

Renewable energy and energy efficiency improvement

STRONG INVESTMENT IN WIND POWER

Vattenfall is making a concerted effort to take a leading role in renewable electricity and heat generation where commercial conditions exist. In 2006, work was begun on Lillgrund, one of Europe's largest wind power farms. Vattenfall's environmental work also includes analyses and advice on energy efficiency.

Renewable sources of energy will be playing an increasingly prominent role in the future, as fossil fuels become more expensive and assets become depleted. Naturally, the environmental factor is also critical: renewal forms of energy result in small net CO₂ emissions and must therefore increase as a proportion of the total energy mix if humankind is to successfully tackle the major climate issues. Thus far, however, renewable forms of energy account for a very small part of total energy generation. The investment costs are high, and it will take a long time before these forms of energy can make any major volume contributions.

Of global electricity consumption, today just under 2% consists of renewable energy, excluding hydro power, which accounts for approximately 16%. Most is generated by fossil fuels (oil, coal and natural gas), which account for nearly two-thirds of global electricity generation, while nuclear power accounts for roughly 16%, according to the IEA.

The EU's goal is that 20% of total energy will be derived from renewable energy sources by 2020, compared with 6%

in 1997. With respect to electricity generation, the goal is 21% by 2010, compared with 14% in 1997.

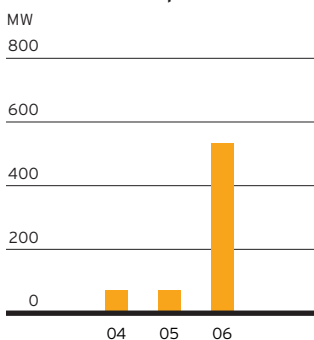
To increase the share of electricity generated from renewal forms of energy, many European countries have introduced economic support systems designed to favour such generation. Sweden has a system based on so-called electricity certificates. Electric utilities receive one electricity certificate for each MWh of renewable electricity they generate. Electricity customers must buy these certificates based on their own electricity consumption. Poland has also introduced "green certificates", which can be traded on the electricity exchange or bilaterally, while Germany has a system of subsidies for renewable electricity that provides a fixed price to electricity producers.

Vattenfall a driver in this development

Vattenfall's ambition is to play a leading role in renewable electricity and heat generation where ecological, technological and commercial conditions exist. The focus is

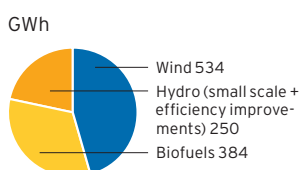
Generation of renewal energy in the Nordic countries

Installed wind power



Through the acquisition in Denmark, Vattenfall more than quadrupled its wind power generation in the Nordic countries in 2006. The rate of growth will continue to be high in the years ahead as a result of the investments currently being made in the Lillgrund wind power farm, among others.

Generation of renewable energy



Wind power accounts for the largest part of Vattenfall's generation of renewable energy, excluding large-scale hydro power generation.

Return on Vattenfall's investments in renewable generation in the Nordic countries 2006

	Wind	Hydro	Heat	Total
Operating profit, SEK million	61.5	117.1	253.2	431.7
Investments, SEK million	3,793.4	23.3	315.1	4,131.8
Property, plant and equipment, SEK million	5,627.9	271.8	3,822.0	9,721.7
Return on property, plant and equipment, %	2.0	43.1	6.6	6.1

Vattenfall's renewable energy generation in Nordic countries¹ (GWh)

	2002	2003	2004	2005	2006
Electricity					
Hydropower (small scale + efficiency improvements)	156	150	211	214	250
Windpower	51	54	58	46	534
Biofuels	525	503	497	547	384
Heat					
Biofuels	4,020	3,844	4,506	4,577	4,138

1) "Renewable energy" pertains to newly started and existing electricity generation that qualifies for electricity certificates in Sweden, newly started and existing electricity generation from plants in the other Nordic countries which, if they had been in Sweden, would have qualified for electricity certificates, and newly started and existing heat production from renewable energy sources.

More offshore wind power farms on the horizon



Vattenfall's wind power capacity will be increasing sharply in the years ahead. In autumn 2007, the first wind power turbines at Lillgrund, off Sweden's Skåne coast, will begin spinning. In all, the farm will include 48 wind power turbines, which together will be able to generate electricity for 60,000 households. The total investment in this project is approximately SEK 1.7 billion.

In addition, during the year, 24% of the generation capacity of the Danish power companies Elsam/E2 was brought into the Vattenfall Group. The acquisition included, among other things, more than 400 wind power turbines and with combined generation capacity of 447 MW. Vattenfall is also planning to build additional offshore wind power farms, at Kriegers Flak, Borkum West and Trolleboda, among other locations (see map at right).



on hydro power, biofuels and wind power. Vattenfall is also participating in national and European research programmes in areas such as wave energy, hydrogen gas, fuel cells, geothermal power and solar energy.

By positioning itself at the forefront and driving this development under commercially feasible conditions, Vattenfall can contribute to ecologically and economically sustainable development. This is in line with the company's strategic ambition to be Number One for the Environment.

In 2006 Vattenfall invested SEK 761 million (650) in research and development (R&D), of which SEK 64 million (56) pertained to R&D in renewable energy and SEK 126 million (61) pertained to other ways of reducing climate-affecting CO₂ emissions from Vattenfall's operations.

In the Nordic countries, Vattenfall stepped up its ambition level even further in 2006. In Sweden the goal is to increase electricity generation from renewable energy sources by 10 TWh by 2016. Most of the projects pertain to wind power, and the total investment can amount to upwards of SEK 40 billion. In summer 2006 the Swedish government extended its electricity certificate program until 2030, which is a necessary precondition in order for these investments to be profitable.

At the forefront of wind power development

In 2006 Vattenfall began construction of a wind power farm

at Lillgrund, 7 km off Sweden's Skåne coast. Lillgrunden is the largest wind power investment in Sweden and one of the largest in Europe, and will yield 330 GWh of electricity per year. The farm is scheduled to be commissioned in 2007.

In addition, Vattenfall has acquired the rights to develop the Swedish part of Kriegers Flak, an area in the southern Baltic Sea, where there is an opportunity to build one of the world's largest wind power farms. In total the project involves approximately 130 wind power turbines with approximately 2 TWh in annual electricity generation. Also in Germany, Vattenfall is investigating opportunities to build large offshore wind power farms. As an initial project, 12 large offshore wind power turbines (approx. 5 MW/turbine) are being planned, together with partners, at Borkum West in the North Sea.

In 2006 Vattenfall also took over 24% of the production capacity from the Danish energy companies Elsam/E2, which includes more than 447 MW of wind power. Altogether, Vattenfall is now one of the top five wind power generators in Europe, with total generation of 0.6 TWh in 2006.

Major investments in biofuel-based generation

Vattenfall has some 90 biofuel-fired heat and combined heat and power (CHP) plants and is thus one of the world's largest buyers and users of biofuel. The goal is to use biofuel as far as possible, often as the main fuel in a mix of fuels, but also as a sole fuel source. Continuous development and optimisation of

biofuel boilers is currently being conducted within the Group in an effort to increase efficiency, lower corrosion damage and achieve lower emissions, such as of nitrous oxides.

Biofuel-fired plants are steadily accounting for a greater share of total energy generation. In Sweden and Finland, facilities are being continuously upgraded to accommodate a greater share of biofuel and a lower share of fossil fuels. In Germany and Poland, work is in progress on upgrading old plants in order to change the fuel mix and achieve a higher share of renewable fuel. The Zérán plant in Warsaw, Poland, is a prime example, where coal and biofuel are being used in parallel with successful results. In Denmark, investments are being made in the Fynsverket and Amagerverket facilities to accommodate combustion of hay to a higher degree.

Vattenfall is also making major new investments in the field of biofuels. In Hamburg, Vattenfall has built a CHP plant based on recycled lumber and demolition lumber, while in the German town of Sellessen, near Cottbus, and in the Swedish town of Motala, CHP plants based on biofuels have been inaugurated. In Denmark, two CHP plants that will use hay are currently being built.

More efficient hydro power

Hydro power plays a very important role in Nordic electricity generation and accounts for about 50% of total electricity generation in the region. Vattenfall has more than a hundred hydro power plants in the Nordic countries – mostly in Sweden – which during a normal year generate roughly 33 TWh of electricity.

Vattenfall's many hydro power plants have provided a wealth of knowledge about how hydro power can be generated with minimal environmental impact and how new research findings and technological solutions can be used to improve the efficiency of today's hydro power plants.

Vattenfall invests heavily in hydro power. The goal of these investments is to secure generation over the long term, improve environmental aspects, lower maintenance costs and increase production.

In Germany, Vattenfall operates six hydro power plants and eight pumped storage power plants. The latter are used to store energy in order to even out generation between periods with low and high consumption. They are important tools for balancing the irregular input of wind power into the electricity grid.

Greater focus on energy efficiency-improvement

Energy efficiency-improvement is a vital tool in the work on reducing CO₂ emissions. In a green paper in spring 2006, the EU laid down the goal of improving the efficiency of energy use by 20% in the Member States by 2020. This corresponds to annual savings in the billions of euro. The measures include, among other things, energy certifications for buildings, an increase in and more targeted information, and subsidies for energy-efficient technologies. Moreover, every Member State has been required to implement a national action plan for improving energy efficiency.

Industries as well as households can save a lot of money through more efficient use of energy. Vattenfall offers advice on energy efficiency-improvement measures both to private and corporate customers.

Improving the efficiency of industrial energy use

Vattenfall is committed to strengthening its customers' competitiveness by providing customised solutions for improving the efficiency of both their energy use and their processes. In the Nordic region, Holmen, Höganäs and Korsnäs have all commissioned Vattenfall to review their energy use. For customers, this entails that Vattenfall identifies efficiency-improvement measures and evaluates them together with the customer. A list of priority efficiency-improvement measures is then prepared.

In the actual implementation for the cases at hand, Vattenfall has stood for the financing – planning, purchase of technical equipment, installation and operation – and the gains have then been shared over a number of years. The customers have not had to invest time or money, and their operating cash flows have thus not been affected. Vattenfall also offers to devise and implement energy management systems for industrial companies.

Vattenfall also offers energy efficiency-improvement services in Germany. One example is the Havelhöhe Hospital in Berlin, where Vattenfall installed new energy technology to lower the use of water, heat and electricity. The one-time cost of this measure was EUR 900,000, with annual energy savings of EUR 180,000. The measure is financing itself through the major savings that have been achieved. In a similar manner, Vattenfall has helped the city of Berlin improve the energy efficiency of some 200 buildings in recent years.

Vattenfall also co-operates with customers to devise suitable strategies and risk policies related to electricity contracts. Market pricing can benefit customers that have the opportunity to reduce their consumption when electricity prices are high, such as during high load periods or power peaks. This contributes to efficient utilisation of the power system.

Advice and tips for household customers

Vattenfall provides advice on a continuing basis to households on how they can lower their energy consumption. This advice is distributed both on Vattenfall's websites, in information brochures and by Vattenfall's customer service units. Vattenfall's approach in its advice to customers is that electricity is a product which in many ways simplifies and raises the quality of life, and that it should be used efficiently.

Vattenfall's consumer publications provide practical tips on how to improve energy efficiency. Among other things, descriptions are provided of how much electricity various household appliances use and how customers can reduce their use of household electricity through very small measures. Vattenfall also describes how home heating affects electricity consumption and how households themselves have the opportunity to affect their total electricity consumption.



SUSTAINABILITY INITIATIVES

Vattenfall's energy solutions should meet customers' requirements and at the same time contribute to long-term sustainable development. The company's goal is to create value economically, socially and environmentally.

Throughout history, people have struggled with the challenge of how to use nature's resources. The challenge confronting humankind today is no longer one of mastering nature. Rather, it's about sustainability – about finding a balance between using and conserving our natural resources.

This also means that the demands and expectations placed on energy companies by society have changed. We must take the step from being solely a producer of energy to also being a good citizen. All our engineering know-how, all our economic strength and all our influence must – together with all the other players in society – be focused on solving the tough challenges that lie ahead in securing the energy supply while supporting sustainable development of society.

Vattenfall's interpretation of sustainable development is the same as the Brundtland Commission's: Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

We emphasise a holistic view of sustainable development as a continuous process that takes economics, the environment and societal aspects into account. Vattenfall must be successful at creating value in each of these dimensions, where economic strength is fundamental in order to create value in the other two dimensions.

As one of Europe's largest energy companies, Vattenfall has a responsibility to provide energy solutions that meet our customers' needs while at the same time contributing to sustainable societal development.

Vattenfall has high ambitions and contributes actively to sustainable development, both by contributing our knowledge and through the decisions that we make. We run our plants in the best possible way and do everything that is within our reach to be the benchmark of the industry. Supporting sustainable societal development means that we strive to use our resources efficiently and responsibly, that we limit our impact on nature and biological diversity, and that we contribute to better living standards

and health for people. This concerns everything from small changes for becoming more effective in our daily work, to major investments, such as in CO₂ emission-free power plants (read more on page 4).

There is always a trade-off between the provision of energy and environmental consequences. The criteria for acceptable impact must be set in dialogue with society.

To communicate how we work with sustainability issues, Vattenfall has been publishing a Corporate Social Responsibility Report for the past three years. This is a vital tool for carrying on a dialogue with stakeholders on how we are living up to the expectations that are put on us and our role in society.

In the 2005 report, six themes were chosen to convey how we actively work with matters that are crucial for sustainable development of society – curbing climate change, safeguarding the nuclear fuel cycle, investing in renewable energy, securing energy supply to customers, utilising fossil fuels efficiently, and leading the energy sector.

For more information, visit www.vattenfall.com/csr.



Vattenfall's CSR report conforms to the most widely used standard for CSR reporting, namely, the guidelines of the Global Reporting Initiative (GRI). These guidelines consist of a set of indicators that measure the company's impact on the environment, society and the economy. GRI is an independent institution whose mission is to develop and disseminate globally acceptable sustainability reporting guidelines. These guidelines are voluntary and are currently used by approximately 1,000 companies around the world. For more information, visit www.globalreporting.org.