European Resource Adequacy Assessment 2023 – Results and key messages

10 January 2024

Kristof Sleurs, *Steering Group Member*
Lazaros Exizidis, *ERAA 2023 Project Manager*
Moderated by: Lukas Galdikas, adequacy specialist.

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Welcome to the workshop!

Instructions:

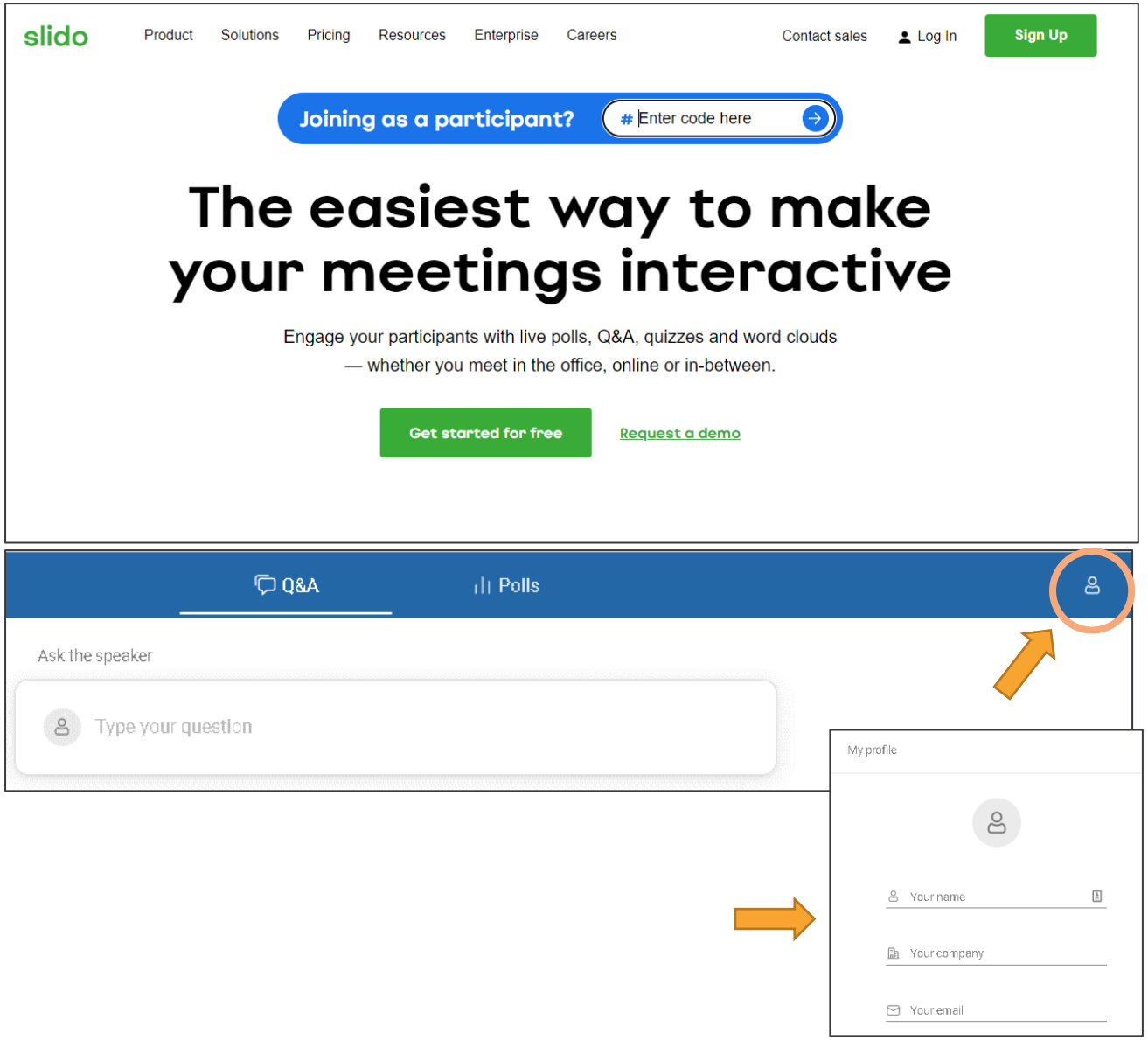
sli.do Interaction
- Ask questions directly through sli.do
- Connection details explained on next slide

Log-in Process
- Enter your name and company details
- Follow on-screen prompts for a seamless log-in

Active Participation
- Vote for the most relevant questions on sli.do
- Moderators will select top questions for speakers

Interaction Features
- Teams "chat" and "hand raising" features will not be used
- Focus on sli.do for a streamlined experience

Recap & Questions
- Questions? Recap on sli.do.
- The webinar will be recorded for future reference.



Submit your questions on Slido

Go to www.sli.do and enter #2679933

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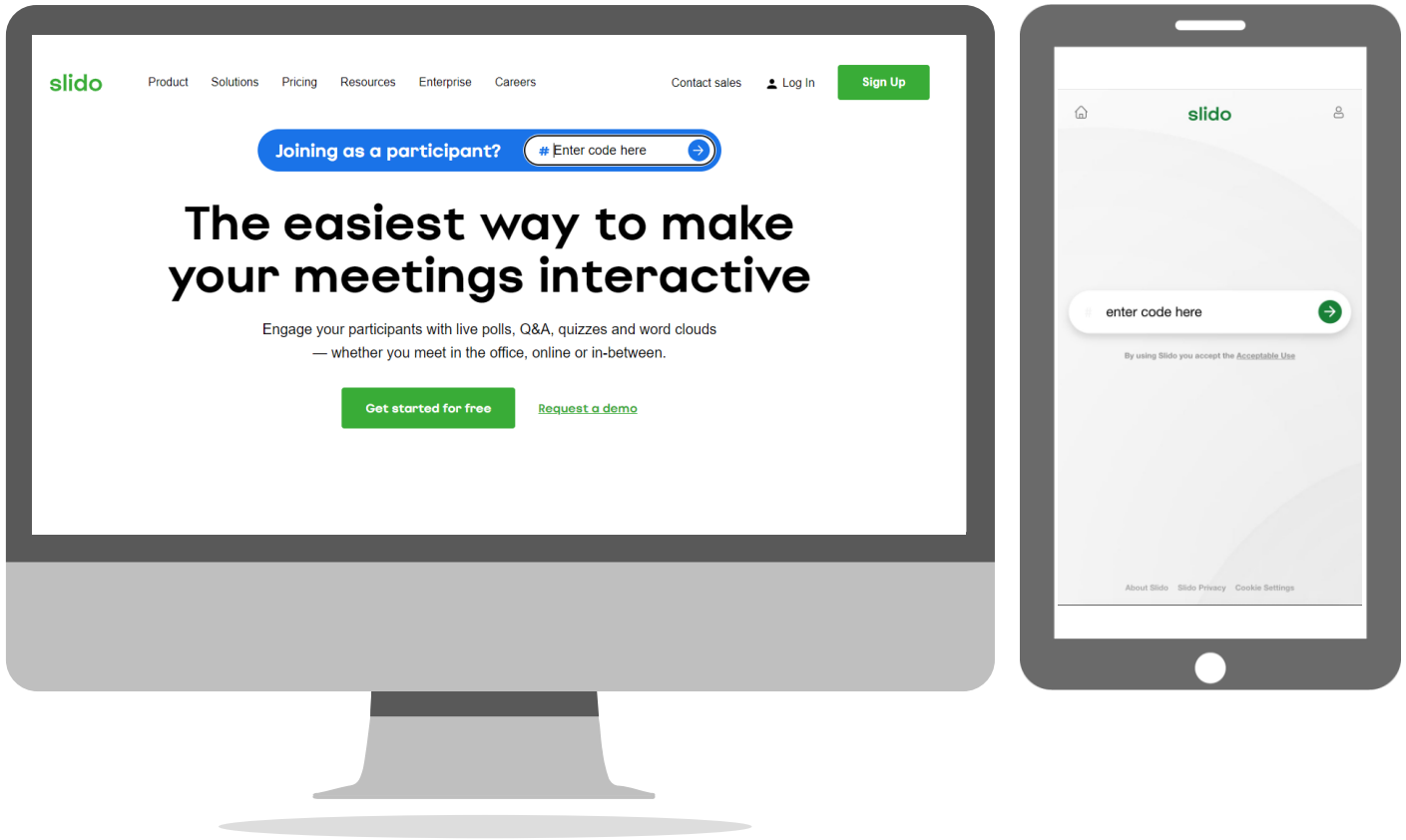

Agenda

1. **Context and Key Takeaways**
   Kristof Sleurs
2. **ERAA 2023 input data and methodological improvements**
   Lazaros Exizidis
3. **ERAA 2023 Outcomes**
   Lazaros Exizidis
4. **Next Steps**
   Kristof Sleurs
5. **Open Q&A**
   Lukas Galdikas

Context and Key Takeaways

Kristof Sleurs,

Steering Group Member

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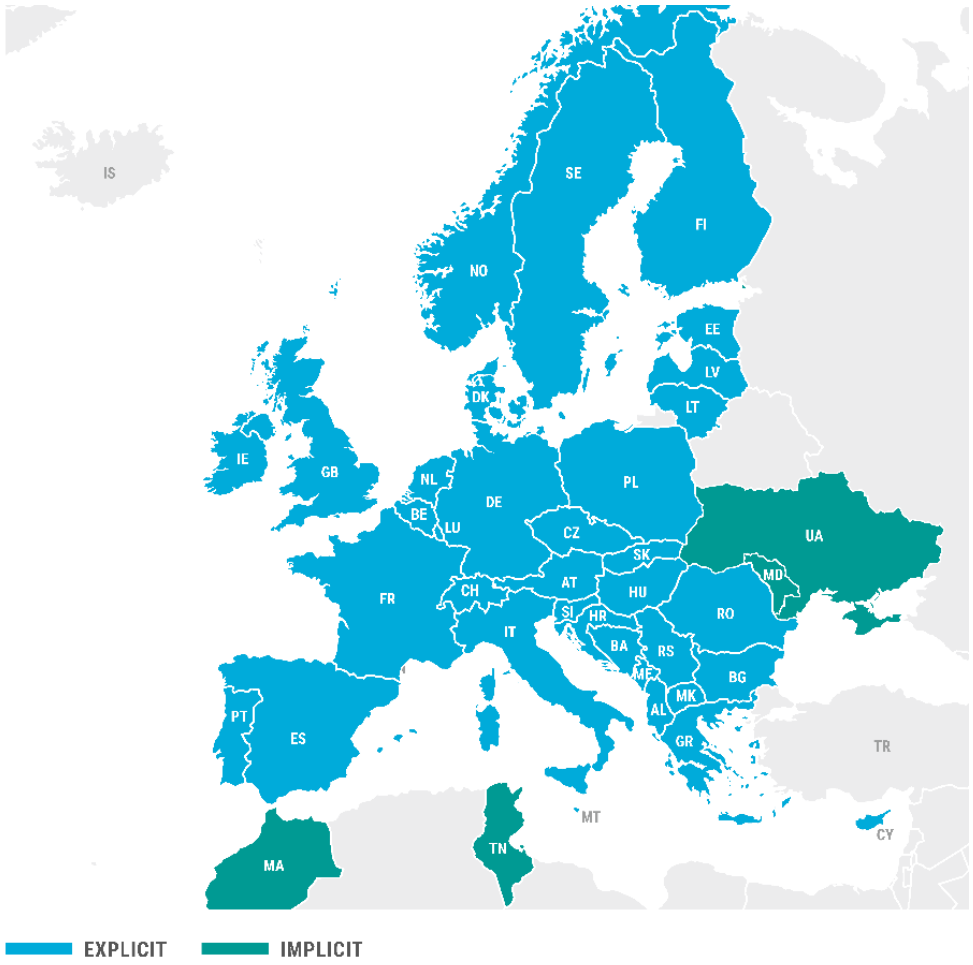
Background

- ERAA is an ENTSO-E legal mandate (Article 23 of Electricity Regulation), which aims to identify resource adequacy concerns by assessing adequacy of the electricity system to supply current and projected demands.
- It is a full pan-European monitoring assessment of power system resource adequacy, unique on its kind, based on a state-of-the-art probabilistic analysis, looking up to a decade ahead.
- Stepwise implementation of the methodology already began with ERAA 2021, with new improvements in the methodology in each edition (2022, 2021).
- ERAA 2023 aims to be an effective tool to identify adequacy risks, and includes an **enhanced Economic Viability Assessment** and advanced **Flow-Based market coupling** incorporated in the central reference scenarios.
- By proactively and factually identifying any system adequacy challenges, ERAA supports decision-makers in ensuring secure, affordable and sustainable energy to citizens and industries.

The interconnected European power system modelled in ERAA 2023



Explicitly modelled member countries/regions and study zones

Albania (AL00)	Estonia (EE00)	Lithuania (LT00)	Romania (RO00)
Austria (AT00)	Finland (FI00)	Luxembourg (LUG1, LUB1, LUV1, LUF1)	Serbia (RS00)
Belgium (BE00, BEOF)	France (FR00)	Republic of North Macedonia (MK00)	Slovakia (SK00)
Bosnia and Herzegovina (BA00)	Germany (DE00, DEKF)	Malta (MT00)	Slovenia (SI00)
Bulgaria (BG00)	Greece (GR00, GR03)	Montenegro (ME00)	Spain (ES00)
Croatia (HR00)	Hungary (HU00)	Netherlands (NL00, NLLL)	Sweden (SE01, SE02, SE03, SE04)
Cyprus (CY00)	Ireland (IE00)	Norway (N0N1, NOM1, NOS0)	Switzerland (CH00)
Czech Republic (CZ00)	Italy (ITN1, ITCN, ITCS, ITS1, ITCA, ITSA, ITSI)	Poland (PL00)	United Kingdom (UK00, UKNI)
Denmark (DKW1, DKE1, DKKF, DKNS, DKBH)	Latvia (LV00)	Portugal (PT00)	

Non-explicitly modelled neighbouring countries/regions

Morocco (MA00) - connected to ES00	Tunisia (TN00) - connected to ITSI
Moldova (MD00) – connected to RO00	Ukraine (UA00) – connected to SK00, PL00 and RO00

- Includes explicitly and non-explicitly modelled study zones
- New to ERAA 2023: energy islands in Denmark, the Netherlands and Belgium

ERAA 2023 main results considering the different time horizons

Midterm Adequacy Risks:
Central/North Europe and islands face adequacy risks.

Short and Mid-term

TYs 2025 and 2028:
Significant capacities at risk of decommissioning; no major investments expected.

Long-Term

TYs 2030 and 2033:
Risks for thermal generation fleet; potential new investments, especially in natural gas power plants.

High-Risk Countries (2033):

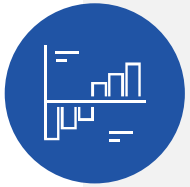
Key takeaways of the ERAA 2023

Continued importance of proactive measures, policy interventions, and strategic planning to ensure energy adequacy in the coming years.

Fossil-Fuelled Capacity at Risk (Next 5 Years): High volumes are at risk of becoming economically nonviable in the next five years. To avoid adequacy risks, the right incentives/interventions will be necessary.

Regional Coordination: Adequacy depends on neighboring countries, stressing the importance of regional coordination.

Flexibility: Growing variability in supply requires the implementation of new flexibility tools that facilitate the management of demand.



Gas vs. Coal Dynamics: The merit order puts more pressure on gas technologies in 2025, while the trend is inverted from 2028 (bringing gas before coal in the merit order)

ERAA 2023 – Input data and methodological improvements

Lazaros Exizidis,

ERAA 2023 Project Manager

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Key enhancements of ERAA 2023

Stakeholder interactions

- Multiple consultations and webinars on input data, methodologies and results
- Integrating views into ERAA 2023 and next ERAAs

Expanded methodology

- Scenarios heading towards Fit for 55
- Enhanced EVA with single-step, multi-year approach
- Flow-based in central scenarios, expanded to reflect additional projects
- EVA network modelling is brought closer to the adequacy model
- DSR, storage and electrolysers considered

The ERAA 2023 Process

Generation

Net Capacities

Market Coupling

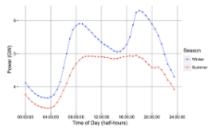
Net Transfer Capacities
Flow-Based

Climate

Capacity Factors

Hydro Database

Temperature profiles



Demand

Demand forecasts

TSO Data and NECP

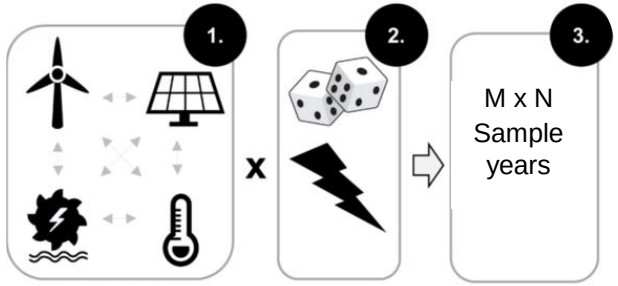
Economic Viability Assessment (EVA)

- Stochastic overall costs minimization

Scenarios

- Include entry/exit of market capacity

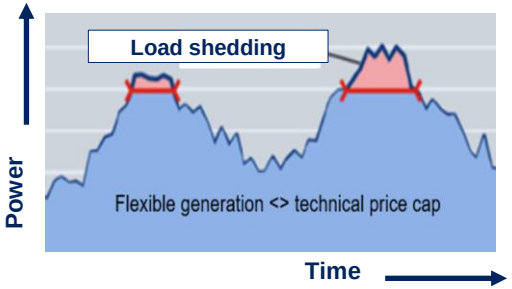
ED Model: Monte Carlo Simulation



N years of interdependent climate data

M random draws for unplanned outages

Adequacy Metrics (per study zone, per target year)

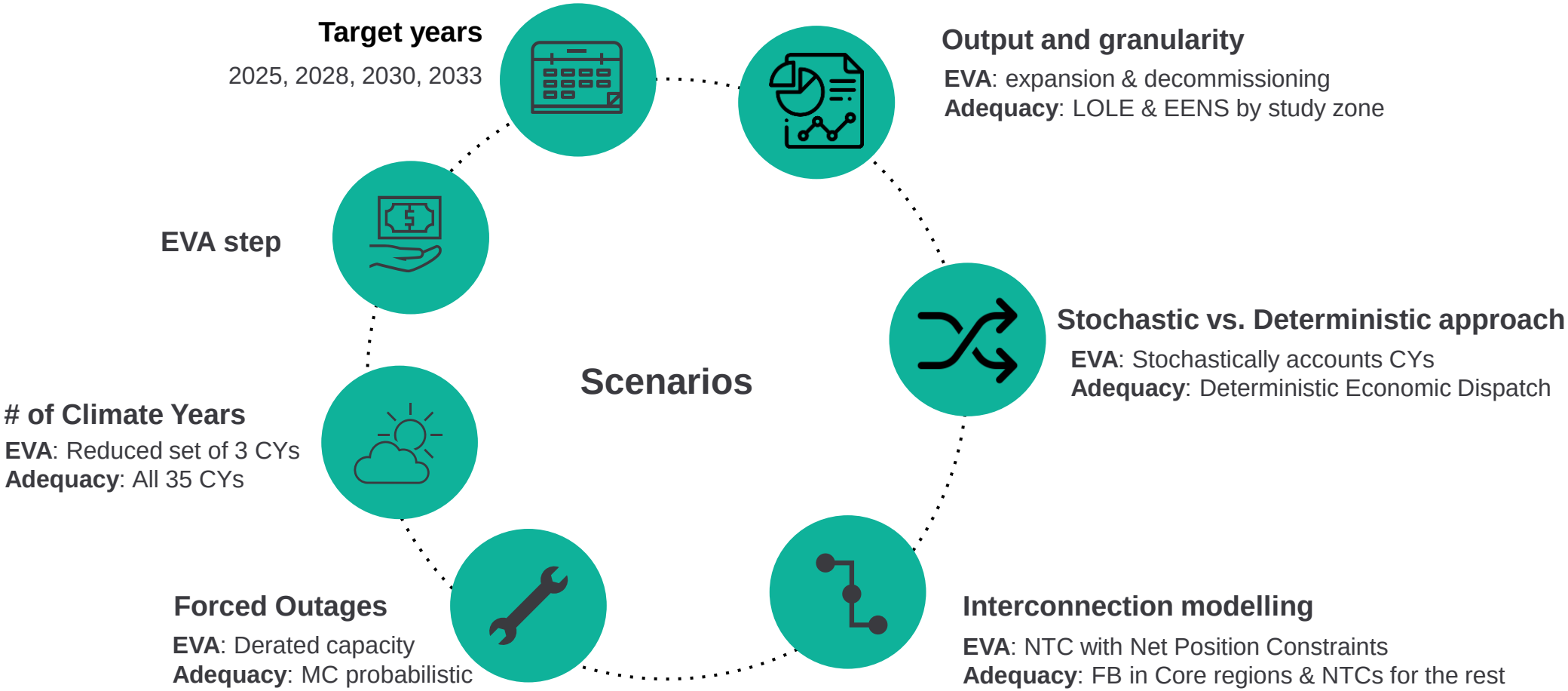


LOLE = Loss Of Load Expectation [h/yr]

EENS = Expected Energy Not Served [GWh/yr]

Acronyms: Economic Dispatch (ED)

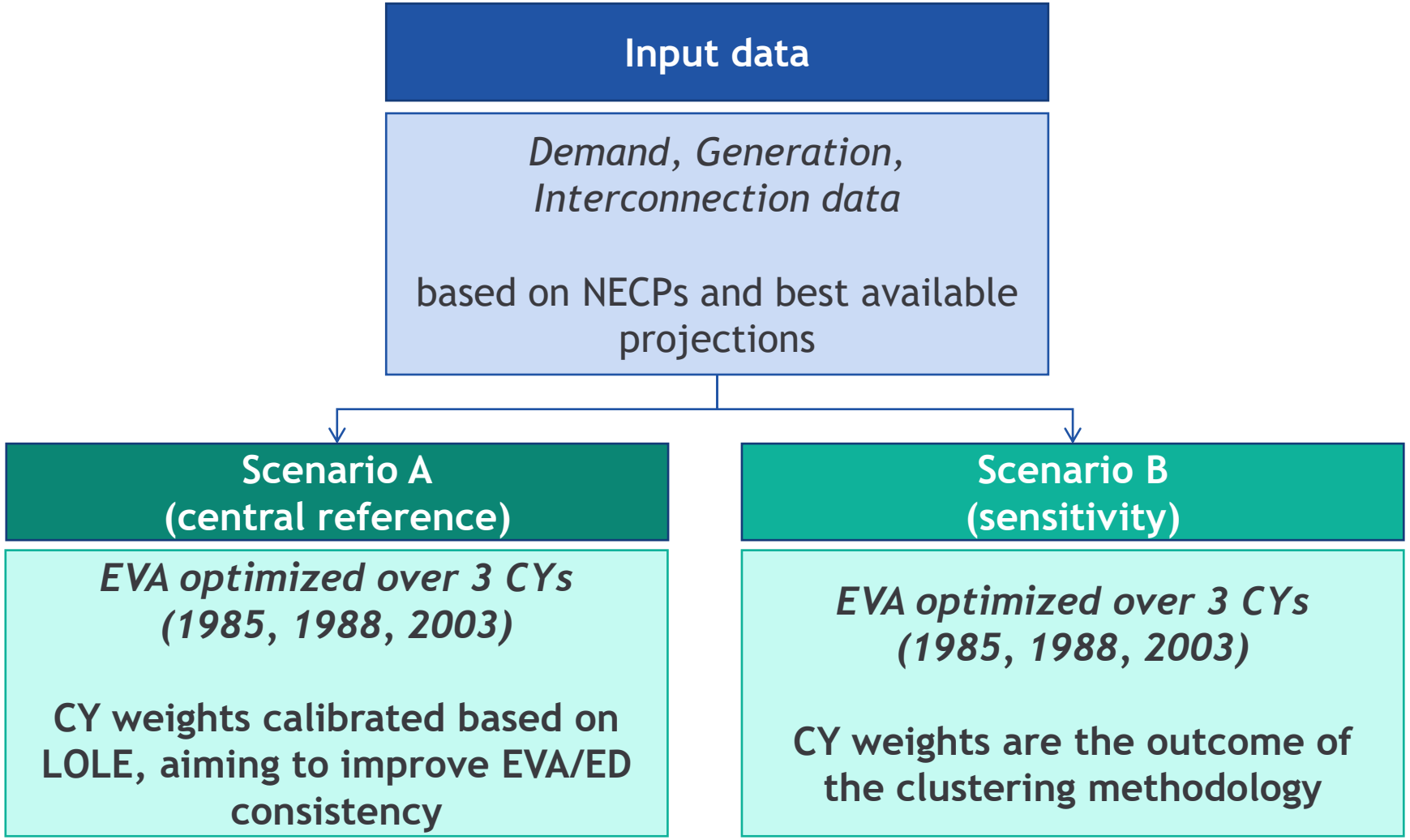
The ERAA 2023 Scope



Acronyms: Economic Viability Assessment (EVA), Climate Years (CY), Net Transfer Capacities (NTC), Flow-Based (FB), Monte-Carlo (MC)

Scenario framework for ERAA 2023

Two complementary scenarios: apply the EVA over the same Climatic Years (CYs) but using different weights per scenario. Each set of weights reflects different investment reactions to price volatility.



ERAA 2023 - Outcomes

Lazaros Exizidis,

ERAA Project Manager

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Scenario A / Central reference

EVA results – Scenario A / Central reference

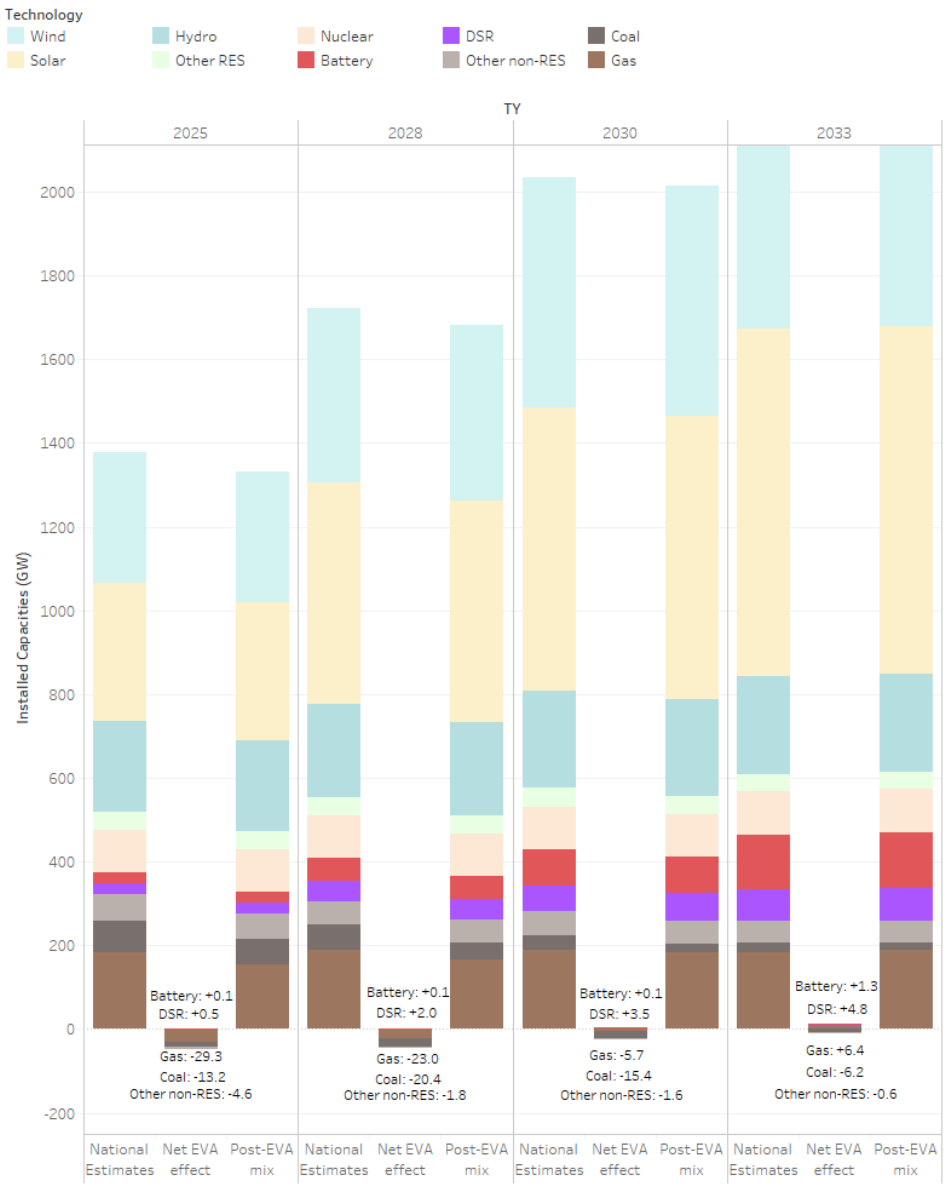
The National Estimates scenarios contain existing units as well as units in various planning/construction stages

Economic decommissioning is the biggest trend when compared with the National Estimates

New Entry includes small capacity of batteries but a growing development of DSR, as well as gas power plants over the TYs

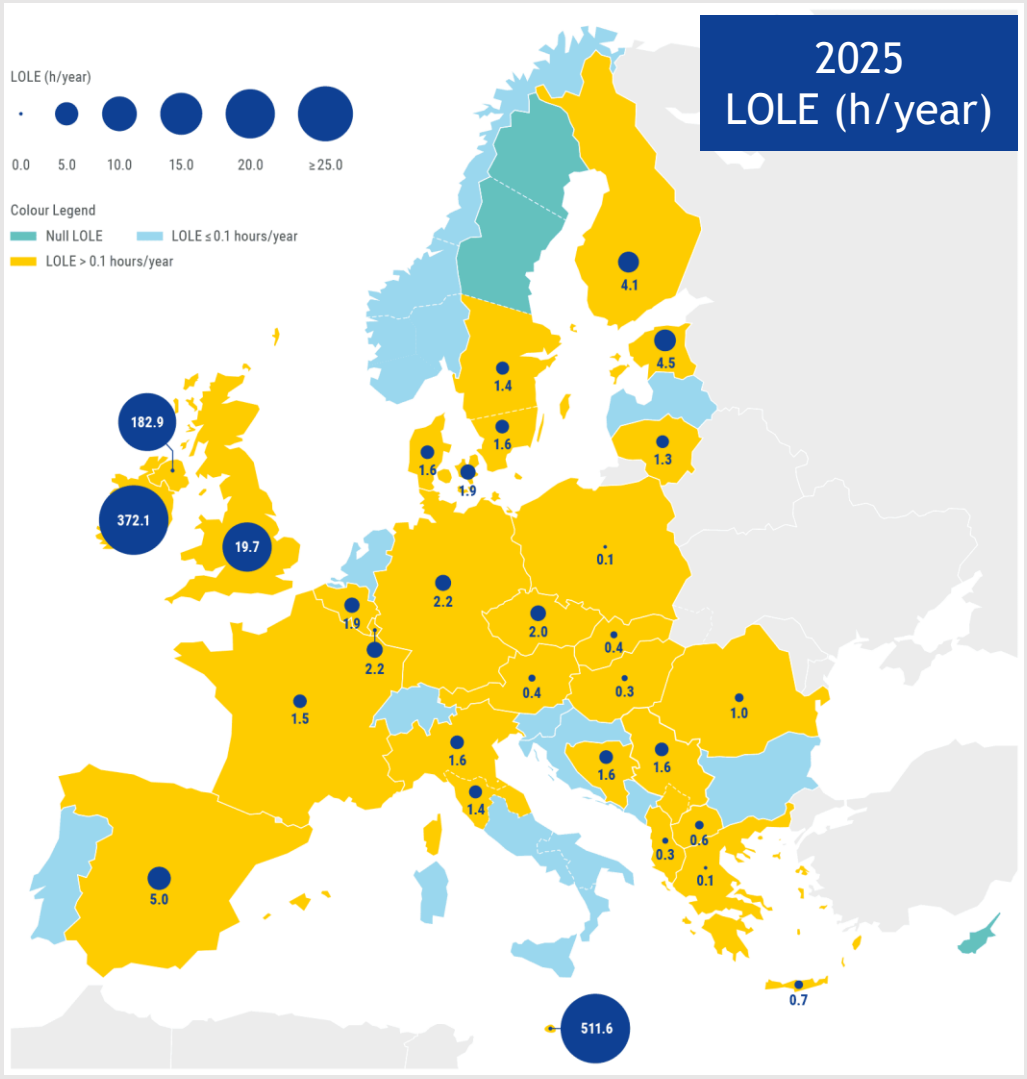
Gas technologies experience these trends:

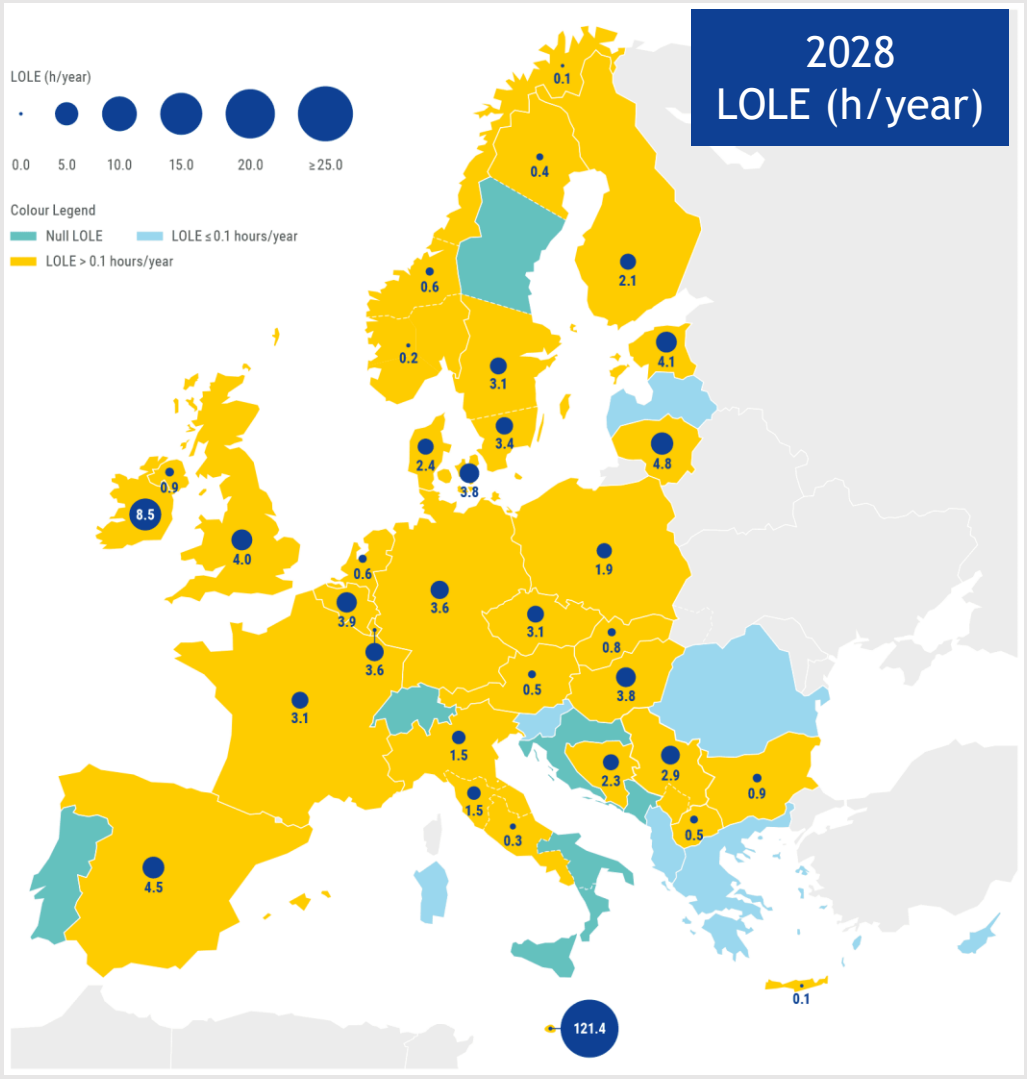
- Highest decommissioning capacity compared to other technologies, with growing decommissioning over time
- New Entry from TY 2028 and life extension from 2025
- High mothballing in TY 2025, decreasing to 0 by 2033



Adequacy results – Scenario A / Central reference

Adequacy risks appear in most European countries in Scenario A and the margins are tight. The scarcity risks tend to shift from the peripheral areas of Europe in 2025 to the central parts of the continent by 2033





Adequacy results – Scenario A / Central reference (cont.)

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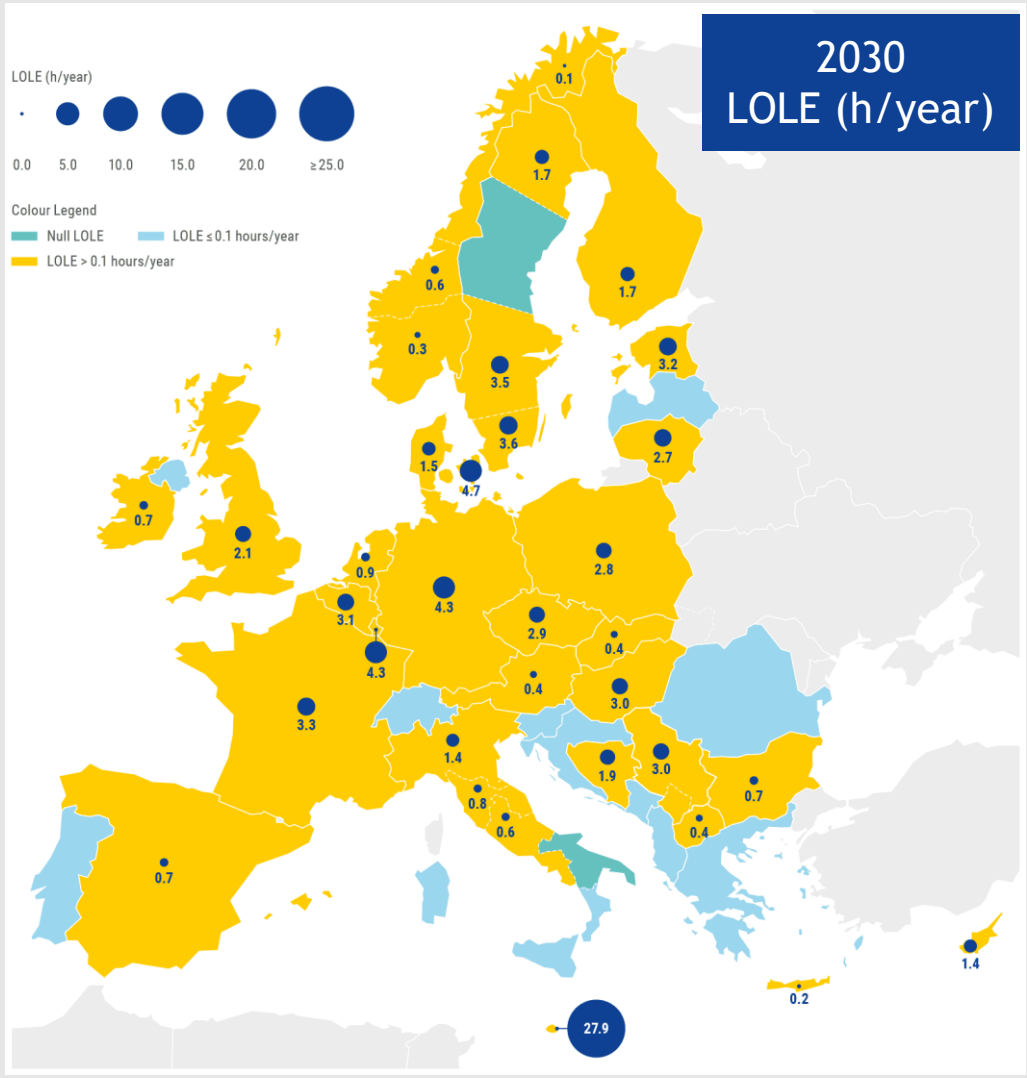

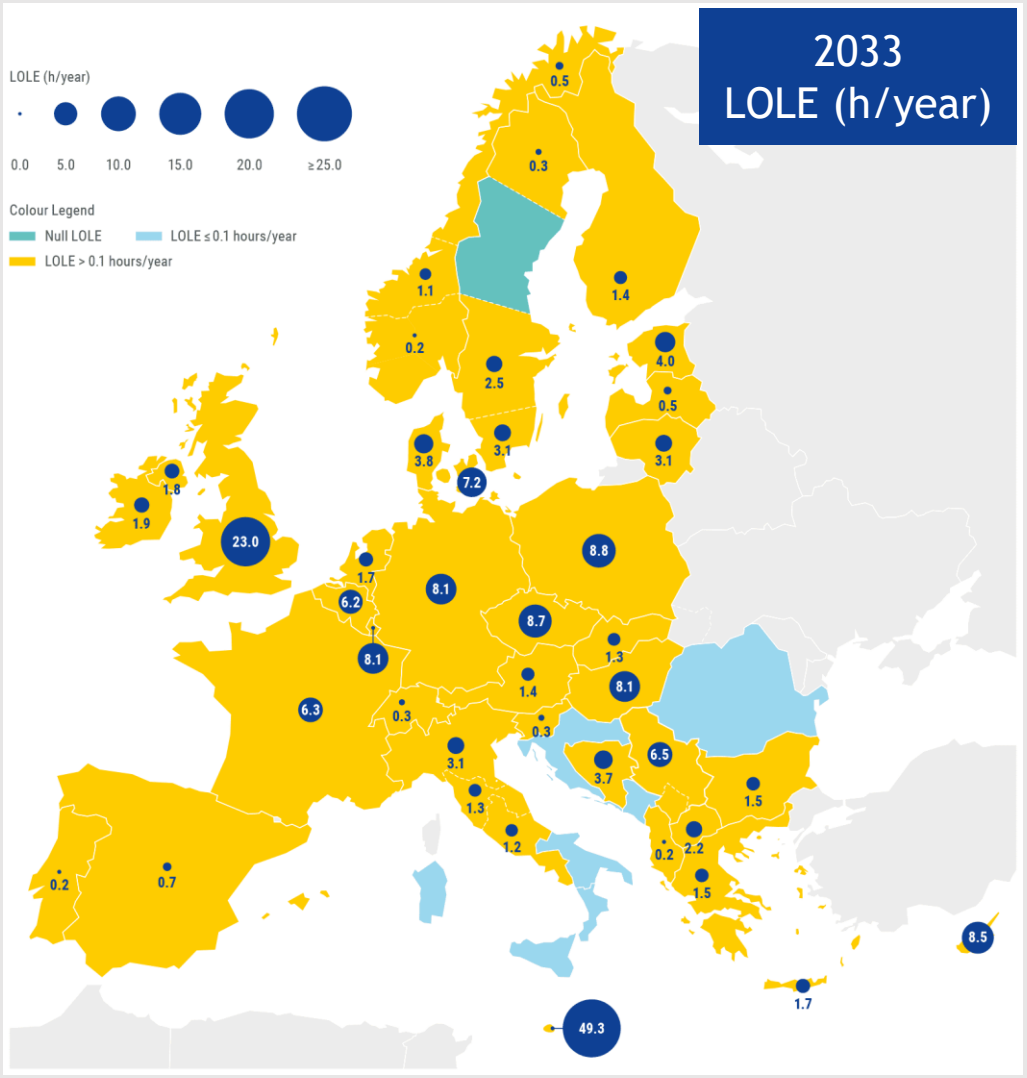

Scenario B / Sensitivity

EVA results - Scenario B / Sensitivity

New Entry includes small capacity development of DSR and Battery, as well as gas power plants over the TYs

Gas technologies experience these trends:

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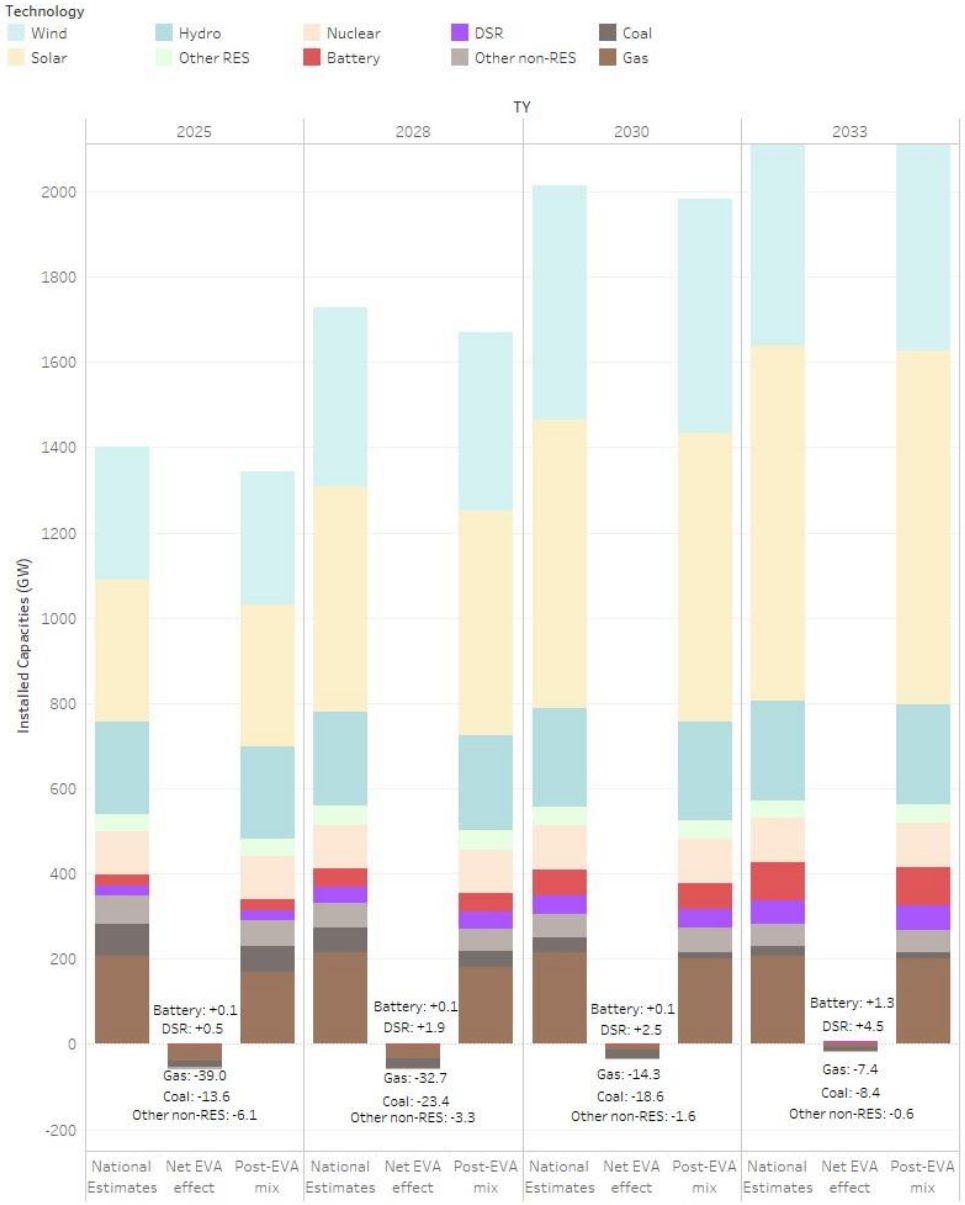
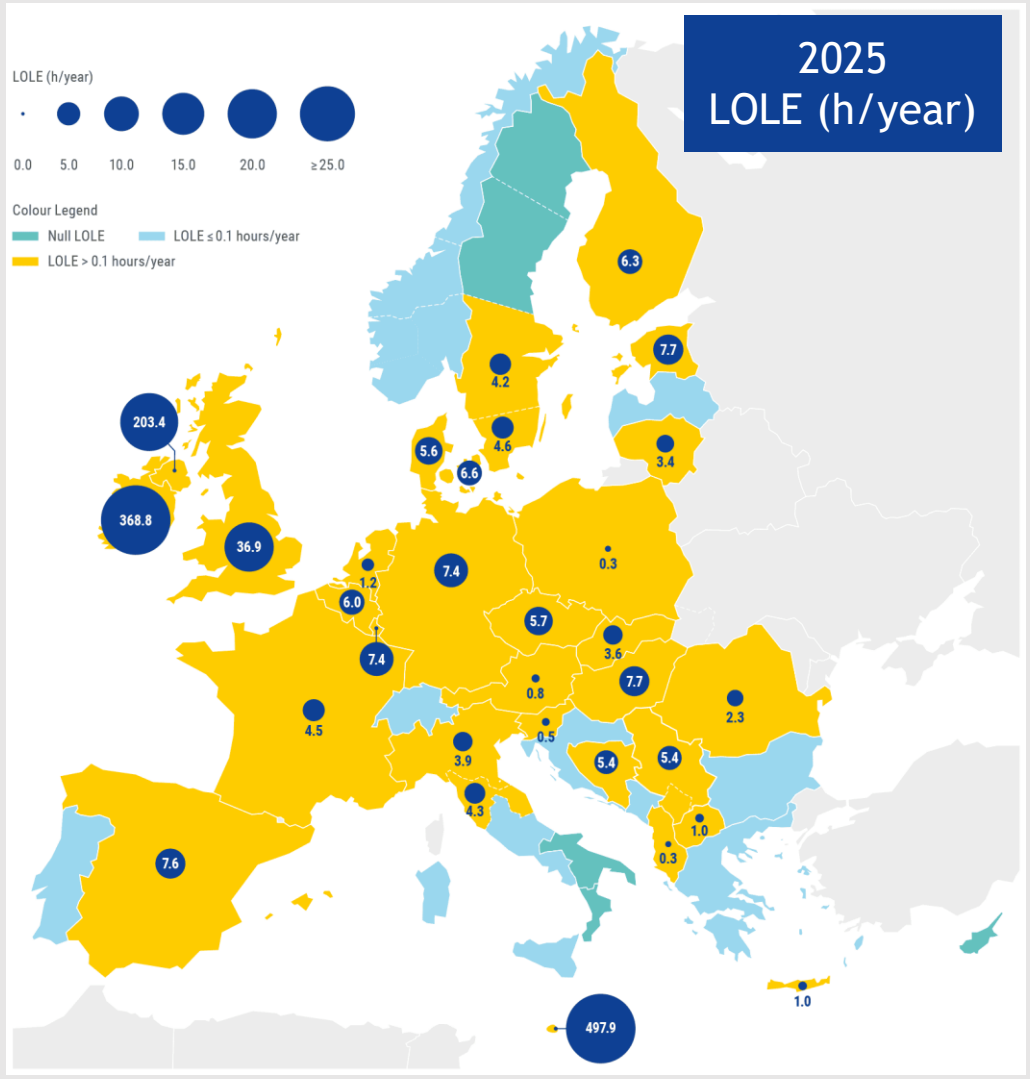
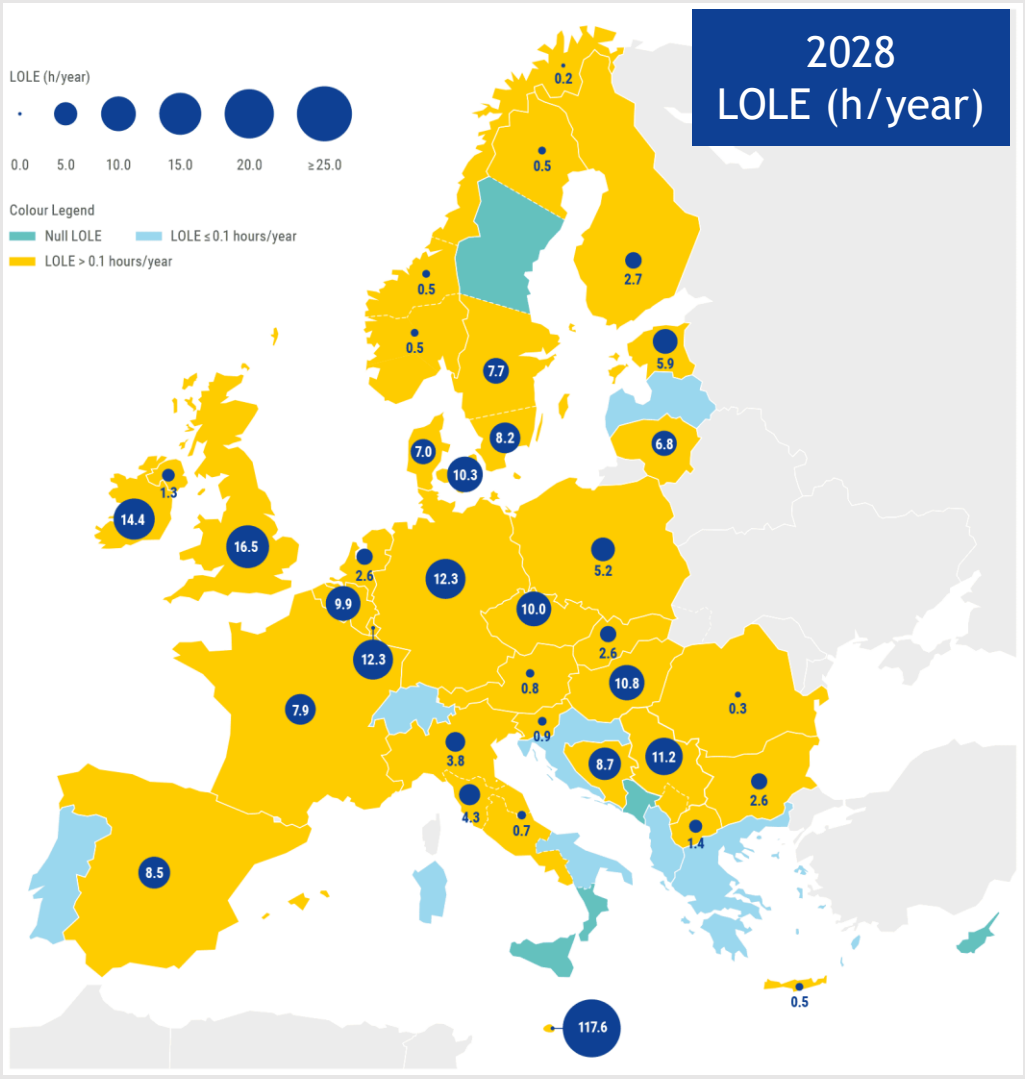


Adequacy results – Scenario B / Sensitivity

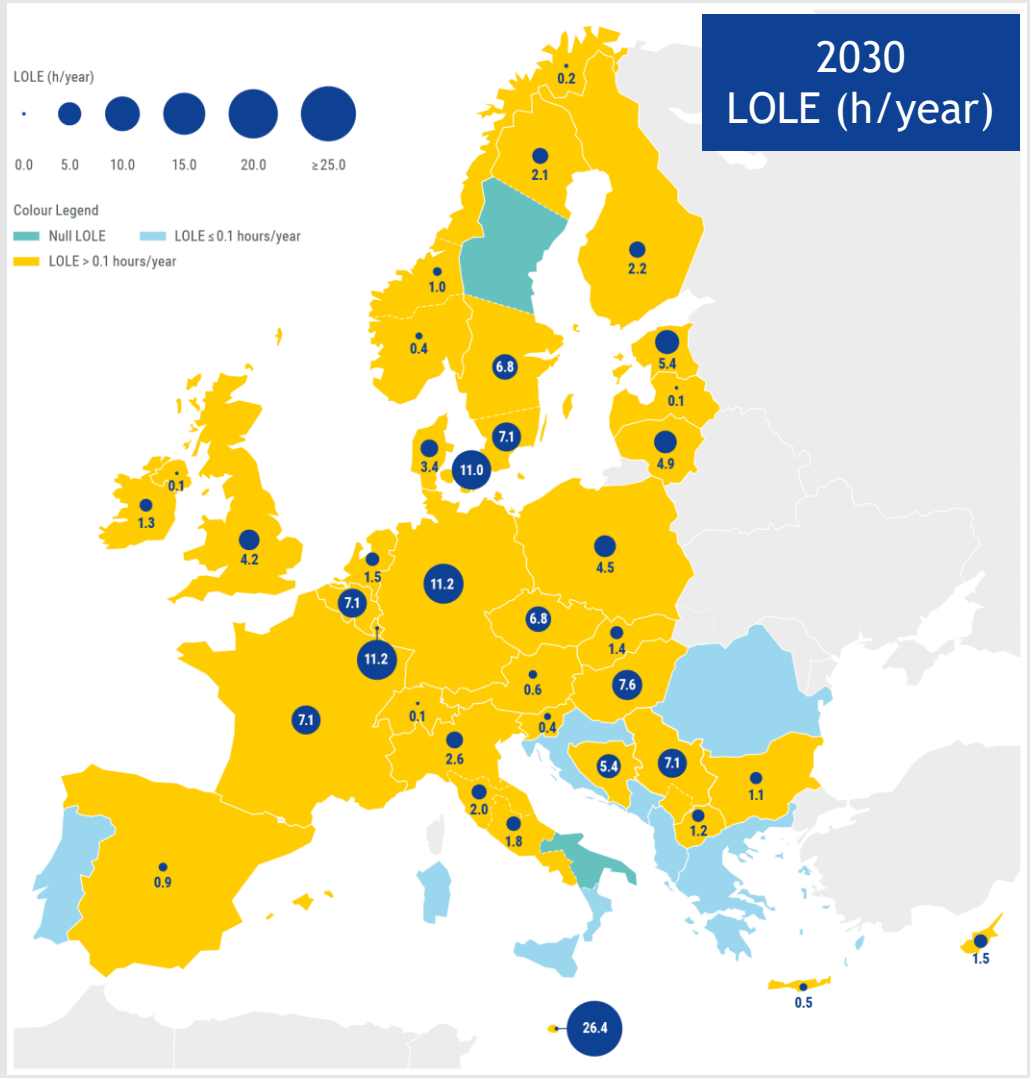
Adequacy risks are higher across Europe in this scenario and increase as we move from the short to mid-term.

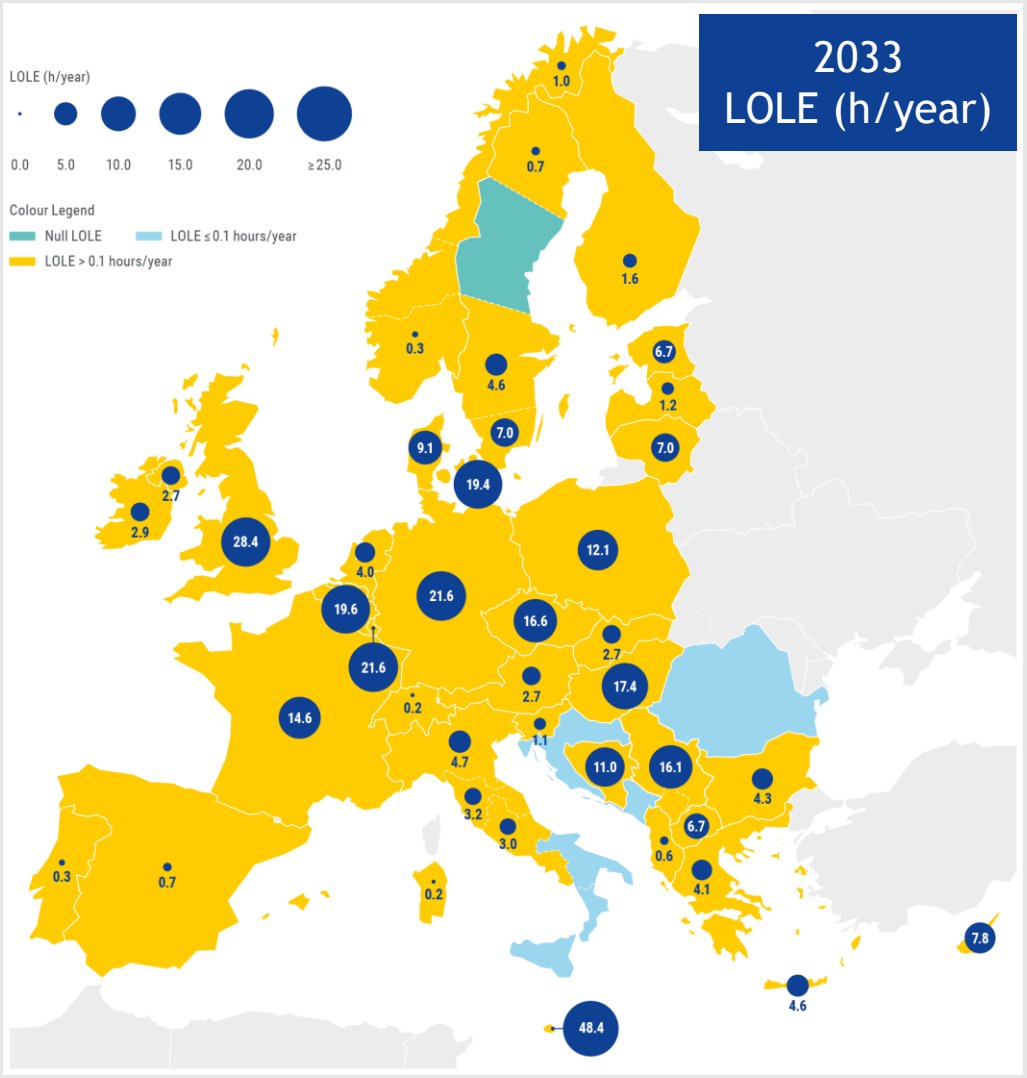




Adequacy results – Scenario B / Sensitivity (cont.)

In 2033, LOLE increases significantly in all the geographical perimeter, but mostly in the central and north of Europe.





Next Steps

Kristof Sleurs,

Steering Group Member

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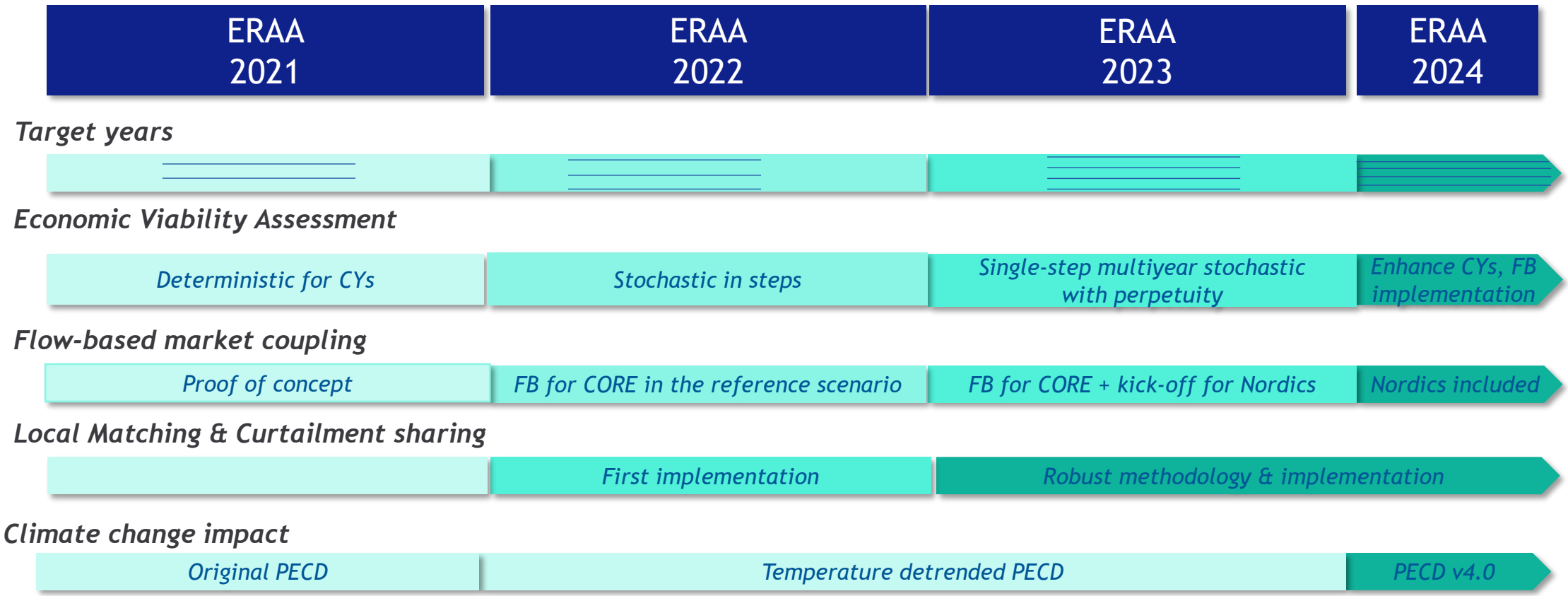
ERAA Implementation: towards the fourth edition



ERAA 2024 on its way

Target Years

ERAA 2024 will focus on Target Years

2026, 2028, 2030, 2035

Data Collection

Data collection ongoing through TSOs

Call for Evidence

Call for evidence planned end February 2024

Q&A

Lukas Galdikas, moderator

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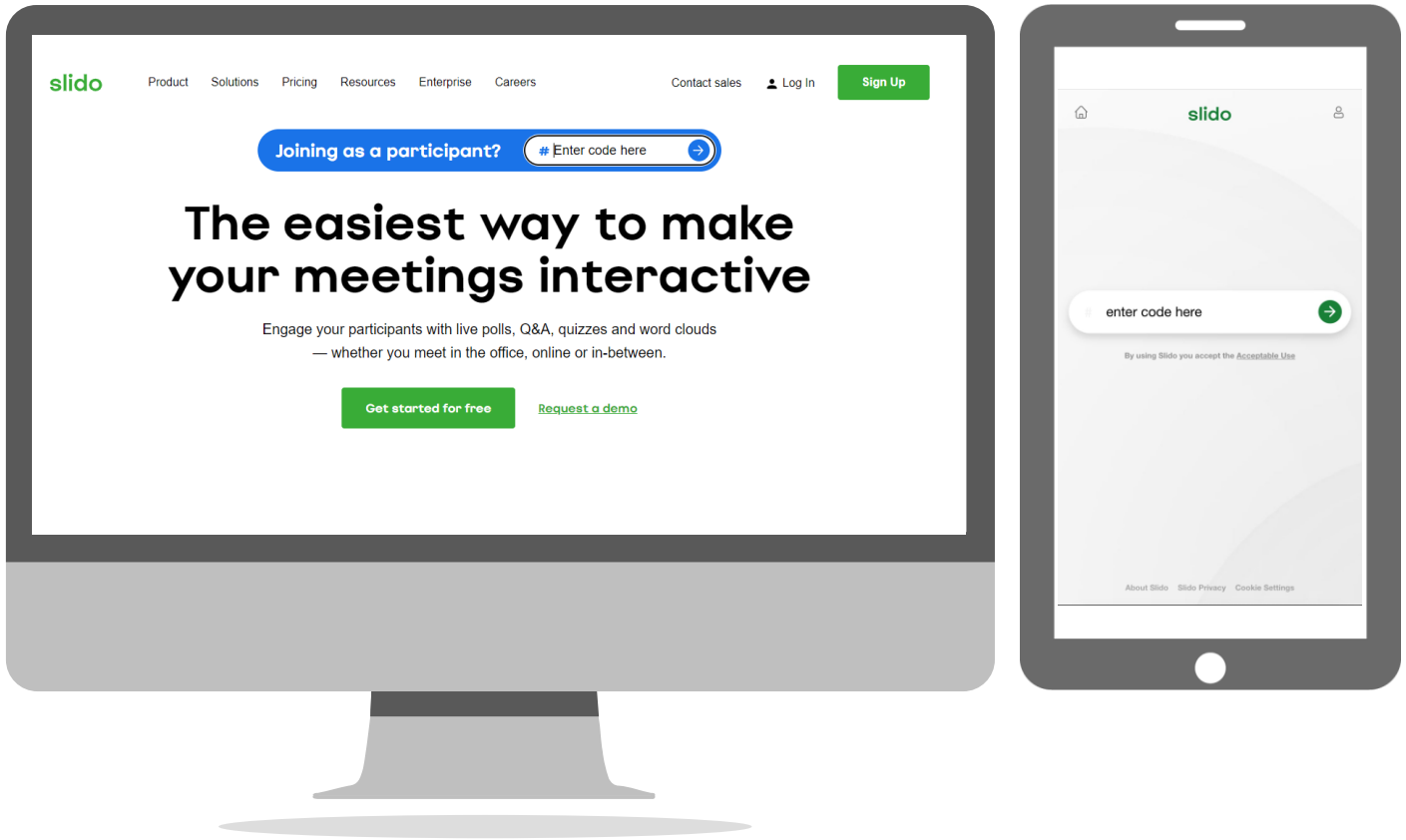


Public consultation – share your feedback on the ERAA 2023

Why your views matter

- **ENTSO-E relies on the contributions of stakeholders to develop the ERAA.**
- **ENTSO-E has regularly consulted with stakeholders during the development of this 2023 assessment.**
- **ENTSO-E now organizes a public consultation of stakeholders to gather feedback on the ERAA 2023 report and further the improvement of the ERAA.**
- **ENTSO-E consults stakeholders to fulfill legal requirements.**

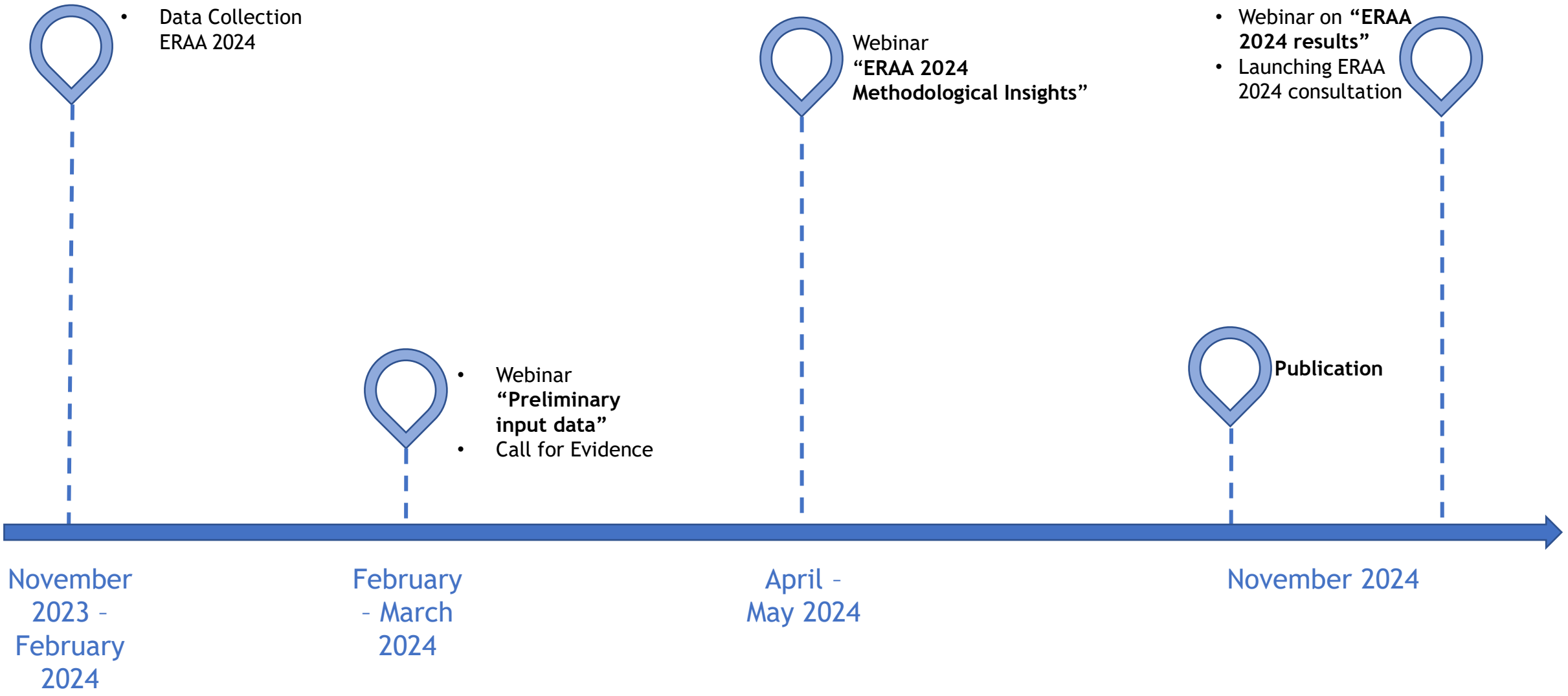
Public Consultation Open

Closing date: 31 January 2024

Consultation page

https://consultations.entsoe.eu/system-development/european-resource-adequacy-assessment-2023/

Milestones and public interactions for ERAA 2024



The ERAA 2023 is available on our website!

ERAA 2023 Publication OR Scan the QR code

Our values define who we are, what we stand for and how we behave.
We all play a part in bringing them to life.

EXCELLENCE

We deliver to the highest standards. We provide an environment in which people can develop to their full potential.

TRUST

We trust each other, we are transparent and we empower people. We respect diversity.

INTEGRITY

We act in the interest of ENTSO-E

TEAM

We care about people. We work transversal and we support each other. We celebrate success.

FUTURE THINKING

We are a learning organisation. We explore new paths and solutions.

We are ENTSO-E