Representation of reservation services while modelling long term power sector development

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Reserve requirement in the system

Possible n-2 disturbance
Possible n-1 disturbance
Total available (accessible) reserves
n-1 disturbance
Activated Frequency Containment Reserve (FCR) for neutralization of n-1 disturbance
Not activated reserves
Activated Frequency Restoration Reserve (FRR) for neutralization of n-1 disturbance
Frequency Containment Reserve (FCR) relaxed for possible neutralization of n-2 disturbance
Frequency Restoration Reserve (FRR) relaxed for possible neutralization of n-2 disturbance
Activated Restoration Reserve (RR) for neutralization of n-1 disturbance

Normal system status
Emergency situation in the system

Post-emergency situation in the system
### Situation in Baltic power system

<table>
<thead>
<tr>
<th>Power plant</th>
<th>Installed capacity, MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal PP</td>
<td>692</td>
</tr>
<tr>
<td>Hydro pumped storage PP</td>
<td>900</td>
</tr>
<tr>
<td>Hydro PP</td>
<td>128</td>
</tr>
<tr>
<td>Wind PP</td>
<td>770</td>
</tr>
<tr>
<td>Biofuel PP</td>
<td>251</td>
</tr>
<tr>
<td>Solar PP</td>
<td>200</td>
</tr>
<tr>
<td>LitPolLink*</td>
<td>402</td>
</tr>
<tr>
<td>NordBalt*</td>
<td>281</td>
</tr>
<tr>
<td>Estlink I*</td>
<td>141</td>
</tr>
<tr>
<td>Estlink II*</td>
<td>261</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4026</strong></td>
</tr>
<tr>
<td><strong>Total without Wind &amp; Solar PP</strong></td>
<td><strong>3056</strong></td>
</tr>
</tbody>
</table>

**Maximal load**: 2100

**Reserve margin, %**: 46 (Allocated to country needs proportionally maximal demand)
Electricity generation during maximal demand
RR balance

Accessible from country sources (without HPSSP)
Accessible from HPSSP
Accesible through interlinks from other countries
Requirement
Utilisation of all external links in Baltics in the case of explicit modelling of reservation services
Questions for discussions

Are the Baltic States in exceptional conditions?

Will the electricity generation from RES increase the need for interconnectors?

Does this not mean that what is now relevant to the Baltic countries can in future become relevant to others?

Can we model development of power systems without explicit modelling of reservation services?
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