Towards Coordinated and Secure Power System Operations in Europe
Structure of the Presentation

- **ENTSO-E role in power system operation**
- **Operational challenges in Continental Europe**
  - Wind power
  - Photovoltaics
  - German nuclear moratorium
- **ENTSO-E Winter Outlook**
- **Network Codes and their development status**
- **Other challenges in the Continental Europe**
- **ENTSO-E and Finnish stakeholders**
ENTSO-E = international TSO cooperation

- 41 TSOs from 34 countries
- Founded on 19 Dec 2008 and fully operational since July 2009
- A trans-European network
  - 525 million citizens served
  - 828 GW generation
  - 305,000 Km of transmission lines
  - 3,400 TWh/year demand
  - 400 TWh/year exchanges

- Replaces former TSO organisations: ATSOI, BALTSO, RTSO, NORDEL, UCTE, UKTSOA
ENTSO-E System Operation Committee and Regional Group Nordic in detail

System Operation Committee

- Ad hoc (5)
- Nordic
- Continental Europe
- Baltic
- Great Britain
- Ireland & N.I.
- Northern Europe
- Isolated Systems

RGN Plenary

- Nordic Operations Group
- Nordic Operations Development
- Nordic Communications Network
- Disturbance Statistics and Classification

- NOIS System Group
- Nordic Analysis Group

- Nordic Switching & Safety Group
- Nordic Training Group
- Nordic Outage Team

- Temporary committee working groups
  - ENTSO-E Academy in future
- Regional groups
  - Voluntary regional groups
  - Regional Group Nordic organisation
ENTSO-E „off-line” role in power system operation

- Obligations from the Regulation 714/2009
- ENTSO-E Awareness System project
  - Continental: RAAS (TSC) and Nordic: NOIS
    
    RAAS = Regional Awareness and Alarm System, TSC = TSO Security Cooperation, NOIS = Nordic Operation Information System

- Regional and ENTSO-E wide working groups
- ENTSO-E Academy
- Drafting of Network Codes (future ”EU laws”)
- Compliance monitoring
- Reports (e.g. frequency quality)
- Lobbying

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ENTSO-E Awareness System

- TSO1
- TSO2
- TSO_n
- SCADA System/Terminal
- EAS Terminal/Browser

Electronic Highway Communication infrastructure

ENTSO-E-wide awareness system EAS

input-data: f
u
Δ P

ENTSO-E TSO restricted system

TASE. 2
TCP/IP (HTTP)
• Installed capacity 18 GW (May 2011)
• 50.2 Hz challenge with existing installations
• New PV installations have proper over frequency protection since May 2011
• Retrofit program will start in January 2012
  • Cost estimate: 65-175 M€
  • Timeline estimate: 3 years
    • installations > 100 kWp: 6 months
    • installations > 30 kWp: 18 months
    • installations ≤ 30 kWp: 36 months
Wind generation in Europe

NEW INSTALLED CAPACITY PER YEAR IN MW

FIGURE 2.1

(ERSA annual report 2010)
Wind power installed in Europe by end of 2010 (cumulative)
Power flows and wind power

- German nuclear phase out stresses balancing
- Strong wind power injection can lead to unintended loop flows through neighbouring countries
- Trading capacities and security margins are reduced
- Coordinated planning is indispensable (PSTs) interconnected TSOs is necessity
German nuclear phase out, regulator analysis

- Permanent solution
- BNetzA analysis
  - Grid margins exhausted
  - Voltage stability and VAR support (Biblis A)
  - Increase of grid investments
  - Market disturbances and interventions

### NPP Shutdown schedule

<table>
<thead>
<tr>
<th>NPP</th>
<th>Date</th>
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<tbody>
<tr>
<td>Biblis A</td>
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<tr>
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<td>Emsland</td>
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<td>Isar 2</td>
<td>End of 2022</td>
</tr>
<tr>
<td>Neckarwestheim 2</td>
<td>End of 2022</td>
</tr>
</tbody>
</table>
Under normal conditions, the situation in Germany is safe but stressed.

The installed capacity in Germany was reduced by 8,3 GW.

- Safe reserve between the power generation and the peak load has been reduced.

The German TSOs analyzed two main scenarios reflecting a widely realistic situation, the analysis under extreme conditions revealed:

- Highly overloaded transmission lines connecting northern and Western Germany with the load centers in the south.
- Low voltage level in some areas.
Adequacy is expected to be maintained during the winter period within the different ENTSO-E countries in case of normal conditions.

Generation and grid reinforcements improved system adequacy in some countries.

December and the third week of January could be identified as the most stressful periods of the winter.

In case of extreme conditions, reliability margins are reduced and tense situations might arise on individual countries.

A stressed situation for all of Europe might result if such extreme conditions take place simultaneously on a large scale.
Winter Outlook 2011 preliminary findings on a map

- Erosion of system security margins
  (in countries which are in blue)
  - Under extreme conditions
  - Possible periods of system stress
  - Need for imports

- December and January are the critical months

- Winter Outlook Report will be published on 2 December
Network Codes - System Operation approach

FROM
Separate regional agreements and codes

TO
General interregional and harmonised regional codes

- **Pan-European** Network Codes should stay concise and general (the “what”)
- The more detailed Network Codes (the “how”) should be requested at the synchronous level
- The existing detailed **regional** rules should be “integrated” in the Network Codes and by this become a legal reference

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Operational Network Codes - the next steps

2011

ACER
Draft FWGL for SO
Preparatory phase

2012

Q1
Q2
Q3
Q4

Scoping workshop
Public consultations

ENTSO-E

2013

Q1

Preparatory phase

Q1-Q4 2012 Operational Security NC

Preparatory phase

Q2 12- Q1 13 Operational Planning & Scheduling NC

Preparatory phase

Q3 12 – Q2 13 Load Frequency Control & Reserve NC

After 2014. Operational training NC

After 2014. Emergency NC

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Other challenges in Continental Europe

• System extensions (and dynamic stability...)
• Frequency quality (deterministic deviations)
• Coordination of „Coordination Initiatives”
• Nuclear power and political atmosphere
• Network codes after comitology
• ENTSO-E is not a Brussels’ monster! – we follow our members and their goals
• Fingrid has a strong representation in ENTSO-E – capitalize on it
• Network codes are being drafted – you are invited to contribute
• Learn from the challenges (problems ?...) in the Continental Europe
• Specific Nordic issues can be addressed within Nordic Region
Thank you for your attention

Questions?