VIEWS AND EXPECTATIONS – KICK-OFF MEETING HYDROBALANCE

Tom Westgård
Statkraft Energi
**Statkraft’s production 2012**

<table>
<thead>
<tr>
<th>Installed capacity¹</th>
<th>60 TWh Power production</th>
<th>97% renewable energy</th>
</tr>
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<tbody>
<tr>
<td>17 000 MW</td>
<td></td>
<td>3 600 employees</td>
</tr>
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**Panama (project)**

**Norway**

**Sweden**

**UK**

**Finland**

**Turkey**

**Germany**

**India**

**Sri Lanka**

**Zambia**

**Chile**

**Brazil**

**Peru**

**Chile**

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**Panama (project)**

1 Including pro rata ownership in associates outside the Nordics
Why we participate
Vast Norwegian potential in an intermittent European power system

Norway has 50% of the hydro reservoirs in Europe – 84 TWh

Options to provide flexibility:
1. Change the operation pattern in existing plants **28 GW**
2. Increase installed capacity **+7- 8 GW**
3. Build pumped hydro storage in connection with existing reservoirs **+ 15-20 GW**
The hydrology vs energy consumption

Data for Norway

Excisting PSH in Norway developed for seasonal pumping
Future PSH possibilities in Norway depends on:

- limitations in the change of water level in upper and lower reservoirs
- and duration for pumping / generation

The technical potential is not the main challenge!

<table>
<thead>
<tr>
<th>Change in waterlevel</th>
<th>PSP Capacity (MW)</th>
<th>Increased capacity existing plants (MW)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>24 hours</td>
<td>7 days</td>
</tr>
<tr>
<td>0.5 m/hour</td>
<td>85000</td>
<td>30000</td>
</tr>
<tr>
<td>0.1 m/hour</td>
<td>30000</td>
<td>16000</td>
</tr>
<tr>
<td>0.01 m/hour</td>
<td>3200</td>
<td>3200</td>
</tr>
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</table>
lake Blåsjø
7.8TWh RESERVOIR

Potential upper reservoir,
several possibilities
Typical lower reservoir
Main Challenges

1. Commercial models
   - Security for long term investments – business concept
   - Market design issues

2. Political acceptance
   - In Norway
     - Environmental aspects
     - Public acceptance
   - Connecting countries
     - Security of supply

3. Grid capacity
   - Interconnectors
   - Restrictions due to national constrains
Our main interest in the program

- European demand for flexibility
- Competing technologies to Norwegian hydro power
- Limitations for concept in foreign transmission systems
- Involvement and focus on European situation
  - A lot of work has already been done regarding different Norwegian issues
  - Norwegian situation will probably not limit the concept in the two first decades
    - Except for interconnector capacities
    - And sustainable business concepts
THANK YOU