Welcome!
Programme

• April 25 “Demand Response Resources – Electricity Market Impacts”

Increased elasticity on the demand side in case of shortage in production and/or transmission capacity is recognized as a vital challenge in a deregulated market environment. This seminar is based on the activities in the IEA/DSM project “Demand Response Resources (DRR)” with participants from 11 countries. The intention is to give the attendants an update on demand response activities world wide, in the European Union and in the Nordic countries and to take part in the discussion of further development

• April 26 “Capacity Shortage – Is there a problem, and how should it be solved?”
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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker</th>
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<tr>
<td>1000</td>
<td>Introduction</td>
<td>Inge Harald Vognild, Norway</td>
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<td>1020</td>
<td>DRR world wide</td>
<td>Ross Malme, USA</td>
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<td>1105</td>
<td>EU perspectives</td>
<td>Håvard V. Malvik, EU Commision</td>
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<td>1145</td>
<td>Nordic Regulatory perspectives</td>
<td>Gunn Oland, Norway</td>
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<td>1215</td>
<td>Discussion</td>
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<td>1230</td>
<td>Lunch</td>
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<td>1330</td>
<td>Back-up generation as regulating power</td>
<td>Mikael Togeby, Denmark</td>
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<td>1350</td>
<td>Large scale 2WC, DR impacts</td>
<td>Willy Bergstrøm, Denmark</td>
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<td>1410</td>
<td>DR activities in Finland</td>
<td>Erkki Stam, Finland</td>
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<td>1445</td>
<td>Discussion</td>
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<td>1500</td>
<td>Coffee Break</td>
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<td>1515</td>
<td>DR - Market design aspects</td>
<td>Peter Fritz, Sweden</td>
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<td>1550</td>
<td>Market based Demand Response</td>
<td>Ove S. Grande, Norway</td>
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<td>1625</td>
<td>Norwegian DR demonstrators</td>
<td>Kjell Øvrebø, Norway</td>
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<td>1645</td>
<td>Discussion</td>
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<td>1700</td>
<td>End of session</td>
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Monday 25 April 2005

Demand Response Resources
Electricity Market impacts

A brief overview of DR in Norway from the TSO perspective

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Content

• Statnett – The Norwegian TSO
• Statnett motivation for Demand Response (DR)
• Economic incentives for DR in Norway
  – The Reserves Option Market (ROM)
• The Norwegian IEA/DSM-DRR project
• New R&D project: Market based demand response
Statnett
The Norwegian TSO

• System operator
• Grid owner/operator
• Part owner of the Nordic electricity exchange (Nord Pool)
• Network and balance settlement
• Close co-operation with the other Nordic TSOs

• Business idea:
  – ”Statnett shall efficiently promote and facilitate a well-functioning electricity market”

• Re. efficient electricity market:
  – DR an even more necessary condition
Motivation for promoting DR

- Tighter capacity and energy balance
  - A White paper on the security of supply has recently emphasized that the System Operator shall contribute actively to a further development of demand side price flexibility (focus on energy)

- Corporate profitability
  - Improved network utilization
  - Increases competition as well as the total potential resources for operating reserves

- Mitigate abuse of market power
A tighter Norwegian capacity balance

MWh/h

Area of available capacity winter

Peak load

All time high 23,050 MW 05.02.2001
A tighter Norwegian energy balance

- Consumption
- Generation
- Maximum inflow (1931-2000)
- Minimum inflow

TWh / year

## Markets/monetary arrangements giving DR a (potential) value in Norway

<table>
<thead>
<tr>
<th>Market / arrangement</th>
<th>Economic value in Norway</th>
<th>Buyer / incentive provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral physical contracts</td>
<td>Seldom</td>
<td>Market participants</td>
</tr>
<tr>
<td>Elspot (day-ahead market)</td>
<td>Seldom</td>
<td>Market participants</td>
</tr>
<tr>
<td>Balancing market</td>
<td>Seldom</td>
<td>Market participants</td>
</tr>
<tr>
<td>Financial market</td>
<td>Seldom</td>
<td>Market participants</td>
</tr>
<tr>
<td>Fast operating reserves (Reserves Option Market)</td>
<td>Yes</td>
<td>TSO</td>
</tr>
<tr>
<td>Frequency-based ancillary services (Possible future arrangement)</td>
<td>(TSO)</td>
<td></td>
</tr>
<tr>
<td>Transmission pricing incentives (capacity fees, interruptible tariffs)</td>
<td>Yes</td>
<td>TSO, other GridCos</td>
</tr>
</tbody>
</table>
The Reserves Option Market (ROM)

• ROM has provided extra resources in the balancing market during the winter season since 1st November 2000

• ROM gives demand-side participants economic incentives to offer fast operating reserves

• Successful ROM participation from large industrials
  • Iron, steel and ferroalloys
  • Primary aluminium
  • Other non ferrous metals
  • Paper and paper products

• Demand side contractors are also allowed to opt-out to the day-ahead market
ROM purchase winter 2004/05

Week

MW

€ / MW/week

Demand side contracts
Generation contracts
Weekly price (area B)
ROM unit price winter 2004/05 (area B)
**DR from medium-sized consumption**

- Statnett encourages ROM participation from medium-sized consumption (pilot projects)
  - Electric boilers
  - Back-up generation

<table>
<thead>
<tr>
<th><strong>Market</strong></th>
<th><strong>Aim at end of winter 2004/05</strong></th>
<th><strong>Aim at end of winter 2005/06</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Day-ahead market</td>
<td>50 MW</td>
<td>60 MW</td>
</tr>
<tr>
<td>Balancing Market (via ROM)</td>
<td>130 MW</td>
<td>200 MW</td>
</tr>
</tbody>
</table>
IEA/DSM-DRR Norway
Purpose

• Information exchange with an international network of DR competence:
  – Technology
  – Cost and volume comparisons

• Contribute to increased price elasticity in the day-ahead market and in the balancing market

• Development and promotion of Norwegian technology through two demonstration projects
IEA DRR Norway
National reference group

• BKK Nett (distribution company)
• EBL (Norwegian Electricity Industry Association
• Elink (software vendor)
• ENOVA SF (The Norwegian energy agency)
• Hydro Energi (oil&gas, metal producer, hydro generator)
• Norwegian Water Resources and Energy Directorate (Regulator)
• Powel (software vendor)
• Statoil (oil&gas, electricity retailer)
• Skagerak Nett (distribution company)
• Statnett SF (TSO)
• Troms Kraft (retail company)
Market based demand response
Norwegian R&D project (2005-2008)

Steering committee

sub-project 1: Increased price elasticity
sub-project 2: Enabling technologies
sub-project 3: IEA/DSM-DRR
Conclusion

High focus on DR / demand side price flexibility in Norway