Tackling the power system flexibility challenge

- rapid growth in renewables calls for greater cooperation

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The European Parliament's joint ITRE-ENVI session
Brussels, 28 November 2023

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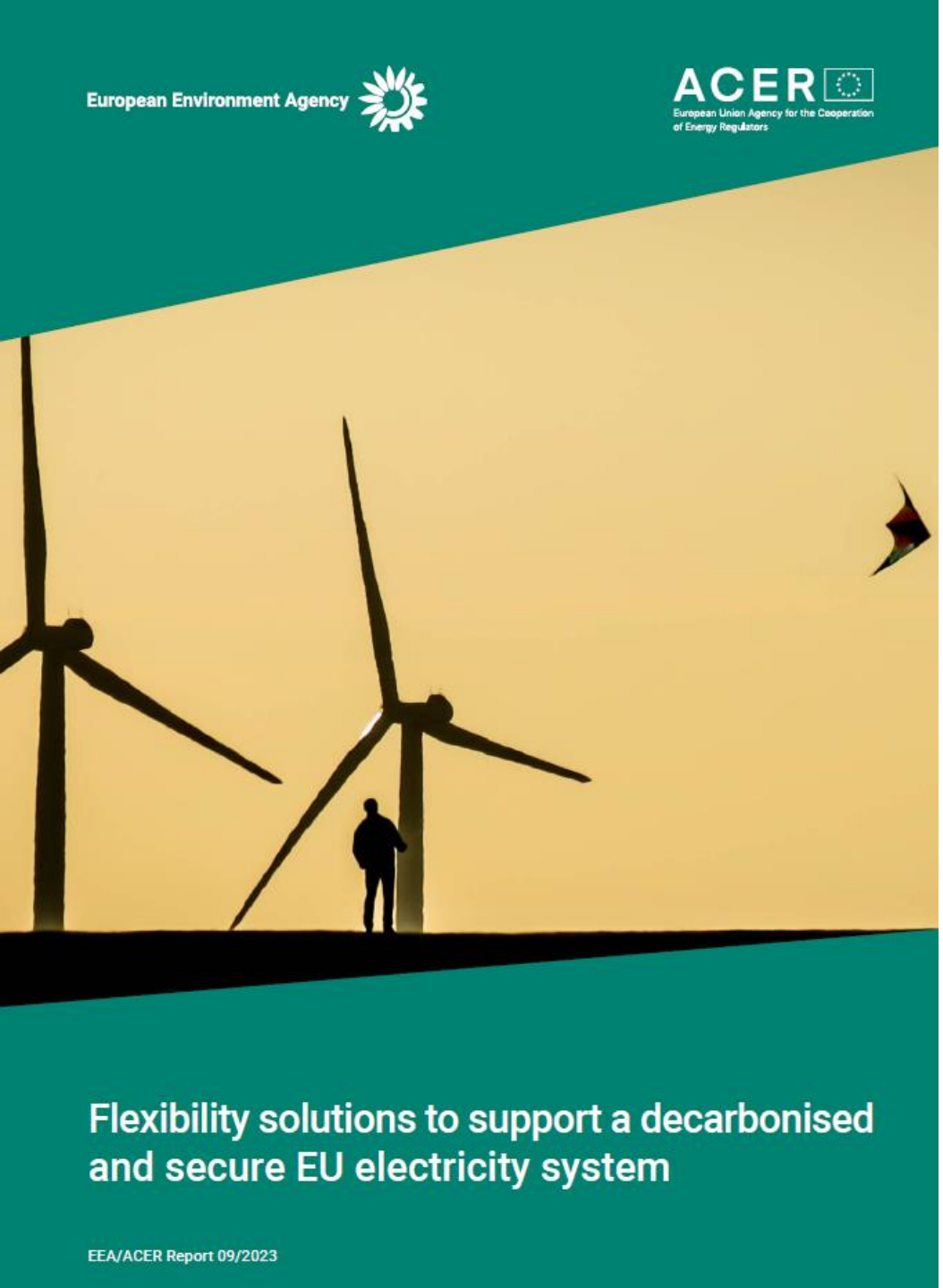

The EU power system must keep pace with the growth in renewables.

(Download report)

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Coordinate better the energy transition with existing instruments

To tackle the flexibility challenge, use current Governance Regulation tools and coordinate your developments:

- NECPs
- National GHG projections with energy parameters = forecast of energy system developments over four years

National greenhouse gas projections (with energy parameters)

Example based on draft NECPs: High ambitions to scale up renewable energy deployment

Source: EEA GHG Projections (https://www.eionet.europa.eu/reportnet/docs/govreg/projections)

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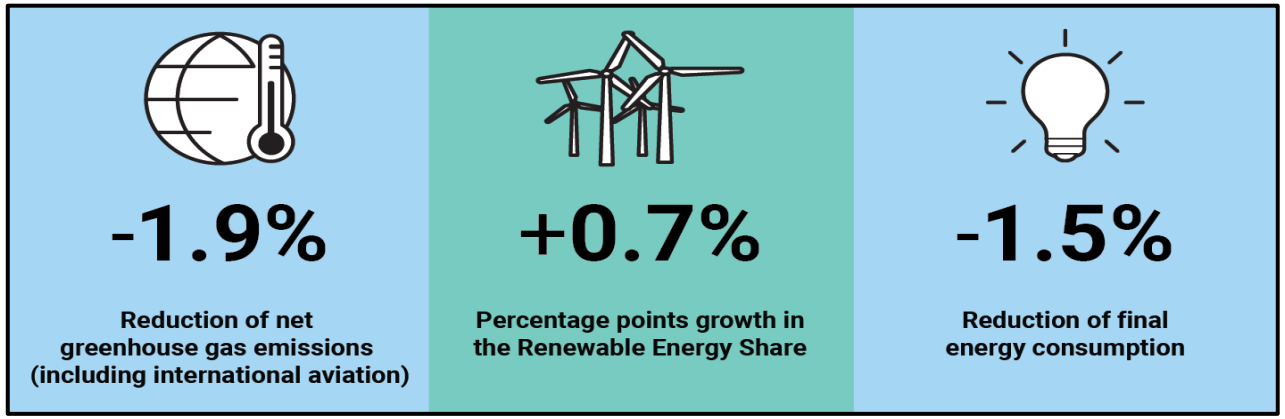
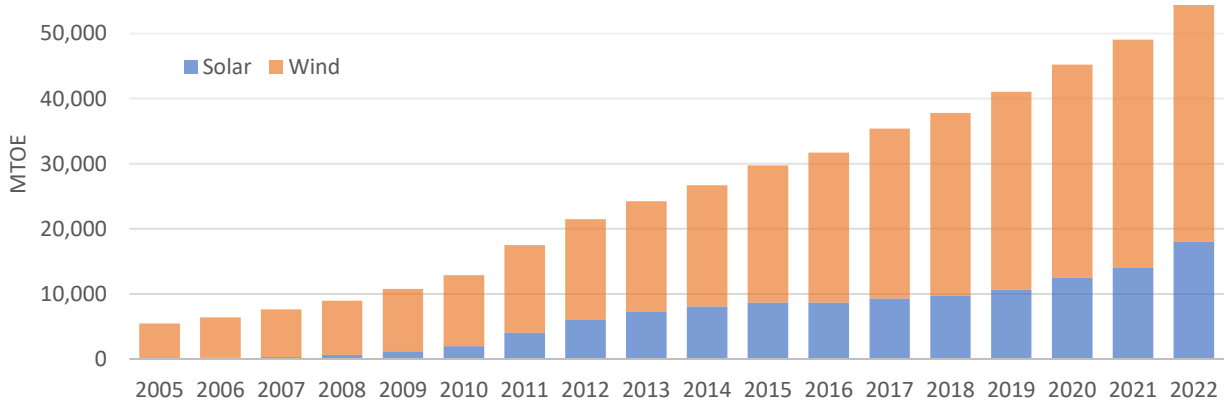
Energy transition gaining momentum

Year-on-year changes 2022 vs 2021



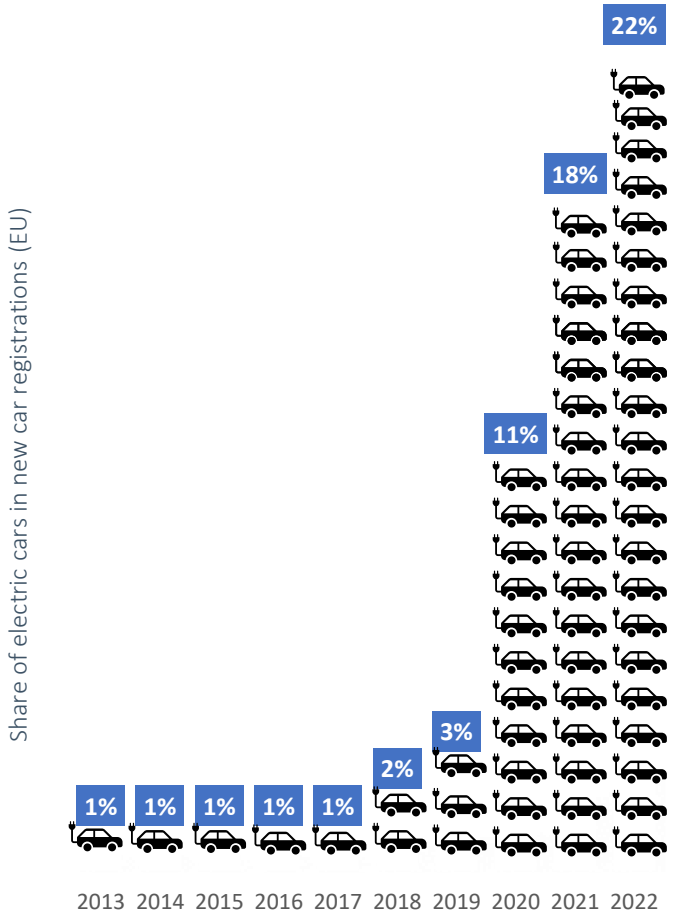
Source: European Environment Agency

Exponential growth in wind and solar deployment



Source: Eurostat, European Environment Agency early estimates

Sharp rise in electric car sales



Source: European Environment Agency

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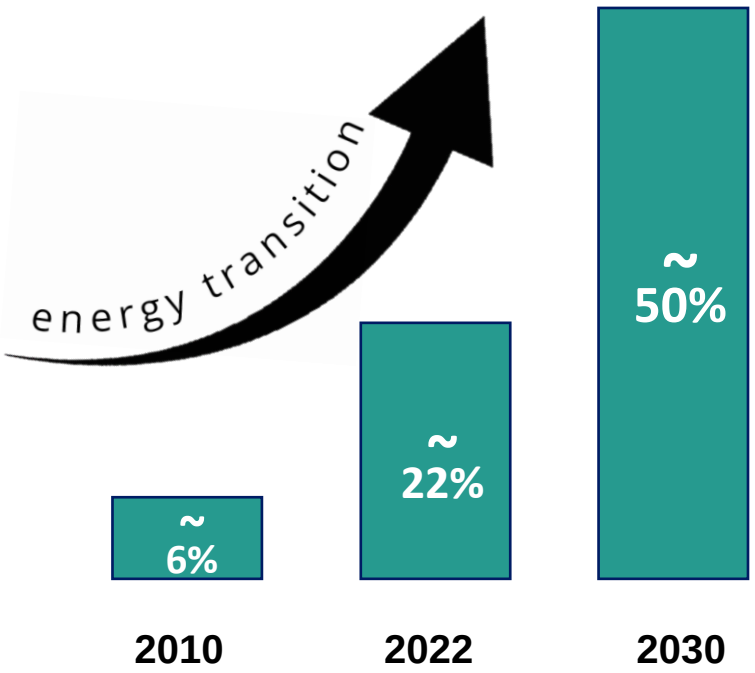
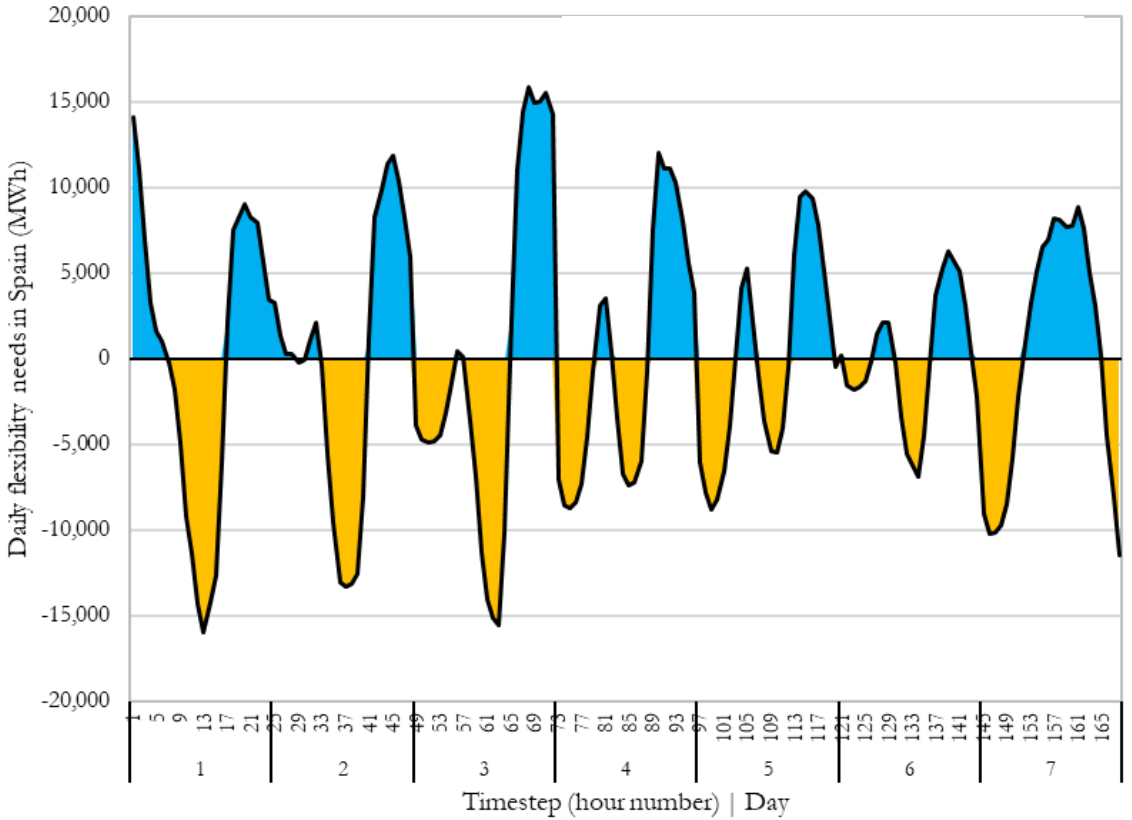
…but, variable renewables also pose a challenge

Share of energy produced by wind & solar in the EU



Example: Forecast daily flexibility needs in Spain in January 2030



- Increasing shares of variable wind and solar power
- Need for more 'flexibility' in EU electricity system

Positive residual demand – daily average
Negative residual demand – daily average
Residual demand – daily average

Source: [Ramboll, Background Report for EEA-ACER report]

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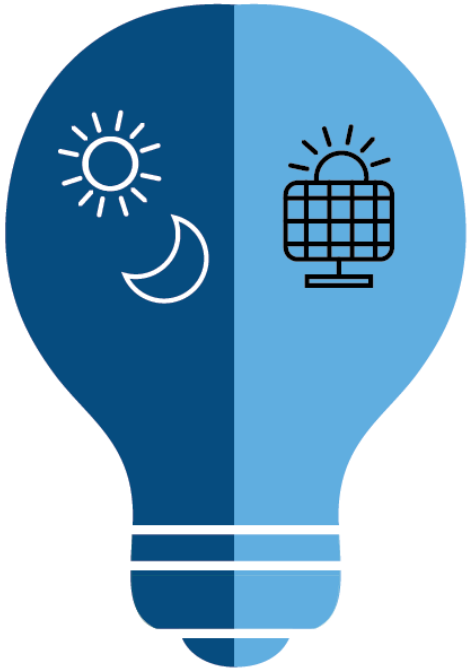
Broad mix of clean flexible resources and supportive policies are needed.

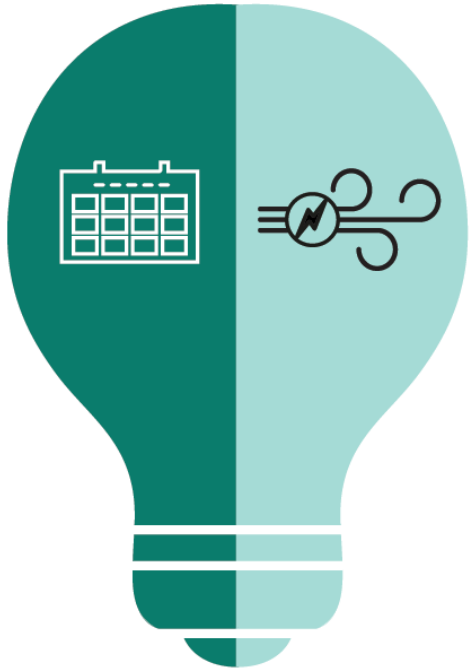
Flexibility needed across all timeframes (right time)



Daily flexibility

Morning and evening demand peaks

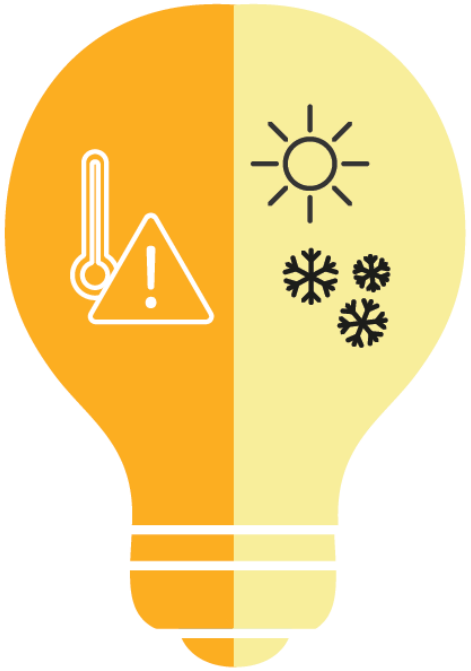
Day-night generation difference



Weekly flexibility

Weekday-weekend demand difference

Wind pattern fluctuations



Seasonal flexibility

Heating-cooling periods

Seasonal weather patterns

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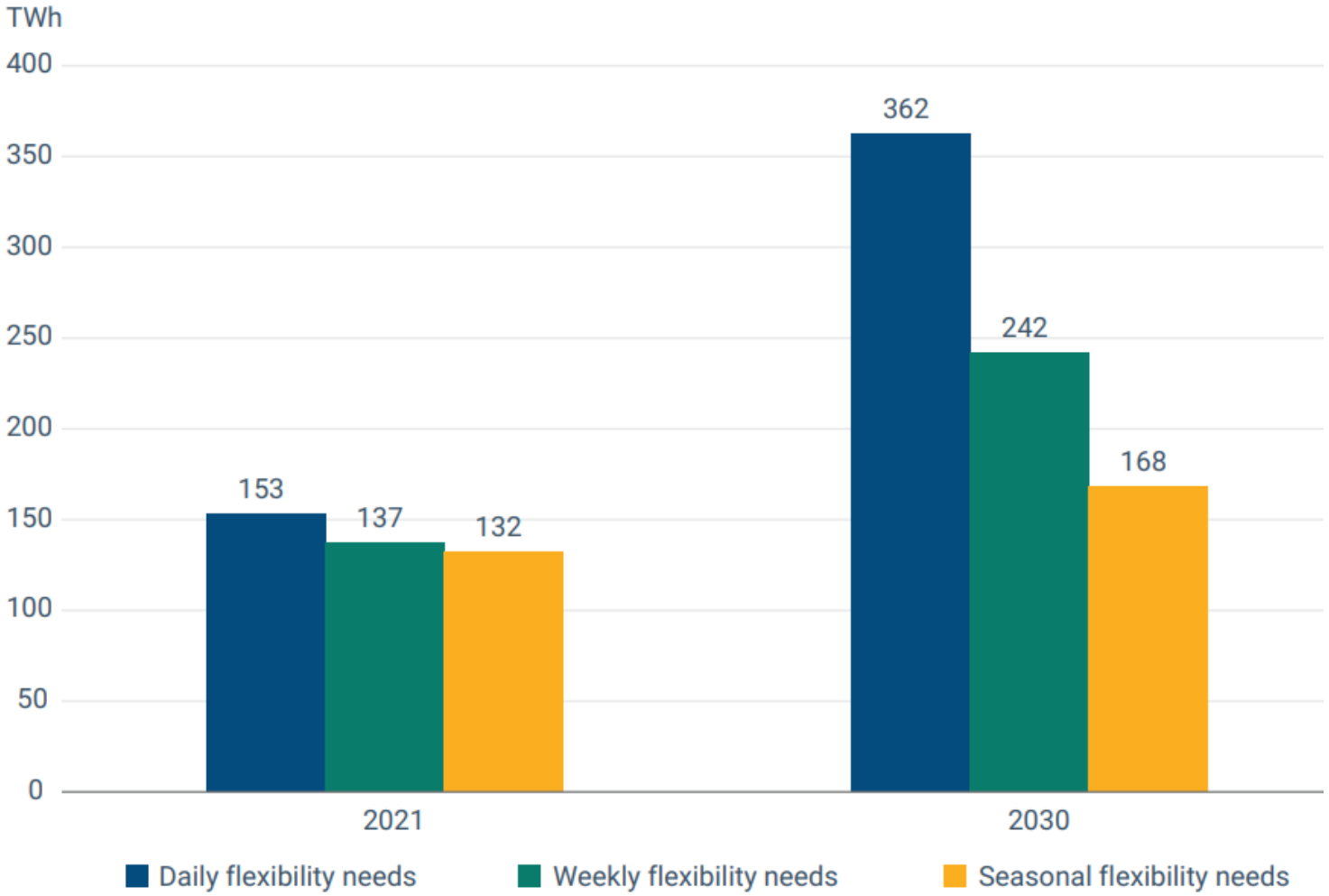
Flexibility must double to keep up with renewables (right amount)

Daily, weekly and annual flexibility needs in 2021 and 2030 in Europe



- Increased solar generation requires substantial daily flexibility
- Wind generation mostly requires weekly flexibility
- Increased electrification of heating (via heat-pumps) requires more seasonal flexibility, but it unlocks demand-side flexibility and cheaper thermal energy storage.

Source: ACER-EEA - Flexibility solutions to support a decarbonised and secure EU electricity system

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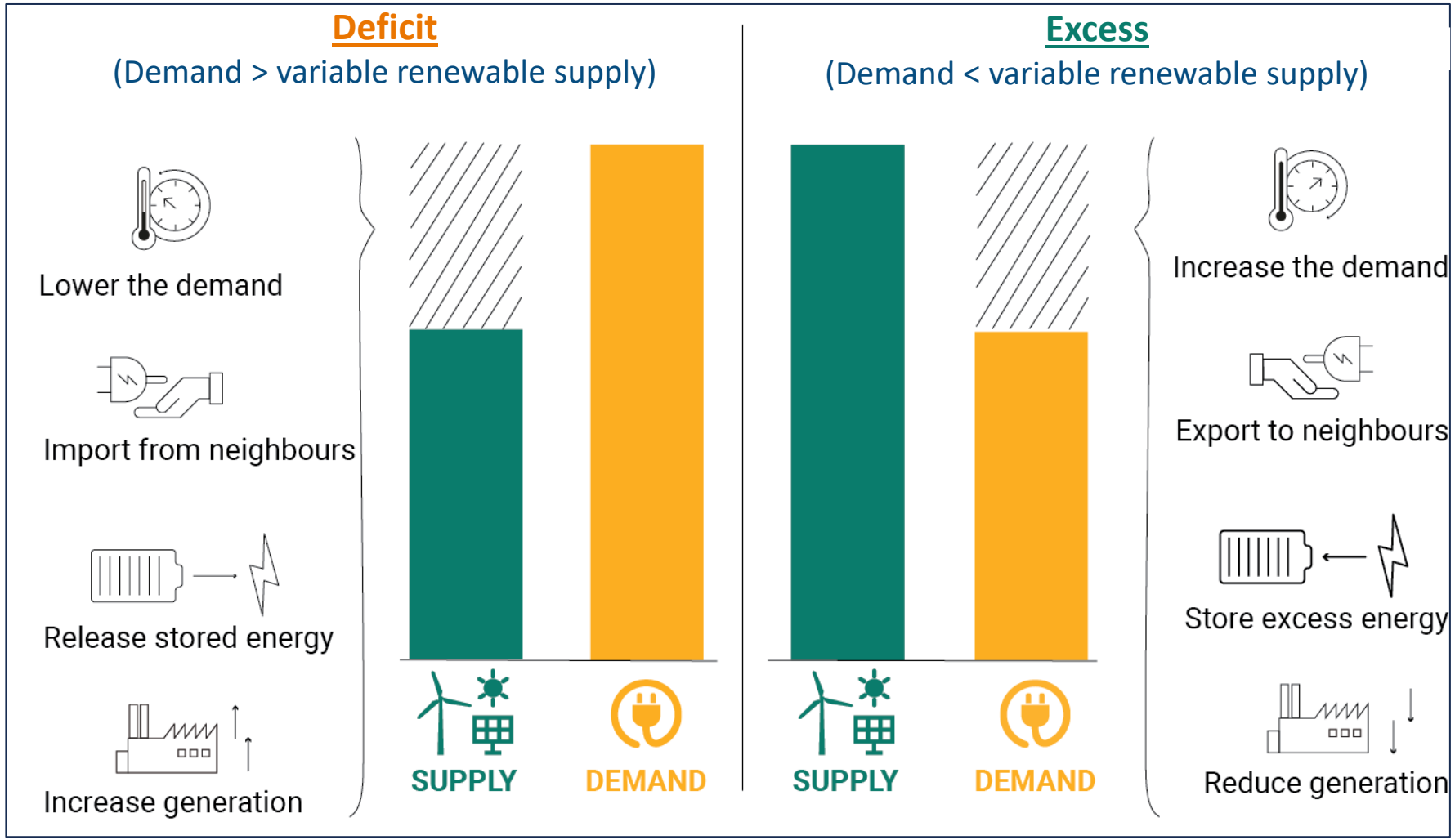
Climate-compatible flexibility solutions exist



- Increasingly, home-grown climate-compatible flexibility resources are needed.
- Facilitate the switch to these low-carbon flexibility solutions.

Source: ACER-EEA - Flexibility solutions to support a decarbonised and secure EU electricity system

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Solutions are promising, but coordinated policies are needed

For instance, demand response and savings are essential this decade:

A 5% peak shaving and 10% demand savings could, in 2030:

- Cut flexibility needs equivalent to Austria's current power consumption;
- Cut backup supply needs for solar and wind power equivalent to Spain's current consumption.

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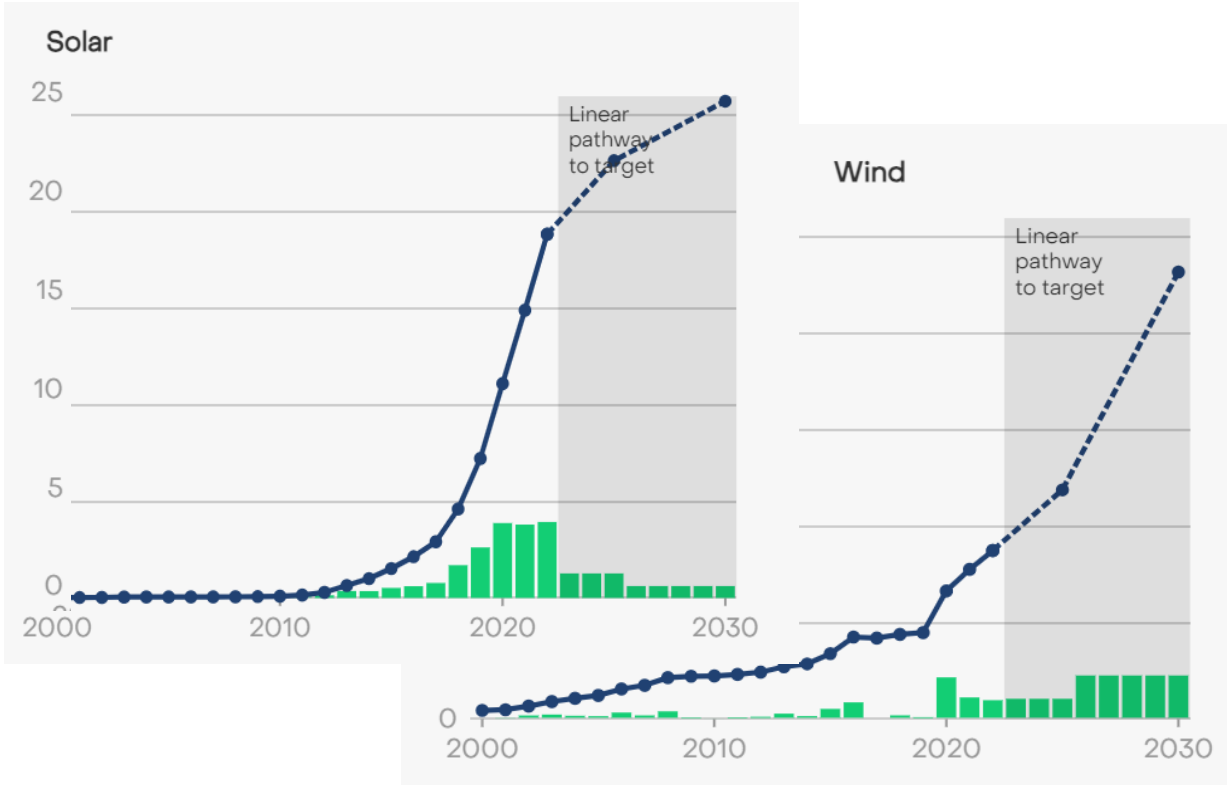
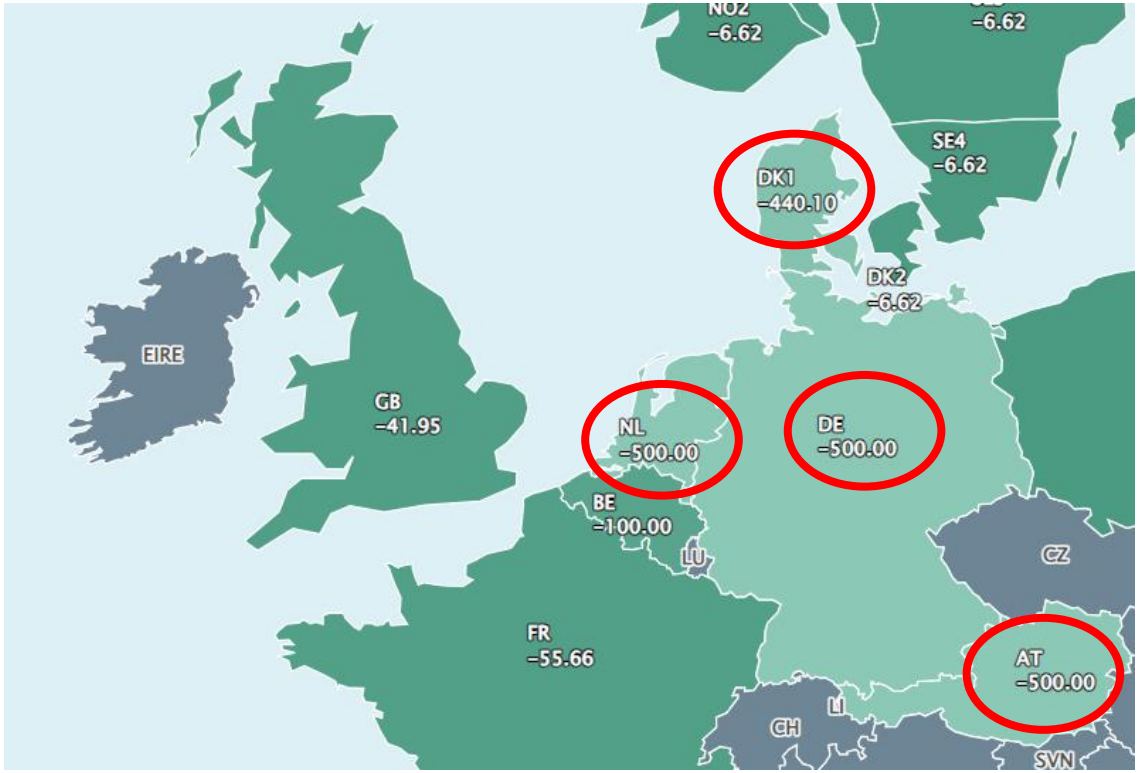
As supply increasingly fluctuates, demand must accommodate and catch up.

As variable renewables grow, focus turns to system responsiveness

Example: Wind & solar capacity targets, Netherlands (GW)*



Day-Ahead Price, North West Europe (EUR/MWh)**



Many NECPs indicate intermittent generation will grow exponentially. Yet, negative wholesale prices are becoming more prevalent, indicating a need to enhance overall system responsiveness (whether for deployment or operational decisions or facilitating demand response).

** Source: EMBER, Live NECP tracker*

*** Source: Nordpool website https://www.nordpoolgroup.com/en/maps/#/nordic, Day-ahead prices 02/07/2023 14.00-15.00h*

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Here, demand response stands out, requiring dismantling of barriers

ACER is publishing a new assessment of barriers to demand response across EU Member States in December 2023

Barriers come in 'many sizes and shapes'

- Difficulties to access markets.
- Lack of national rules.
- At times (too) cushioned retail prices.

Households need incentives & information to become active

- Retail contracts that reward flexible use.
- Public advisory tools to compare offers; understand benefits & risks.
- Rapid deployment of smart meters a prerequisite.

Market rules should become *"demand response friendly"*

- EU-wide network code on demand response to facilitate access to electricity markets.
- Harmonised rules (e.g. on aggregation) improve the business case for demand response providers.

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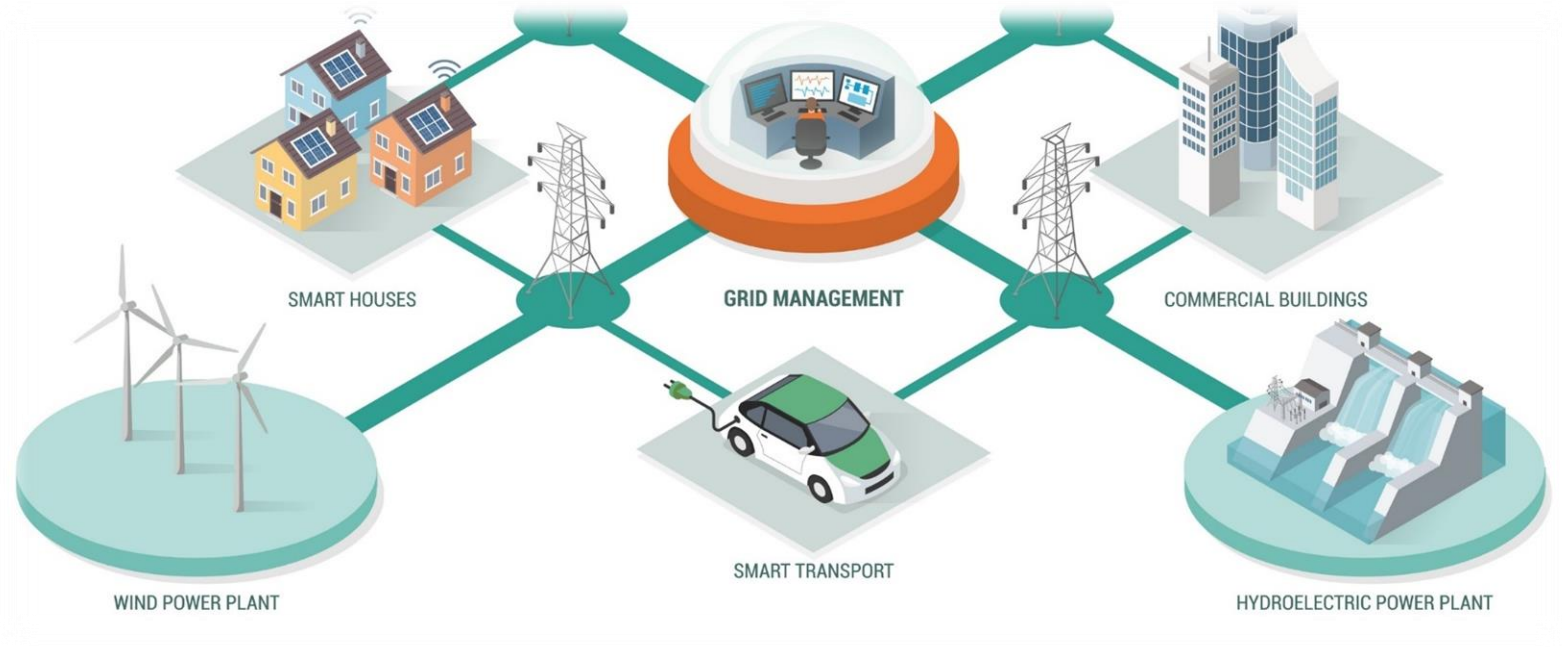
Further connectivity of distributed flexibility resources is next



- **Electric Vehicles**, **Heat Pumps** and **Power-to-Gas** units: harmonised connection rules ensure system stability during the energy transition while providing economies of scale and facilitate mass uptake.
- **Storage**: customised connection rules to harness the advanced capabilities of storage technologies.

Read more here about ACER's work to amend EU grid connection rules

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Europe’s interconnected power system is a key lever to meet flexibility needs and to cost-efficiently integrate renewables.

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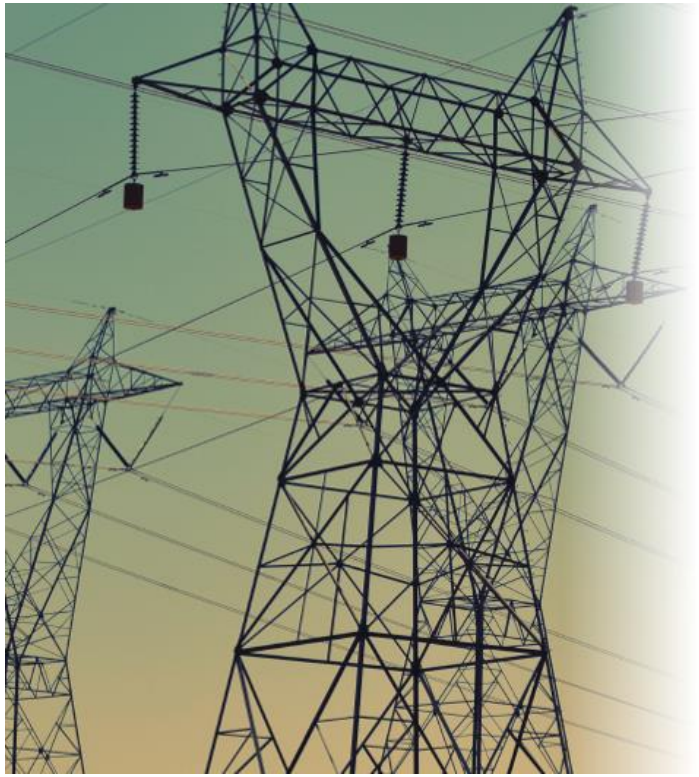
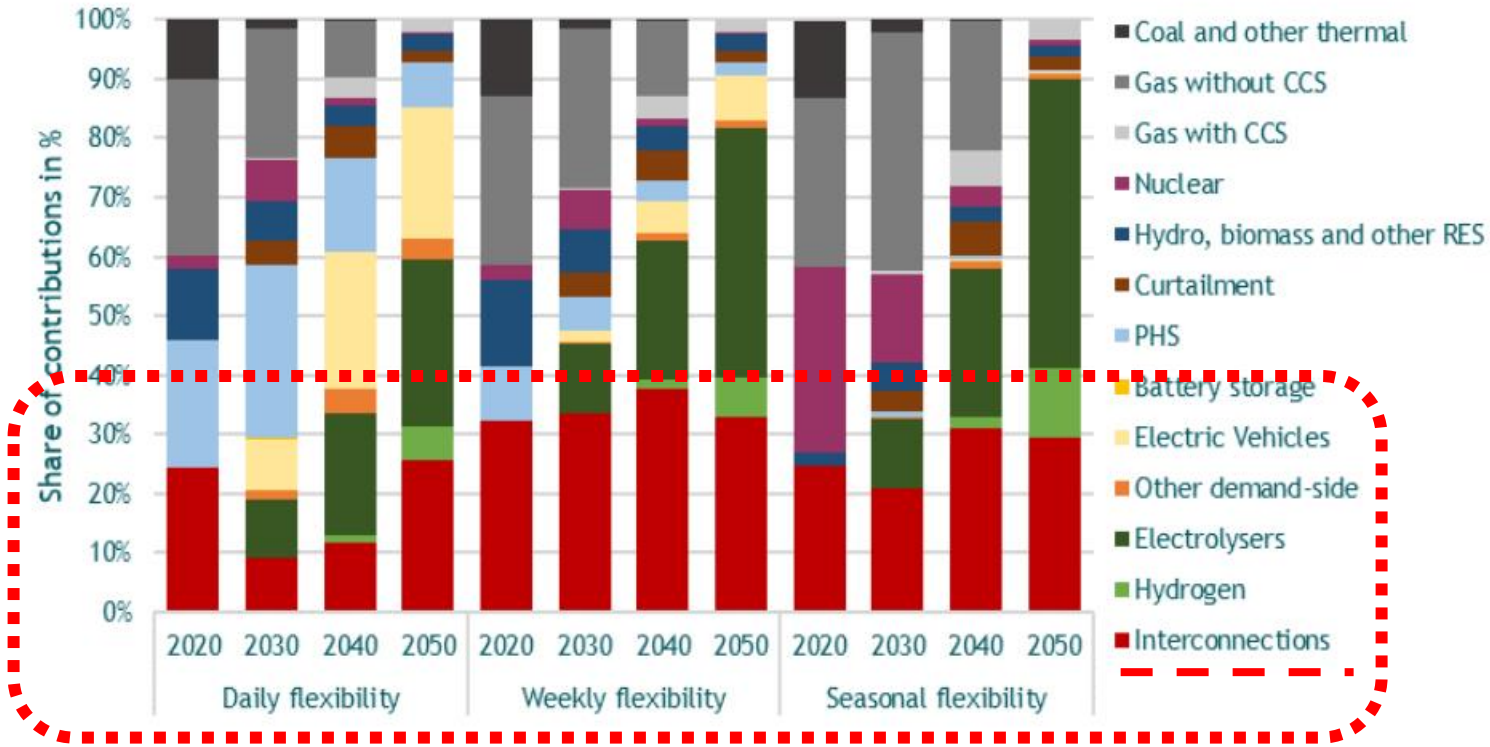
Future flexibility needs point to the role of interconnectors



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



- As coal and then 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.

Source: Artelys. &Trinomics, Power System Flexibility in the Penta region, March 2023

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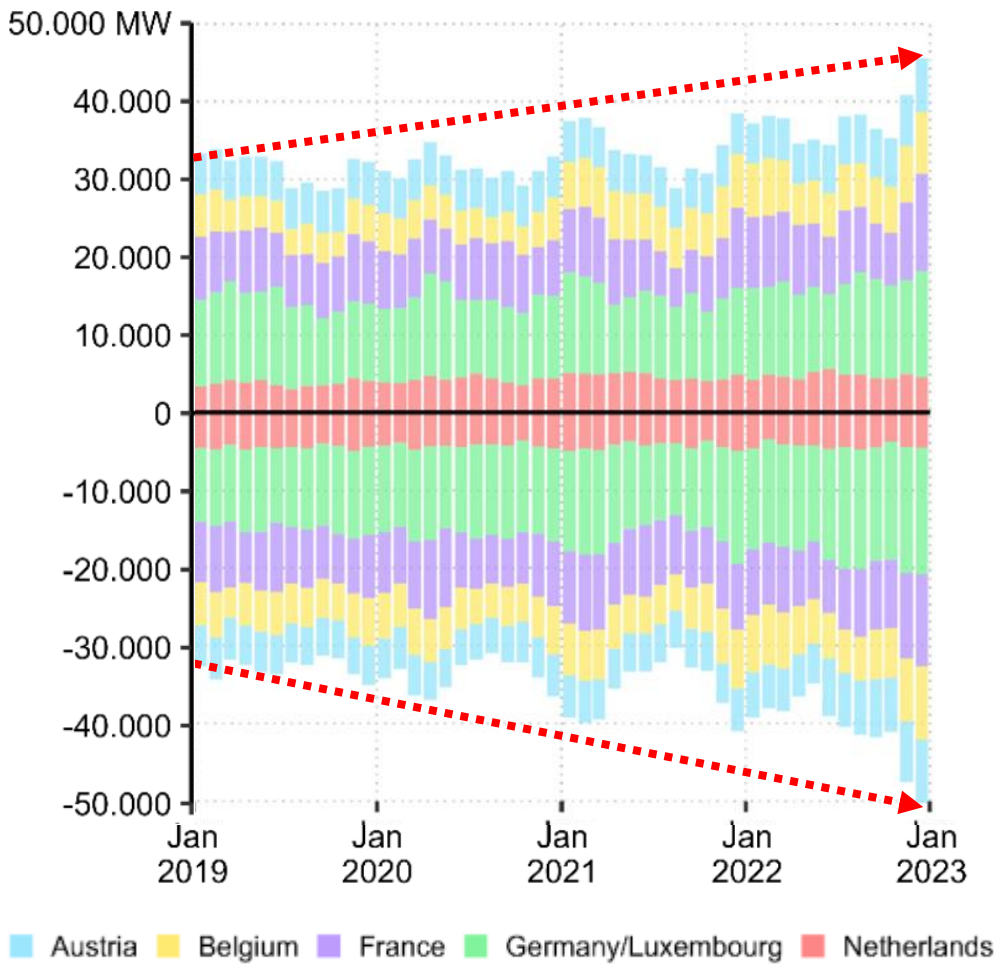
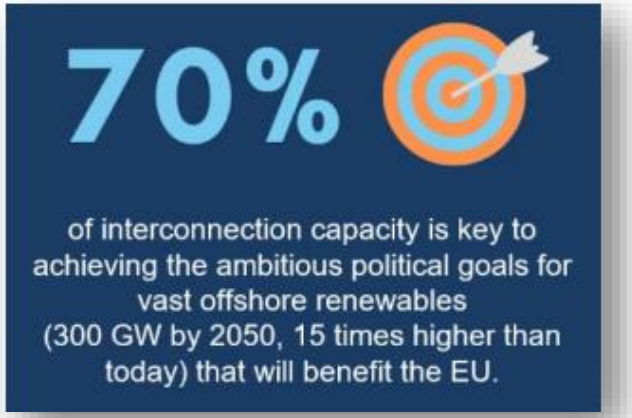
‘Sweet & sour’: Progress is being made, yet concerns prevail

Evolution of the monthly average power interconnector capacities for `Central West Europe` *





- **Capacity allocation (once capacity is available)**: `Flow-based` **market coupling** provides for efficient capacity allocation, increasing electricity flows both in the intra-day and day-ahead timeframes.
- **Making more capacity available**: Grid operators are required to make min. **70%** of interconnection capacity available for cross-border electricity trade. Here, progress is uneven, giving rise to concerns.

efficiency enhancers

*Source: based on ACER - Cross-zonal capacities and the 70% margin available for cross-zonal electricity trade

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Improvements will likely be key to make offshore renewable hubs a reality

THE ESBJERG DECLARATION

on The North Sea as a Green Power Plant of Europe

Energy security and the fight against climate change are crucial to the future of the European Union. Recalling the Versailles conclusions on energy, the European Commission's communication on Joint European Action for more affordable, secure and sustainable energy, and the most recent IPCC

OSTEND DECLARATION

ON

THE NORTH SEAS AS EUROPE'S GREEN POWER PLANT

DELIVERING CROSS-BORDER PROJECTS

AND ANCHORING THE RENEWABLE OFFSHORE INDUSTRY IN EUROPE

aration on the North Seas as a Green Power Plant of Europe in Esbjerg

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By Michaela Pia Camilleri - May 18, 2023 8:30 PM

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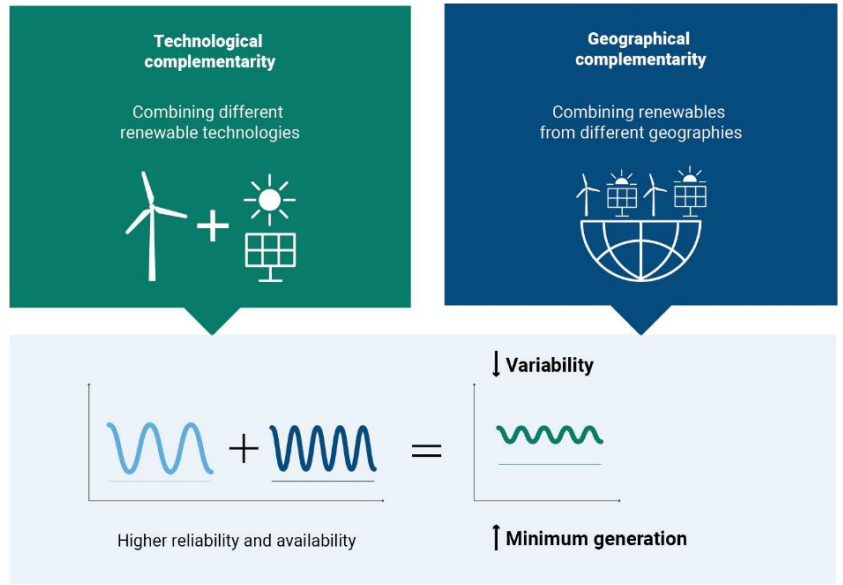

*"Sharing renewable resources among well-interconnected Member States enhances the certainty of availability."**

*Source: * ACER-EEA - Flexibility solutions to support a decarbonised and secure EU electricity system*

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Rapid growth in renewables calls for better policy planning, benefitting from enhanced Member State cooperation.

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Assessing flex needs; incorporating ‘flex checks’; collaborating more

- **Assess flexibility needs** in a forward-looking manner at the national level *and* at an EU level *(per current discussions in the context of the electricity market design negotiations).*

- **Do ‘flexibility checks’ to highlight policy trade-offs**, e.g. needs-reflective pricing that drives behaviour vs. price cushioning to protect consumers *(per unintended consequences that may hinder demand response opportunities from entering the market).*

- **Foster common flexibility policies/ initiatives**, potentially using Member States’ National Energy and Climate Plans *(this in order to meet assessed flexibility needs, leveraging both local and cross-border resources).*

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Conclusions

Flexibility in the EU power system
needs to double
by 2030 to keep pace with renewables.

Clean flexibility resources are needed, such as demand response, batteries, hydropower

Demand response & savings are essential this decade:

5% peak shaving & 10% demand savings could in 2030:

- cut flexibility needs equivalent to Austria's current power consumption;
- cut backup supply needs for solar & wind power equivalent to Spain's current power consumption.

Further enhancing interconnections is key

to enable flexibility across borders.

In 2030, interconnectors could avoid switching off (to balance the system) as much renewables as the current electricity consumption of Sweden.

Let's enable consumers to reduce energy bills & support climate goals.

Give consumers:

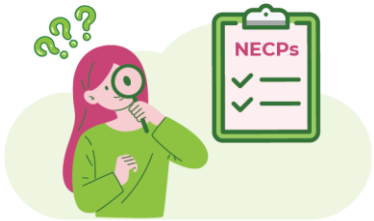
- price signals to adapt their consumption;
- reliable information, to make informed decisions.

Power grid operators must:

- coordinate planning and operation to support both EU climate and security of supply goals;
- maximise grid capacity available for cross-border trade with neighbours.

ACER & EEA call for Member States to:

- develop national and EU-wide assessments of flexibility needs;
- foster common flexibility initiatives starting from their National Energy and Climate Plans (NECPs) and projections.



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Thank you!

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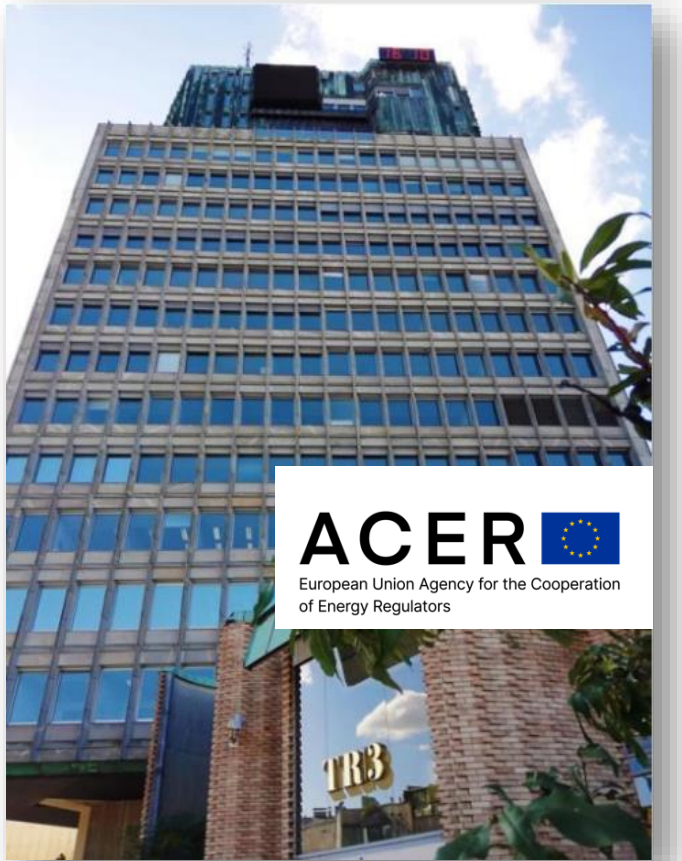
Annex



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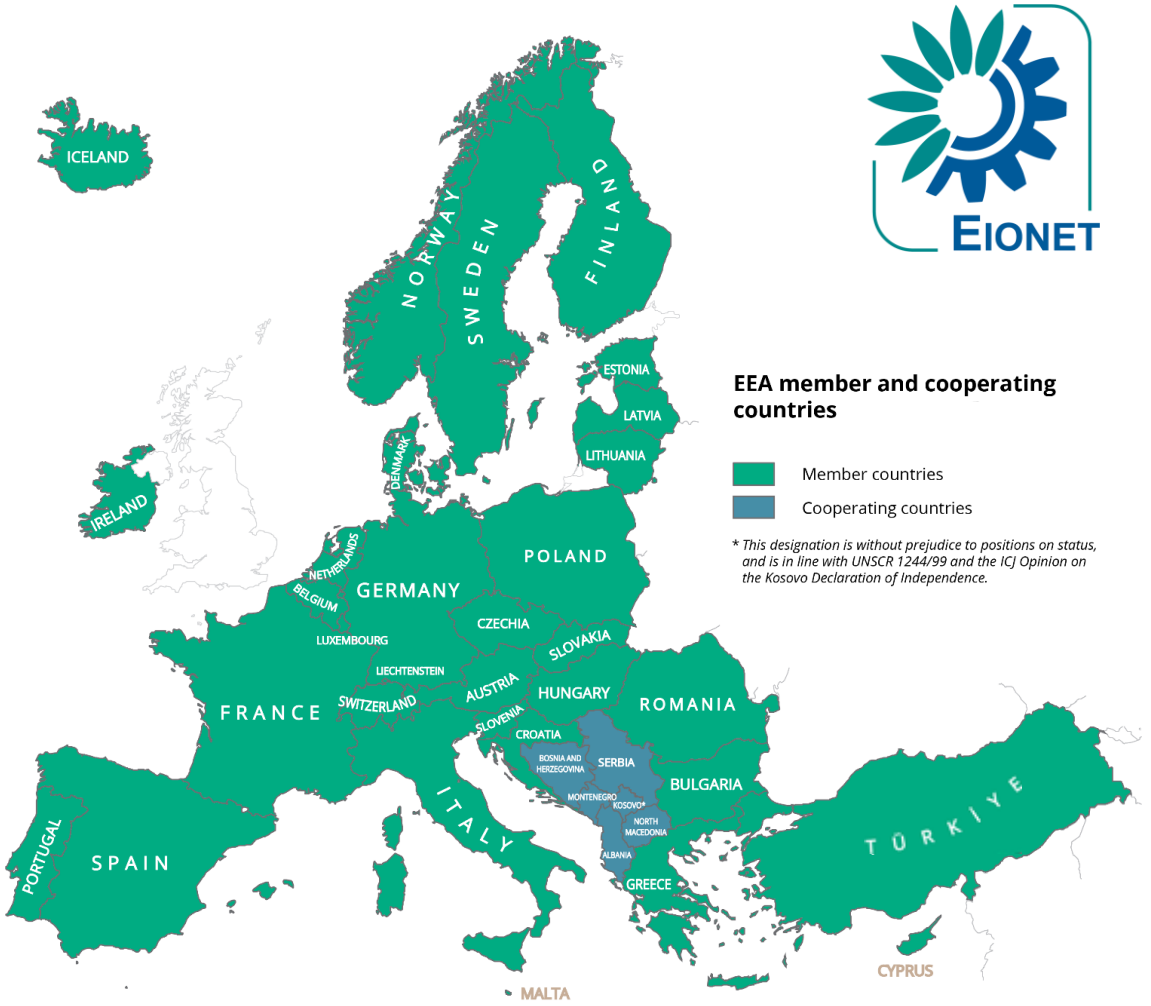
Independent EU Agency

Mandate: Delivering data and knowledge to achieve Europe's environment and climate ambitions

- Information and knowledge hub
- Interface between science and policy
- Network oriented

Largest environmental network in Europe



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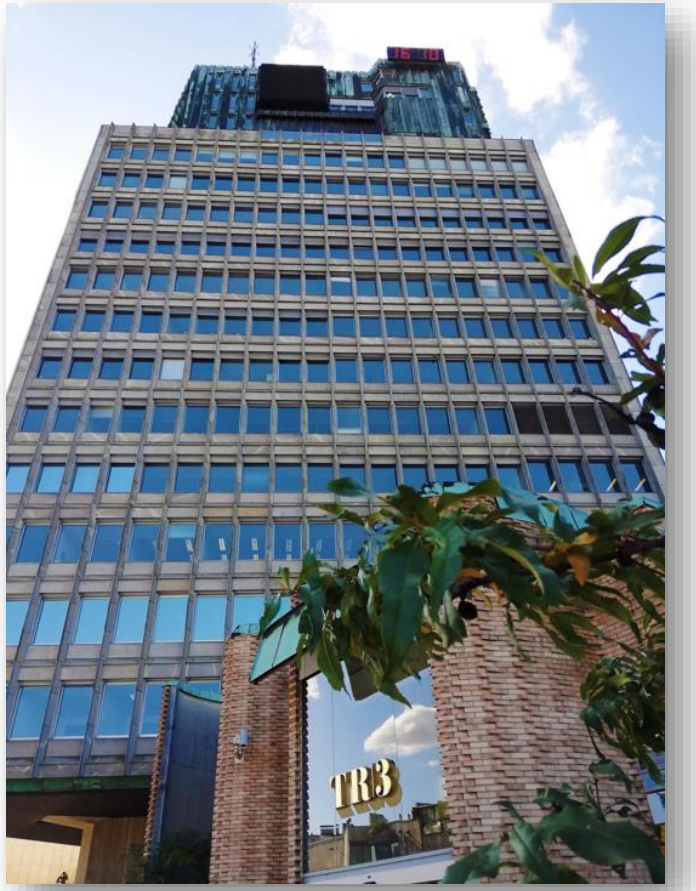
ACER: Role & governance



- **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 the well-functioning and transparency of energy markets, **deterring 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.