Making the most of Vattenfall’s assets

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Today’s focus

• Organisation and key figures
• AOT’s main business activities
• AOT’s role within Vattenfall
• Vattenfall’s hedge-objective and -strategy
• Market developments
• Future challenges
Organisation and key figures

Key figures
- Employees: 660 (FTE)
- Nationalities: 25+

Trading Volume (external) 2011
- Electricity (TWh): 2,010
- CO₂ (EUA and CER) mn tonnes: 480
- Gas (bcm): 104
- Number of counterparts: ~650
- Transactions per day: >1,250

Asset Optimisation and Trading (AOT)
- Optimisation and Dispatch of Assets
- Hedging and Hedging Strategy
- Interface to Assets

Asset Optimisation
- Continental
- Nordic

Trading
- Market Access
- Prop Trading
- Fuel Sourcing
- Origination

Operations
- Analysis
- Models and systems
- IT operation
- AOT common processes
AOT’s main business activities

1. Asset Optimisation
   - Maximise value of assets in spot, intraday, and forward markets by deciding how to dispatch flexible assets and trading on flows generated by the assets

2. Hedging (incl. sourcing)
   - Protect/secure value of assets and customers by acting in forward markets
   - Reduce volatility in earnings and cash flow

3. Proprietary trading
   - Generate profit on back of financial risk capital, systems, and capabilities by position taking on price movements and exploiting arbitrage possibilities

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

Electricity and commodity markets

Hedging and trading

Asset Optimisation and Trading

Generation
- Hydro
- Nuclear
- Thermal
- Renewables

Supply of fuels
- Coal
- Oil
- Gas
- Biomass
- CO₂

Power

Sales
- B2B
- B2C

Sourcing power and gas

Hedging
Perspectives on trading and commercial risk taking in Vattenfall

<table>
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<tr>
<th>Commercial activity</th>
<th>Horizon</th>
<th>Vattenfall’s objectives</th>
<th>Vattenfall’s market risk</th>
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<tbody>
<tr>
<td>Proprietary trading</td>
<td>Within liquid horizon</td>
<td>Capture value in markets and shield hedge positions (flows)</td>
<td>Risk mandate</td>
</tr>
<tr>
<td>Hedge Strategy Deviations</td>
<td></td>
<td>Capture value on fundamental market developments (mid-term horizon)</td>
<td>Secure Gross Margin</td>
</tr>
<tr>
<td>Asset management and overall exposure hedging</td>
<td>Outside liquid horizon</td>
<td>Pure risk mitigation to achieve hedge objective set by Board of Directors</td>
<td>Project Development and Market Risk</td>
</tr>
<tr>
<td>Invest in and manage generation assets</td>
<td></td>
<td>Maintain and develop competitive asset portfolio in core markets in line with corporate strategy</td>
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</table>
The hedge strategy process follows four steps and is generally initiated once a year in relation to the business planning process*

*) Or when assumptions on which the hedge strategy rests appear not to be valid any longer

**Focus of hedging**

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

Protection against financial downside

Support financial targets given by the owner

Reduce volatility in earnings and cash flow

- Debt / Equity
- ROCE
- FFO/ Adjusted Net Debt

Relevant key indicators are monitored and deliver the basis for calibration of the corporate asset strategy. FFO can be effected sufficiently by hedging.
From hedge objectives to a hedge strategy

**Group Finance** calculates balance sheet and financial performance based on business plan in a forward looking manner.
Financial model is stress-tested and minimum profit/cash flow required is calculated to maintain important financial indicators.

**Group Risk** has tools to assess risks in various hedge strategies.
The risk of not meeting financial requirements is calculated.

**Top Management** sets a risk boundary to guide the choice of a hedge strategy.
Asset Optimisation analyses and proposes to Top Management a suitable hedge strategy for approval.

**Asset Optimisation** conducts a feedback loop by regular reviews of hedge strategy performance.
Vattenfall’s hedging position as of 30 Sept 2012

<table>
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<tr>
<th>EUR/MWh</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tr>
<td>Nordic region</td>
<td>47</td>
<td>46</td>
<td>44</td>
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<tr>
<td>Continental Europe</td>
<td>55</td>
<td>55</td>
<td>53</td>
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</tbody>
</table>

% hedged of planned electricity generation (2012: remaining part of the year)*

* as of 30 Sep, 2012

* as of 30 Sep, 2012
Growth of renewables affects the merit order curve

Installed capacity GER & NL (2008-2016)

- **Solar**
- **Wind On-/Offshore**
- **Conventional (Net Change)**

### Comments
- Renewables expected to grow further despite decreasing subsidies
- Reduction of conventional power plants exceeds new-buils 2014 ff

Source: Vattenfall
European gas prices firm while power, CO2 and coal prices look bearish

Comments

• Power spot prices back at the level in the beginning of 2010
• CO2 prices have almost halved from 2010 to 2012
• Gas prices doubled
• Coal prices slightly above level of January 2010

Source: EEX, Vattenfall
Gas-fired plants suffer especially in peak hours

Clean Spark Spread on average summer weekday 2009-2020*

Source: EEX, Vattenfall

* Example of a modern combined-cycle gas turbine, 60%

Comments

Supply
- Maximum feed-in of PV and Wind in Germany since 2011:
  ~ 35,000 MW
- max Wind: ~25,000 MW
- max PV: ~22,000 MW

Demand
- Off-peak demand: ≥ 40 GW (except on public holidays)
- Peak demand: ≥ 70 GW
- Noon peak (2009) has changed to an afternoon valley (2012)
- PV max at peak times means that renewables more and more often cover for 1/3 up to 1/2 of total demand
Profitability of gas and coal plants has diverged since February 2012

Dark and Spark Spreads in GER and NL 2010-2012 (60d Moving Average)

€/MWh

Source: EEX, Vattenfall

* Example of a modern combined-cycle gas turbine, 60%

Comments

- Coal / gas spread has significantly diverged since February (2011: 6.6 €/MWh; today: 20 €/MWh)
- High coal switching price (CO2 > 45 EUR/tonne)
- Prices in Germany are mainly set by coal-fired plants while Dutch power prices are set by gas-fired plants
- Transmission capacities can not fully mitigate price difference between GER and NL

⇒ The tendency is not expected to reverse this year
Industry and market trends are reshaping energy commodity trading markets in Europe

<table>
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<tr>
<th>Impact on energy commodity market</th>
<th>Impact on energy commodity traders</th>
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<tr>
<td>• Increasing volatility</td>
<td>• Extrinsic value of flexible fleet will increase</td>
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<tr>
<td>– Due to increased share of intermittent energy</td>
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<tr>
<td>• Increasing market efficiency</td>
<td>• Arbitrage opportunities will decrease in mature markets</td>
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<tr>
<td>– High volatility will attract many players, in turn leading to increasing liquidity</td>
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<tr>
<td>• Decreasing cross-country spreads</td>
<td>• More difficult to hedge</td>
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<tr>
<td>– Driven by market coupling</td>
<td>• Less opportunities for standard prop trading</td>
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<tr>
<td>• Less liquidity likely</td>
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<tr>
<td>– Increased costs of trading</td>
<td></td>
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<tr>
<td>– Financial regulations (EMIR and MiFID)</td>
<td></td>
</tr>
<tr>
<td>• Lower volatility</td>
<td></td>
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<tr>
<td>– Oversupply driven by economic downturn and renewable energy</td>
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<tr>
<td>– Prices set at flat merit order curve</td>
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<tr>
<td>• Decreasing wholesale market volumes</td>
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<tr>
<td>– Increasing share of renewables with feed-in tariffs</td>
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<tr>
<td>• Decreasing OTC trading</td>
<td></td>
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<tr>
<td>– Increasing clearing requirements</td>
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