The strategic role of power grids in the worldwide energy transition

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1. Towards a low carbon energy and sustainable development

The three European Union objectives:

- Reduction of CO₂ emission in the atmosphere
- Security of supply by limiting dependence on fossil fuels
- Completion of structuring electricity and gas internal markets
2. The predominant role of electricity in the new power context

Gross electricity generation of the EU as in its 2\textsuperscript{nd} strategic energy plan

<table>
<thead>
<tr>
<th>EU - 27 (TWh)</th>
<th>2011</th>
<th>(%)</th>
<th>2020 green New policy*</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil -fuel</td>
<td>1636</td>
<td>48,9</td>
<td>1489</td>
<td>42,6</td>
</tr>
<tr>
<td>Nuclear</td>
<td>886</td>
<td>26,5</td>
<td>911</td>
<td>26,1</td>
</tr>
<tr>
<td>Renewables</td>
<td>822</td>
<td>24,6</td>
<td>1094</td>
<td>31,3</td>
</tr>
<tr>
<td></td>
<td>3344</td>
<td>100</td>
<td>3494</td>
<td></td>
</tr>
</tbody>
</table>

(*) 100$/b

(Sources: European Commission 11/2011)
ENTSO-E Memo 2011
Gross electricity generation of the EU 27 in 2020

2/3 from low carbon sources:

- Less than 1/3 from nuclear energy
- More than 1/3 from renewables:
  - Wind energy: 13% of total mix
The wind energy in the electricity mix in 2020

- 13% of electricity mix in 2020 will represent more than 450 TWh out of a total of 3500 TWh
- To generate such an output, between 200 and 250 GW of wind capacity should be connected to the grid out of a total of 1000 GW
3. The strategic role of power system networks (1)

- Such a drastic change in power systems will require a strong evolution of power grids …
3. The strategic role of power system networks (2)

- To enable the integration of large quantity of intermittent energy (wind and solar)
- To increase the security of supply for mutual back-up of neighbouring member state power grids and regional neighbouring systems
- To achieve a better integration of the EU electricity market
Infrastructure development of electricity transmission: four major strategic projects of the EU (3)
The two main strategic directions for the power grid of the future

- **SUPER GRIDS**
  - Ultra High Voltage in AC and DC

- **SMART GRIDS**
  - More intelligence in the grid
The smart grids

- Transmission grids are intelligent since the 1960’s
- More decentralized production in distribution networks: active distribution grids
- Intelligent metering devices enabling greater energy efficiency for end consumers
- More coordination in the operation of the European electric systems, through greater integration of intelligence in the transmission systems
4. The role of CIGRE in this context

- To facilitate the sharing of information and of experience at the World level between the actors of the power systems: operators, manufacturers, regulators, grid users, …

- To stimulate innovation through the participation of engineers, experts and academics to support the electric power industry,
Thank you for your kind attention!

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