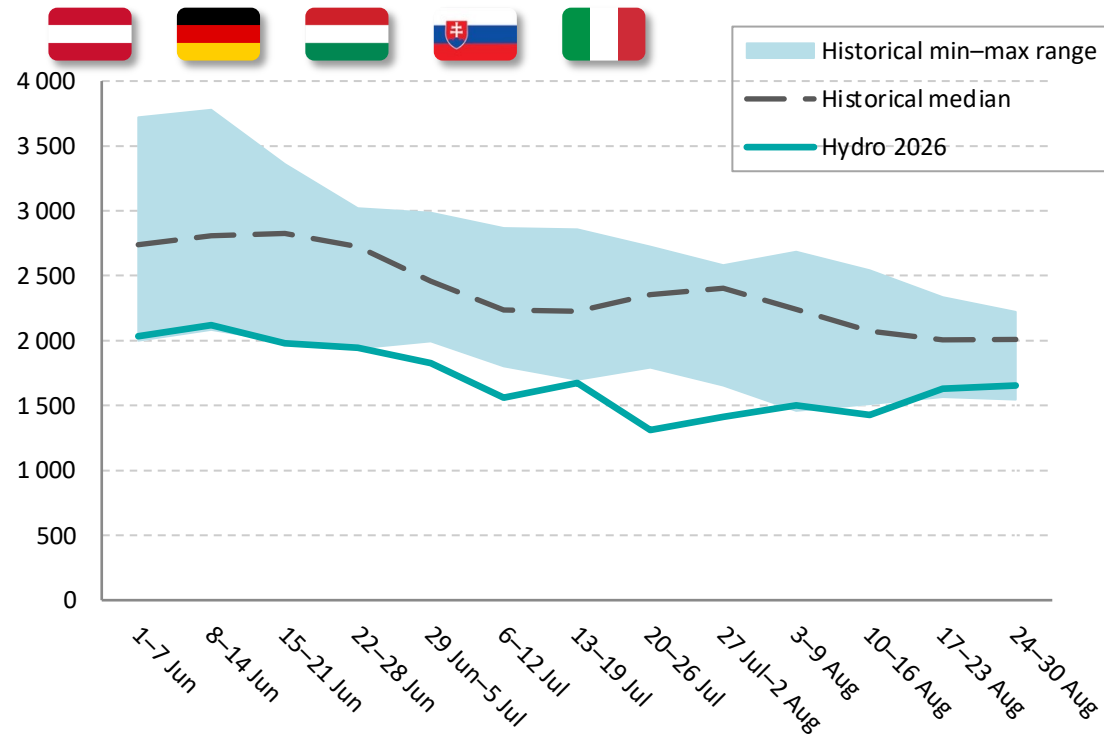
Sources:

- E-Control
- APG

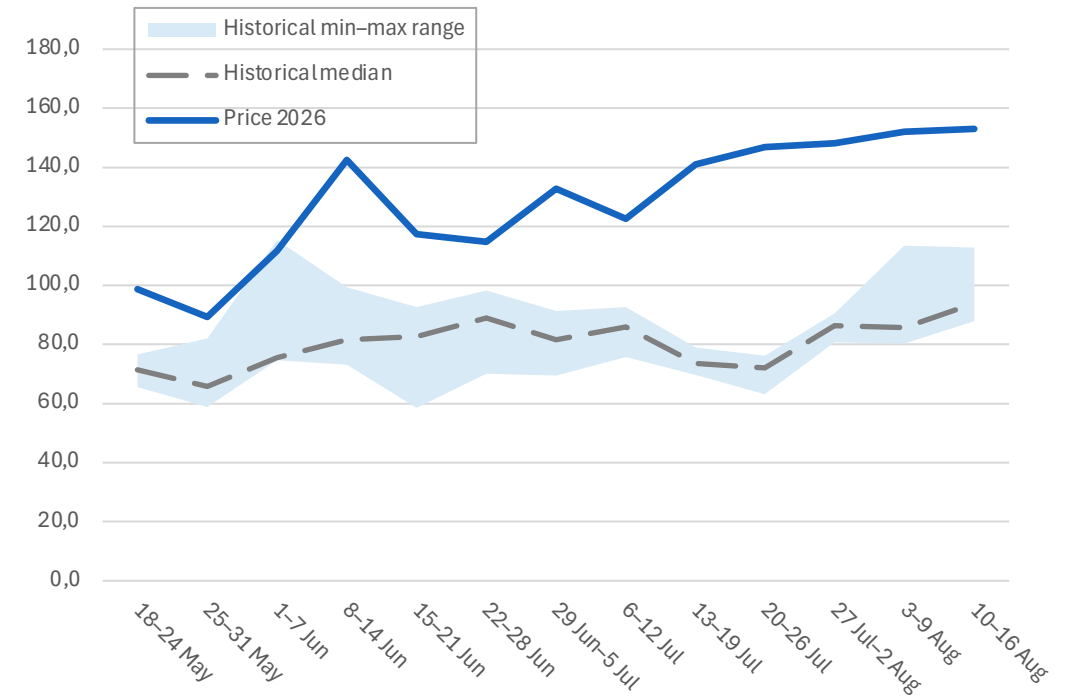
Note: The generation coefficient compares actual monthly run-of-river generation with the long-term average for that same month, where 1.0 means average conditions

Summer 2026 combined low hydro availability with a changing generation mix and elevated power prices

Regional natural hydro generation (GWh/week)



Austria day-ahead price (EUR/MWh)



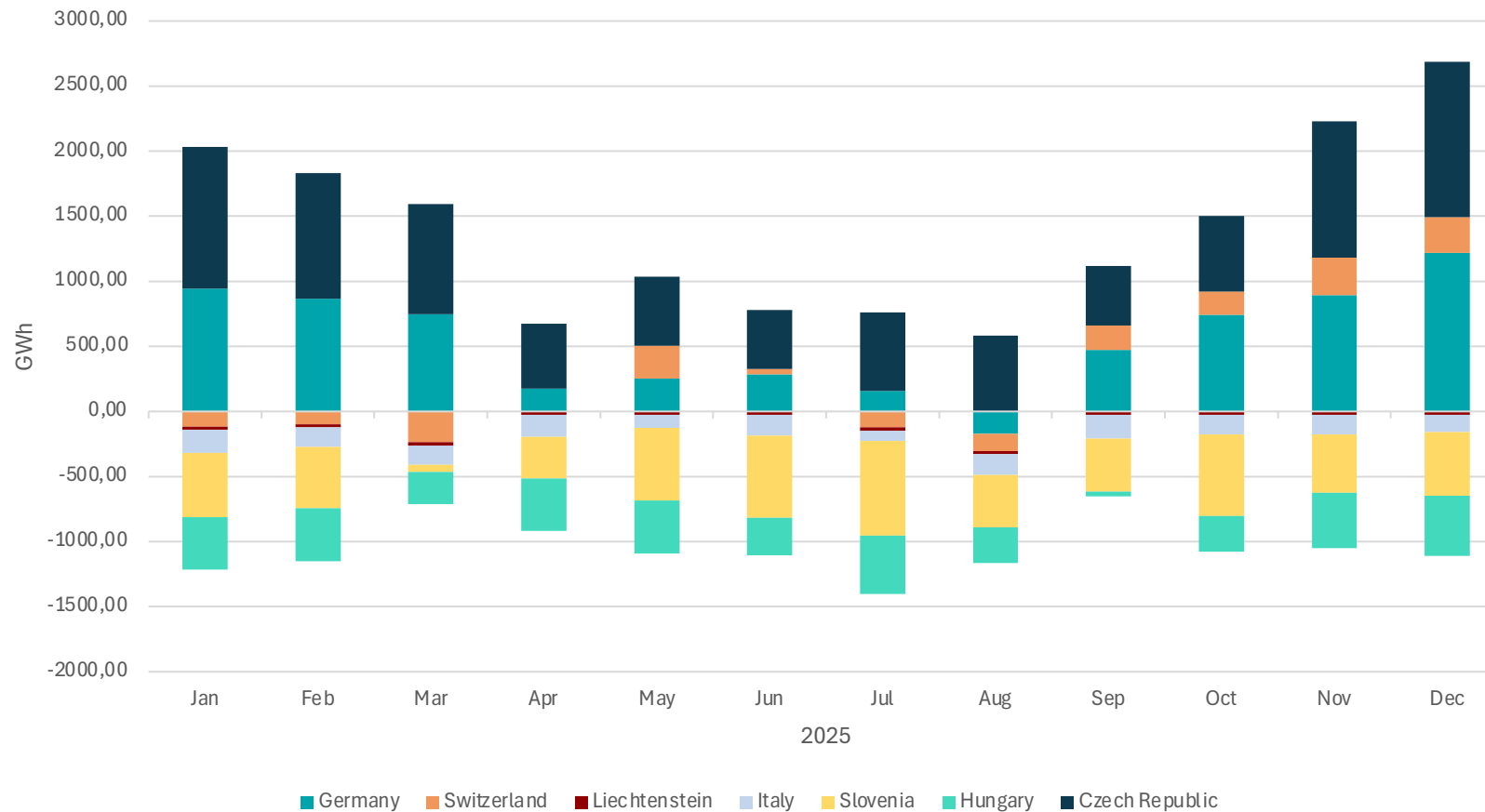
- Regional hydro generation, in line with Austria's own hydro output, was down 23.4% compared to historical summer levels
- Lower hydro availability coincided with higher than usual Austrian day-ahead prices
- Compared with the 2021–25 summer average, the hydro shortfall was partly offset by higher solar (+36.5%) and wind (+16.9%) generation, while thermal/fossil (–12.4%) and nuclear (–7.0%) generation were lower.

Note: Data range 2021–2025. Data from 2022 not included to avoid graph distortion. Regional countries include AT, CZ, IT, SI, DE.

Austria in the middle of a highly interconnected system and may offset domestic production swings through the interconnections



Physical Import Balances by neighboring country in 2025



What does this graph show?

- Austria's physical exchanges are **highly seasonal and differ strongly by border**
- Germany and Czechia generally provide the largest net imports, while Slovenia, Hungary and Italy are more often associated with net exports
- **The pattern changes substantially over the year**, showing that Austria's role is not simply that of an importer or exporter

Source:
- Entso-e Transparency Platform

Note:

- **Positive** values mean Austria is **importing** electricity from that country
- **Negative** values mean Austria is **exporting** electricity to that country

Austria may offset domestic production swings through the interconnections whose net position can change sharply between different years



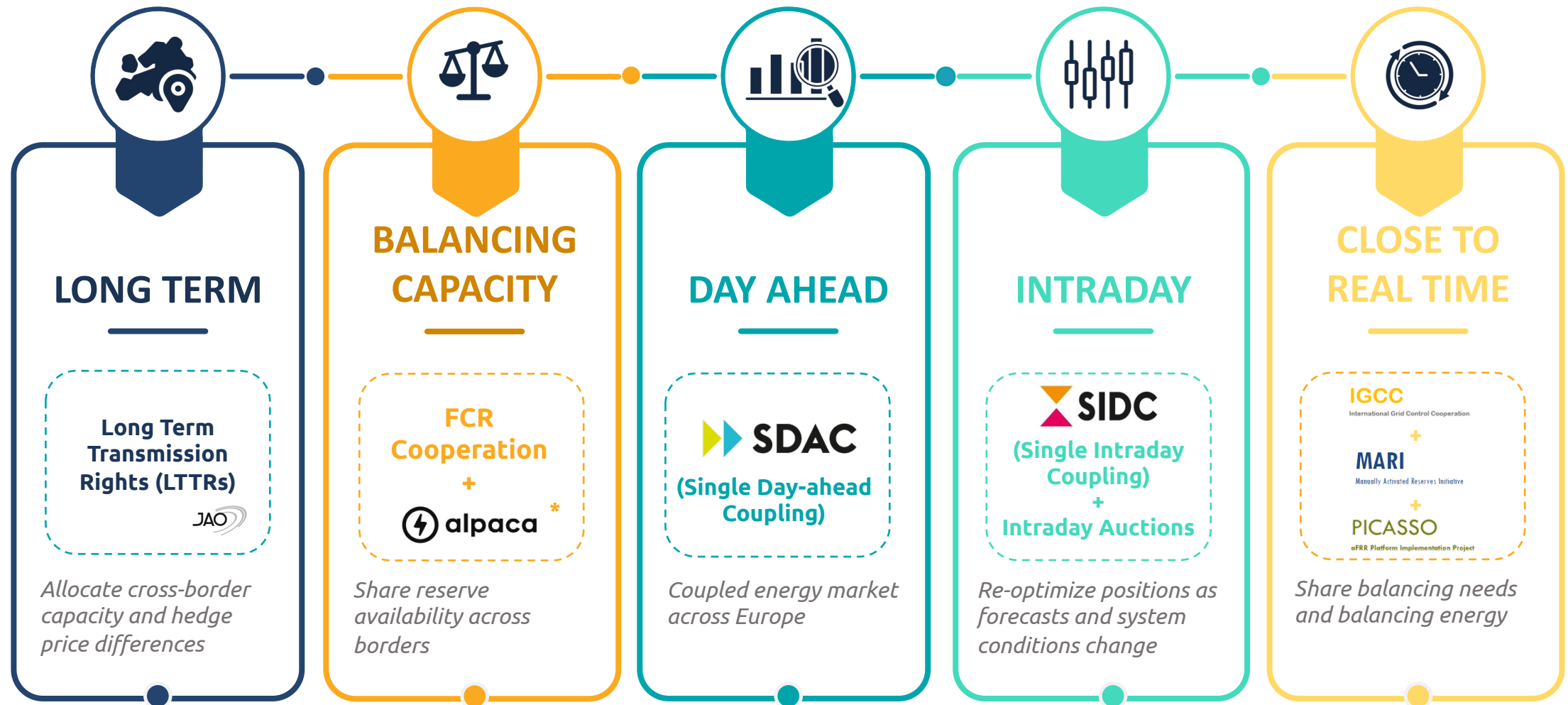
Import balance AT



- 2024 and 2025 illustrate this particularly clearly
- Austria moved from **around 7 TWh of net exports in 2024 to around 4 TWh of net imports in 2025**, a swing of roughly 11 TWh
- Over the same period, **hydro generation fell from 40.4 TWh to 30.4 TWh**, while demand increased
- The interconnected system therefore **allowed Austria's external position to adjust substantially** as domestic generation conditions changed

Source: E-Control, 2026

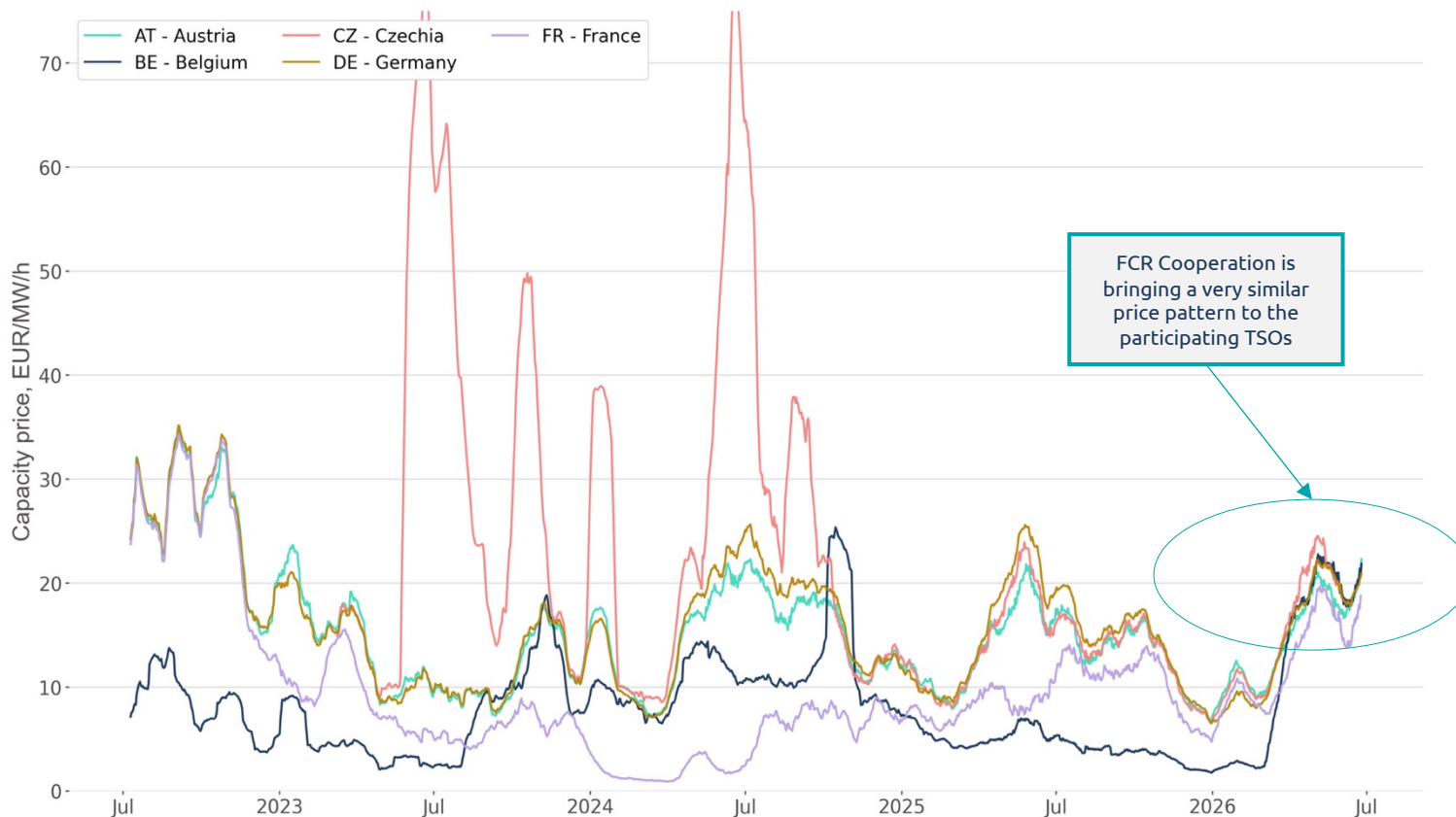
The interdependencies across the border region are not only grid- and technology -specific but also market-related as Austria is part of multiple cross-zonal cooperations across timeframes



Austria's flexibility is not only domestic. European markets allow flexibility to be shared across borders from long-term planning to real-time balancing.

Thanks to the FCR Cooperation, FCR prices are gradually converging across CWE

Contracted FCR Symmetric procurement prices over time



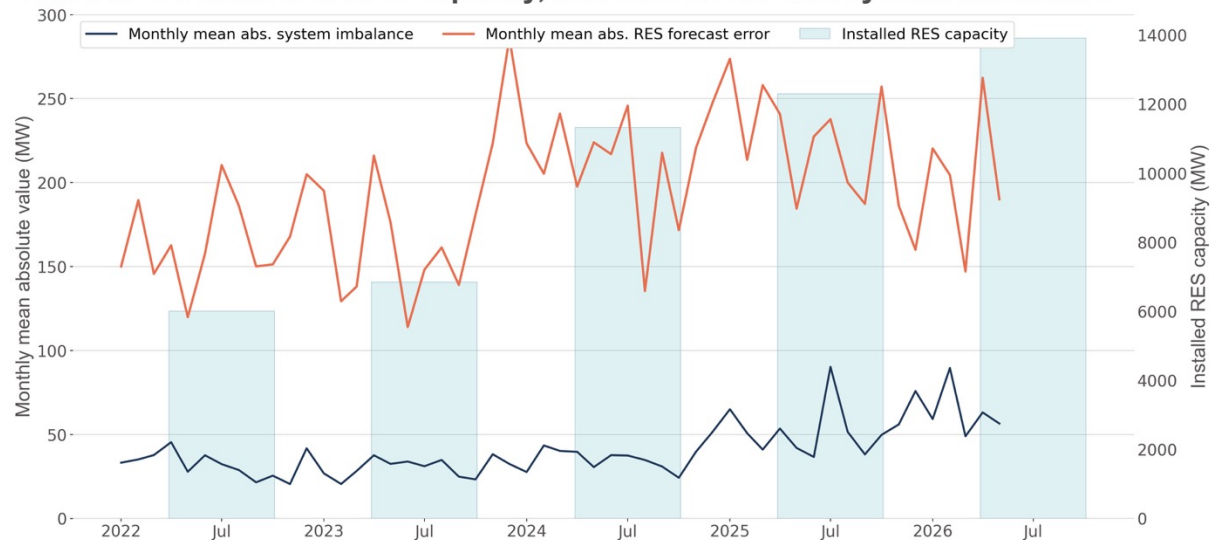
- **FCR prices are gradually converging across the region**, with most countries now following a very similar pattern over time
- This is **largely supported by the FCR Cooperation**, which brings participating TSOs into a common auction and clears bids through a shared merit order. In practice, this allows cheaper offers to serve demand across borders and reduces persistent price differences between countries
- **Some temporary gaps still appear due to occasional local procurement limits**, cross-border constraints or scarcity conditions become binding. Czechia showed the clearest deviations in 2023 and 2024, but its prices have since moved much closer to the rest of the region

Source:
- Entso-e Transparency Platform

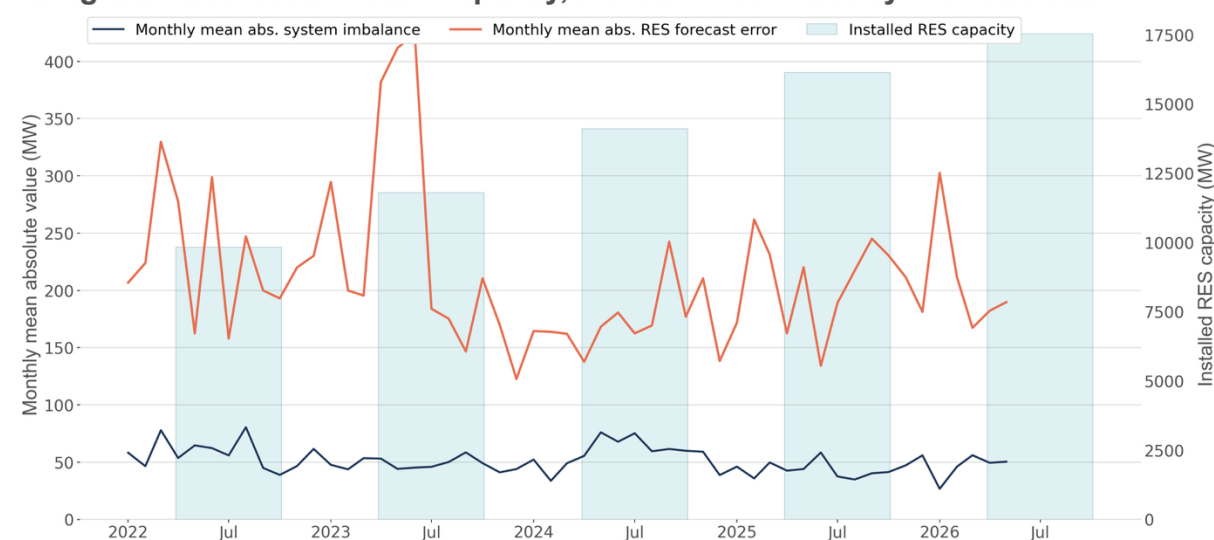
Unlike common concerns, a strong growth of intermittent RES (wind & solar) has not created a consistent rise in system imbalances in Austria or other EU Member States



Austria - Evolution of RES capacity, forecast errors and system imbalance



Belgium - Evolution of RES capacity, forecast errors and system imbalance

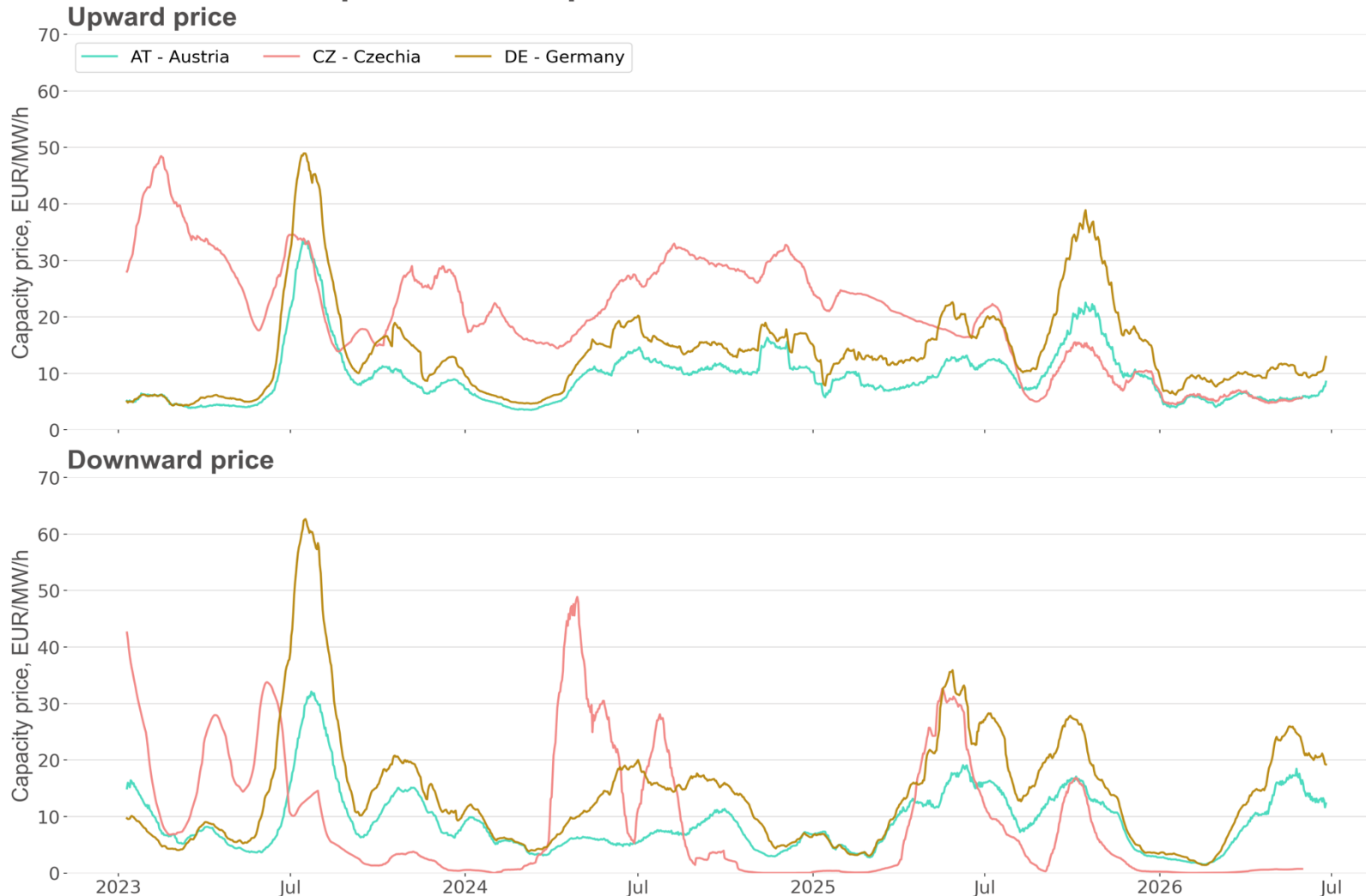


- **Both Austria and Belgium added a large amount of solar & wind capacity over 2022 – 2026, the rise amounted to ca. 75%**
- In Belgium, forecast errors stayed broadly stable and system imbalances did not increase (if anything, they slightly decreased).
- Austria shows a slightly different picture, forecast errors became more volatile and system imbalances slightly increased, especially from 2025 onwards but without a stable trend.

More variable renewables have not made the system consistently harder to balance.

aFRR capacity prices increasingly move together across AT, DE and CZ, but national and seasonal differences remain. Price differentials are dependent on the available cross-zonal capacity and maximum exchange limits.

Evolution of aFRR procurement prices across countries

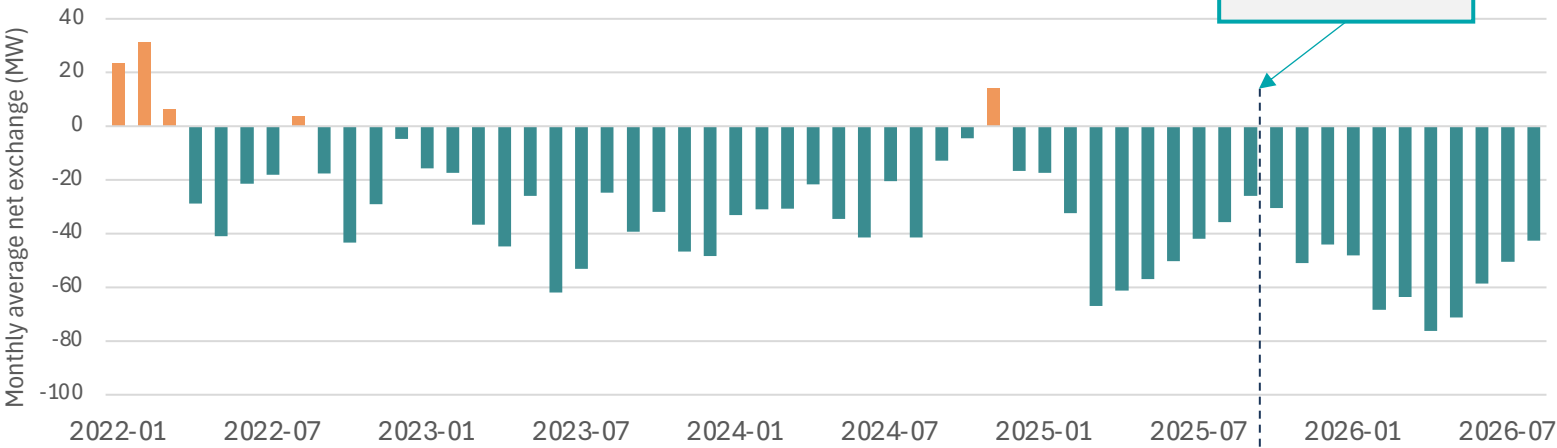


- **Austria, Czech Republic and Germany (members of ALPACA), are more closely grouped in the upward direction.** Their prices often move at similar times, but the size of each increase still depends on national supply and procurement conditions, as well as available cross zonal capacity in the region.
- **Downward prices show a much clearer seasonal pattern** and general downward trend. Several markets show seasonal patterns: they rise during spring and summer, when downward flexibility is generally more valuable, and fall during winter.

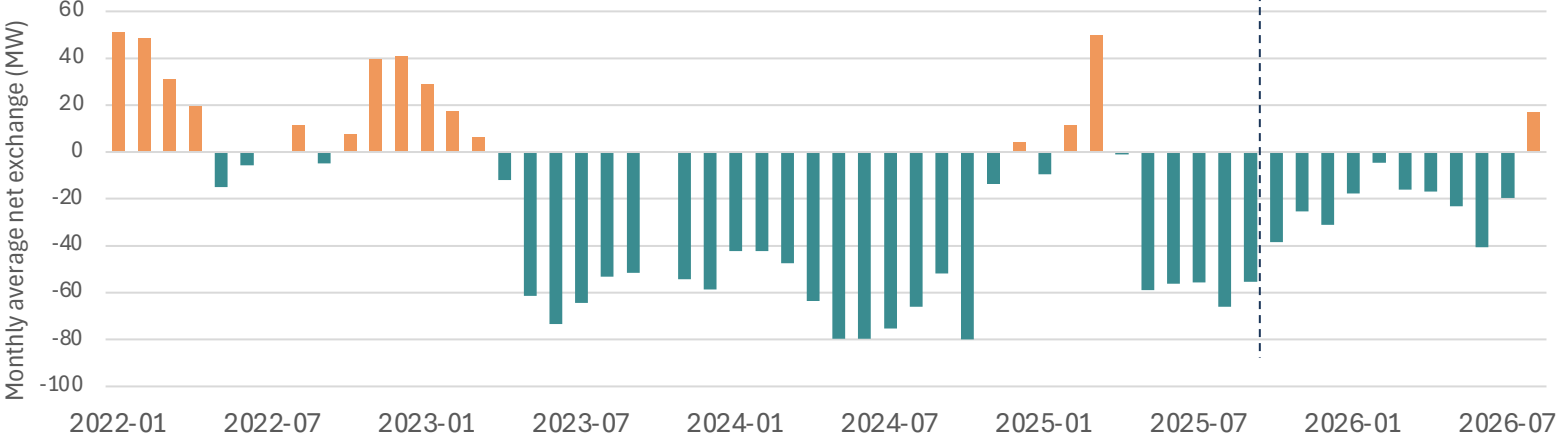
Austria has been predominantly **exporting** aFRR capacity to Germany



aFRR up capacity exchange between AT and DE



aFRR down capacity exchange between AT and DE

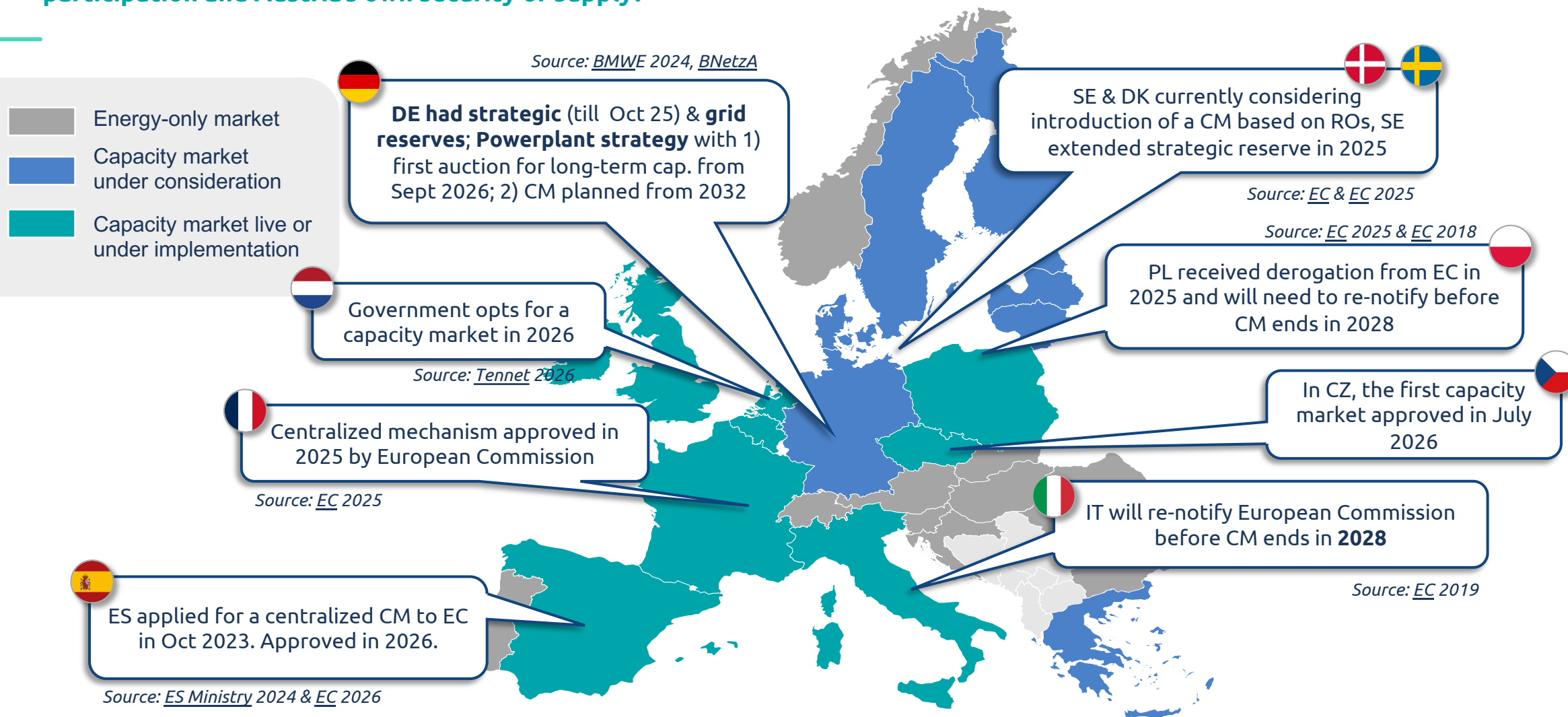


- **Austria and Germany have jointly procured aFRR capacity since 2020**, with cross-border exchanges limited to 80 MW.
- In September 2025, **this bilateral cooperation was continued under ALPACA and expanded to Czechia**. Austria remained predominantly a net exporter to Germany both before and after this expansion.

Note:

- Monthly average positive = AT import
- Monthly average negative = AT export

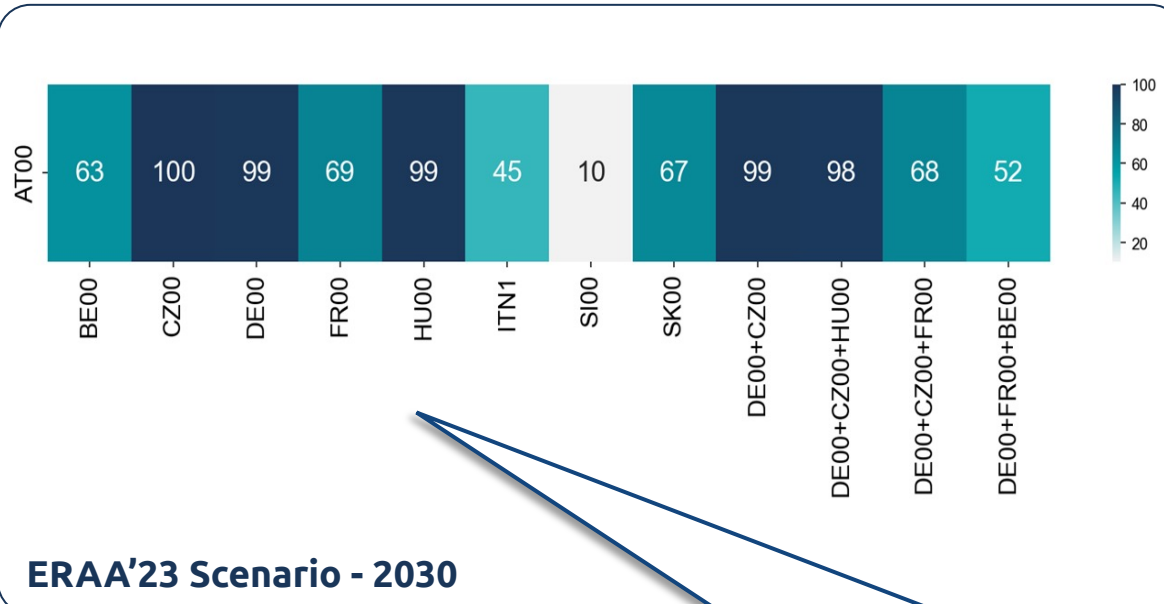
Austria remains one of Europe's few energy-only markets as capacity mechanisms spread. What does this mean for cross-zonal participation and Austria's own security of supply?



In the EU, an increasing number of Member States are planning and applying for new or renewing their existing capacity mechanisms as they are becoming an integral part of the EU electricity market design.

Austria's energy-only model relies on regional adequacy but scarcity can occur at the same time across the region

ERAA shows a high correlation of scarcity events across Austria and neighbouring countries. Cross border imports can support adequacy in normal conditions, but they may be less available when several countries face stress at the same time.



Based on European Resource Adequacy results, the probability of scarcity events in Austria in 2030 happening at the same time as at its neighbors is extremely high



Austria remains energy only

Austria is one of the few European countries without a market wide capacity mechanism, while several neighboring markets already have one or are moving in that direction.



Imports are not firm capacity

Interconnection can reduce national adequacy needs, but its contribution depends on available cross zonal capacity and on whether neighboring systems are also experiencing scarcity.



A growing cross-border question

As neighboring countries procure firm capacity, Austrian generators may participate abroad, while Austria itself becomes increasingly exposed to capacity decisions taken outside its own market.

Austria is not an island. Neither its weather risk, market outcomes, system needs and security-of-supply concerns.



Nationally we see...



Austrian hydro output,
national load, variable RES
injection



Austrian balancing capacity
demand, FCR, aFRR, mFRR
prices and national
imbalances



Austrian available firm &
flexible capacity



What actually determines national outcomes is ...

- Weather across Central Europe
- Availability of German RES and French nuclear
- “downstream” needs in Italy, Slovenia, etc.
- Cross-zonal capacity limits

- Supranational impacts on balancing energy prices from common merit order lists in MARI and PICASSO
- Cross-zonal capacity constraints
- AT-DE exchanges of aFRR
- Cross-zonal impacts on imbalance prices

- Whether imports are actually available when we need them or whether neighbors are experiencing scarcity as well

National
conditions
affect the
region

Regional
conditions
feed back
into Austria

Interconnection helps diversify risks and strengthens overall resilience but also problems “flow across borders” in the worst case causing domino effects

Austria is not making single and isolated technology choices but **portfolio choices embedded in the national but also European reality.**



What should market parties watch?

Technology availability & markets

- Regional hydro production & cross-zonal capacities across timeframes
- *Competing* uses of the same flexible MW and MWh, effects of increasing cross-zonal competition on balancing markets, DA/ID spreads, etc.
- Evolution of internal congestion & grid access conditions
- Security-of-supply discussions in Austria and capacity market implementation progress at the neighbors (e.g. DE CM from 2028)



Regulation – national *and* EU

- *Updated EU Network Codes & Guidelines*
- *European DA/ID + balancing markets*
- *Flexible grid access (ELWG §§103/104)*
- *Market-based grid flexibility (§139)*
- *Common flex platform (§142)*
- *Flexibility + adequacy assessments (§§149/150)*



Grid and market flexibility increasingly valued *across* use cases!

The value of the mix will be decided by European integrated markets, European weather and increasingly national and European grids.

Key takeaways

1

Hydro is a major source of flexibility and decarbonization for Austria but climate change shows it's not "any-weather-proof"

Hydro output can vary significantly between years and seasons. Batteries and distribution-level flexibility will add new resources but their role alongside hydro, grids and cross-zonal markets is still evolving

2

Austria cannot be treated in isolation

Interconnection helps Austria ensure grid resilience, secure imports or support neighbors with balancing reserves but it also means that prices across markets and the value of flexibility increasingly depend on regional conditions and available cross-zonal capacity.

3

National security of supply increasingly depends on regional conditions

Austria remains an energy-only market while several neighboring countries introduced or plan to introduce capacity markets. Interconnection helps, but its value during scarcity depends on whether capacity is actually available across the region and who foots the bill.



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For further insights from the EU the balancing markets, check out our quarterly **Balancing Market Watch** [here](#).

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