

Sustainability aspects of bioenergy

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Vattenfall Power Consultant – Sweden's Leading Energy Consultancy

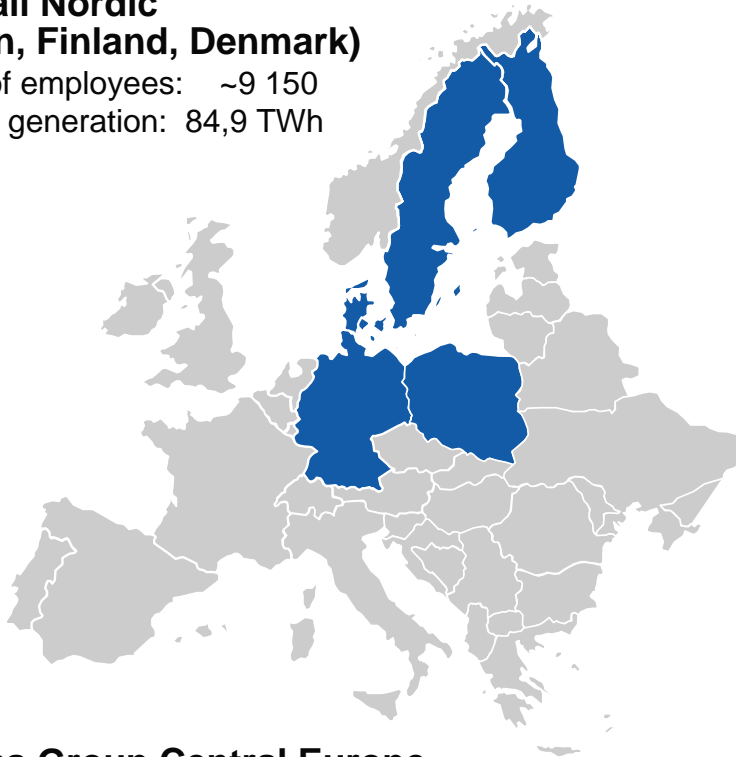
- Approx. 700 employees
- Technical, management and environmental consulting
- Active in the Nordic countries, Central and Eastern Europe, Africa, Asia and Latin America
- 13 offices in Sweden and locations in 19 other countries worldwide
- Some major clients: Vattenfall, LRF, Dubai Electricity



Vattenfall – Europe’s fifth largest generator of electricity and the largest producer of heat

Vattenfall Nordic (Sweden, Finland, Denmark)

Number of employees: ~9 150
Electricity generation: 84,9 TWh



Business Group Central Europe

Germany

Number of employees: 19 660
Electricity generation: 72,8 TWh

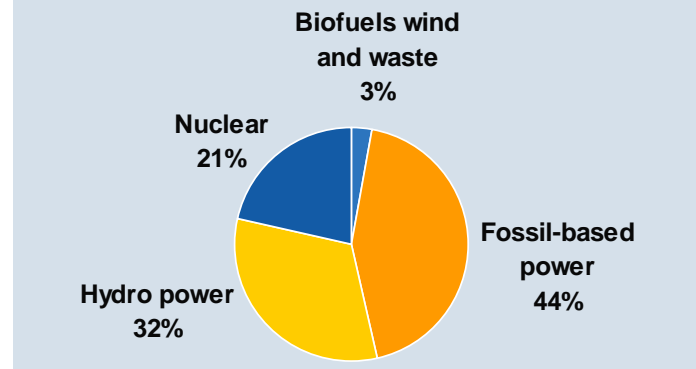
Poland

Number of employees: 2 740
Electricity generation: 3,8 TWh

Key figures Vattenfall Group in 2007

Net sales	15 168 MEUR
Electricity generation	167,6 TWh
Heat Sales	36,2 TWh
Employees	~32 400
Electricity customers	~ 6 million
Local networks	289 500 km
High voltage grid	10 000 km

Total installed capacity (35 GW)



Vattenfall use of bioenergy

- Approx. 50 plants using renewable fuels for bio heat and power
- Mainly in Sweden and Finland but also in Germany, Denmark and Poland
- Biomass used e.g. forest residues, demolition wood and waste fuels
- Extensive R&D investments in e.g. co-combustion, corrosion and recycling of ashes



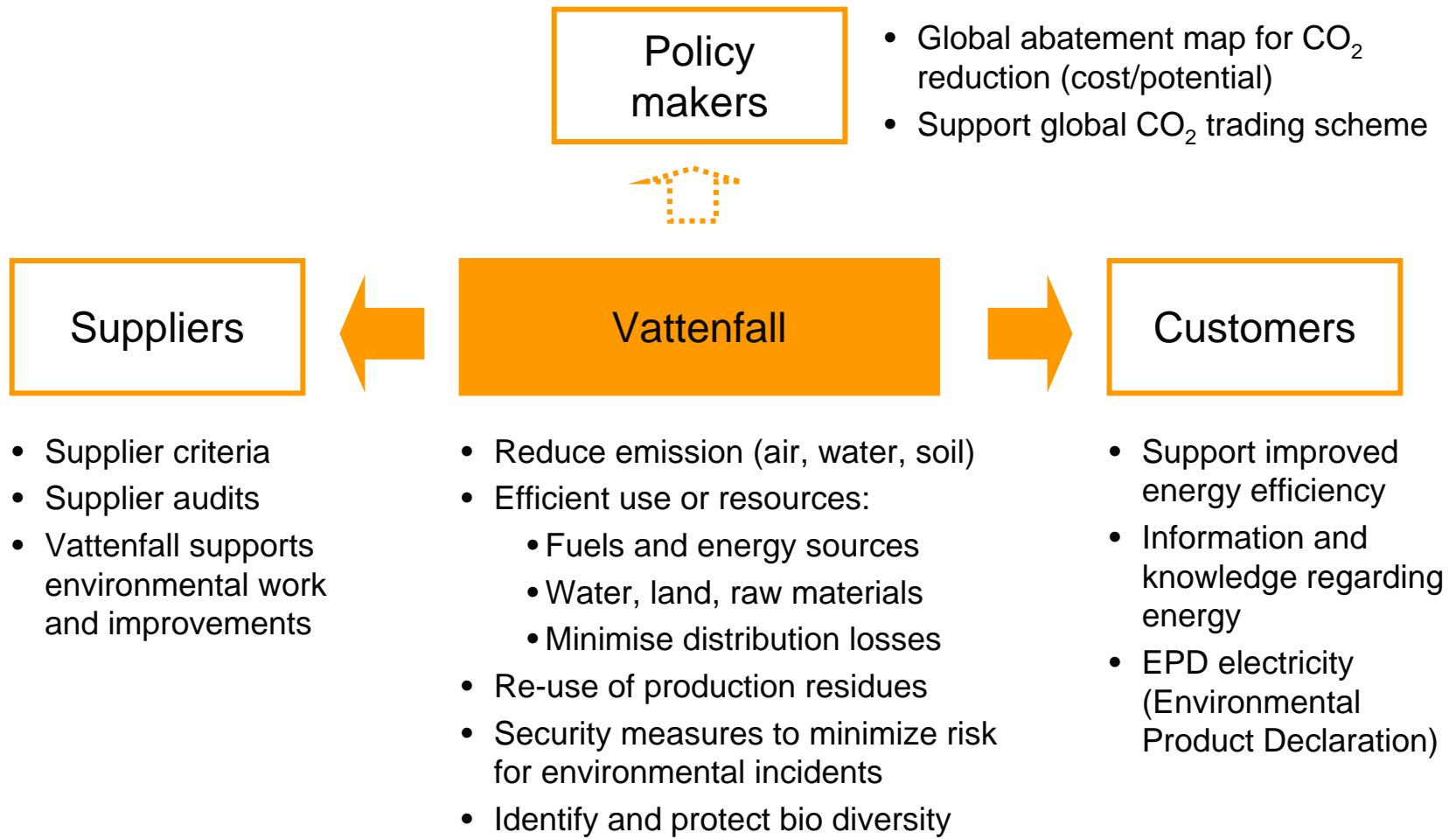
Some drivers for use of bioenergy

- Vattenfall's ambition is to be Number One for the Environment and the Customer
- Vattenfall's CO₂ reduction target is 50% by 2030*
 - In addition, the vision of the Nordic operations is to be CO₂-neutral
- Many initiatives within Vattenfall stimulate increased use of renewables such as wind power and biomass

* Base year 1990



Vattenfall actions to improve environmental performance



Sustainability aspects of bioenergy

- Work led and initiated by Mrs Agneta Rising
Vice President Environment, Vattenfall Group

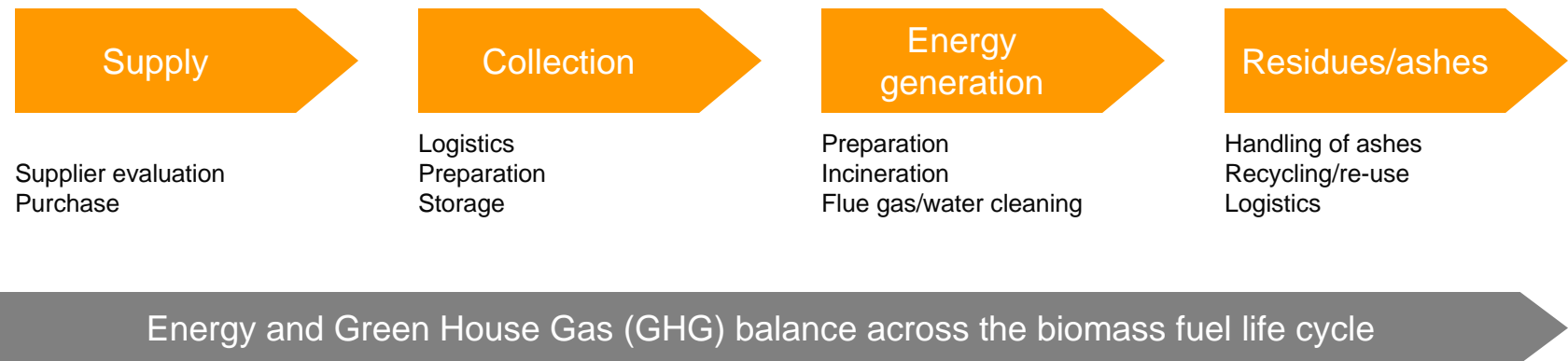
Tasks include:

- Forming Vattenfall opinion on sustainability aspects of bioenergy
- Identify sustainability aspects for different fuels, and acceptable criteria for use
- Internal workshop held in May 2008 with representatives from across Vattenfall:
 - Finland, Denmark, Germany, Poland and Sweden
 - Strategic planners, Environmental managers and experts, R&D, Purchasers etc.
- Approx 50 biomass fuels considered

Biomass fuel groups

1. Forestry
2. Agricultural
3. Bio oils
4. Energy crops
5. Biogas
6. Waste

Bioenergy – sustainability aspects



Examples of sustainability aspects in the life cycle:

Local env. impact:

- Soil conservation (carbon stock, health, productivity)
- Biodiversity/deforestation
- Water use

Other aspects:

- Competition with food, transport and other industry
- Poverty reduction and development of society
- Human rights
- Labour standards
- Anti-corruption

- Transport (distance and transportation mode)
- Emissions from preparation and storage

- Emissions to air and water from storage, preparation and incineration
- Energy efficiency
- Chemical use

- Recycling and re-use of ashes and other by-products
- Hazardous waste
- Transport

Aspects can be relevant in more than one step

Some issues identified

- GHG balance throughout different fuel value chains
 - LCA data on e.g. wood chips, pellets and willow
 - CO₂ time perspective often not included in LCAs
 - What methodology will be generally accepted?
 - How far reaching GHG criteria can an individual company have on biomass fuel suppliers?
- Conflict with food production
 - Reality already or perceived or created by media?
 - Is oil and market expectations increasing food prices?
 - How is current research conducted?

Some conclusions so far

- Sustainability aspects of biomass are complex and further work and research is needed
- A life cycle perspective is taken on bioenergy conversion to ensure that it is resource and energy efficient, and biomass residues and waste materials shall be utilized when possible
- Suppliers of bioenergy fuels shall comply to Vattenfall's CSR supplier criteria (based on UN Global Compact) as well as additional bioenergy-specific criteria*

* *or show action plan on how to reach compliance*

Vattenfall general CSR criteria

- CSR criteria for prequalification of suppliers
- Aspects being covered:
 - Environmental management system
 - Climate change management
 - Environmental reporting
 - Human rights policy
 - Labour standards policy
 - Evaluation of sub-contractors
 - Social and ethical reporting
 - Social, environmental and ethical standards
 - Prevention of bribery and corruption

Next step

- Opinion paper including guiding principles for bioenergy
- Sustainability aspects to consider for use of different biomass fuels
- Extended procurement criteria for biomass suppliers

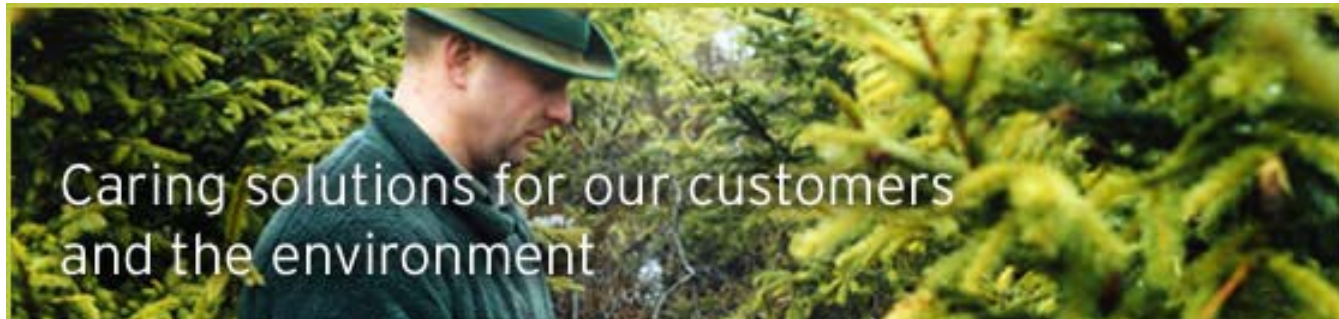


Image: www.vattenfall.com

Thank you for your attention!

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