Resource Adequacy Methodologies

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

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Agenda

1. New challenges under the Clean Energy Package
2. Methodology for Mid-term Adequacy Assessment
3. Methodology for Short-term Adequacy Assessment
4. Summary – Take-aways
New challenges under the Clean Energy Package
Methodology package for the implementation of the Clean Energy Package

Three main methodologies (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
European Resource Adequacy Assessment: A basis for enhancements of market design and integration & security of supply

Methodologies to be developed within 6 months after entry into force

One adequacy methodology for European, regional and national assessments

Common adequacy indicators as a basis for regionally coordinated national security of supply standards

Pan-European and national assessments complementing each other in a consistent approach
Resource Adequacy methodologies – Timeline

2019
- June
- July
- August
- September
- October
- November
- December

2020
- January
- February
- March

Consultation of the methodologies
- TSOs consultation
- External consultation
- Public workshop 16th December

ERAA, CONE/VoLL/Reliability Standards - Methodology drafting
- Regular exchanges with EC/ACER

MAF 2019 calculations and drafting
- MAF 2019 public consultation
- MAF 2020 preparation

Finalisation for submission to ACER
European Resource Adequacy Assessment (ERAA):

Methodology and implementation plan for the mid-term adequacy assessment
Adequacy: different products for specific purposes

- **Mid-Term Resource Adequacy**
  - 10 years ahead
  - Optional
- **Seasonal Adequacy**
  - Several months
  - Optional
- **Short-Term Adequacy**
  - 1 month
  - 1 week
  - 1 day
  - Intra-week regional adequacy

The nearer to real time, the higher the accuracy pursued.
Mid-term Adequacy Forecast – current methodology

Supply

Deterministic Information:
- Capacities
- Planned outages
- Storage

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

Network Infrastructure

Deterministic Information:
- Network topology
- Planned outages
- NTCs / FB domains

Uncertainty:
- Forced outages

Demand

Deterministic Information:
- Demand
- Demand-side response

Uncertainty:
- Weather conditions (e.g. temperature-dependency of demand)
## European Resource Adequacy Assessment: what’s new?

### 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)
ERAA will significantly expand scenario framework

- Robustness check on assumptions for costs
- Robustness check on assumptions for CO₂ prices
- Consistency check with expectations from national market parties through national consultations

**CENTRAL SCENARIO**
- No CM
- CM

**SENSITIVITIES**
- Adequacy Simulation
- Viability loop considering all years. Investment decisions shall be optimized within the 10 yrs of the assessment

**Starting Year**
- Y+1
- Y+2
- Y+3
- Y+4
- Y+5
- Y+6
- Y+7
- Y+8
- Y+9
- Y+10

**National Data (exogenous assumptions + input for EVC)**

- Bottom up National input data from MS
- Viability loop considering all years. Investment decisions shall be optimized within the 10 yrs of the assessment
- Adequacy Simulation
Implementation principles

Feasibility and robustness should be ensured with Proof of Concept tests, prior deployment.

- Especially economic viability checks will require several years of implementation.

Innovations that are not mature and robust will not be included.

- Methodology can be updated at any time later on.
Reliability Standard (RS)
Value of Lost Load (VoLL)
Cost of New Entry (CoNE)
The Economic approach to define reliability standard

→ Optimal level of security of supply determined by the point at which the incremental cost of additional capacity against load curtailments (CONE) is equal to the incremental cost of load curtailments to customers (incremental volume of Expected Energy Not Served expressed as LOLE, valued at VOLL).

For a given load duration curve:

\[
\frac{d\text{EENS}(Q^*)}{dQ} = -\text{LoLE}
\]

This leads to the following optimal relationship:

\[
\text{CONE} = \text{LoLE} \times \text{VOLL}
\]

An economic approach for the reliability standard is based on incremental change of EENS (LOLE in hours per year), derived from the value of CoNE and VoLL only and not on the total EENS.
Methodology for short-term and seasonal adequacy assessments
Adequacy: different products for specific purposes

10 years ahead
- Mid-Term Resource Adequacy
  - Optional
- Mid-Term regional sensitivity

Several months
- Seasonal Adequacy
- Optional
- Seasonal regional sensitivity

1 month
- Short-Term Adequacy
- Optional

1 week
- Intra-week regional adequacy
  - When risk detected

1 day

The nearer to real time, the higher the accuracy pursued
Seasonal Adequacy – current methodology

Inputs from TSOs and Pan-European databases

European constraining scenarios
- Synchronous peak (upward) → Wednesdays 7 PM
- Low demand with high RES (downward) → Sundays 5 AM and 11 AM

Focused analysis on weeks flagged at risk
- Probabilistic approach using numerous situations (temperature, wind...)
- Aim is to estimate the probability that an issue could occur
- Main drivers are identified
Short-term/Seasonal Adequacy – target methodology

Supply

Deterministic Information:
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Uncertainties:
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• Forced outages
• Hydro

Network Infrastructure

Deterministic Information:
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Uncertainty:
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Demand

Deterministic Information:
• Demand
• Demand-side response

Uncertainty:
• Weather conditions (e.g. temperature-dependency of demand)
Methodology for Short-term Adequacy

Consultation

8 responses in the hub and 3 direct to project team

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Methodology Update

- Extension of the methodology detail to the extent possible (e.g. on process)
- Consistency with European Resource Adequacy Assessment
- Definition of month-ahead triggering
Take-Aways
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