WINTER OUTLOOK 2016

13 December 2016
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SETTING THE SCENE...

- **Winter and Summer Outlooks**
  - Analyse in a detailed & consistent way the main adequacy risks within a season
  
  - EU legal obligation
  
  - Subject to an ACER opinion
WHAT DO THE OUTLOOKS TELL YOU?

- Role of interconnection

- **Influence of external factors**: weather, market conditions, consumer behaviour...

- **Sensitivity analysis**: look for worst case scenario & see how network reacts

- **Review**: deeper understanding of the previous season
WHERE TO FIND THEM?

Seasonal Outlooks

**Summer & Winter Outlooks**

ENTSO-E analysis possible risk for the security of supply in Europe twice a year: for the summer and winter periods. Because of possible very high/low temperatures and other 'extreme' weather conditions, winters and summers are more the most critical periods for the power grid.
DIFFERENT RISKS ADDRESSED AT DIFFERENT TIMES

Uncertainty increases

**Short term**
- Operational decisions
  - 6 months

**Mid term**
- Investment decisions
  - 1 year
- Policy decisions
  - 5 years
- MAF
  - 10 years
ENTSO-E SEASONAL OUTLOOKS - STEPWISE APPROACH

Collect inputs from TSOs

Build pan-European worst-case scenarios

- At peak time (upward adequacy) => Wednesdays 7 pm
- At low demand time + high RES (downward adequacy) => Sundays 5 am & 11 am

Focused analysis of regions potentially at risk

- Probabilistic approach using a lot of situations (temperature, wind...)
- Aim is to be able to say with how much probability an issue could occur
- The parameters driving the issues are identified
Non usable capacity at reference point
System service reserves
Forced outages
Planned outages (maintenance)
Reliable available capacity at reference point

Unavailable Capacity

Remaining Capacity

Net Generating Capacity

Peak Demand

Demand Side Response

Net Load

ENTSO-E– General Methodology - Upward adequacy
ENTSO-E Winter Outlook – Severe Conditions & Merit Order

Cross-border exchanges
- market driven
- contributions to adequacy

Week 48 49 50 51 52 1 2 3 4 5 6 7 8 9 10 11 12 13

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Excess capacity
Import driven by market
Import needed for adequacy

Curtailment
Gas-power
Pumped Hydro Storage
Coal-power
Hydro RES-E

Demand curve
GWh
Risk in case of severe cold wave (source: mid October 2016 data)
Additional capacity from gas and pump storage units (total ~3.8GW), not considered in the input but expected to cover the deficit. Also possible excess volumes of Short Term Operational Reserve (STOR) can be used.
Full availability of the nuclear park was expected at the moment of data collection. Belgium’s TSO relies on a range of possible measures.
The analysis shows that all considered, even if the situation in France will be tense, Europe has sufficient generation to meet normal and severe demand conditions in the winter of 2016/2017.

France facing lowest nuclear power generation in 10 years
Tense situation in France from early December to early February in case of a severe cold wave
Possible repercussions on several neighbouring countries, but TSOs anticipating appropriate measures
The analysis shows that all considered, even if the situation in France will be tense, Europe has sufficient generation to meet normal and severe demand conditions in the winter of 2016/2017.

- Great Britain’s adequacy might also be impacted by the French situation
- UK will need high imports from all neighbouring countries
- Great Britain has additional capacity from OCGTs and Pump Storage
Other must-run generation
Run of river
Variable renewable generation (e.g. wind, solar)
System service reserves (downward)
Pumping capacity
Off-peak demand
Excess of generation
ENTSO-E
Downward regulation

Export needs at the night time minimum (Sunday 5 am)

- Ireland possible wind curtailment in case of windy Sunday nights in December and January.
- In Poland, during the Christmas night wind might be also curtailed

Week

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No need for energy import
Exports needed at least one week.
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Downward regulation

Export needs at the day
time minimum (Sunday
11 am CET)

Sunday 26 March at 11
am CET in Germany,
export capacity might not
be sufficient to export
surplus of generation. In
that case, up to 1 GW
renewable might be
curtailed in that hour.
Knowledge sharing & cooperation at European level essential to maintain safe system

Example of possible gradual measures to maintain the supply that operators can use

- Structural grid reinforcement internally & cross border
- Local optimisation of the grid
- Extra generation reserves
- Demand Response

EXCEPTIONAL MEASURES
- Voltage lowering
- Local power cuts

HOW TO KEEP SYSTEM SAFE FOR THE CONSUMERS?
KEY TAKEAWAYS

• Winter outlooks are not just only a legal mandate

• They inform TSOs, markets, policy makers, public + contribute to right decisions being taken for security of supply!

• ENTSO-E & TSO update & monitor the situation throughout the Winter

• They build on the strong cooperation between ENTSO-E, RSCs and TSOs
WHAT ABOUT THE FUTURE?

• Electricity **Regional Security Coordinators** to take a greater role in security analysis

• **Clean Energy For All Europeans package** welcomes the important role of the Seasonal Outlooks regarding Risk Preparedness
ENTSO-E Target Methodology

Integration with appropriate market-based stochastic models to assess adequacy

Hourly resolution

Probabilistic method using climate database to assess market prices & functioning, including during times of scarcity

More detailed view of cross-border contributions to a country’s system adequacy

Assessment informs about the 'need for flexibility'

Extensive range of indicators, e.g. LOLE/ EENS/ LOLP, RES curtailments, capacity factor (as indicator for likelihood of units staying online)
Thank you for your attention

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Summer Outlook 2016 – Risk Identified for Poland

- A potential risk is identified for Poland
- Simulation of the Polish situation for Week 22 (merit order approach)
- All available cross-border capacities into Poland are saturated (all import arrows entering Poland are red)
- No import capacity is available on the common synchronous profile (with DE+CZ+SK shown as coupled black arrows).
• PST investment project agreed by PSE and 50Hertz in February 2014.

• It foresees among other:
  - PSE installs the PST in the Polish substation Mikułowa (in the PL-DE double circuit 400kV cross border line MIK-HAG),
  - 50Hertz installs the PST in German substation Vierraden (in PL-DE double circuit cross border line KRA-VIE).

• In addition as preventive measure only and to decrease the risk of not fulfilling N-1 criteria and to allow increasing commercial transmission capacities to Poland, PSE and 50Hertz agreed to exceptionally and temporarily disconnect the Krajnik-Vierraden line between the two countries.
ENTSO-E Summer ‘Review’– Status Poland

[Graph showing unscheduled flows on PL-DE, PL-CZ, and PL-SK borders from 2010 to 2016. Key points:
- Import direction
- Export direction
- Unscheduled flows on PL-DE border
- Unscheduled flows on PL-CZ border
- Unscheduled flows on PL-SK border
- 22.06.2016: Reconfiguration on the PL-DE border
- Significant decrease of unscheduled flows]

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ENTSO-E Summer ‘Review’ – Status Poland

- Cross Border Redispitching (CBR)
- Multilateral Redispitching (MRA)

CBR needed due to failure 1 among 4 PSTs

PST tapping replaced by bilateral redispitching on 50Hz request

22 June, 2016 at 12:15: Krajnik – Vierraden line switched off after commissioning PSTs in Mikulowa
ENTSO-E Summer ‘Review’ – Status Poland

- Multilateral Rescheduling (MRA)
- Cross Border Rescheduling (CBR)

Redispatching exhausted on 15.09.2016. N-1 on 50Hz / PSE profile not fulfilled

22 June, 2016 at 12:15: Krajnik – Vierraden line switched off after commissioning PSTs in Mikulowa
ENTSOG Winter Outlook - Ukraine transit disruption

Assessment of the Ukraine transit disruption

Reminder:

- **Cold Winter** (increasing demand = reference winter +10% at EU level)
- **Peak-Day** (national design case for gas demand, taking place in 1 January)
- **2-week Cold Spell** (14-day period demand, taking place 15-28 February)

Disrupted Demand: Share of gas demand that cannot be satisfied

Households and social services are protected customers and shall be the last to be disrupted (Reg. (EU) No 994/2010)

In case of potential gas disruption, industrial consumers and power producers are expected to reduce their consumption and/or switch to alternative fuels driven by market incentives (high gas prices).
ENTSOG Winter Outlook - Ukraine transit disruption

Low flexibility in South-Eastern Europe

• More countries share the demand curtailment as a result of the cooperative modelling but at a lower disruption rate
• Bulgaria, FYROM, Romania, Greece, Bosnia, Hungary, Serbia face demand curtailment under high demand situations

FID projects will help mitigate the situation in the coming years
Ukraine transit disruption: impact on electricity

South-Eastern Europe electricity system robust

In the case of a Ukraine gas transit disruption, the electrical system adequacy and security can be maintained in spite of a high demand (design case) and potential disruption of gas for power generation.

<table>
<thead>
<tr>
<th>Country</th>
<th>Gas demand curtailment risk in peak conditions with disruption through Ukraine</th>
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<tbody>
<tr>
<td></td>
<td>1-day Design Case (peak demand)</td>
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<tr>
<td>Bulgaria</td>
<td>&gt;25 %</td>
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<tr>
<td>Greece</td>
<td>5 % to 25 %</td>
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<tr>
<td>FYRO Macedonia</td>
<td>&gt;25 %</td>
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