WHAT WILL THE OFFSHORE GRID LOOK LIKE?

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The North Seas Offshore Grid Initiative Conference
Oostende

23/10/15
Quick facts about ENTSO-E

- 41 TSOs from 34 countries
- 530 million citizens served
- 830 GW generation
- 300 Thousand Km of transmission lines

Adequacy forecasts
Ten-Year Network Development Plans
Market Platforms
Network Codes
The 2030 EU Council targets and the electricity transmission system

-40% CO2 emissions
+27% energy efficiency
27% Renewable Energy Sources

>45% of RES generation in the electricity transmission system in 2030

Interconnection target
15% by 2030
10% by 2020

BUT regional differences & needs must be considered
Northern Seas Offshore Grid Infrastructure 2030 – a strategic EU corridor

2008: EC’s Strategic Energy Review

- North Sea grid = one out of six highly prioritised infrastructure measures in the Second Strategic Energy Review
- Expectations for < 20% infrastructure investment cost savings.

2010-2012: NSCOGI

- The amount, timing and location of offshore RES determines the level of hybrid offshore grid infrastructure.
- Modular approach mitigates associated uncertainties.

2013-2014: EC study on a meshed grid

- higher benefits for coordinated design compared to NSCOGI, especially for the more ambitious RES scenarios, due to applying higher interconnection capacities.

2015: EC study on regulatory matters

- Build the grid first – keeping in mind the bigger picture
ENTSO-E’s current view on the 2030 offshore grid infrastructure

TYNDP 2014

TYNDP14 Key Facts and Figures 2030
- Additional 10,000 km,
- 19 projects
- Infrastructure costs of 17-22 bn €

General findings
- to move along, cooperation among countries and among stakeholders is key.
- Modular step-wise development of the North Seas grid is ongoing and re-evaluated every 2 years
Outlook to TYNDP2016 – Result of planning studies

Regional Investment Plan 2015

Project Identification

Long Term Concept

https://consultations.entsoe.eu/system-development/regional-investment-plans/consult_view
## Development since 2011

<table>
<thead>
<tr>
<th>2011 / 2012 – Call for….</th>
<th>2015 - Status today:</th>
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<tbody>
<tr>
<td><strong>General</strong></td>
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<tr>
<td>- Masterplan</td>
<td>-&gt; TYNDP every 2nd year</td>
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<tr>
<td>- Binding 2030 targets</td>
<td>-&gt; 40 / 27/ 27 (non binding)</td>
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<tr>
<td>- Demos needed</td>
<td>-&gt; EEPR projects, Horizon 2020</td>
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<tr>
<td><strong>Technical issues</strong> (~ NSCOGI WG1)</td>
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<tr>
<td>- DC breaker</td>
<td>-&gt; Available … but not yet tested</td>
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<tr>
<td>- Ancillary services</td>
<td>-&gt; Possible (RES able to deliver)</td>
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<tr>
<td>- Standards &amp; frameworks</td>
<td>-&gt; IEC &amp; NCs underways</td>
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<tr>
<td><strong>Market / regulatory issues</strong> (~NSCOGI WG2)</td>
<td></td>
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<tr>
<td>- Treatment of hybrid projects</td>
<td>-&gt; Case by case – no one-fits-all</td>
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<tr>
<td>- Responsibility OWP connection</td>
<td>-&gt; still differs</td>
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<tr>
<td>- Anticipatory investments</td>
<td>-&gt; national issue</td>
</tr>
<tr>
<td>- Distribution of Cost / Benefits</td>
<td>-&gt; (EU) 347/2013</td>
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<tr>
<td>- Compatibility billing &amp; subsidy schemes</td>
<td>-&gt; work initiated by EC</td>
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<tr>
<td><strong>Permit Issues</strong> (~NSCOGI WG3)</td>
<td></td>
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<tr>
<td>- Long procedures, internat. uncoordinated</td>
<td>-&gt; (EU) 347/2013</td>
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Network Codes

*common reference for internal market, secure system operation, and facilitated RES connections*

### 3 Connection
- **Network Codes**
  - set requirements for
    - Generators
    - Demand-side
    - HVDC connections

### 3 Market
- **Guidelines**
  - set market rules for
    - Day ahead/intraday & Capacity calculation
    - Long-term timeframes
    - System balancing

### 4 Operational
- **Guidelines**
  - set common rules for
    - Load-frequency control
    - Outage planning & adequacy
    - System security
    - Emergency situations

- **Status**:
  - **Green**: Adopted
  - **Yellow**: Prepared for Member State discussion/voting
  - **Blue**: Recommended for adoption
  - **Gray**: Drafting
Network Code for HVDC connections and offshore wind

Focus on new connections

- DC-connected PPMs (mainly offshore wind)
- DC links connecting PPMs
- HVDC Systems connecting Synchronous Areas or Control Areas
- Embedded HVDC Systems

HVDC technology has a large potential, and is increasingly used in Europe’s grid planning.

An integrated system vision is crucial, driven by TSOs at European level.

Application is based on often national best practices. Also standards are still under development.

A NC HVDC gives a clear framework for future project specifications and technical standards.

A level playing field is needed for all generation (including offshore wind), for all DC links (including 3rd parties), regardless of ownership.

The NC HVDC completes the trio of connection codes.
Conclusions
In Conclusion: further offshore RES integration requires:

• Political agreement and political coordination across Member States
• A coherent regulatory framework to allow such complex projects to happen
• A functioning market allowing for market-driven investments
• A strong investment climate
• Continued regional coordination to master technological and operational challenges
• A coordinated maritime spatial planning
Recommendations: How can NSCOGI help?

- Support coordination of national energy policies and energy mix decisions for 2020 and 2030 targets
- Support TSOs with public acceptance and help explain the benefits of infrastructure
- Exchange experience to accelerate international projects.
The Energy Union ahead: Reliable, Sustainable, Competitive

ENTSO-E will reveal its Vision for the Energy Union, with recommendations on:

- better regulation in energy;
- market design and innovation;
- security of supply;
- energy regions.