



European Union Agency for the Cooperation
of Energy Regulators

Rising electricity network costs and flexibility needs: A 'perfect storm' or a 'perfect match'?

Informal Ministerial Meeting – Council Presidency of Hungary
Budapest, 15-16 July 2024

Christian Zinglensen, *ACER Director*

“The average network use is low. How to get it (much) higher?”





‘Efficiency First’ also applies to grid infrastructure



‘Getting more out of what you have’ requires flexibility ~ thus doubling-down on demand-response



Interconnectors will be key, too, for flexibility ~ but need further attention

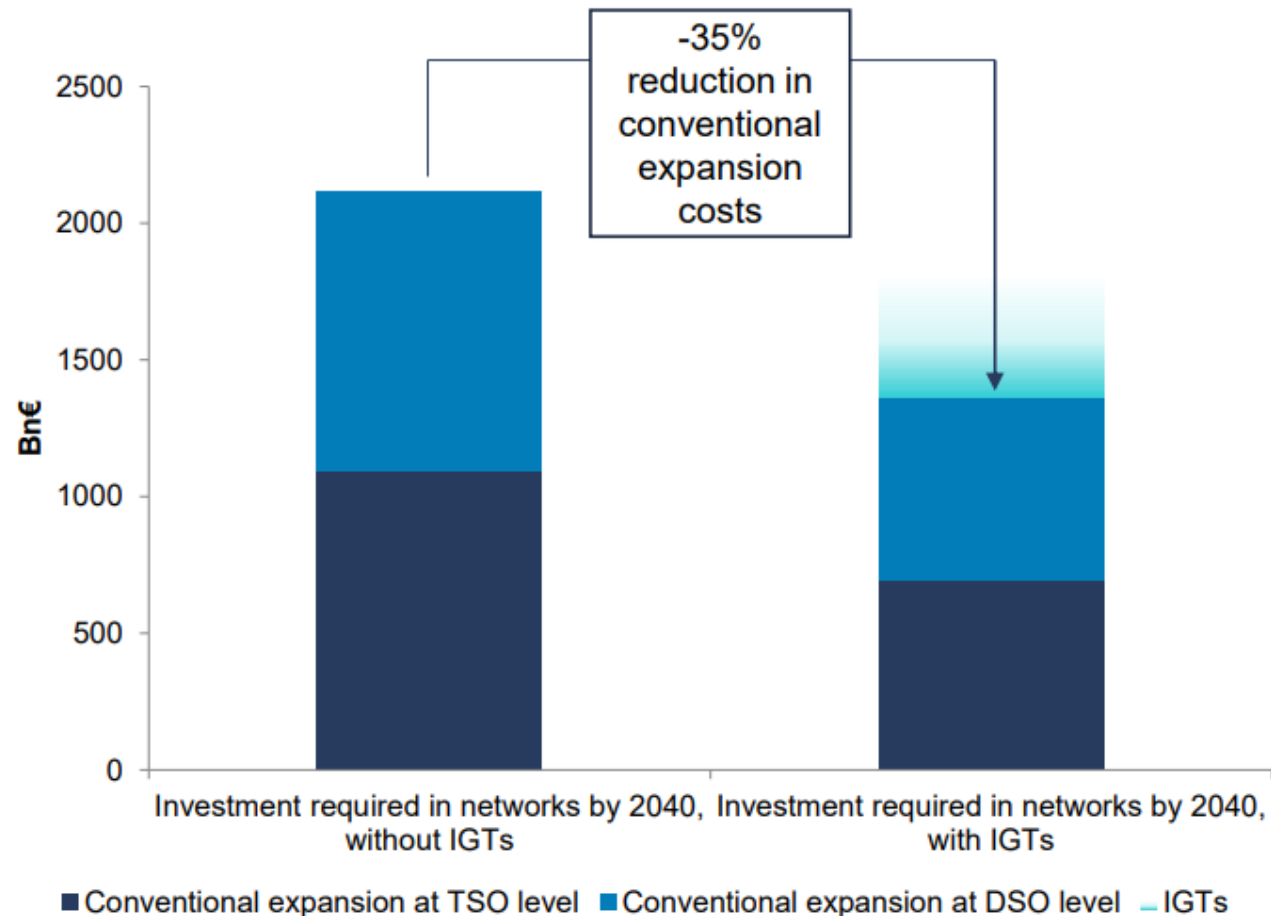


‘Efficiency First’ also applies to grid infrastructure



Enhancing grid capacity is part of the solution

Gross benefits of IGT deployment - Saved investments in network expansion

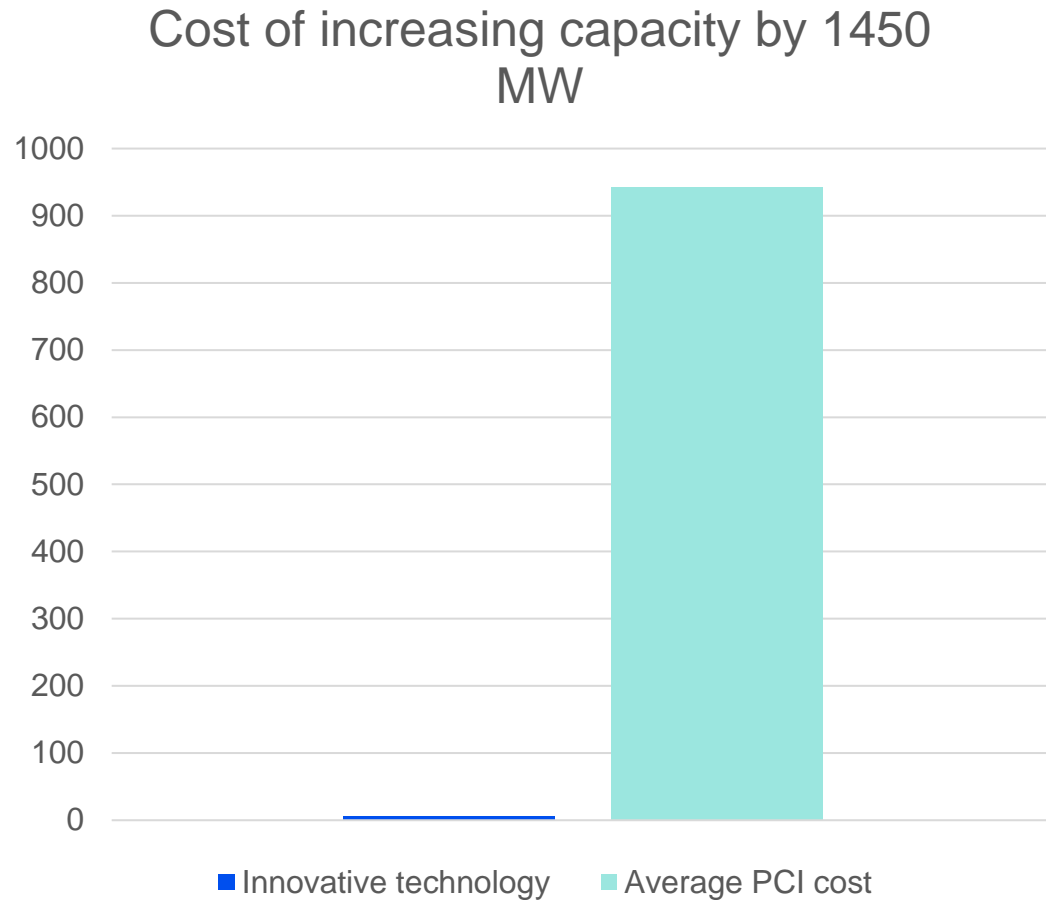


Innovative grid technologies can help:

20-40 % increase in overall network capacity by 2040

35 % reduction in conventional expansion costs by 2040

Pop quiz: What savings for Italian consumers?

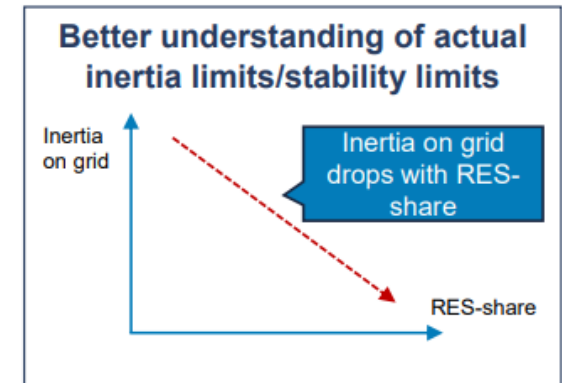
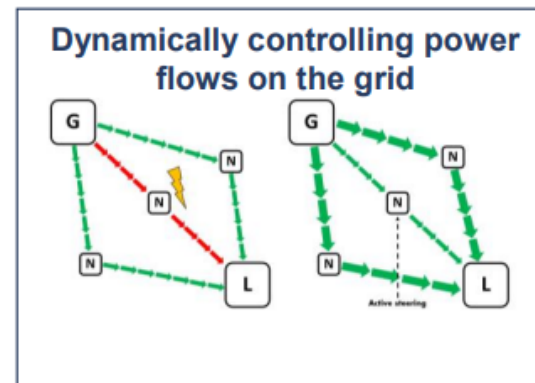
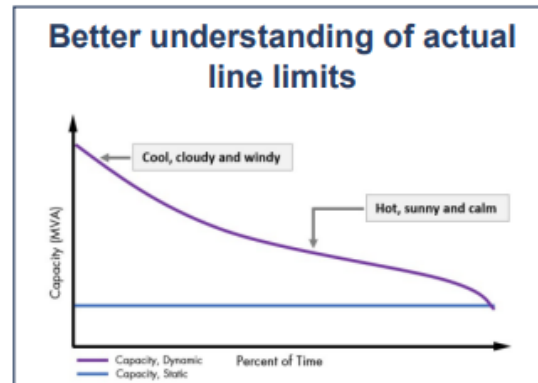
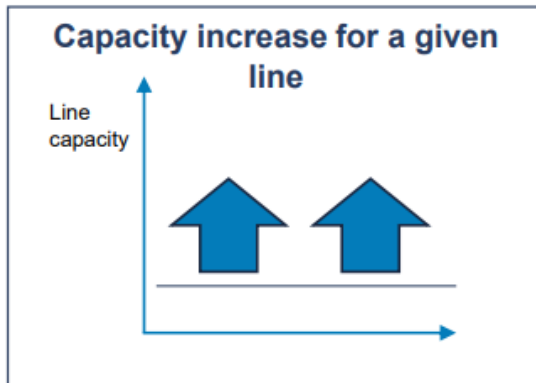


Arera (Italy's energy regulatory authority) incentivises innovative solutions to increase grid capacity, making for ...

- Innovative technology cost ~ **€ 5 M** for 1450 MW
- Same result by building new lines ~ approx. **€ 950 M**
- Making for ~ **190-fold** difference

A portfolio of innovative technologies offers options

Superpowers:



Innovative Grid Technologies:

Advanced conductors
High Temperature Superconductor
Storage as a transmission asset (SATA)

Dynamic line rating (DLR)

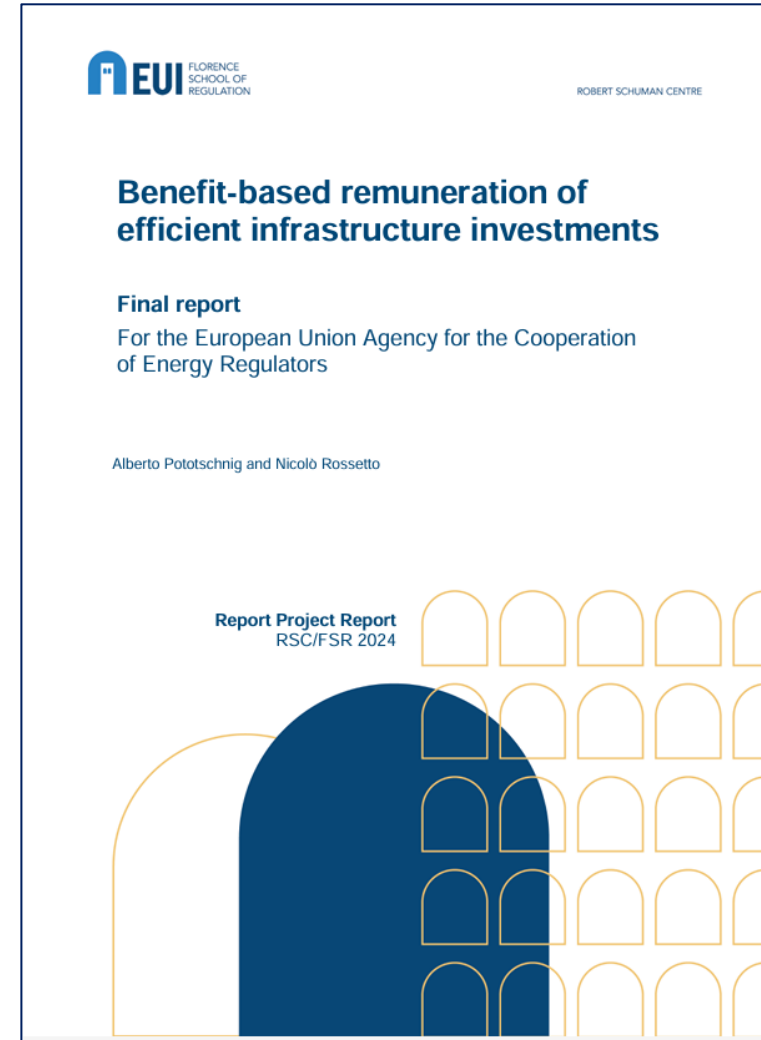
Advanced Power Flow Control (APFC)

Grid inertia measurements

Digital Twin, Flexibility Management Systems

How to incentivise enhanced grid capacity?

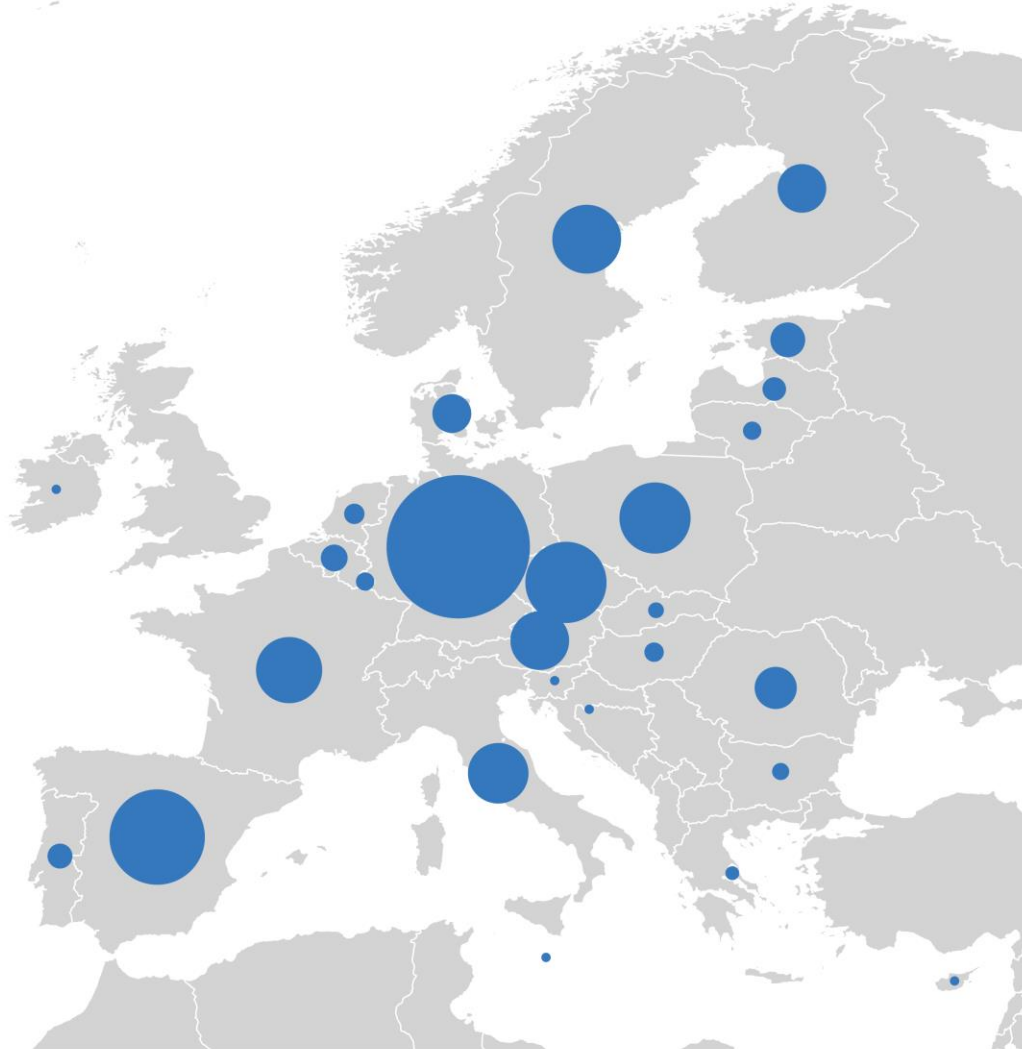
- **Incentivising cheaper investments to increase grid capacity**
 - Cost-based remuneration is not always effective
 - Benefit-based incentives hold promise



An elephant in the room perhaps?



'Small may well be beautiful' – yet sometimes may not



Number of DSOs

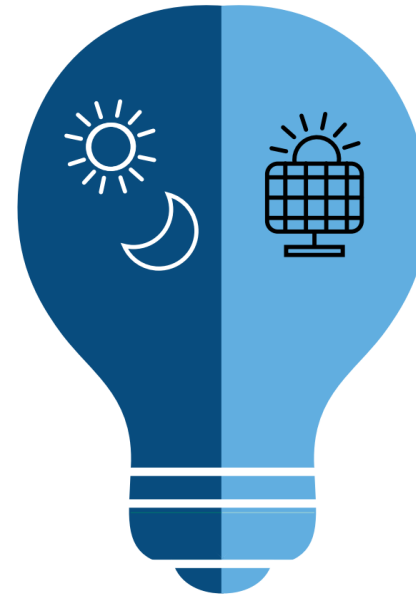
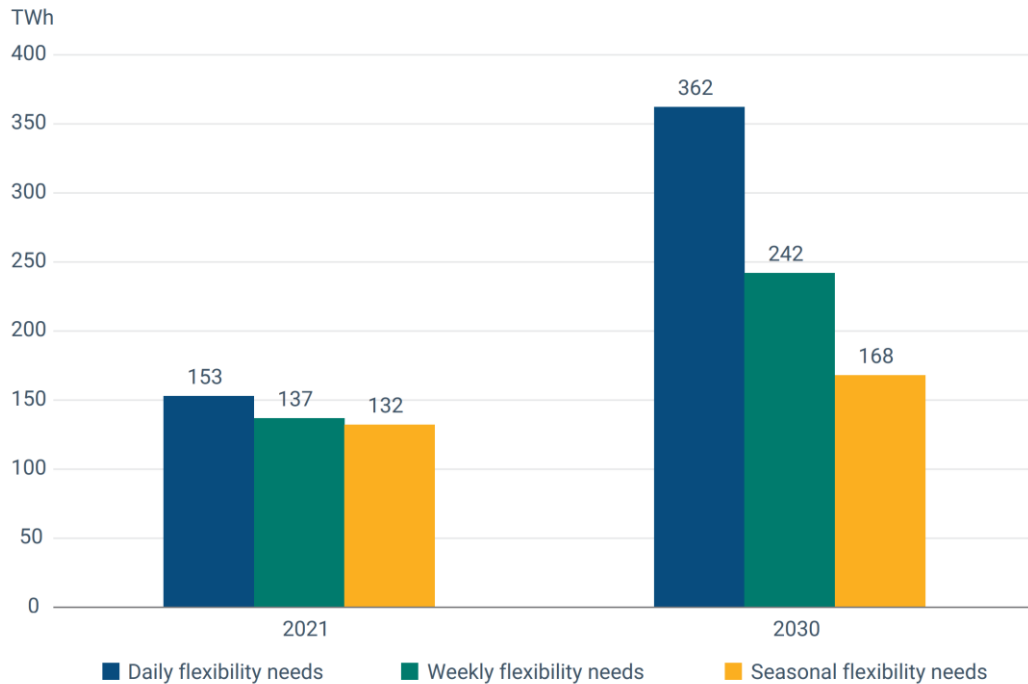




‘Getting more out of what you have’ requires flexibility ~ thus doubling-down on demand-response

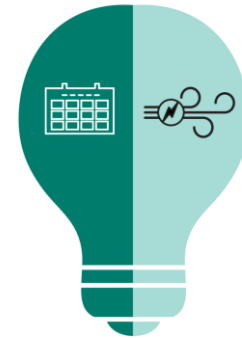


Flexibility needs double by 2030



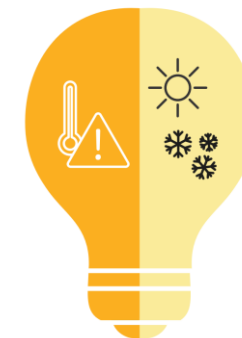
Daily flexibility

Morning and evening demand peaks
 Day-night generation difference



Weekly flexibility

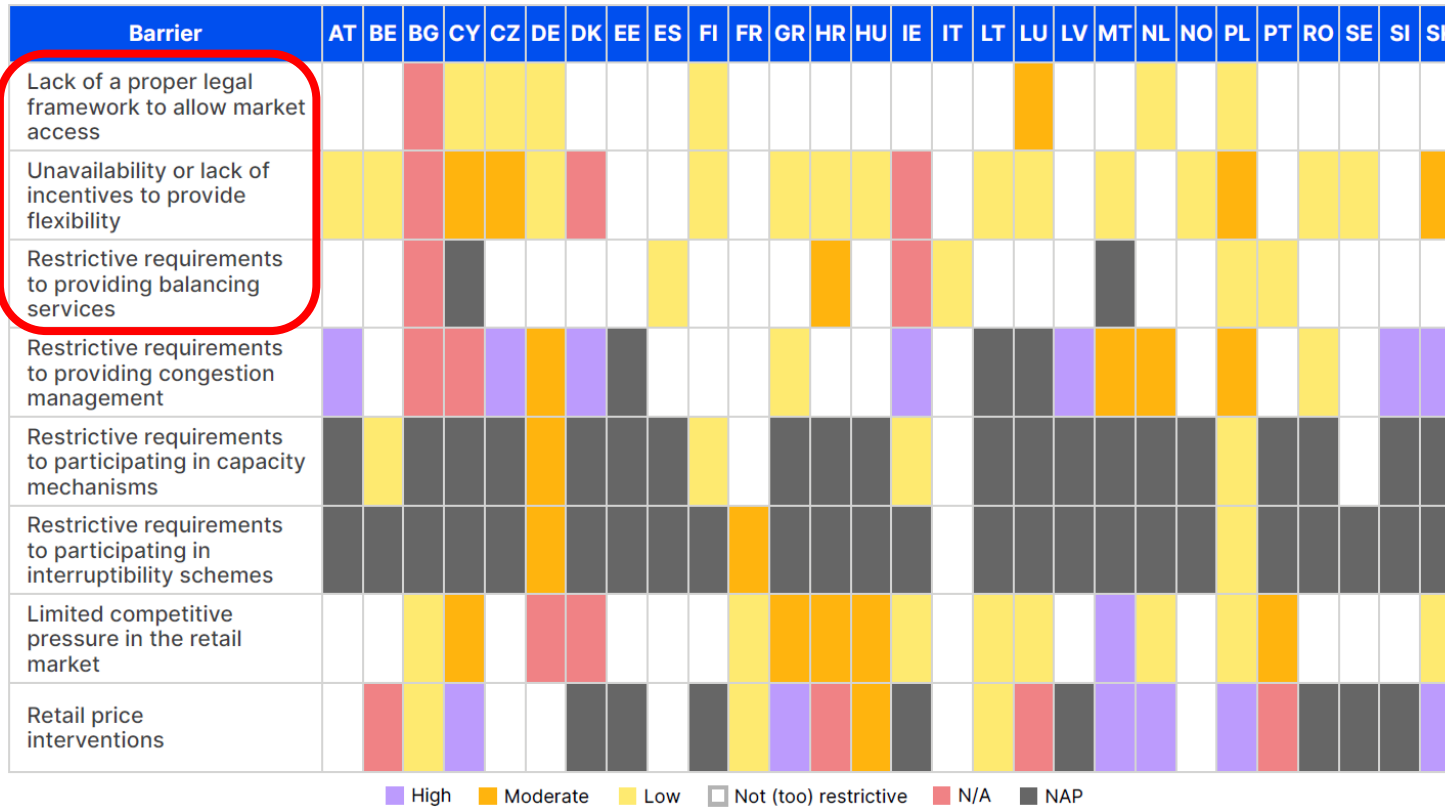
Weekday-weekend demand difference
 Wind pattern fluctuations



Seasonal flexibility

Heating-cooling periods
 Seasonal weather patterns

Multiple barriers ‘hiding in plain sight’



Barriers to demand response are **often ‘hiding in plain sight’**. The **sum of many small obstacles can add up to significant barriers**, impeding system flexibility.

A detailed and updated report on the first three barriers listed above will be released by early 2025.

What problem are we keen to solve?

Governments need to factor in 'the full picture'



Interventions
to pursue
policy
objective A, B
or C ...

Raising barriers
to demand
response, new
technologies or
participation of all
assets?

For consideration: Comprehensive 'flexibility check' at national level



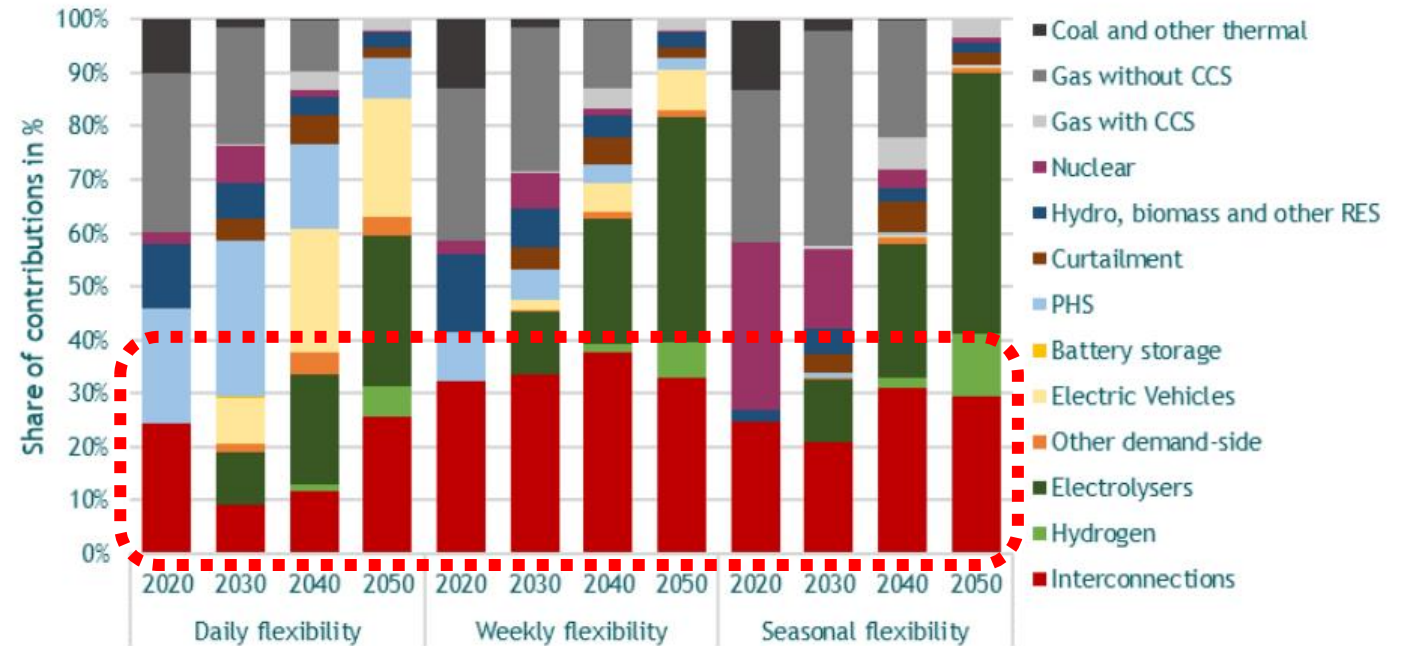
**Interconnectors will be key,
too, for flexibility ~ but need
further attention**



Future flexibility needs also point to interconnectors



Share of technologies providing system flexibility in the Pentalateral countries for daily, weekly and seasonal timeframes

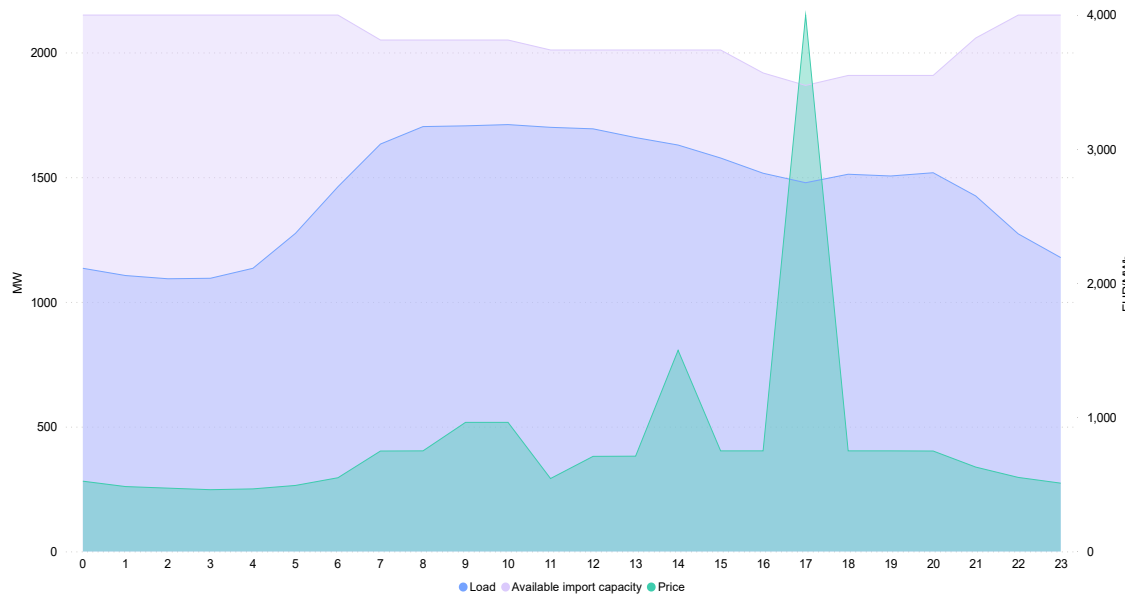


As coal and conventional gas plants increasingly are phased out, flexibility portfolios will transform, gradually relying more on cross-border exchanges, storage, demand-side response and low-carbon technologies. Interconnections can play a key role, not least in multi-day/multi-week flexibility time frames.

Beyond flexibility, providing also security of supply

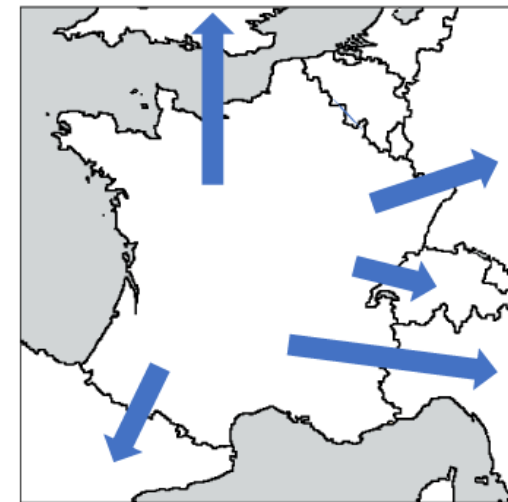
Small reductions in cross-zonal capacity triggered price spikes in the Baltic region, 17 August 2022

Hourly variations in load, import capacity and day-ahead price in the Baltic region on 17 August 2022 (MW, MW and EUR/MWh, respectively)

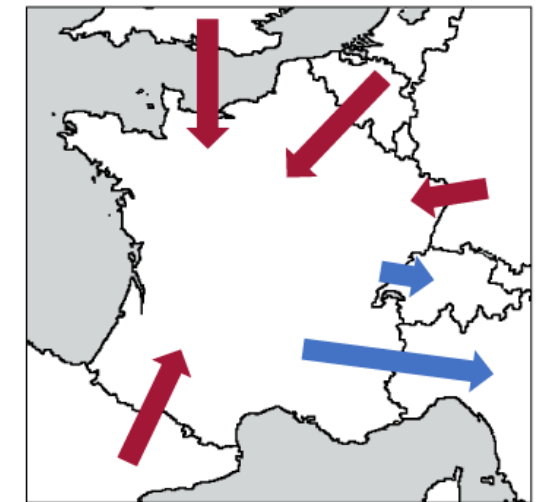


France became a huge importer of electricity during the energy crisis

2019 and 2021 mean net cross-border flows



2022 net cross-border flows



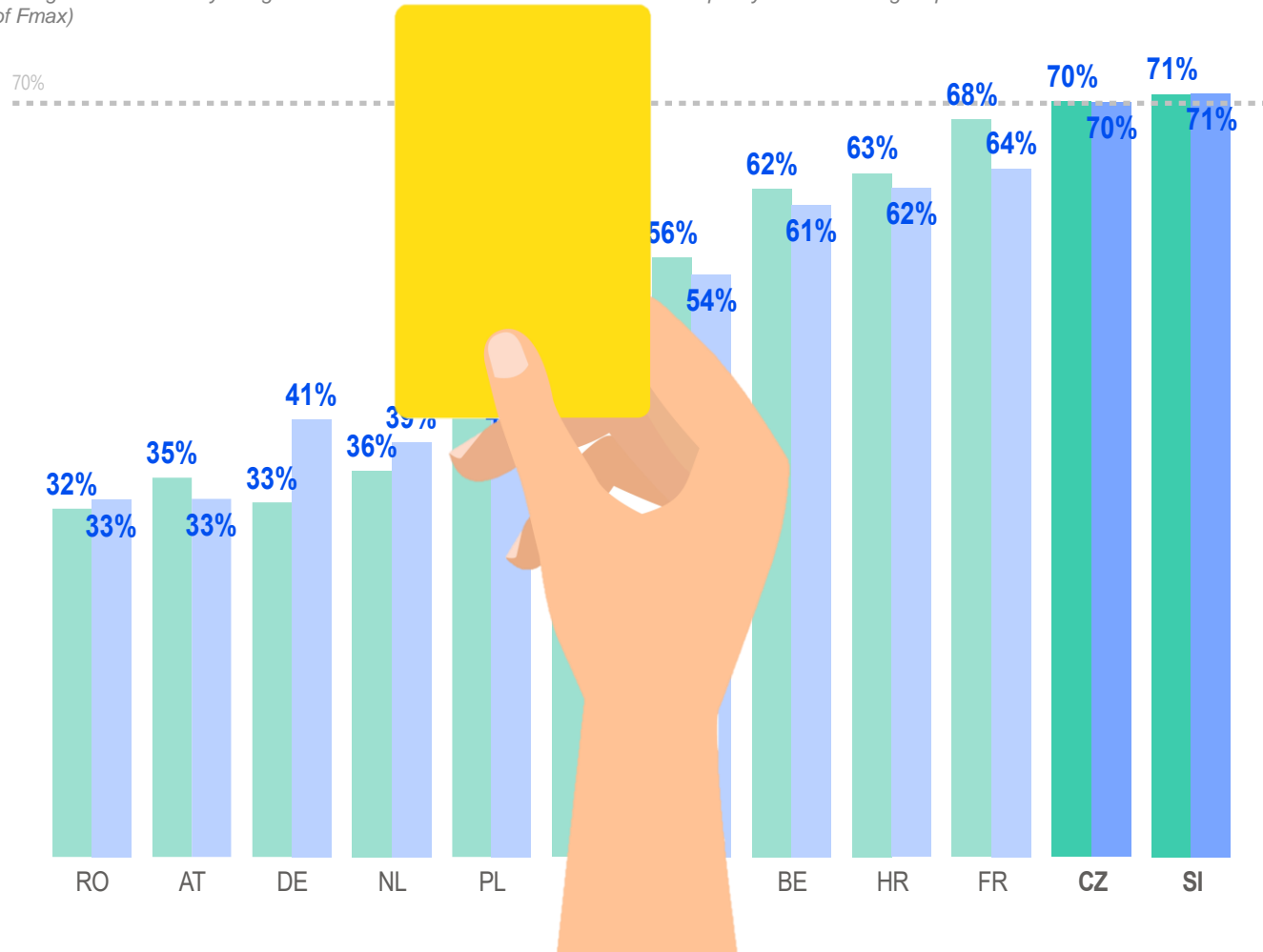
Note: The length of the arrow is directly proportional to the amount of electricity imported or exported.

Well-interconnected markets are key to mitigate the impact of national price shocks and enable Member States under strain to import surplus electricity from abroad or export excess generation.

However, improvements are needed ...

There is limited progress towards 70%

Average minimum hourly margin available for cross-zonal trade in the Core capacity calculation region per Member State – H2 2022-2023 (% of Fmax)



Increasing cross-border capacity is needed to unlock benefits, incl. more flexibility. Necessary steps are:

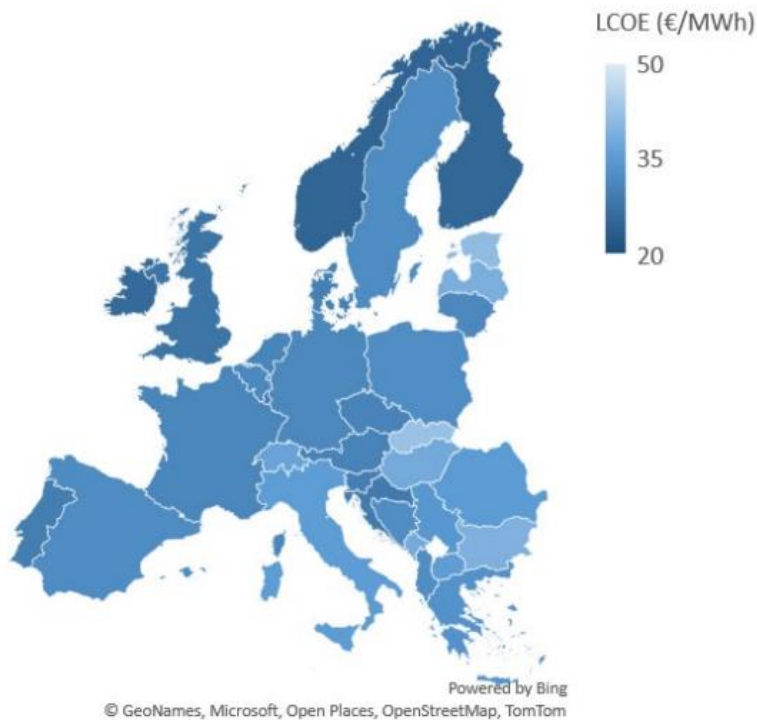
TSOs to make **optimal and coordinated use of remedies to relieve congestions** in the grid

TSOs to undertake **targeted grid developments**

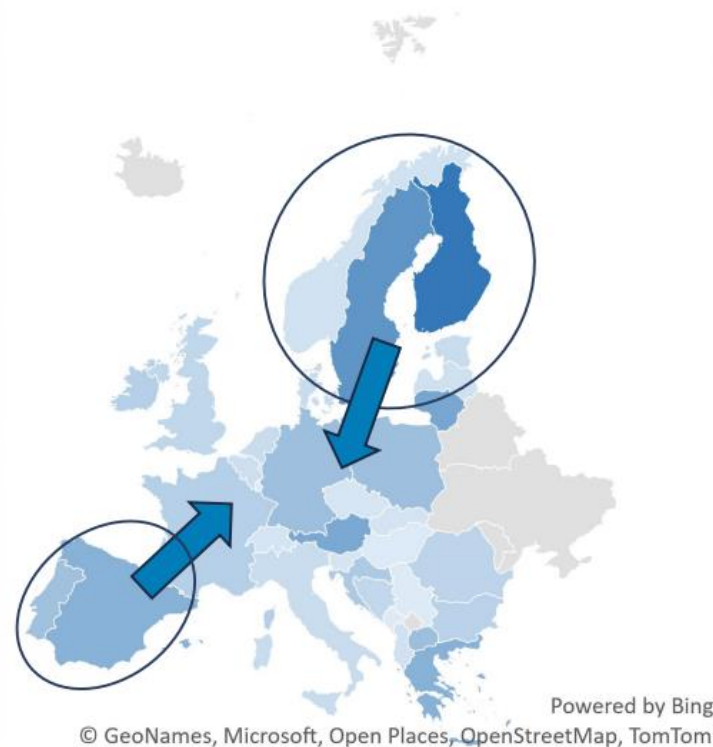
TSOs to complete the **bidding-zone review** process and Member States / European Commission to decide

RES-E development can be optimised through cross country collaboration mechanisms targeting least cost areas combined with transmission capacity expansion

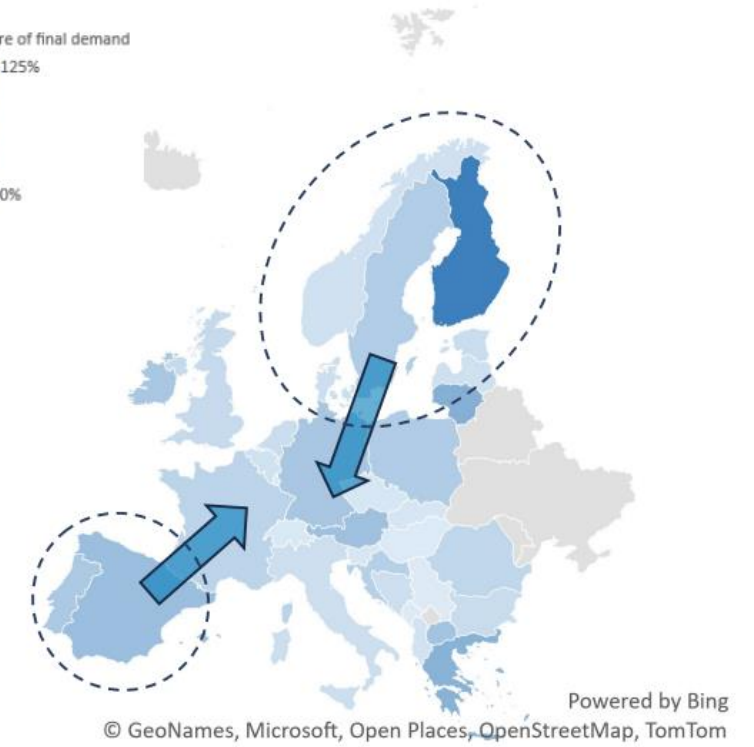
Onshore wind LCOE – Both scenarios



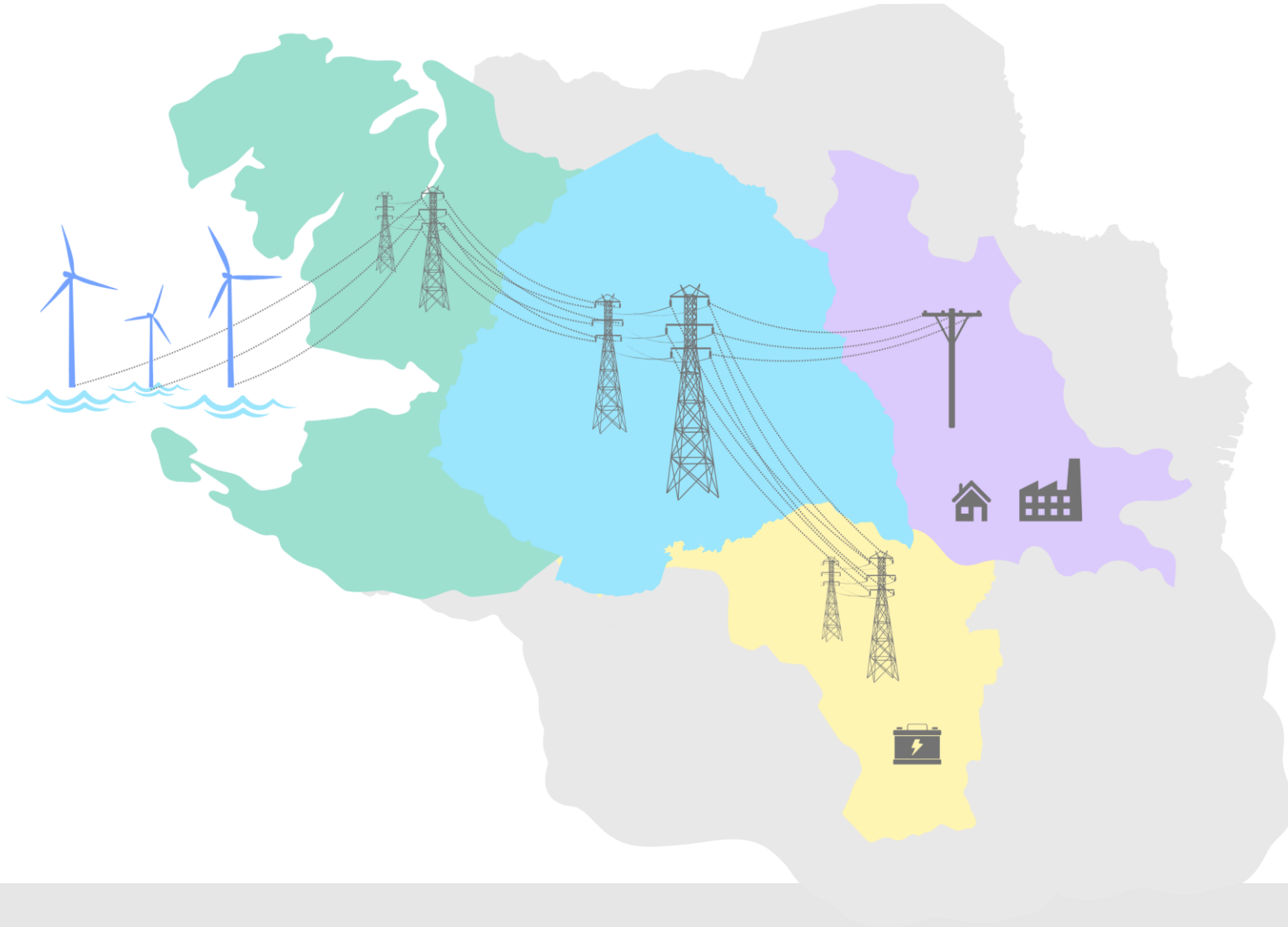
Onshore wind capacity – MT scenario



Onshore wind capacity – FT scenario



Taking it further? **Trust** becomes name-of-the-game



Translating ‘trust’: What might it take to get there?



1. **It starts & ends with political will:** Commitment to **structurally integrate energy markets**; a commitment that is anchored institutionally
2. Coordinated **infrastructure planning and cost-/benefit-sharing** across borders, done or verified by public authorities
3. **Coordinated renewable and flexibility deployment** across borders
4. Closer **integration of real-time operation** (especially offshore)
5. **Rigorous enforcement by public authorities** to ensure trust in the whole framework; why else accept increased interdependence?

“The average network use is low. How to get it (much) higher?”



‘Efficiency First’ also applies to grid infrastructure:
Several options available

‘Getting more out of what you have’ requires more **demand-response** ~ and thus targeting its barriers

Interconnectors are key for future flexibility needs:
But more attention is needed, incl. politically, to make sure **capacity is made available**

Enhanced EU energy ***independence*** will likely require more **energy *interdependence*** amongst Member States. This starts & ends with **political will**



European Union Agency for the Cooperation
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ACER is hiring!

Join us in powering Europe's energy future.

Check out our job vacancies (in many areas).

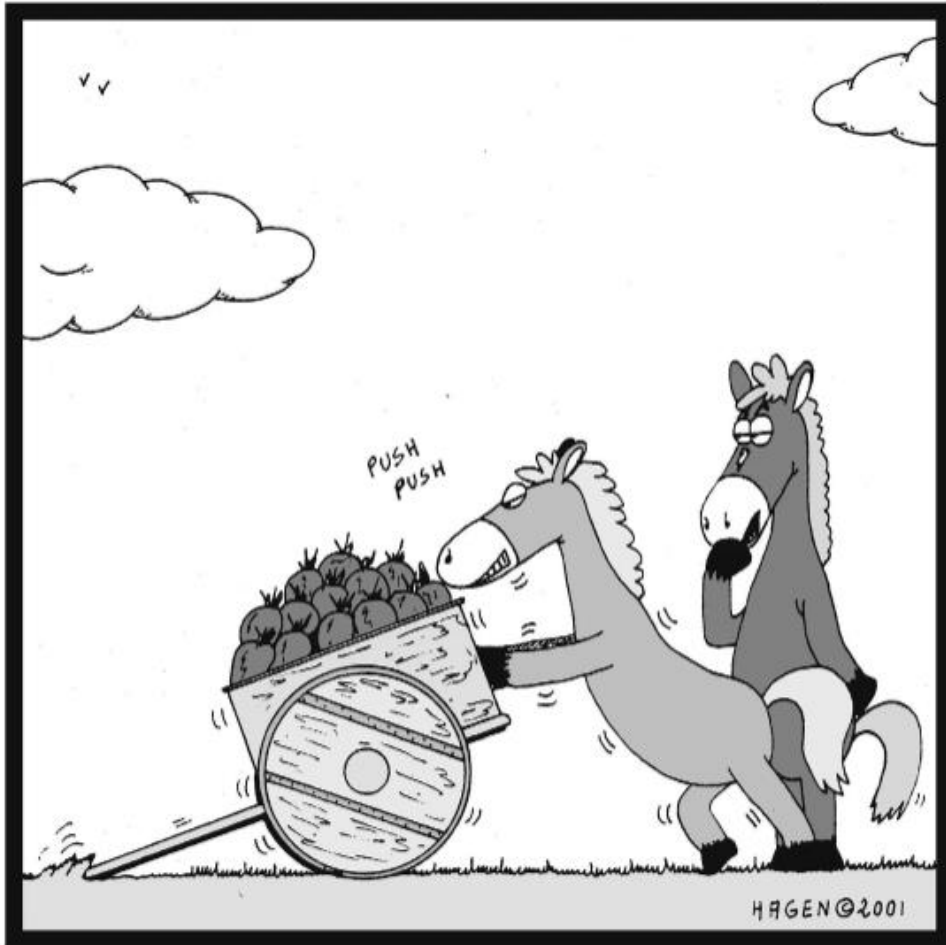


**Supply built to meet demand, right ...
or wait, was it the other way around?**

It's the supply. No, it's the demand. No, it's the ...



Grid build-out per future demand ~ always a ‘no-regret’?



Hang on... We must be doing something wrong...
How does the saying go again?

IEA: “*EU electricity consumption is not expected to return to 2021 levels until 2026 at the earliest*”

ACER: “*... according to the ongoing adequacy assessment of ENTSO-E (ERAA 2024) demand in some Member States would have to grow at an annual rate of up to 12% every year from 2024 to 2026.*”

Annex



- **Supporting the integration of energy markets in the EU** (by common rules at EU level). Primarily directed towards transmission system operators and power exchanges.
- **Contributing to efficient trans-European energy infrastructure**, ensuring alignment with EU priorities.
- Monitoring energy markets to ensure that they function well, **detering market manipulation and abusive behaviour**.
- Where necessary, **coordinating cross-national regulatory action**.
- Governance: **Regulatory oversight is shared** with national regulators. **Decision-making** within ACER is collaborative and joint (formal decisions requiring 2/3 majority of national regulators). **Decentralised enforcement** at national level.
- Headquartered in Ljubljana, Slovenia. **Engaged across the EU**.

Good practices to reduce system costs

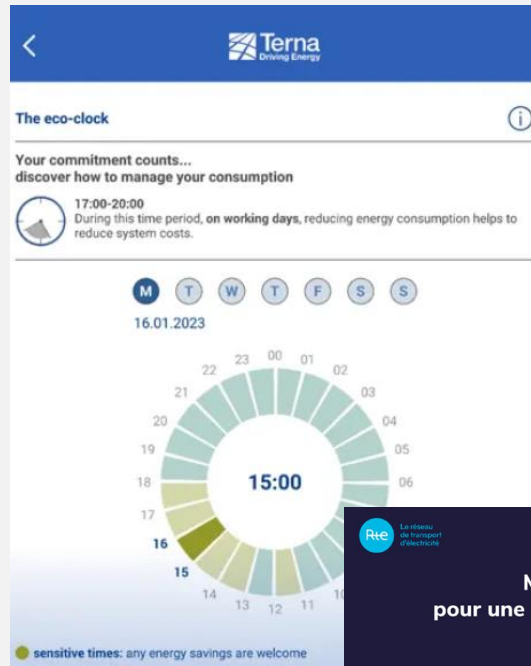


“Beat the Peak” initiative to empower to reduce their demand during peak times

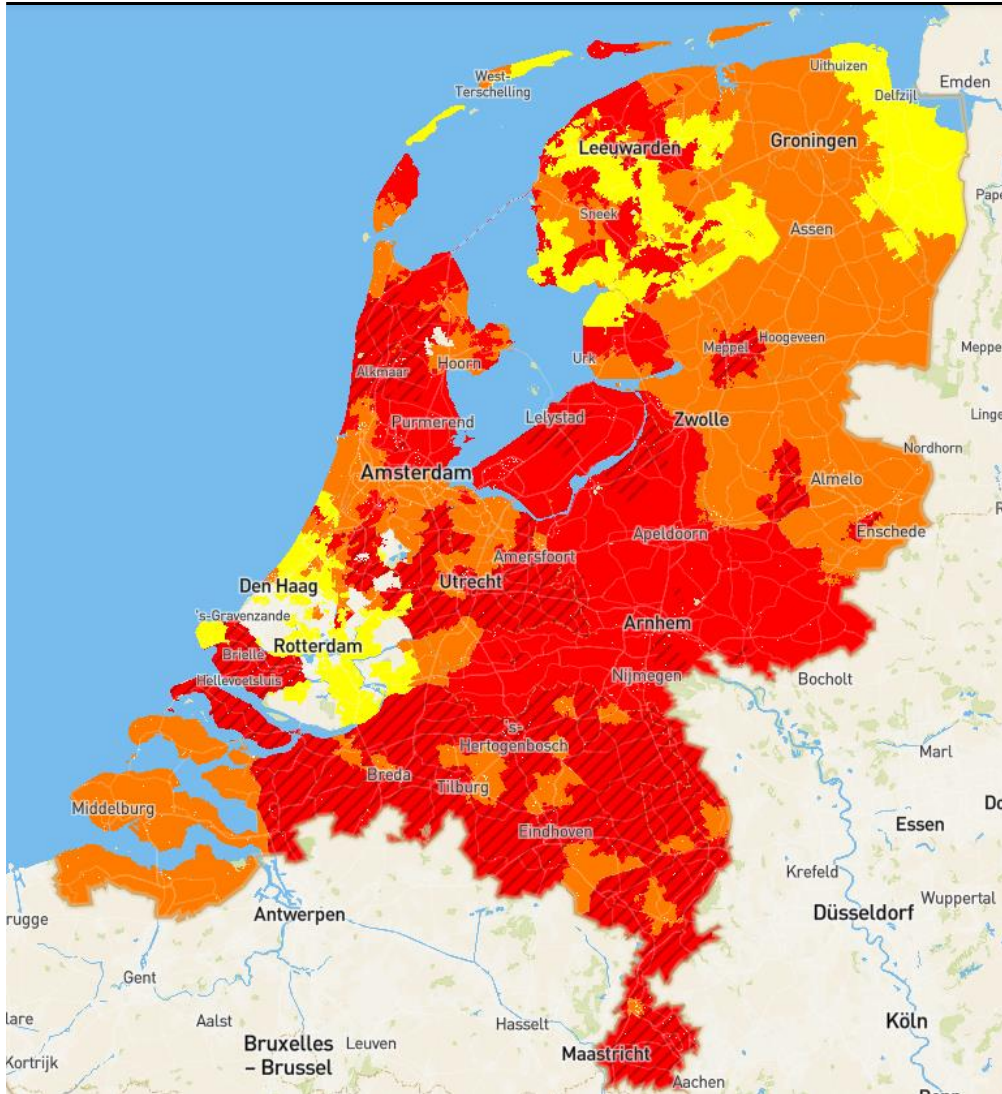


Procurement of local services to improve cost-efficiency of network development and operations

Consume electricity **off peak** and **reduce system costs**

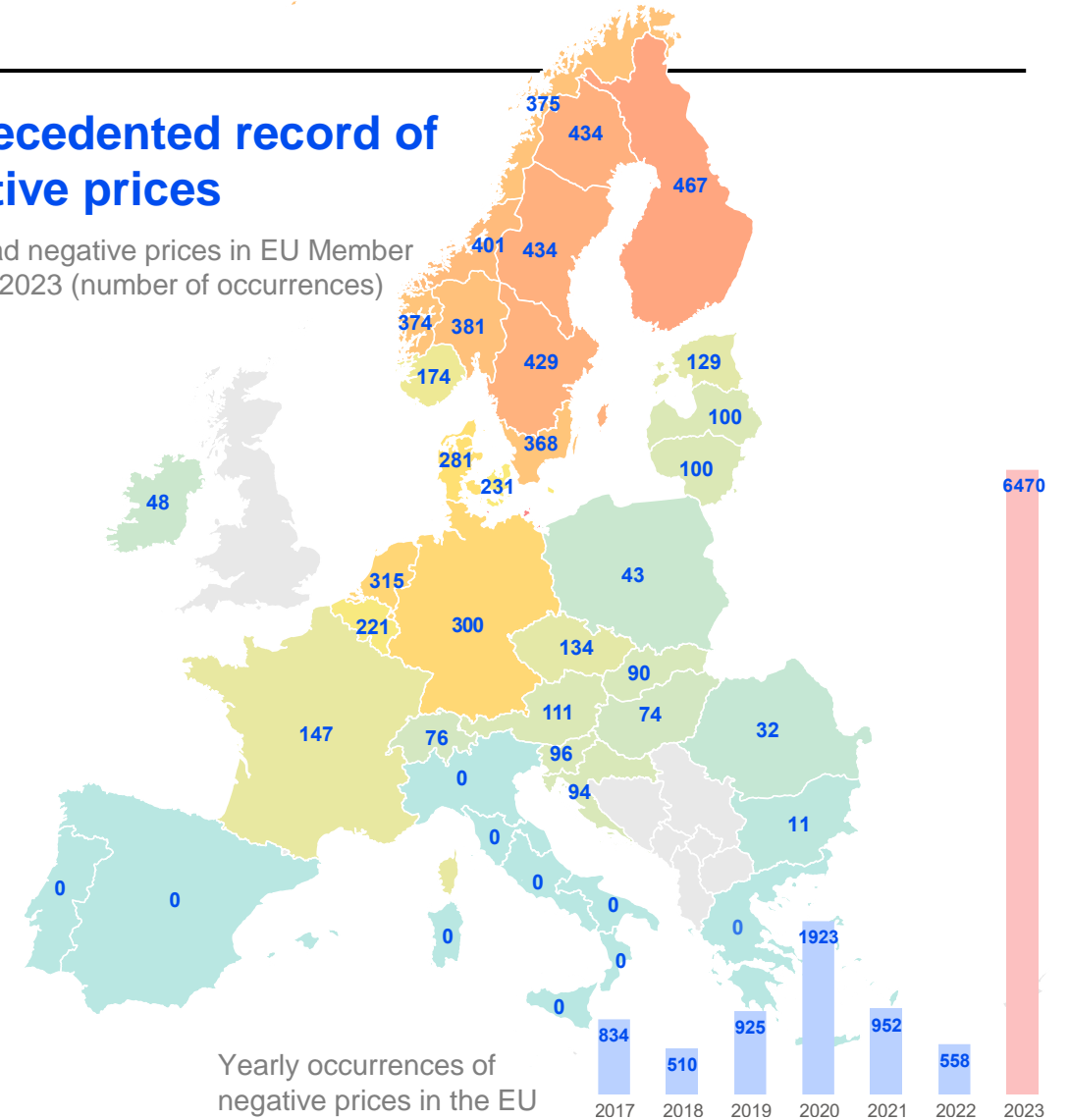


Learning lessons from the more recent past



Unprecedented record of negative prices

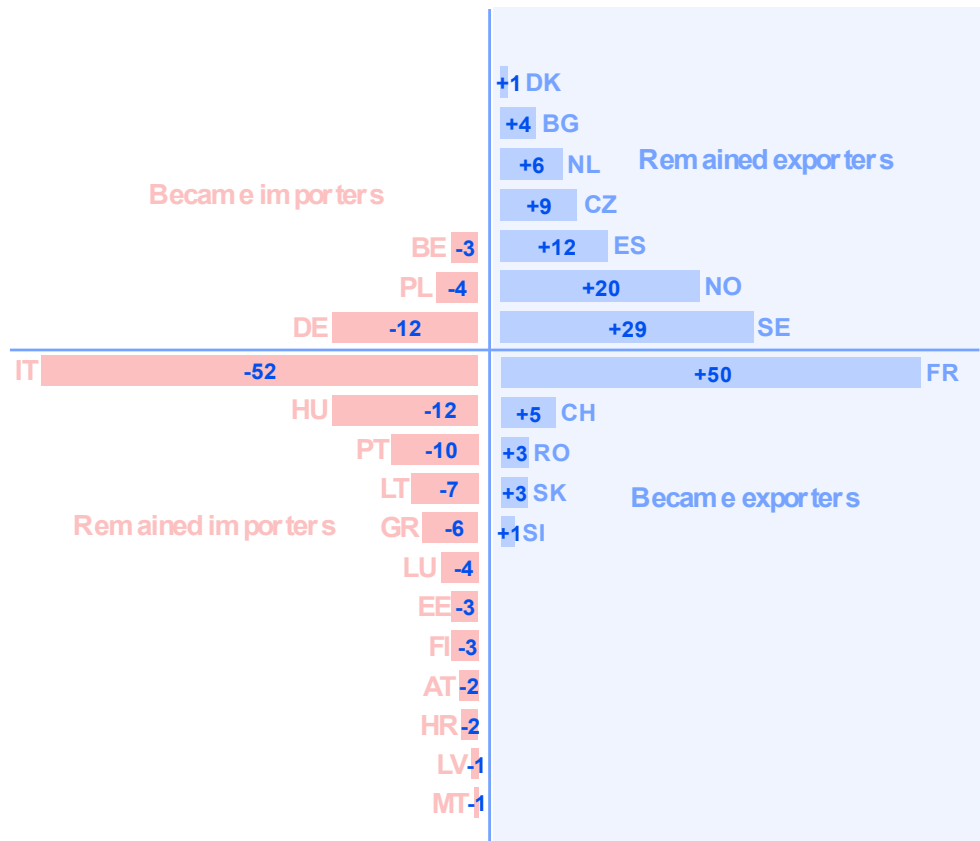
Day-ahead negative prices in EU Member States in 2023 (number of occurrences)



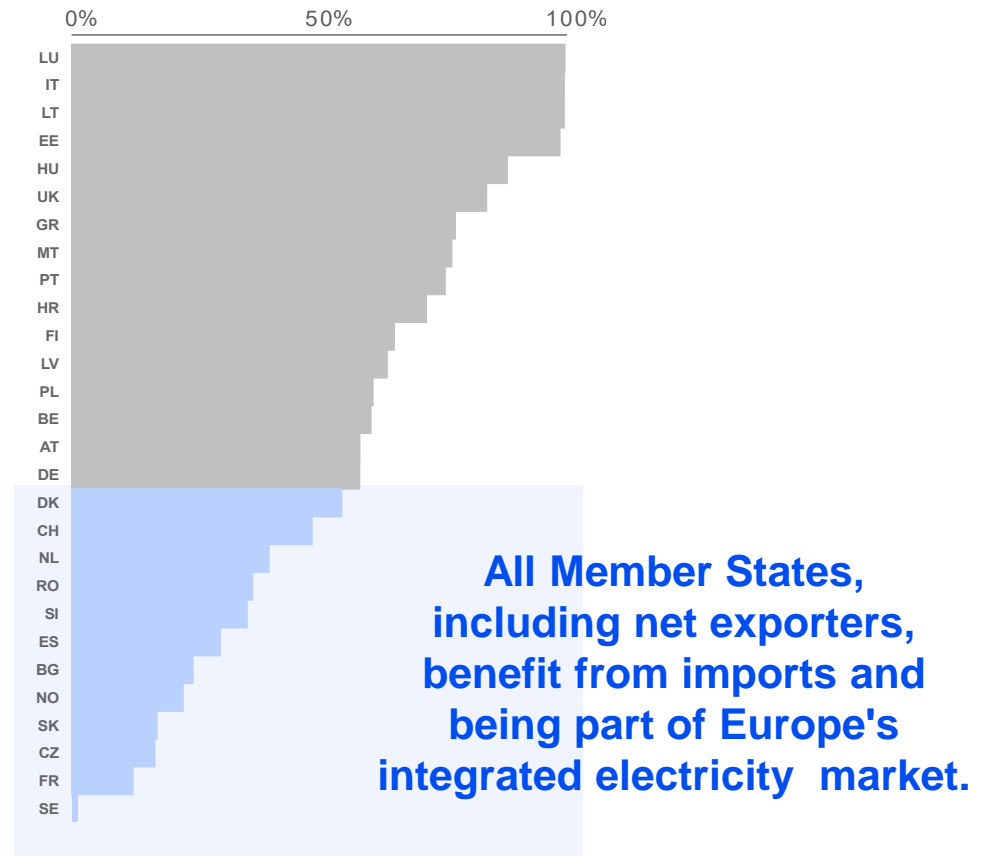
Import and export patterns vary, yet confirm interdependence

In 2023, every Member State benefitted from imports at times, showing the importance of cross-border capacity being available for trading with neighbours

Import-export swings and net positions from 2022 to 2023, EU-27 (TWh)



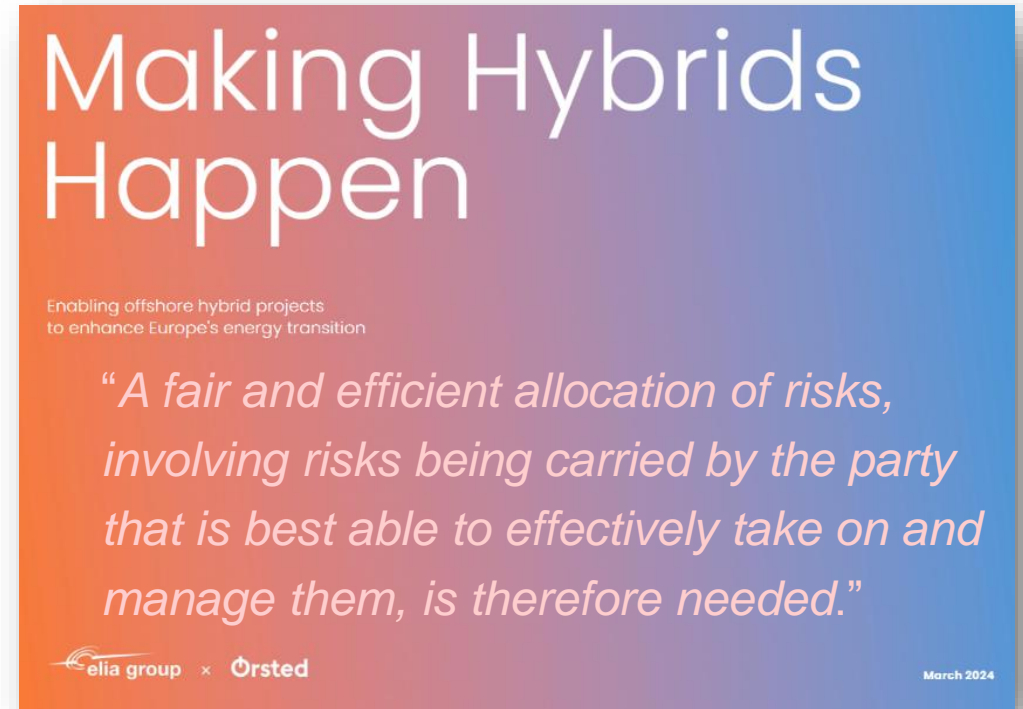
Percentage of electricity net import hours in the EU-27 /EEA(Norway), Switzerland, 2023





The level of demand (un)certainty deemed appropriate determines the investment risk borne by consumers.

Regulators will need to endorse somewhat riskier ‘anticipatory investments’ than in the past because of an accelerated energy transition and because network deployment is often slower than generation deployment.



On the other hand, full ‘de-risking’ may prove ‘risky’

In the past, full de-risking for renewables led to adverse consequences for the electricity system (as well as additional funds needed for support schemes):

- “*Build and forget*”: no incentive to react to (negative) short-term prices
- No incentive for system-friendly design nor system-friendly siting choices

Hence, now is the time to learn lessons from the more recent past.



Current financing framework not fully fit for (future) purpose

Networks are funded through various scattered financial streams involving many stakeholders:

- Cross-border cost allocation (CBCA) focuses on bilateral cost-sharing
- Inter-TSO compensation (ITC) as a scheme covers close-to-negligible amounts
- Congestion income ('rents') is primarily used to reduce national network tariffs

Infrastructure cost-sharing is currently mainly bilateral, thus not reflecting the wider (regional) distribution of benefits from infrastructure build-out.

EU funding can help cover some of these wider benefits but is unlikely to be a 'silver bullet' to fund all/most offshore-related infrastructure.





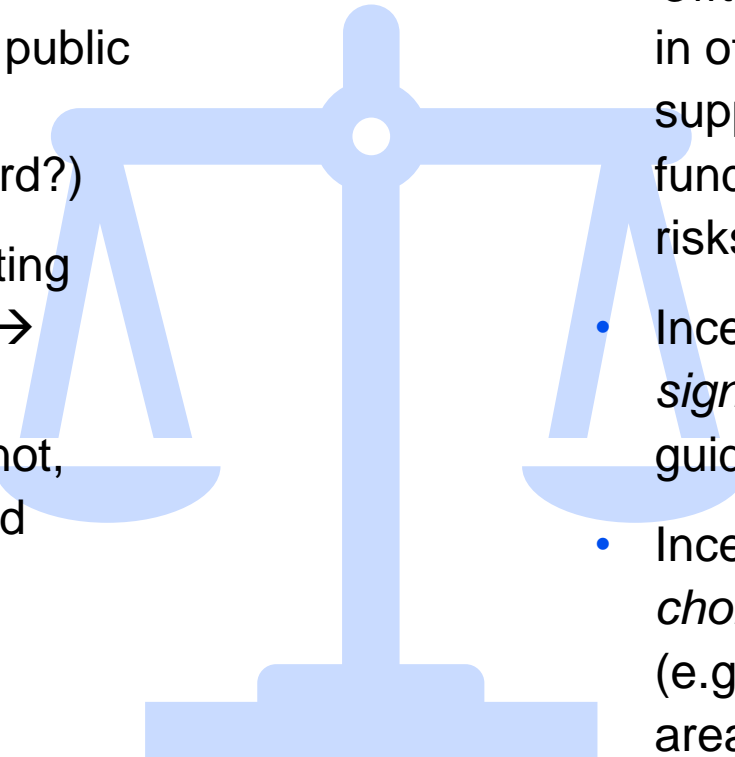
Financial institutions will fund infrastructure costs provided they trust the related benefits/revenue flows (alternatively, if someone else covers the risks).

The same holds for Member State Treasuries.

Hence, fully trustworthy/trackable/transparent/replicable cost-benefit analyses (CBAs) of infrastructure investment – meaning, performed or at least validated by public authorities – can enhance this trust.

Regulated networks:

- *Investment risk* → subject to regulatory oversight, taken by public authority. Low-to-no risk. (Co-funding regionally going forward?)
- *Availability risk*, i.e. using existing infrastructure to its full extent → TSOs/DSOs should maximise available network capacity. If not, accountability/ penalties should ensue.



Renewable generation:

- *Offtake risk* may be impacted by actions in other Member States → regional support schemes or Member State co-funding renewable tenders (i.e. sharing risks and rewards).
- Incentives to react to *short-term price signals* → ‘smart CfDs’ (role for EU-level guidance?).
- Incentives for *better design and siting choices* → ‘upstream’ choices play a role (e.g. designating renewable acceleration areas), thereby inviting more regional coordination on siting.



The image shows a screenshot of the Financial Times website. At the top, the 'FINANCIAL TIMES' logo is centered. Below it is a navigation bar with links for HOME, WORLD, US, COMPANIES, TECH, MARKETS, CLIMATE, OPINION, WORK & CAREERS, LIFE & ARTS, and HTSI. On the right side of this bar are links for Workspace, Digital Edition, and Portfolio. Below the navigation bar is a secondary menu with links for Membership, Partnerships, and Careers. On the left side, there is a 'bruegel' logo and a list of categories: Topics, Publications, Commentary, Datasets, The Sound of Economics, and Events. The main content area features a large black background with white text. The title of the article is 'Unity in power, power in unity: why the EU needs more integrated electricity markets'. Below the title is a subtitle: 'Electricity market integration has substantial benefits that will improve the resilience and enable the transition of Europe's energy system'. The publishing date is listed as '14 February 2024'. The authors are listed as 'Georg Zachmann, Carlos Batlle, Francois Beaudé, Christoph Maurer, Monika Morawiecka, Fabien Roques'. On the right side of the article, there is a portrait of a man in a suit, looking upwards and to the right, against a blue background with colorful diagonal stripes.

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Policy brief

Unity in power, power in unity: why the EU needs more integrated electricity markets

Electricity market integration has substantial benefits that will improve the resilience and enable the transition of Europe's energy system

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