

Mid-Term Adequacy Forecast MAF 2019

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

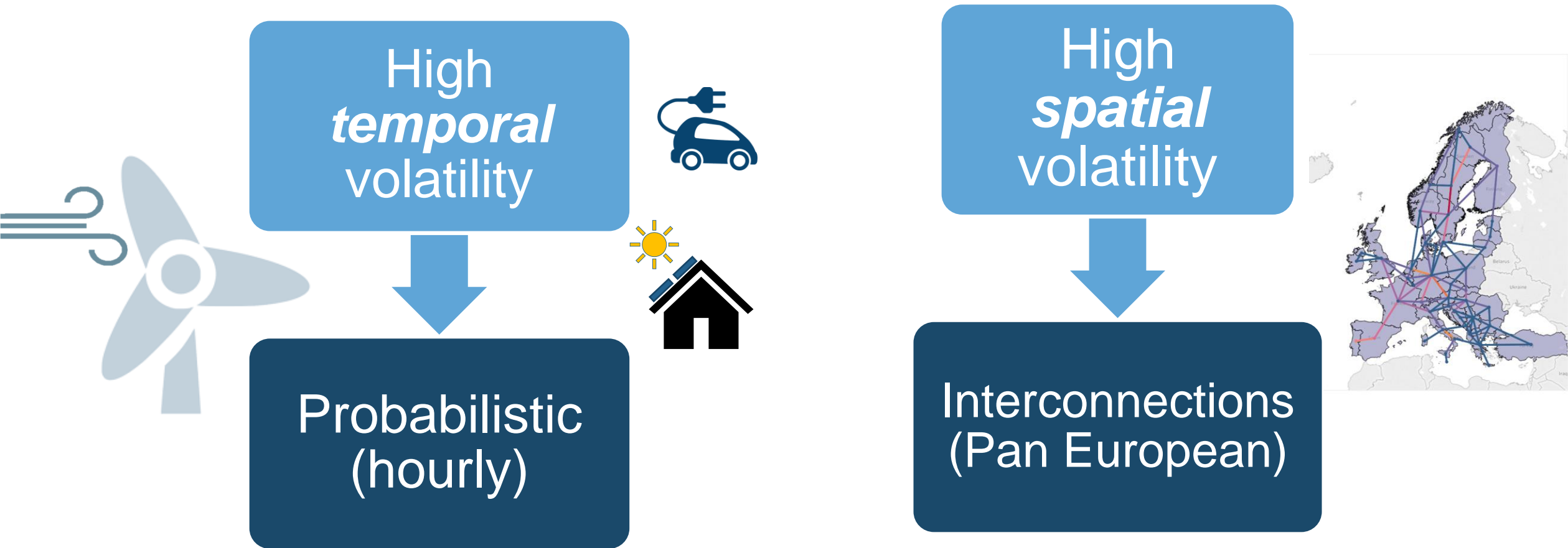
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Programme

- 1 Adequacy at ENTSO-E**
- 2 MAF 2019 methodology and outcomes**
- 3 MAF key take-aways**

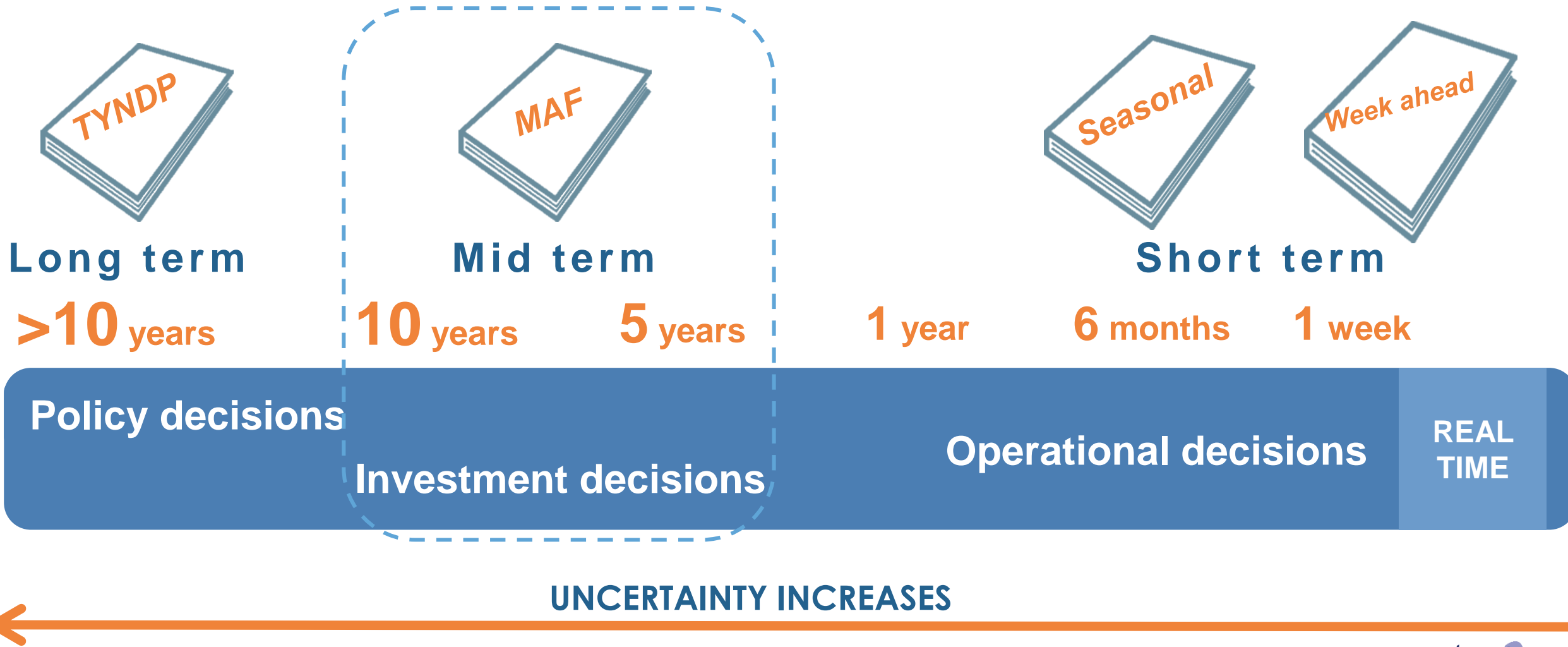
Adequacy at ENTSO-E

Energy transition requires a robust methodology



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

Different risks addressed with different timeframes



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

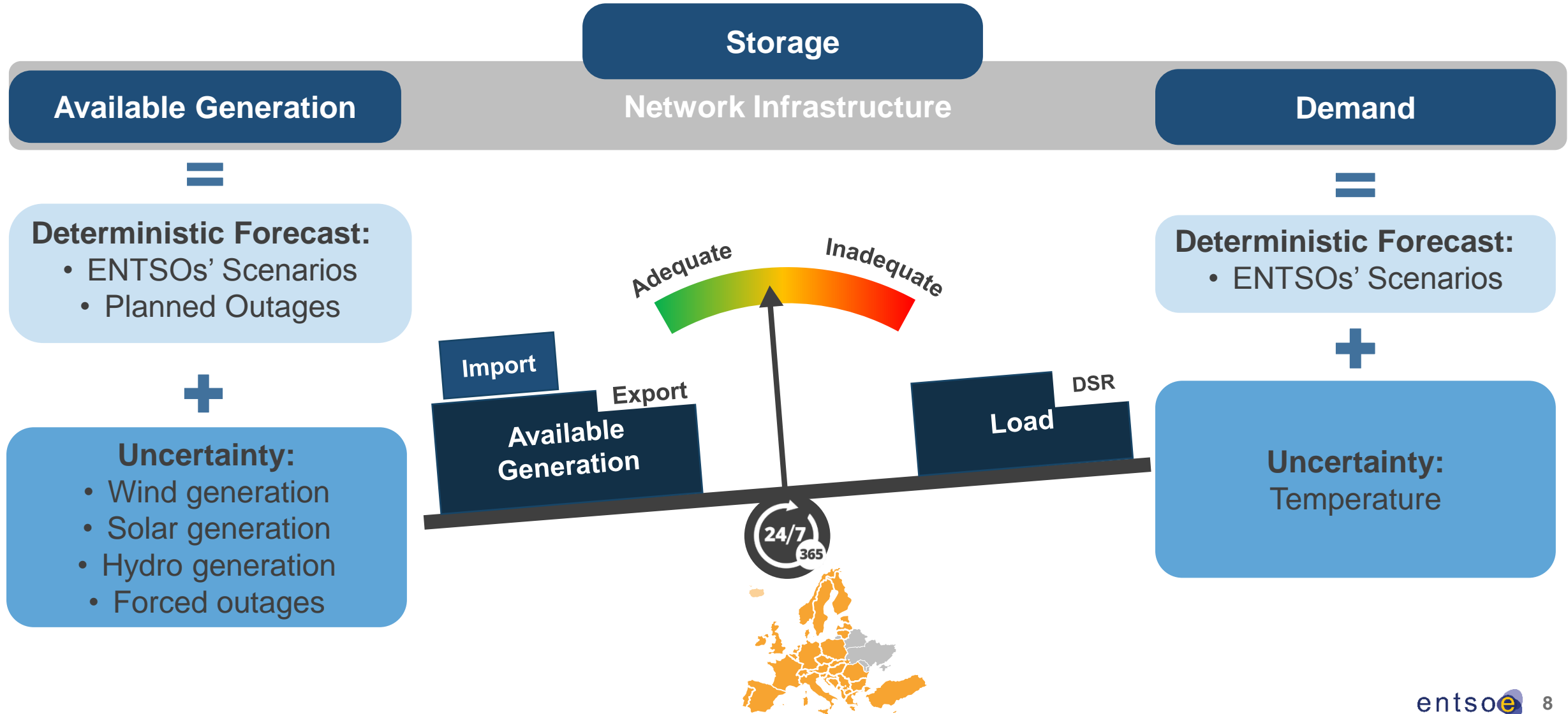
Not yet addressed

Economic viability assessment

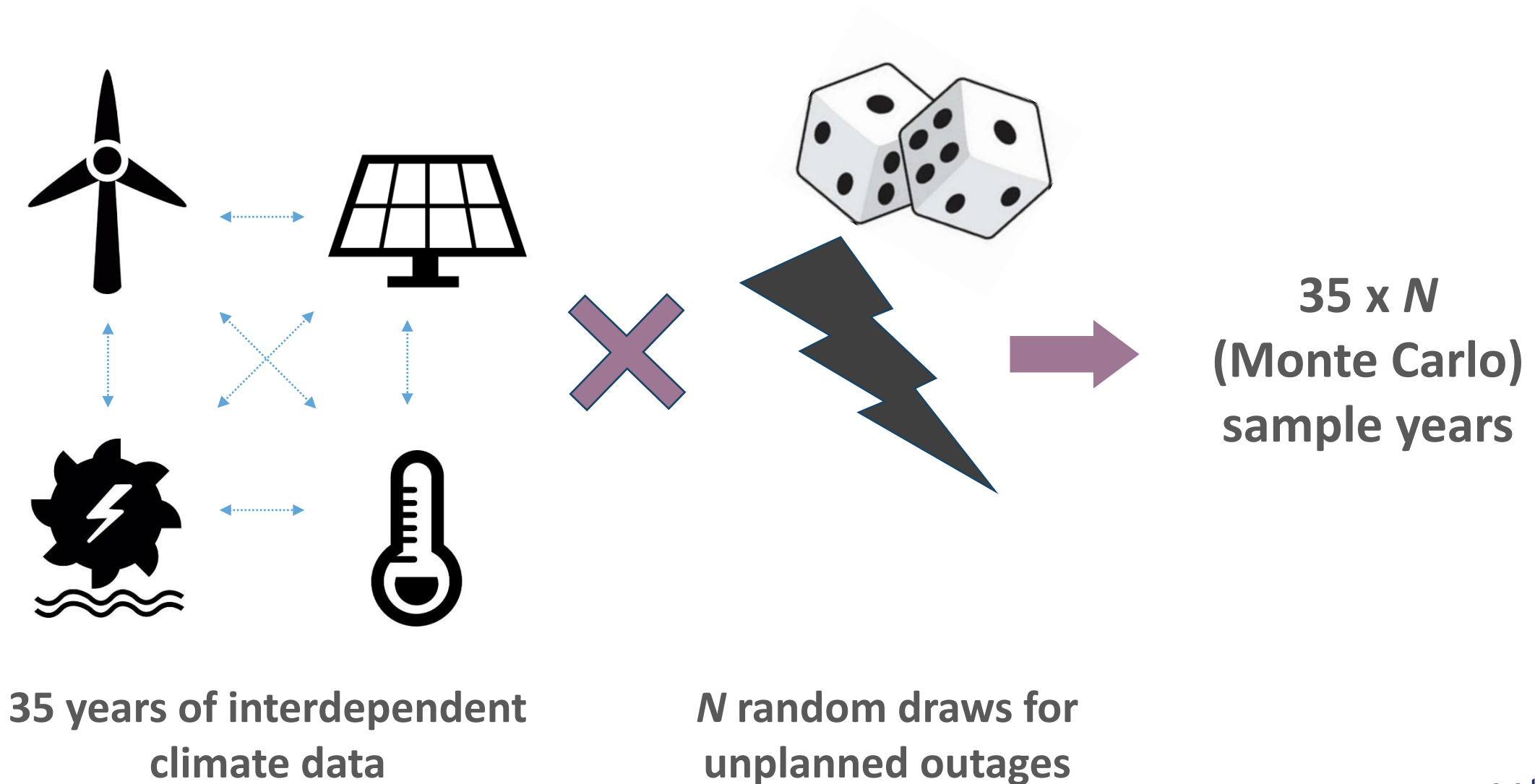
Suitability of **regulatory framework & market design** (e.g. rightness of Capacity Mechanism)

Internal congestion within a Bidding Zone (considered as copper plate)

Resource Adequacy: General Methodology



Resource Adequacy: Construction of Sample Years



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

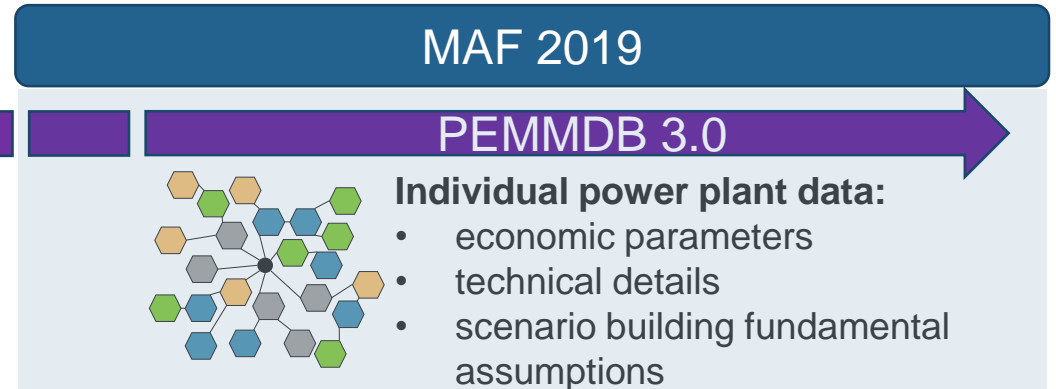
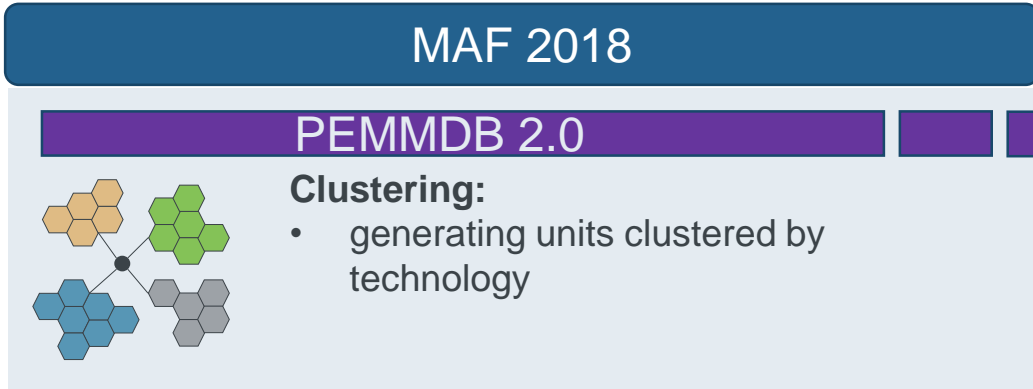
Hydro Modelling: Complete set of climate years with year-specific hydrological conditions

- 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.)** ;

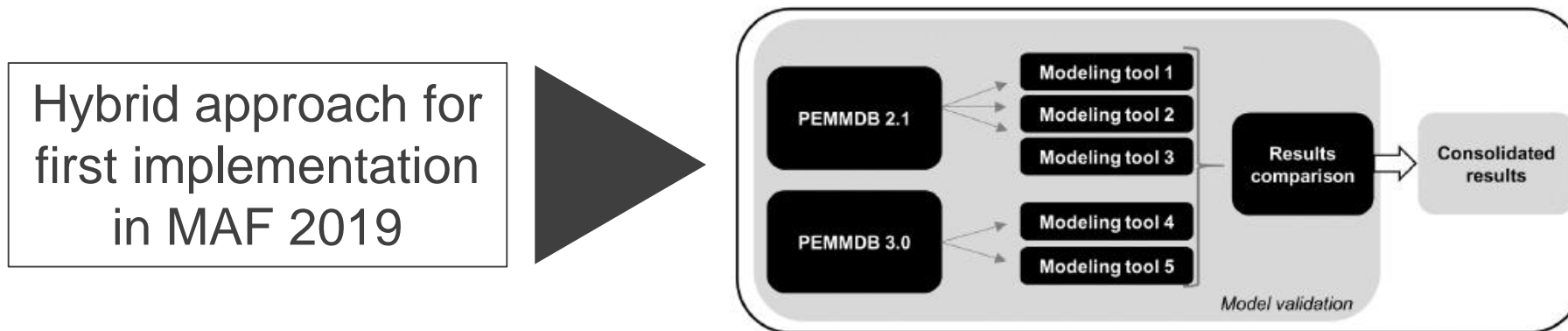
Demand time-series: advanced tool for an improved model

- 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

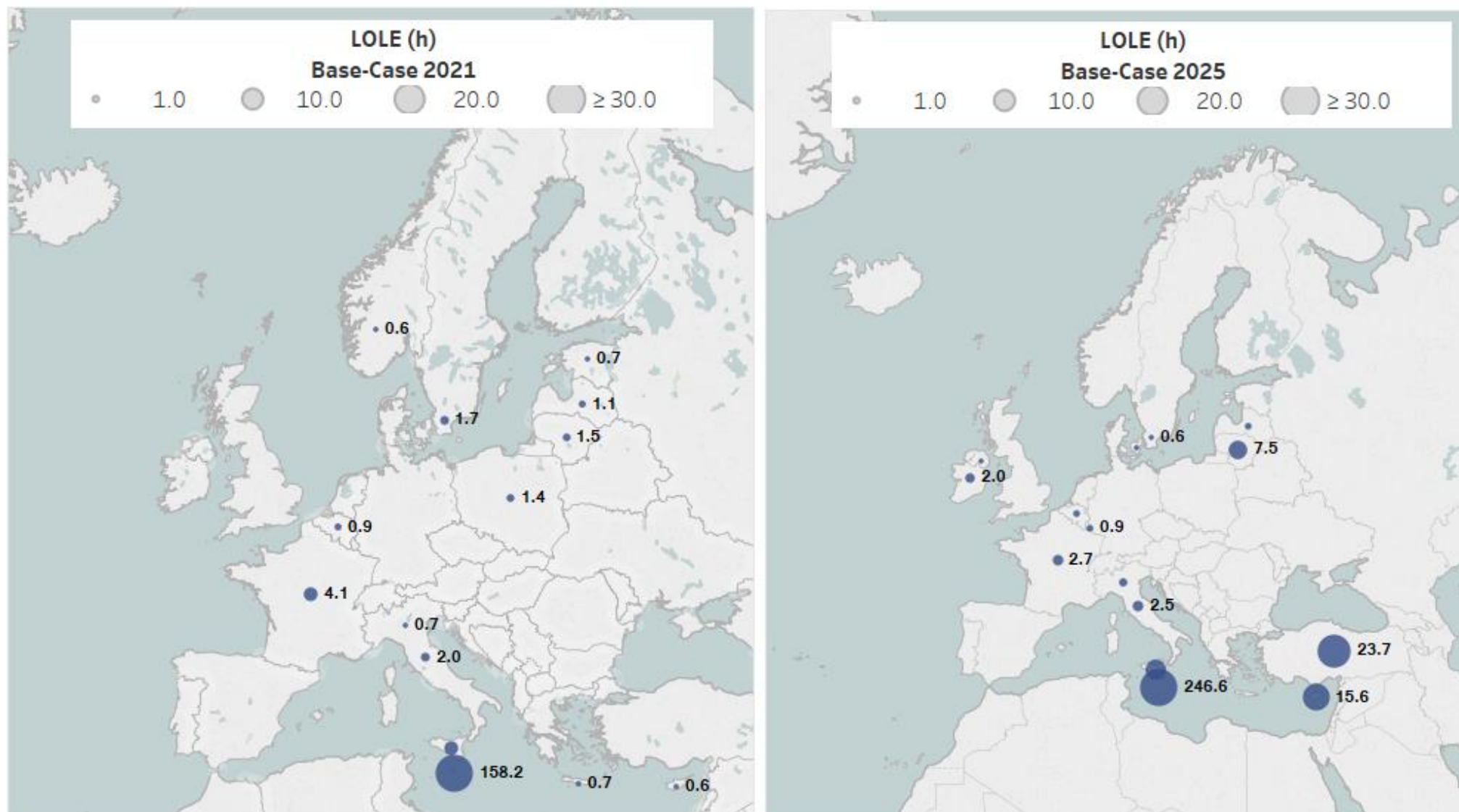


- Unit-by-unit granularity of thermal generation data is a milestone for System Development studies;
- Detailed modelling** of various properties, e.g., maintenance, derating of generation plants, ramping, expectations of commissioning and decommissioning, economic parameters etc.;

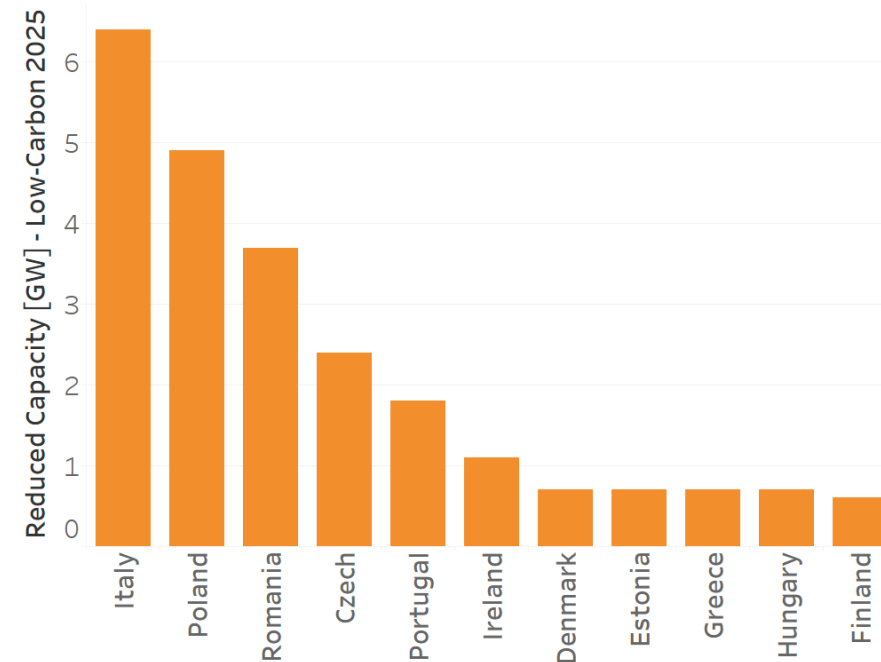
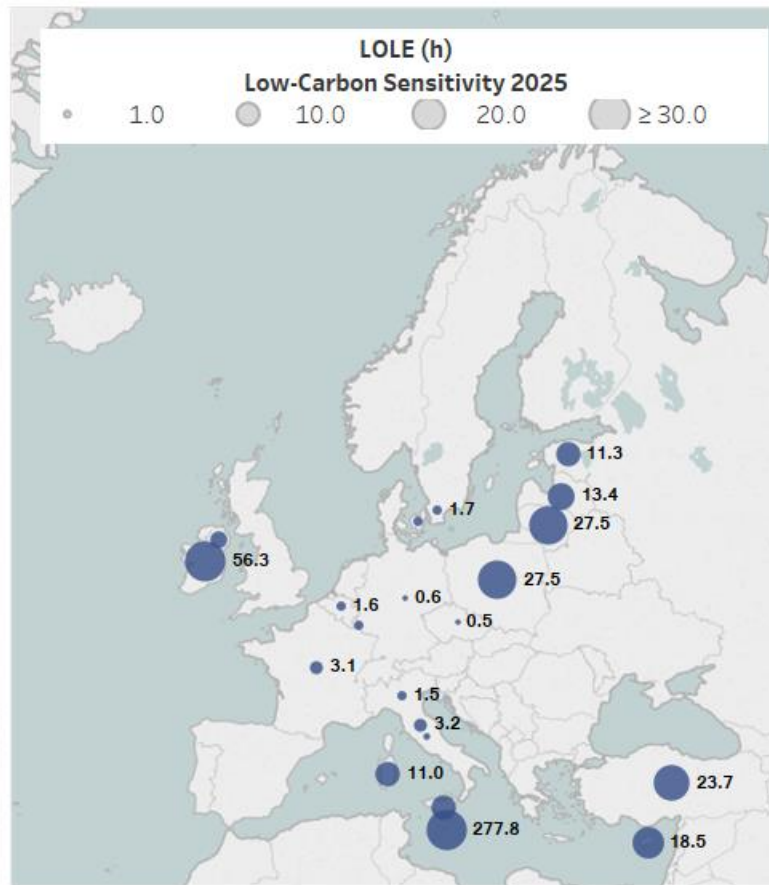
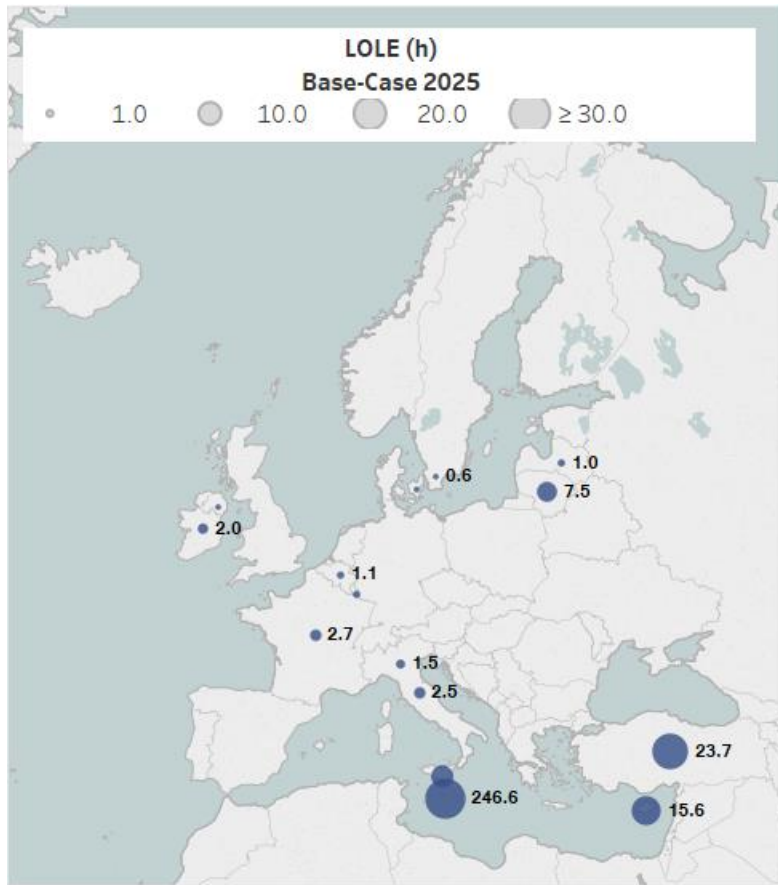


MAF 2019: Main Outcomes

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

MAF 2019: Take-Aways

ENTSO-E MAF is a pan-European, monitoring assessment of adequacy – benchmark for all other regional and national studies

Data and methodology are important:

- Datasets are updated & improved in quality and granularity year-by-year;
 - Methodology evolves & is enhanced with new features towards the ERAA;
 - Probabilistic assessment is recognized as state-of-the-art approach;
 - Uncertainties and extreme climate years might have significant impact on results.
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MAF 2019 identifies restricted number of risks in target years 2021 and 2025, given that the input assumptions on availabilities will materialize.

Thank you for your attention
