Asset Optimisation and Trading

Harald von Heyden
Head of Business Division Asset Optimisation and Trading

Stockholm, 21 September 2011
Today’s focus

- Organisation and key figures
- AOT comprises four business activities
- AOT’s role within Vattenfall
- Hedge strategy process
- Hedge position
- Market development and outlook
Organisation and key figures

Key figures:
- EBITDA (2010): SEK 6,035 million (10% of Group Total)
- FTE: 650
- Nationalities: 24+

Trading Volume (External) 2010
- Electricity in TWh: 1,900
- CO₂ (EUA and CER) in mt: 430
- Gas in TWh: 925
- Counterparts: ~550
- Transactions per day: >1,650

Asset optimisation
- Europe
  - Optimisation and Dispatch of Assets
  - Hedging and Hedging Strategy
  - Interface to Assets
- Nordic
- Trading
  - Market Access
  - Prop Trading
  - Fuel Sourcing
  - Origination
- Operations
  - Analysis
  - Models and systems
  - IT operation
  - AOT common processes
AOT comprises four main business activities

1. Dispatch optimisation
   - Maximize value of assets in spot and intraday markets

2. Asset backed proprietary trading
   - Maximize value of assets in forward markets
     - Trade on flows incl. hedging
     - Exploit physical optionality

3. Non asset backed proprietary trading
   - Generate profit on back of financial risk capital
     - EUR 200 million max loss limit

4. Origination
   - Acquire & restructure contractual assets (semi-physical contracts) and other contracts
AOT’s role within Vattenfall

Electricity and commodity markets

Asset Optimisation and Trading

Generation
- Hydro
- Nuclear
- Thermal
- Renewables

Supply of fuels
- Coal
- Oil
- Gas
- CO₂

Power

Sales
- B2B
- B2C

Sourcing power and gas
Introducing new hedge strategy

Old hedge reference environment

- primary focus on production plans and how the volumes should be hedged from a Business Unit perspective
- financial aspects only implicitly represented

New hedge strategy process

- financial aspects explicitly incorporated when deciding the hedge strategy
- focus is derived from an overall Group perspective whilst taking national level requirements into account

Identify hedge objectives → Set guiding thresholds → Analyse/decide hedge strategy → Implement and review
Hedge ratios

% hedged of forecasted electricity generation, 30 June 2011

<table>
<thead>
<tr>
<th>EUR/MWh</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nordic region</td>
<td>78</td>
<td>76</td>
<td>38</td>
</tr>
<tr>
<td>Continental Europe</td>
<td>99</td>
<td>96</td>
<td>31</td>
</tr>
</tbody>
</table>

Nordic region
Continental Europe
Market development and outlook

- Oversupply situation in Northern Europe

- Risk of market splitting and lower liquidity
  - E.g. the Swedish market will be split into 4 price areas 1 November 2011
  - Liquidity constraints on some local power and gas markets e.g. Netherlands, UK and Spain

- Post-Fukushima changes in German and Swiss physical market
  - Will Germany become a net importer?
  - Grid constrains

- Increased and changed regulation
  - Proposed financial regulation by the EU on e.g. transparency, market integrity, capital requirements, MiFID and mandatory clearing
Appendix
Changes in the Nordic system price are highly correlated with changes in hydrological balance

Outlook
- Changes in the balance will continue to be the main price driver going forward. Correlation has not changed.
- A new major downturn in the economy will surely affect Nordic prices as output falls.

System price and hydrological balance

Financial crisis 2008 pushed prices down despite weakening hydrology
Marginal cost of coal acts as support to the Nordic system price - except hydrological balance is very positive

Outlook

- With normalisation of the hydro balance, dark spreads will be under pressure in the Nordic region considering the expansion of wind and nuclear.
- Could CO2 prices again edge towards zero if the economy turns down and output falls?
- The uptrend in coal prices will be broken if the economy turns down. Although, support of coal prices will remain when money flies into gold, commodities, property (things that retain value when „money dies”).

Hydbal >15 TWh
German off-peak prices provide additional support - except hydrological balance is very positive

**Outlook**

- With normalisation of the hydro balance, also the Nordic-German off-peak spread will be under pressure in the Nordic region considering the expansion of wind and nuclear.

- German off-peak prices will be supported by nuclear decomissioning. They will also stay strong in relation to peak prices although considering the expansion of solar power.
The Nordic system price is most of the time below the German peak - except hydro balance is extremely strained in winter*

*in combination with low nuclear availability, low temperature and precipitation.

Outlook

- More installed wind capacity in the Nordic region will lead to higher peak / off-peak spreads and higher volatility in the spot prices.
- Solar power expansion will put pressure on German peak prices.
- Hydbal < -30 TWh

Potential if hydro goes extremely negative again?
The German moratorium triggered a big trade balance swing

Import/Export Balance Germany (7day moving average)

Offline before:
- Biblis B, Krümmel
- Brunsbüttel
- Isar 1, Philippsburg 1
- Neckarwestheim 1
- Unterweser, Biblis A
- Grafenrheinfeld (maintenance)

- Grohnde, Gundremmingen B
- Philippsburg 2, Emsland

MW (+ Import / - Export)

Jan  |  Feb  |  Mar  |  Apr  |  Mai  |  Jun  |  Jul  |  Aug  |  Sep  |  Oct  |  Nov  |  Dec  
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- 
-8000 | -6000 | -4000 | -2000 | 0 | 2000 | 4000 | 6000 | 8000 | 2007 | 2008 | 2009 | 2010 | 2011 | Average (07-10)
France contributed the most with a shift of >4,000 MW
Highest nuclear production in France since years facilitates high exports

Nuclear Production France

If France sticks to the target, a lower utilisation (~1,500MW) would be the result for Q4
Higher wind production in Germany gives relief to imports

Offpeak Import/Export Balance DE-FR (7day moving average)

MW (+ Germany imports / - Germany exports)

Jan Feb Mar Apr Mai Jun Jul Aug Sep Oct Nov Dec

-5000 -4000 -3000 -2000 -1000 0 1000 2000 3000 4000 5000

-5000 -4000 -3000 -2000 -1000 0 1000 2000 3000 4000 5000

2007 2008 2009 2010 2011 Average (07-10)

Wind Germany 2011 (deviation from norm)
Wind and solar complement one another in the peak

Typical Wind & PV production pattern in Germany

- Total Wind & Solar
- Solar (Peak)
- Wind
### Definitions

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset backed Trading</td>
<td>Trades with an underlying natural exposure from a trading asset</td>
</tr>
<tr>
<td>Proprietary Trading</td>
<td>Trades with no underlying natural exposure</td>
</tr>
<tr>
<td>Origination</td>
<td>Trading of highly non-standardised contracts, often with multi-commodity components. Origination also incorporates Portfolio Management services, mainly executing more or less standardised transactions</td>
</tr>
</tbody>
</table>