The Strategic reserve - why and how?
Joakim Cejie
Miljö- och energidepartementet
Agenda

• The history behind it
• Generation adequacy- the current situation
  – recent activities
• The current system
  – size
  – period
  – cost
  – impact on trade
Why do we have a reserve?

- Before deregulation, physical obligation
- Need for heating during extremely cold conditions.
- Factor 3 between summer and winter consumption.
- Weak or non-existing commercial incentives.
- Aggravated after decommission of nuclear in 1999 and 2002 (Barsebäck. 1200 MW)
Preconditions

- Cables to 5 neighboring countries
  - more to come
  - 4/5 have normally have higher prices
- 4 bidding zones
  - limitations between areas.
- Prices far below LRMC.
- 9/10 of all consumers live in SE3 and SE4
- Adequacy problems in south of Sweden
- All nuclear production in SE3
- Additional power in Sweden, Finland, Lithuania and Denmark
Energy balance 2015

• Sweden and the nordic countries will have a surplus of energy
• Production 2014: 151 TWh
• Consumption 2014: 135 TWh under 2014
• Ringhals 1 and 2 produced approximately 10 TWh under 2014.
• Oskarshamn 1 and 2 produced approximately 3 TWh
  – Normally annual production 8 TWh
• 5 TWh within electric certificate system.
• Additional power in the neighbouring countries
# Load balance 2014

<table>
<thead>
<tr>
<th>Område</th>
<th>Tillgänglig produktion</th>
<th>Elförbrukning</th>
<th>Områdesbalans</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE1</td>
<td>4680</td>
<td>-1 600</td>
<td>-1 700</td>
</tr>
<tr>
<td>SE2</td>
<td>7300</td>
<td>-3 000</td>
<td>-3 200</td>
</tr>
<tr>
<td>SE3</td>
<td>12750</td>
<td>-16 800</td>
<td>-17 700</td>
</tr>
<tr>
<td>SE4</td>
<td>2570</td>
<td>-4 800</td>
<td>-5 100</td>
</tr>
<tr>
<td>Summa</td>
<td>27300</td>
<td>-26 200</td>
<td>-27 700</td>
</tr>
</tbody>
</table>
Uncertain nuclear production

<table>
<thead>
<tr>
<th>Block</th>
<th>Netto-</th>
<th>Energitillgänglighet</th>
<th>Produktion</th>
<th>Summa prod. från idrifttagning t.o.m år 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barsebäck 1</td>
<td>(600)</td>
<td>90,1</td>
<td>93,8</td>
<td>79,2</td>
</tr>
<tr>
<td>Barsebäck 2</td>
<td>(600)</td>
<td>64,1</td>
<td>85,7</td>
<td>91,9</td>
</tr>
<tr>
<td>Forsmark 1</td>
<td>984</td>
<td>86,1</td>
<td>83,1</td>
<td>88,7</td>
</tr>
<tr>
<td>Forsmark 2</td>
<td>1 120</td>
<td>70,5</td>
<td>79,0</td>
<td>73,3</td>
</tr>
<tr>
<td>Forsmark 3</td>
<td>984</td>
<td>77,9</td>
<td>92,0</td>
<td>76,6</td>
</tr>
<tr>
<td>Oskarshamn 1</td>
<td>473</td>
<td>15,2</td>
<td>32,0</td>
<td>70,3</td>
</tr>
<tr>
<td>Oskarshamn 2</td>
<td>638</td>
<td>17,4</td>
<td>48,7</td>
<td>81,6</td>
</tr>
<tr>
<td>Oskarshamn 3</td>
<td>1 400</td>
<td>39,1</td>
<td>80,3</td>
<td>24,9</td>
</tr>
<tr>
<td>Ringhals 1</td>
<td>878</td>
<td>91,3</td>
<td>83,7</td>
<td>79,3</td>
</tr>
<tr>
<td>Ringhals 2</td>
<td>866</td>
<td>92,8</td>
<td>89,3</td>
<td>50,1</td>
</tr>
<tr>
<td>Ringhals 3</td>
<td>1 064</td>
<td>50,0</td>
<td>55,6</td>
<td>58,0</td>
</tr>
<tr>
<td>Ringhals 4</td>
<td>938</td>
<td>64,0</td>
<td>70,1</td>
<td>72,0</td>
</tr>
</tbody>
</table>

Källa: OKG, Ringhalsgruppen, Forsmarks Kraftgrupp
Load balance with 4 reactors decommissioned

<table>
<thead>
<tr>
<th>Område</th>
<th>Tillgänglig produktion</th>
<th>Elförbrukning</th>
<th>Områdesbalans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Normalvinter</td>
<td>Tioårsventer</td>
</tr>
<tr>
<td>SE1</td>
<td>4 760</td>
<td>- 1 600</td>
<td>- 1 700</td>
</tr>
<tr>
<td>SE2</td>
<td>7 340</td>
<td>- 3 000</td>
<td>- 3 200</td>
</tr>
<tr>
<td>SE3</td>
<td>1 0840</td>
<td>- 17 000</td>
<td>- 17 900</td>
</tr>
<tr>
<td>SE4</td>
<td>1 920</td>
<td>- 4 900</td>
<td>- 5 200</td>
</tr>
<tr>
<td>Summa</td>
<td>24 860</td>
<td>- 26 500</td>
<td>- 28 000</td>
</tr>
</tbody>
</table>
The Swedish system

- Annual procurement of production and demand reduction.
- 25 percent must be demand reduction.
- Until year 2020.
- Thereafter supposed to be handled by the market.
- Does not solve extreme price fluctuations.
- Does not reduce risk and lead to better investment climate.
- Available between 16 November to 15 March.
Basic facts

- **Regulatory framework**
  - The Act 2003:436 on Peak Load Reserve
  - The government Regulation 2010:2004 on peak load Reserve

- **1000 MW until 2017, thereafter 750 MW**

- **Demand response. (626 MW)**
  - Stora Enso
  - Holmen
  - Rottneros
  - Reservkraft AB

- **Production resources (874 MW)**
  - Karlshamn (E.ON)
  - Stenungssund (Vattenfall)
  - Aros (Mälarenergi)
  - Oil or coal CHP

- **Unprofitable production**
Annual cost

- Cost for 2014: 112 miljoner (13 million Euro)
- Cost for 2013: 138 miljoner (14 million Euro)
- Cost for shortage situation 900 miljoner (90 million Euro)
- Cost covered by balance responsible/consumers
  - not where shortage occur.
## Historic use

<table>
<thead>
<tr>
<th>Winter</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014/2015</td>
<td>No activation</td>
</tr>
<tr>
<td>2013/2014</td>
<td>No activation</td>
</tr>
<tr>
<td>2012/2013</td>
<td>Activation one time</td>
</tr>
<tr>
<td>2011/2012</td>
<td>Activation 5 times.</td>
</tr>
<tr>
<td>2010/2011</td>
<td>No activation</td>
</tr>
<tr>
<td>2009/2010</td>
<td>Activation 3 times</td>
</tr>
<tr>
<td>2008/2009</td>
<td>No activation</td>
</tr>
<tr>
<td>2007/2008</td>
<td>No activation</td>
</tr>
<tr>
<td>2006/2007</td>
<td>Activated due to net problems</td>
</tr>
<tr>
<td>2005/2006</td>
<td>No activation</td>
</tr>
<tr>
<td>2004/2005</td>
<td>Partly activated</td>
</tr>
<tr>
<td>2003/2004</td>
<td>No activation</td>
</tr>
</tbody>
</table>

Some of these occasions are due to problems in Finland and vice versa.
Production Vs Demand side management

- **2011-2013**: 1750 MW
  - 25% demand side reduction
- **2013-2015**: 1500 MW
  - 25% demand side reduction
- **2015-2017**: 1000 MW
  - 25% demand side reduction
- **2017-2019**: 750 MW
  - 25% demand side reduction
Reduction 1(3)

In general:

- Yearly procurement of reduction resources as regards reporting and submitting bids to the Regular Power Market
- The resource owner is free to submit the resource to the Power Exchange - Nord Pool Spot at desired price
- If the resource is not activated on Nord Pool Spot market it is still available for the RPM.
Reduction 2(3)
Resource owner commitment

• Resource owner shall in the tendering process declare his requirements for an administrative payment in SEK per hour, effect and bid price on the RPM.

• Commitment by agreement:
  – The resource owner shall submit bids to RPM for all hours the resource is available.
  – Only valid reasons for not being available are operational disturbance or activation on the Nord Pool Spot market.
  – The resource owner shall continuously report unavailability to Svenska Kraftnät.
  – The price on the bid to RPM is set by the owner in the tender.
  – Maximum 30 minutes start up time
Reduction 3(3)
Activation and payment

- The resource owner get an administrative payment per hour for availability on the RPM
- The resources are activated in merit order after all the commercial resources have been activated.
- Payment for activation according to the accurate market price which in RPM is Marginal pricing.
- The resource owner is guaranted one hour payment according to the bid price if the time of activation is less than one hour.
- No administrative payment if not available
Production 1(4)

In general:

• Yearly procurement of resources
• Bidding and activation after decision by Svenska kraftnät
• The resources may be activated on both the Nord Pool Spot market and Regular Power Market (RPM).
• If the resource is not activated on spot market it is still available for the RPM.
Production 2(4)
Resource owner commitment

• Resource owner shall in the tendering declare his requirements for the fixed payment as well as the price for activation (SEK/MW)

• Commitment by agreement:
  – Ensure availability during the winter period
  – Maximum 16 hours start up time
Production 3(4)
Activation and payment on RPM

• The resources are activated in merit order after all the commercial and reduction resources have been activated.
• Production resources are paid the fixed and variable compensation that they have set out in the tender agreement.
Production 4(4)
Activation on the Nord Pool Spot market Production

• Activation only if there is a curtailment situation in Sweden or/and Finland
• Price of the PLR order in Nord Pool Spot market will be the price of the highest commercial order with a volume change + 0,1 EUR/MWh
• Production resources are paid the fixed and variable compensation that are set out in the tender agreement
The financing of the PLR

- The PLR are financed by the balance providers as a group by an additional fee on the consumption energy during the winter period
- All excess money are repayed to the BRPs
How to minimize need for strategic reserve?

- **Bidding zones**
  - better price signal, nor regulated prices
  - Electricity flow where it is most needed.
- **Increased market integration**
- **Strengthen transmission network**
- **Hourly metering**
  - 5 million customers without no extra fee
- **Smart grids**
- **Nordic solution**
  - shorter time frame on day ahead?
- **Nordic cooperation on how to minimize problems**
  - Measures will be discussed by ministers in November 2015
Thank you for your attention!

Joakim Cejie
Miljö- och energidepartementet