Mid-Term Adequacy Forecast MAF 2019

European Network of Transmission System Operators for Electricity (ENTSO-E)

Alban Joyeau, Adequacy Manager
Dr. Lazaros Exizidis, Adequacy Specialist
Stela Nenova, Policy Senior Specialist

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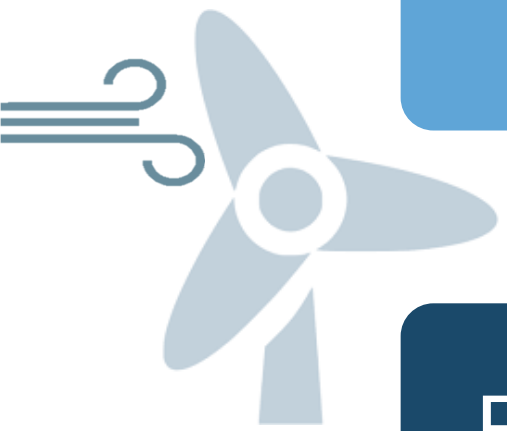
Programme

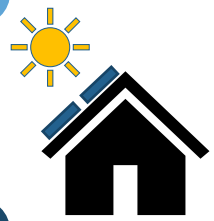
1. Adequacy at ENTSO-E
2. MAF 2019 methodology and outcomes
3. Future scope – CEP Implementation
4. Q&A

Adequacy at ENTSO-E

Energy transition requires a robust methodology

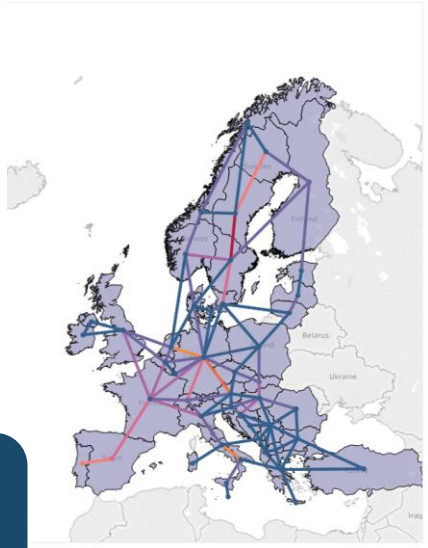


High ***temporal*** volatility



Probabilistic (hourly)

High ***spatial*** volatility



Interconnections (Pan European)

Need to reflect accurately the complementarities of the different technologies (generation capacity flexibility, storage, demand response, energy efficiency)

Different risks addressed with different timeframes

addressed today

Long term

>10 years

Mid-term

Several years

Short term

Several months **1 week**

Policy decisions

Investment decisions

Operational decisions

REAL TIME

UNCERTAINTY INCREASES

MAF 2019: Methodology

MAF 2019 scope and limitations

Addressed by MAF 2019

- ☑ Identification & quantification of **resource scarcity risk** in day-ahead market in 2021 and 2025
- ☑ **Accelerated low-carbon** stress test for 2025
- ☑ **Flow-Based** sensitivity for 2021

Not yet addressed

- ☐ **Economic viability assessment**
- ☐ Suitability of **regulatory framework** & **market design** (e.g. rightness of Capacity Mechanism)
- ☐ **Internal congestion** within a Bidding Zone (considered as copper plate)

Resource Adequacy: General Methodology

Storage

Available Generation | **Network Infrastructure** | **Demand**

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Deterministic Forecast:
- ENTSOs' Scenarios
- Planned Outages

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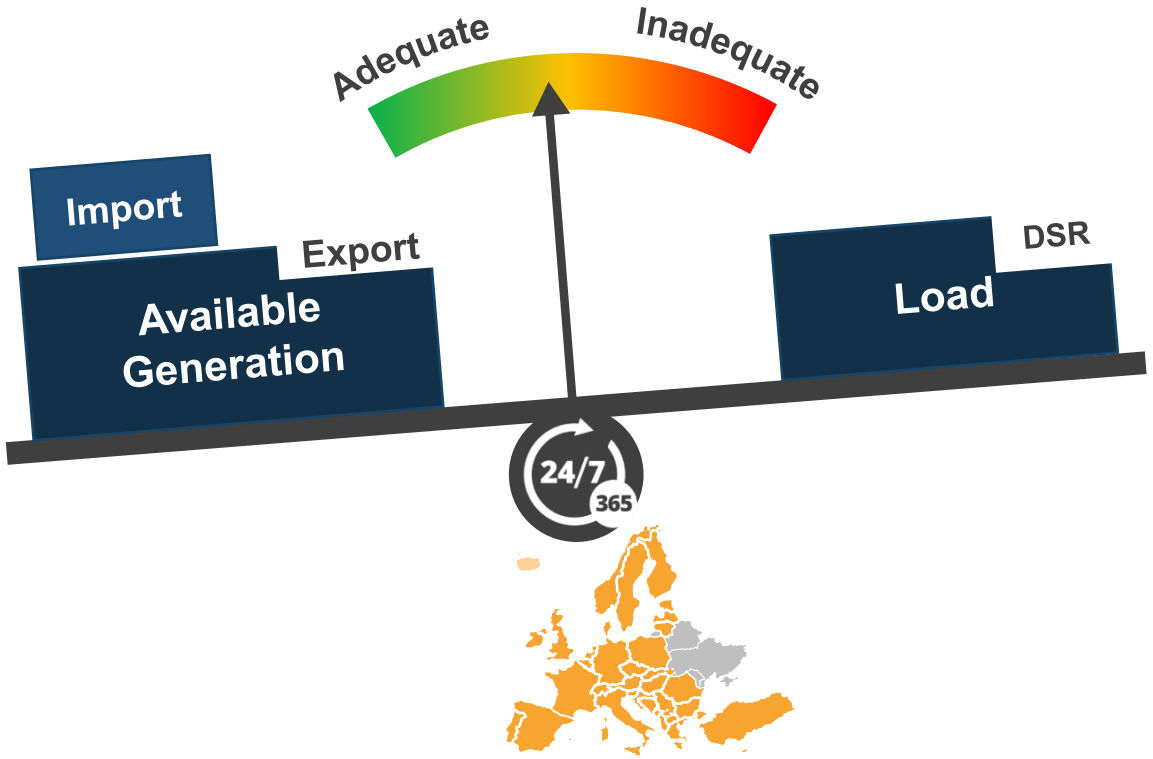
Uncertainty:
- Wind generation
- Solar generation
- Hydro generation
- Forced outages



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Deterministic Forecast:
- ENTSOs' Scenarios

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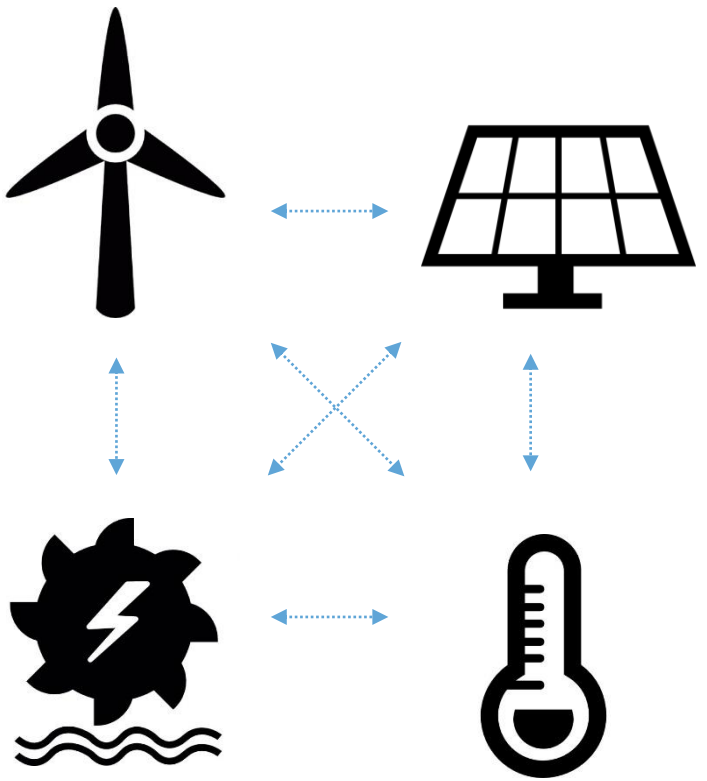
Uncertainty:
Temperature

Resource Adequacy: Construction of Sample Years



35 years of interdependent climate data

N random draws for unplanned outages

35 x *N* (Monte Carlo) sample years

Improvements compared to previous editions: Focus on input data – Hydro and Demand

Hydro Modelling: Complete set of climate years with year-specific hydrological conditions

- Hydropower modelling has a significant impact on the results;
- Harmonized assumptions, common methodology based on re-analysis of historical data and better reflection of the **interdependence of hydrological and the rest climate variables (temperature, wind, solar, etc.) ;**

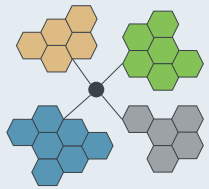
Demand time-series: advanced tool for an improved model

- Common tool and methodology to build time-series for all zones;
- Trained on a number of historical demand time-series and their correlation with climate variables based on identification of significance of each variable, e.g., temperature, irradiance, wind speed, etc.;
- Considering contribution of Electric Vehicles and Heat Pumps.

Improvements compared to previous editions: Focus on input data – Thermal Generation

MAF 2018

PEMMDB 2.0

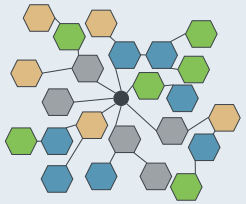


Clustering:

- generating units clustered by technology

MAF 2019

PEMMDB 3.0

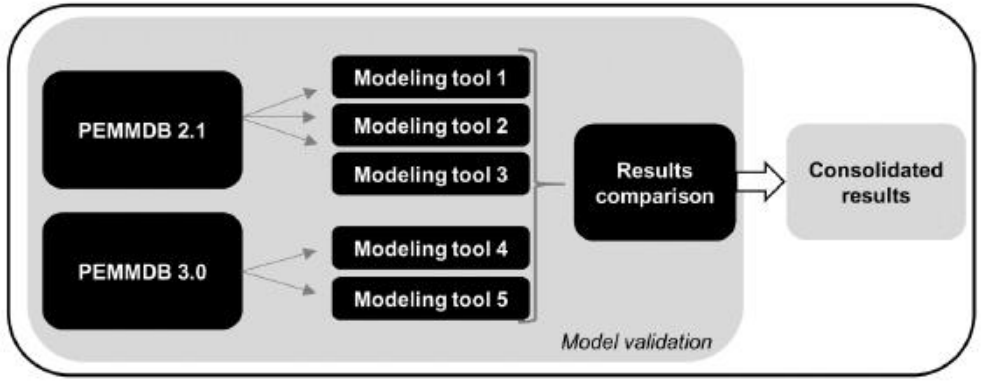


Individual power plant data:

- economic parameters
- technical details
- scenario building fundamental assumptions

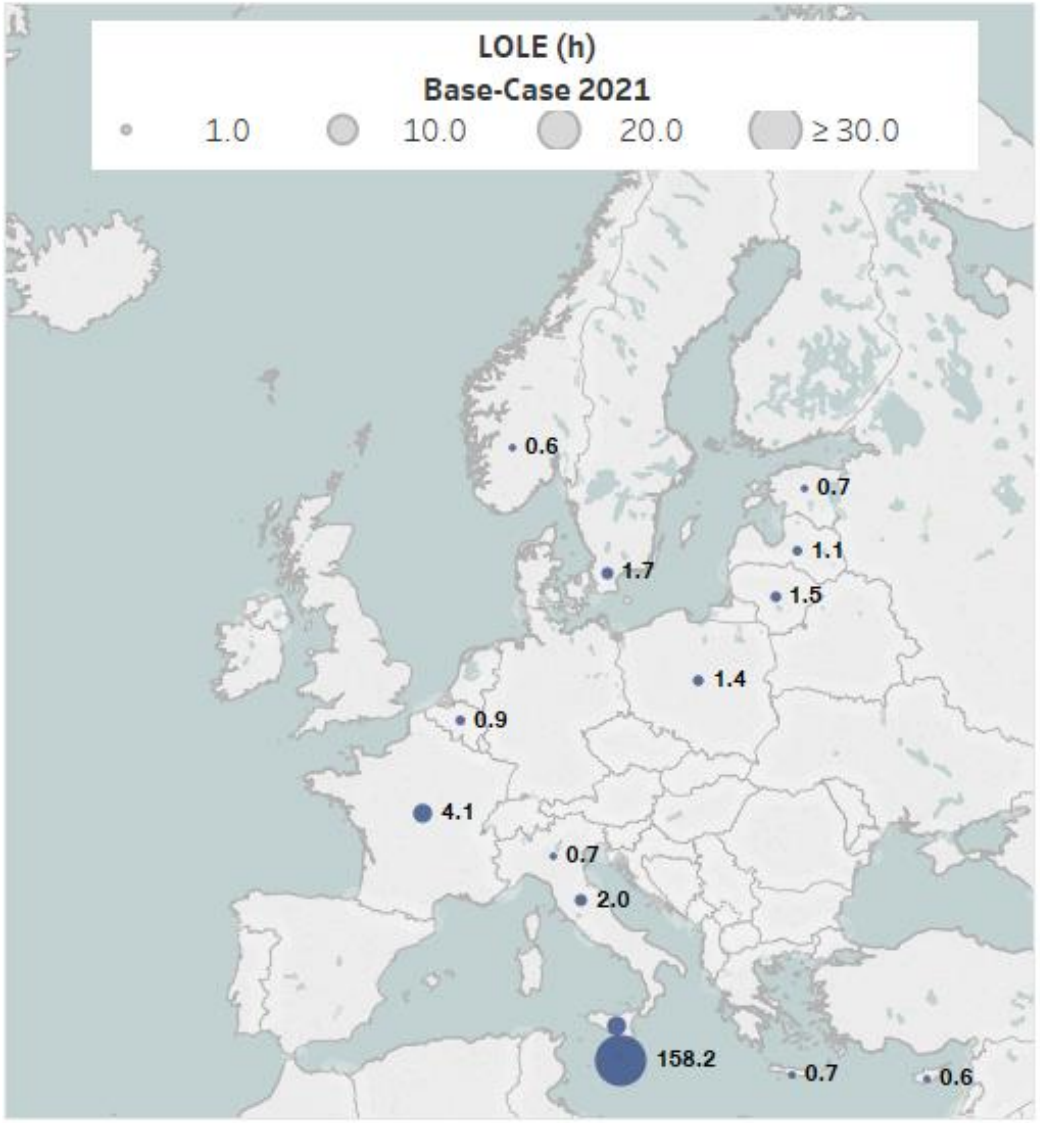
- Unit-by-unit granularity of thermal generation data is a milestone for System Development studies;
- **Detailed modelling** of various properties, e.g., maintenance, derating of generation plants, ramping, expectations of commissioning and decommissioning, economic parameters etc..;

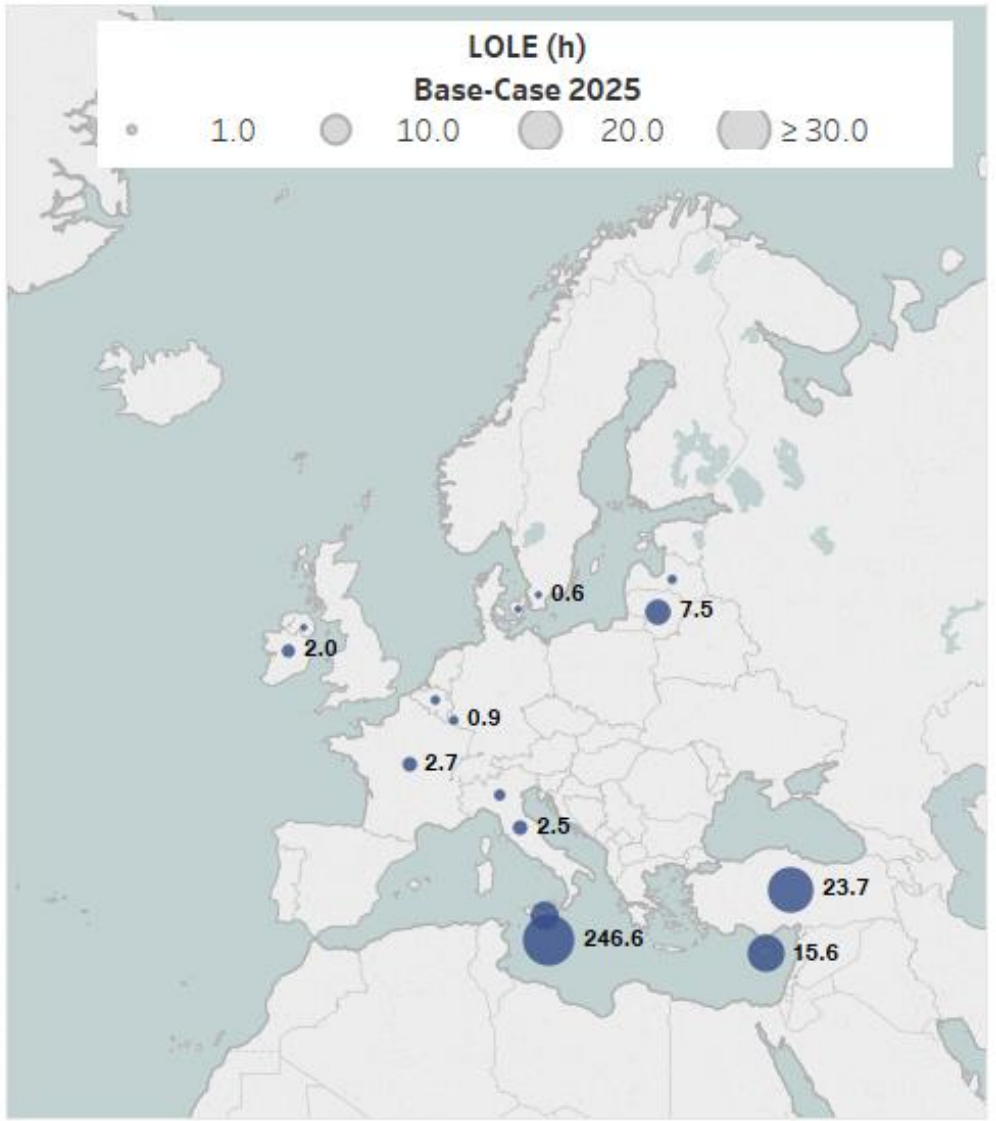
Hybrid approach for first implementation in MAF 2019



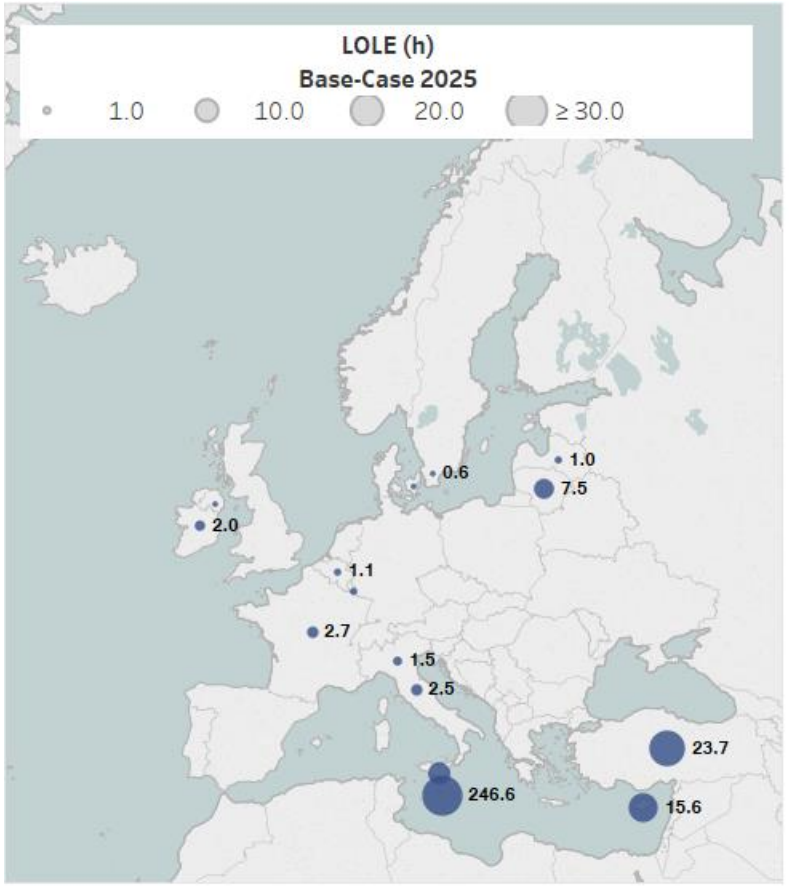
MAF 2019: Main Outcomes

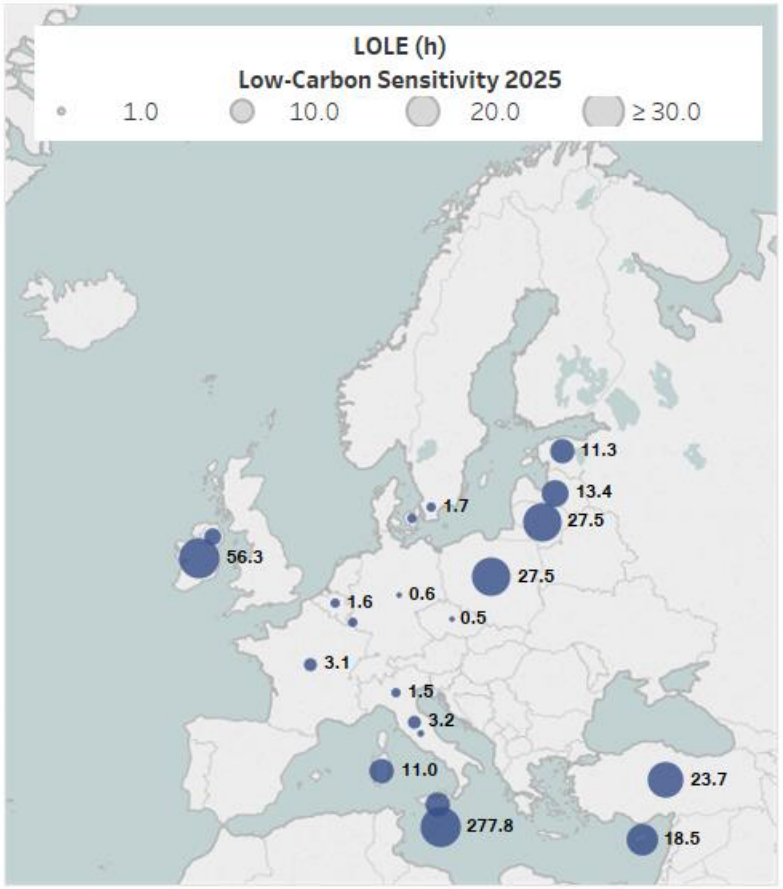
Base case results: Comparison of year 2021 and 2025

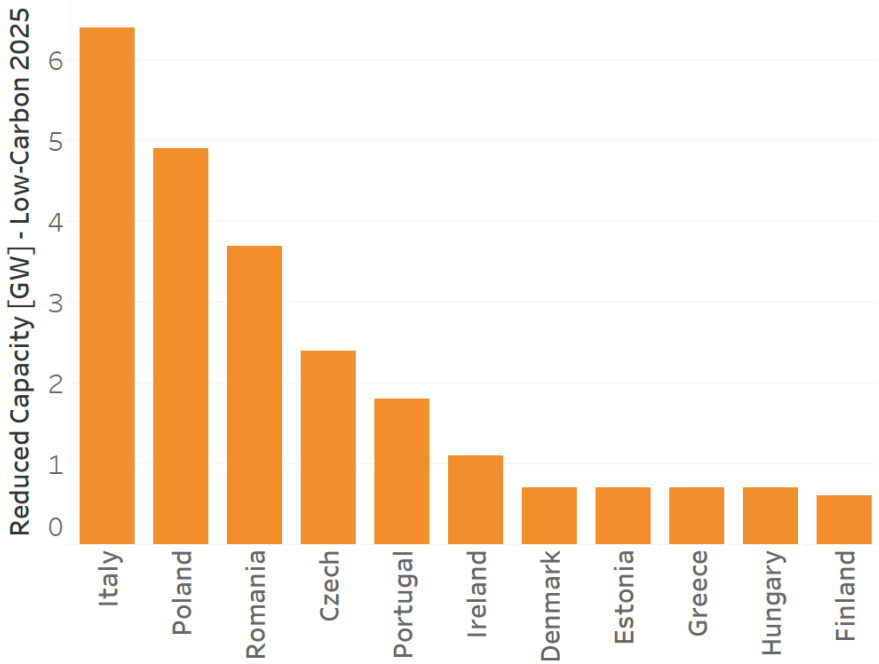




Low-Carbon stress test for 2025: 23 GW phased out







*only zones with LOLE > 0.5 hours/year are shown

Future Evolution: Towards the European Resource Adequacy Assessment (ERAA)

CEP Implementation

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Pan-European Resource Adequacy Assessment: CEP deliverable methodologies

What does this mean for ENTSO-E and adequacy in Europe?

→ Three main methodology packages (to be delivered by ENTSO-E):

1. Methodology for the European Resource Adequacy Assessment (ERAA)

2. Methodology for:
   - Cost of New Entry (CONE)
   - Reliability Standards
   - Value of Lost Load (VoLL)

3. Methodology for calculating the maximum entry capacity for cross-border participation to Capacity Mechanisms

Pan-European Adequacy Assessment: Impact of CEP Implementation and New Challenges

What are the differences with current methodologies?

Current Approach (MAF 2019)

- Probabilistic market modelling
- 7 years ahead - 2 simulated years
- Bottom-up approach and expectations of commissioning / decommissioning
- No explicit CM considerations
- NTC approach, flow-based only tested
- No sectoral integration

Target Approach

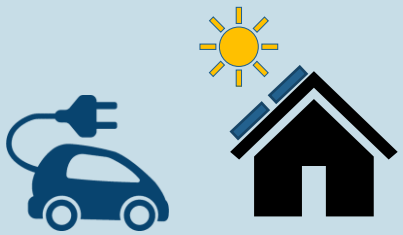
- ☑ Probabilistic market modelling
- ❑ 10 years ahead - annual granularity
- ❑ Economic viability of generation assets, integrated in the model
- ❑ Integrated consideration of CM
- ❑ Compliance with FBMC when available
- ❑ Sectorial integration (P2X consideration)

Time for questions/answers

European Resource Adequacy methodologies: stay tuned and have your say!

European Resource adequacy assessment (ERAA)

Value of Lost Load (VOLL)



Cost of new entry (CONE)

Reliability standard (RS)

- 5 December 2019 - Public consultation on all methodologies opens for 8 weeks
- 16 December – Stakeholder workshop on the Resource adequacy methodologies

THANK YOU
FOR YOUR ATTENTION!