

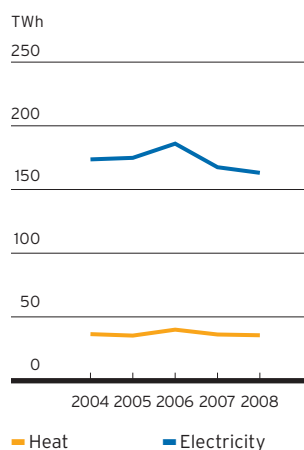
CORPORATE SOCIAL RESPONSIBILITY REPORT 2008

WHAT WE WANT > WHAT WE DO > WHAT WE HAVE ACHIEVED

VATTENFALL AT A GLANCE

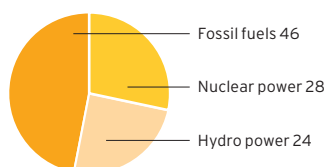
Vattenfall is Europe's fifth largest generator of electricity and the largest producer of heat. Consolidated sales in 2008 amounted to SEK 164,549 million. Vattenfall's vision is to be a leading European energy company, and its main products are electricity and heat. Vattenfall works in all parts of the electricity value chain: generation, transmission, distribution and sales, and generates, distributes and sells heat. Vattenfall also

Vattenfall's total electricity and heat production



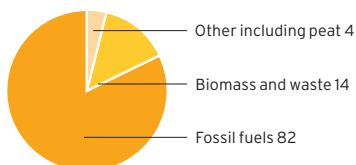
Short term variations are due to variations in weather related factors, economic fluctuations etc.

Electricity generation 2008¹, %

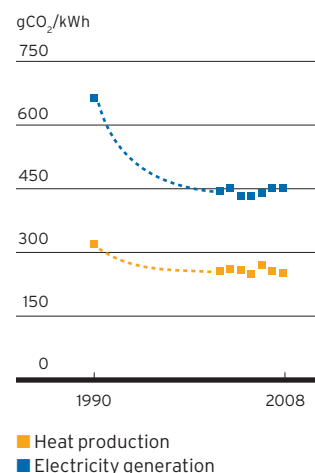


1) Wind power, biomass and waste amounted to 2.4 TWh for 2008 and 1.9 TWh in 2007, corresponding to approximately 1-2% of Vattenfall's total electricity generation.

Heat production 2008, %



CO₂ emissions per generated unit



Specific CO₂ emissions from Vattenfall's total electricity and heat production, incl. acquired companies. Approximate values for 1991-2002.

Key data

		2008	2007	Change, %	2008 (MEUR) ¹	2007 (MEUR) ¹
Net sales, SEK million	▲	164,549	143,639	14.6	15,041	13,130
Net profit, SEK million	▼	17,763	20,686	-14.1	1,624	1,891
Return on equity, %	▼	13.6	17.6			
Investments, SEK million	▲	42,296	18,964	123.0	3,866	1,733
Average number of employees						
Sweden	▲	9,126	8,698	4.9		
Denmark	▲	684	653	4.7		
Finland	▶	490	490	0		
Germany	▼	19,760	19,770	0		
Poland	▼	2,712	2,759	-1.7		
UK	▲	9	0			
Other countries	▼	20	26	-23		
Total	▲	32,801	32,396	1.3		
Electricity generation ² , TWh	▼	161	166	-3		
Heat production ² , TWh	▲	38.5	38.1	1		
CO₂ emissions, million tonnes						
Sweden	▲	0.424	0.367	15		
Denmark	▼	5.26	6.13	-14		
Finland	▶	0.328	0.328	0		
Germany	▼	70.4	71.7	-2		
Poland	▼	6.06	6.14	-1		
Total	▼	82.5	84.7	-3		

1) Exchange rate
SEK 10.94=EUR 1

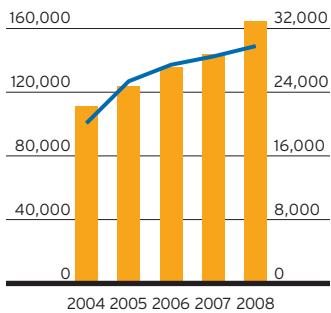
2) Definition of electricity generation and heat production, see page 51.

conducts energy trading and lignite mining. The Group has approximately 33,000 employees. The Parent Company, Vattenfall AB, is 100%-owned by the Swedish state. Operations in 2008 were conducted in Sweden, Denmark, Finland, Germany, Poland and the UK. Through the planned acquisition¹ of the Dutch energy company Nuon, starting in 2009 Vattenfall will also have operations in the Netherlands and Belgium.

1) Read more on page 70 of the 2008 Annual Report.

Sales and operating profit

Sales, SEK million
200,000
Operating profit, SEK million
40,000

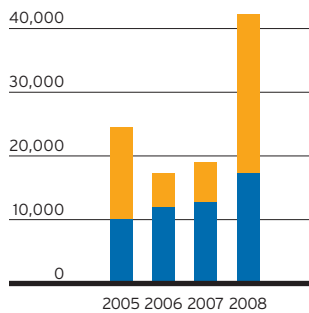


■ Net sales
■ Operating profit¹

1) Excl. items affecting comparability.

Investments

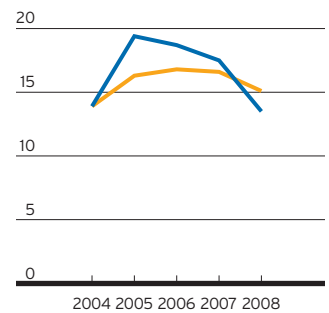
MSEK
50,000



■ Maintenance investments
■ Growth investments

Profitability, %

%
25



■ Return on equity (IFRS)¹
■ Return on net assets¹

1) Excl. items affecting comparability.

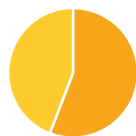
Business Group Nordic

Vattenfall is the leading energy group in the Nordic region, with a market share of approximately 20% in electricity generation. Operations cover Sweden, Finland and Denmark as well as Vattenfall's wind power investments in the UK. Vattenfall produces, distributes and sells both electricity and heat. Hydro and nuclear power are the base of electricity generation, while wind power, biomass, waste and fossil fuels are also used. Vattenfall sells district heating and has a substantial volume of heat production, largely based on biomass, and is the fourth-largest supplier of heat in the Nordic countries. Vattenfall also conducts consulting and contracting activities, mainly in the energy sector.

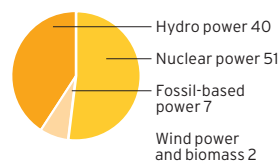
Share of Group's external net sales¹, 33%



Share of Group operating profit¹, 56%



Production mix, generated electricity, %



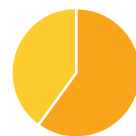
1) The segment Other reported external net sales of SEK 10,635 million (7%) and an operating loss of SEK -2,005 million (-7%).

Business Group Central Europe

Business Group Central Europe comprises operations in Germany and Poland. In Germany Vattenfall produces, distributes and sells electricity and heat and is currently the country's third-largest producer of electricity and the largest supplier of district heat. Production is based mainly on lignite. Operations include open-cast lignite mines in Lausitz, power plants in eastern and northern Germany, the transmission grid in eastern Germany, and local distribution networks in Berlin, Hamburg and Mecklenburg Vorpommern.

In Poland, heat production and heat sales are the largest part of operations, where Vattenfall has a market share of approximately 12%. Electricity and heat production are based primarily on coal. Vattenfall also owns and operates electricity networks, and distributes and sells electricity, mainly in south-west Poland.

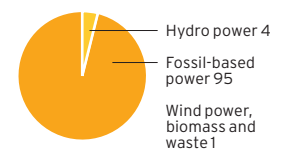
Share of Group's external net sales¹, 60%



Share of Group operating profit¹, 51%



Production mix, generated electricity, %²



2) In the German operations, Vattenfall normally generates electricity also from nuclear power. However, in 2008 two of the German nuclear power plants were offline (see page 2 of the 2008 Annual Report).

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CEO's comments

STRENGTHENING OUR STRATEGY TO SUPPORT SUSTAINABLE DEVELOPMENT

This year marks the first time that Vattenfall's sustainability report is being published in conjunction with the Annual Report. Thereby, we are able to present a concurrent report package for 2008 that covers all aspects of Vattenfall's operations. In our Annual Report we have chosen to describe a number of key areas in which Vattenfall is investing for tomorrow's energy generation, while the CSR report focuses on a number of areas in which our stakeholders often have questions and views.

Vattenfall's task as an energy company is to provide its customers with energy; but we also see our role from a broader perspective. The operations we conduct have a major impact on society – globally, regionally and locally – and thus all of society is our customer. We are therefore convinced that Vattenfall's success will be determined by our ability to support sustainable development in society, and we are relentlessly striving towards that goal. Our five strategic ambitions have been vital tools in this work during many years and will continue to be so in the future.

In 2008 Vattenfall redoubled its efforts by adopting a strategic direction that we summarise in three words: Making electricity clean. This is our promise to customers and society, and it entails that we continue reducing the environmental impact of all our operations at the same time that we emphasise the significant role that electricity will play in the sustainable society of tomorrow. An integral part of this strategy is Vattenfall's climate vision – to be a climate-neutral company by 2050. For 2030 we have set the target of halving our CO₂ emissions per kWh from energy generation compared with 1990.

The years 2030 and 2050 may seem almost unrealistically distant. However, in the energy sector, investment periods are long and the planning horizon stretches many years into the future. Achieving our highly placed climate goals requires that we act now. Therefore, we are currently pursuing a concrete and realistic plan for Vattenfall's generation portfolio until 2030. And already by 2020 and earlier, Vattenfall's contribution to the EU's climate targets will be substantial.



To achieve its objectives, Vattenfall must step up to the challenge in many areas. More energy sources than today will be utilised, and a number of new, technical solutions that enable energy supply with high environmental standards are being introduced. The new Carbon Capture and Storage (CCS) technology plays a central role in reducing CO₂ emissions from fossil-fired power plants, but so far this is still in a development stage. Another important and rapidly growing component in tomorrow's energy generation is renewable energy, such as hydro power, wind power,

bioenergy and ocean energy. Nuclear power is also expected to make a significant contribution to energy supply in the future.

A large part of Vattenfall's work is about developing and using new technologies. Surely there are those who refer to us at Vattenfall as technology optimists – it is a description that I embrace with pride. At Vattenfall we believe in the promise that modern technology offers. For 100 years Vattenfall's engineers and technicians have come up with innovative solutions that have helped increase the capacity and cost-effectiveness of energy generation while reducing its environmental impact. In recent decades, new technology has helped to virtually eliminate emissions of particles and sharply reduce emissions of sulphur dioxide and nitrogen oxides from fossil-fired power plants. I am convinced that technological solutions in the coming years will play a key role in the realisation of Vattenfall's strategies.

Vattenfall can do a lot – and will do a lot – in the fight against global warming. But political decisions are also needed, such as in the form of a global pricing system for carbon emissions. When international regulatory systems provide the right incentives, investments in climate-neutral energy generation will truly gain momentum. This is why Vattenfall, in parallel with the major investments we have been making in our own plants, has been actively working for many years as an opinion-shaper on the climate issue. We have launched a number of initiatives that put the spotlight on the climate challenge and have urged people to become involved. These include, among others, our Climate Abatement Map and the international 3C corporate initiative, Combating Climate Change.

But it is not until the launch of our Climate Manifesto that Vattenfall's environmental ambitions became truly known among the broad public. Starting in autumn 2008, in an extensive campaign conducted in six European countries through print and TV advertising, Vattenfall invited the general public to sign a manifesto demanding a global price for CO₂ emissions, more support for climate-friendly technologies, and climate requirements for products. By the

end of January 2009, 235,000 people had signed the manifesto, which will be presented at the UN's major climate conference in Copenhagen in autumn 2009.

Our goal with the Climate Manifesto is to give a voice to the strong public opinion that exists with respect to the climate issue, but also to spark a debate. We have succeeded in achieving both objectives, and Vattenfall will continue to invite critics and supporters alike to continued dialogue in this most pressing issue for society.

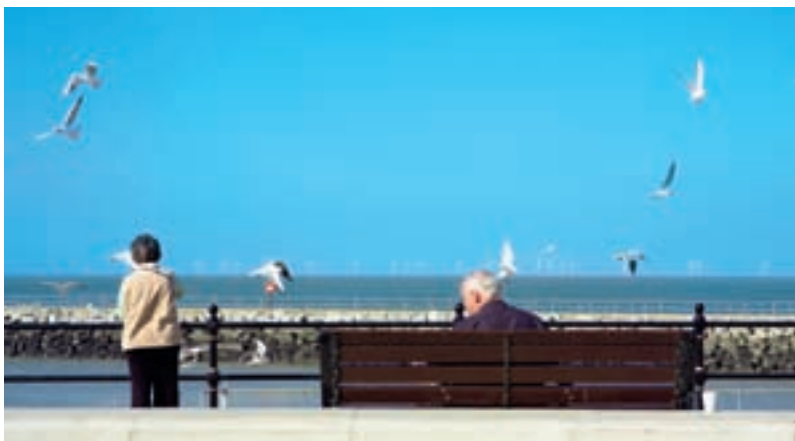
In 2008, Vattenfall also signed the UN Global Compact, which include the UN's ten principles regarding human rights, labour rights, the environment and anti-corruption. By doing this, we express our intent to support and advance those principles within our sphere of influence. We are committed to incorporating these principles into our strategy, culture and day-to-day operations.

Finally, I would like to stress that Vattenfall's work on supporting sustainable development of society through our strategic ambitions, our strategic direction of Making electricity clean, and our climate initiatives, is all about development and progress – for us and for society. We are convinced that a strategy that prepares us today to meet the demands of the future on environmental performance, profitability and social responsibility, is a winning strategy. We are eager to get started in 2009 and on 23 February 2009 we announced the intention to acquire Dutch Nuon, which will significantly increase our strength and possibility to reach our ambitions.



Lars G. Josefsson, President and CEO

Positive events in 2008



Developing Vattenfall's generation portfolio

A number of important steps were taken to develop Vattenfall's generation portfolio. In September the pilot CCS plant at Schwarze Pumpe, Germany, was inaugurated, where CCS technology is being tested for the first time in a power plant. Strong investments in wind power continued. In June the official inauguration was held of the Lillgrund wind farm in the Oresund Strait between Sweden and Denmark, and during the autumn Vattenfall acquired the wind power companies AMEC Wind and Eclipse Energy, and the Thanet Offshore Wind farm – all in the UK. And in partnership with ScottishPower, Vattenfall will be participating in the bidding process for the continued expansion of offshore wind power in the UK. Through the acquisition of Irish Pandion, which was realised in the beginning of 2009, Vattenfall is also taking an active role in the development of wave power.

At the end of the year, Vattenfall decided to take a leading global position in nuclear safety and power generation. The decision made by the Swedish government in February 2009 to allow new construction of nuclear reactors also enables continued electricity generation with low emissions.

A major investment in biomass in Denmark was decided on in December 2008. Through the Max-Bio program, up to 724,000 tonnes of coal will be replaced by biomass by 2018.

In February 2009, Vattenfall announced its offer on the Dutch energy group Nuon. Together, the companies will have a strong position to accelerate investments in renewables and to develop the CCS technology.



Moorburg go-ahead

In September Vattenfall received the green light to proceed with its project work on the new Moorburg combined heat and power plant in Hamburg, Germany. In the foreseeable future, there is no alternative to coal to cover Europe's need for electricity and heat, and through modern efficient power plants, total carbon dioxide emissions are being reduced. The Moorburg plant is designed to incorporate CCS technology in the future.



Improved customer satisfaction

During 2008 Vattenfall's Customer Satisfaction Index scores improved, particularly in the Nordic countries, while in Germany Vattenfall is once again attracting new customers.

Negative events in 2008

Nuclear power plants offline

Vattenfall's nuclear power plants in Germany, Brunsbüttel and Krümmel, remained offline throughout 2008 following the scrams in 2007. The reasons for the scrams were remedied the same year, however, as a result of time consuming controls and verification work as well as new demands that have been raised, the plants have not yet been able to be restarted. In Sweden, the Forsmark nuclear power plant was also out of operation during the last quarter 2008, when several control rods were replaced due to defects. Despite the negative impact on electricity generation, it is assuring that the safety routines at the power plants are working as intended.

Hydro power project stopped after referendum

In November, the residents of Vilhelmina, Sweden, voted against a project that would divert water from the Vojman River for the purpose of increasing electricity generation at the Stalon hydro power plant. This stopped a planned hydro power expansion of approx. 154 GWh per year (corresponding to roughly half of the output of the Lillgrund wind farm, or the electricity needs of 30,000 households). We are nevertheless grateful for the dialogue and co-operation shown by residents of the municipality during the pre-study.

VATTENFALL'S VISION AND STRATEGY FOR SUSTAINABILITY

Access to energy is a precondition for the function and development of society. However, all energy generation has an impact on the environment. Vattenfall supports sustainable development in society by managing the balance between secure energy supply and environmental and social consequences in a responsible way.

Vattenfall is committed to meeting society's need for energy in a responsible manner. The guiding principle is that meeting the needs of the present must never compromise the ability of future generations to meet theirs. The criteria for acceptable impact from energy generation and supply must be set in dialogue with society, within a framework defined by regulation and market mechanisms. Vattenfall believes that market-based solutions are the best way to strike a balance between diverging interests, combined with a carefully designed regulatory framework to obtain fair conditions and reach common targets and ambitions.

Vattenfall's vision is to be a leading European energy company; this requires excellent performance across the energy value chain. In order to support sustainable development in society, Vattenfall must create value in the economic, environmental and social dimensions. Financial strength is fundamental to the creation of social and environmental value.

What is expected from Vattenfall?

Vattenfall is engaged in a continuous and open dialogue with its stakeholders regarding their expectations and needs in relation to Vattenfall's undertaking to provide energy. Many stakeholders have very high expectations on Vattenfall, and they often represent varying interests and conflicting needs. Therefore, it is important for Vattenfall to include stakeholder expectations in decision-making and activities, to balance between varying interests, and to communicate how this is carried out. For more information on stakeholder expectations, see the Materiality analysis on page 40.

What is possible for Vattenfall to achieve?

Within the framework set by society, Vattenfall operates and invests in energy sources that support sustainable development – economically, environmentally and socially. To achieve sustainable development, decisions must be made from a long-term perspective. The relative merits of all options to generate energy must be assessed according to their individual characteristics and their ability to function together in the energy system.

Vattenfall manages its operations in accordance with its core values – openness, effectiveness and accountability – and for each energy source and each type of technology, Vattenfall strives to be best in class.

Vattenfall is taking a leading role in developing bridging solutions for energy systems of the future. These are the viable solutions needed to improve environmental performance and meet society's need for reliable and affordable energy. Such bridging solutions include renewables, coal using Carbon Capture and Storage (CCS) technology, and nuclear power. Vattenfall is also investing in research to develop and exploit potential future energy solutions, providing knowledge and expertise for the benefit of the company as well as society.

Vattenfall's strategies and work for sustainability

To ensure long-term value creation and realise the vision of being a leading European energy company, Vattenfall has established five strategic ambitions: Number One for the Customer, Number One for the Environment, Profitable Growth, Benchmark for the Industry and Employer of Choice. These ambitions interact with and are dependent on each other.

If Vattenfall is able to contribute to sustainable development in society by offering energy solutions that meet customers' needs as well as high environmental standards, then Vattenfall will also win the trust of its customers and the general public. By having the public's trust, the company can more easily attract the right competence. With the right competence, good leadership and committed employees, Vattenfall can become the Benchmark for the Industry. If Vattenfall is the Benchmark for the Industry, with focus on operational efficiency and value creation, the company can continue to expand with good profitability. This is a basic prerequisite for Vattenfall's ability to contribute to sustainable development in society, and work towards Making electricity clean and fulfilling the climate vision of being climate-neutral by 2050.

In all business activities and decisions, the five strategic ambitions are important tools for ensuring future value creation, which is the core of sustainability. For each strategic ambition, Vattenfall has set a strategy along with long- and short-term quantitative goals. For additional information, see Vattenfall's 2008 Annual Report. In the CSR report, the strategic ambitions have been aligned with selected Preferred Performance Indicators (PPI), which are GRI¹-indicators that are especially relevant for the respective ambitions.

1) Vattenfall's CSR report follows the GRI (Global Reporting Initiative) standard. For further information, see page 38 of the reporting section.

Strategic ambition – key strategies	Targets	GRI indicators to watch (PPIs)
<p>Number One for the Customer</p> <p>Increase customer orientation and market shares while boosting cost effectiveness</p> <ul style="list-style-type: none"> • Increase customer orientation in all areas of Vattenfall's operations. • Make sure that Vattenfall has products and services that best meet the needs of the respective customer segments. • Increase awareness about and strengthen the Vattenfall brand. • Continue growing the customer base and market shares. • Ensure reasonable profitability and maintain competitive strength through continuous improvements in cost effectiveness. 	<p>69 The target for 2011 is a Customer Satisfaction Index score of 69 for retail customers; the long-term target score is 70.</p>	<p>Customer satisfaction (PR 5)</p>
<p>Number One for the Environment</p> <p>Develop the generation portfolio towards clean energy</p> <ul style="list-style-type: none"> • Significantly increase investments in low-emitting energy generation (renewables, nuclear power and coal using CCS technology). • Increase the efficiency of existing electricity and heat production as well as of distribution networks. • Accelerate R&D activity, such as in CCS technology. • Actively work for global and market-oriented climate solutions to provide incentives for investment in low-emitting technologies. 	<p>-50 The target is to reduce CO₂ emissions by 2% in own operations from 2009 to 2011, corresponding to 2 million tonnes. The long-term target is a 50% reduction of CO₂ emissions per unit generated electricity and heat in own operations by 2030 compared with 1990 levels.</p>	<p>CO₂-emissions (EN 16) and other emissions¹ (EN 20)</p>
<p>Profitable Growth</p> <p>Drive growth through organic expansion and business development combined with acquisitions in priority markets</p> <ul style="list-style-type: none"> • Increase investments in organic expansion. • Continue M&A activities, primarily emphasising entry to new markets. • Pursue business development as a complement. 	<p>10 The target is an increase in generated electricity and heat corresponding to 17 TWh from 2008 until 2011. The long-term target is a 10% market share in the future integrated European energy market.</p>	<p>Financial targets (EC 1)</p>
<p>Benchmark for the Industry</p> <p>Strive for operational excellence through higher productivity and better utilisation of Group synergies</p> <ul style="list-style-type: none"> • Continuously execute performance efficiency programmes (benchmarking, benchlearning, improved processes). • Measure, follow up and reward improved performance. 	<p>-11 The target is a productivity improvement of 11% from 2006 until 2010, corresponding to a cost reduction of SEK 5 billion. The long-term target is to belong to the upper quartile of the energy industry.</p>	<p>Stakeholder engagement/external communication¹ (EU 18)</p>
<p>Employer of Choice</p> <p>Attract, retain and develop people and competencies for the future</p> <ul style="list-style-type: none"> • Strengthen talent management. • Attract, retain and develop excellent leaders. • Continue to develop the organisation by fostering greater employee commitment. 	<p>76 The target is a Commitment score of 76 in 2011. The long-term target is a score of 81.</p>	<p>Employee commitment¹ (HR 4, LA 7, LA 10) and diversity (LA 13)</p>

1) These indicators have been chosen as complements to the business planning targets since they are important measures of Vattenfall's performance from a CSR perspective.

8

The challenges of investing in new energy
The challenge is to generate energy with acceptable environmental impact at prices customers and society are willing to pay. Vattenfall's ambition is to develop its energy generation portfolio towards low-emitting energy sources.



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Technology as a tool for reducing emissions
Since the 1970s Vattenfall has been continuously investing in emission-reducing technology and has virtually eliminated emissions that have a direct effect on the environment, such as sulphur dioxide and particles. The plan now is to do the same with carbon dioxide.



WHAT WE DO

Vattenfall is investing heavily in solutions and initiatives to shape energy systems of the future that will support sustainable development of society. The following five sections provide in-depth descriptions of Vattenfall's work and challenges related to making this change happen.



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Coal-based power – new and improved
Despite all efforts on finding alternative sources of energy, coal will continue to play a major role in secure energy supply in the foreseeable future. However, it must be used as efficiently as possible and requires the introduction of new technologies to reduce CO₂ emissions. Vattenfall is investing to replace old coal capacity with new capacity.



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Efficient use of nuclear fuel
Significant progress has been made in the use of nuclear fuel in energy generation. Today nuclear fuels are much more advanced and efficient thanks to improvements in fuel fabrication and in how fuels are used in generation. This has resulted in less mining and a decrease in the resources needed, as well as a reduced amount of waste generated.

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A diverse Vattenfall performs better
Diversity is a necessity as well as opportunity to build a more profitable, effective and attractive Vattenfall. Having a diverse workforce is essential for creating an innovative performance-driven culture that supports Vattenfall's ambition to grow and lead the development of new energy technologies. Diversity also makes Vattenfall better equipped to understand different customer groups and their needs.



THE CHALLENGES OF INVESTING IN NEW ENERGY





In 2008 Vattenfall accelerated its expansion in wind power, primarily through acquisitions in the UK. The Thanet Offshore Wind project will have installed capacity of approximately 300 MW. With the acquisition of Eclipse Energy and AMEC Wind Energy Ltd, and the partnership with Scottish Power Renewables, Vattenfall has taken an active role in wind power development in the UK. Vattenfall already owns the Kentish Flats offshore wind farm in the UK, as well as two of the world's four largest offshore wind farms, Lillgrund off the southern coast of Sweden, and Horns Rev in the Danish North Sea. Vattenfall also operates one of the biggest wind farms in Poland and continues to invest there.

Over the next 20 years, the energy system must be further adapted to support sustainable development in society. The challenge is to provide energy with an acceptable environmental impact at prices that customers, and society, are willing to pay.

Vattenfall's ambition is to develop its generation portfolio in order to meet the long-term target of reducing CO₂ emissions per generated energy unit in own operations by 50% by 2030 compared with 1990. This will be done by replacing old capacity, investing in renewables and nuclear power, and applying CO₂ reduction measures in existing facilities. In addition, the planned growth of the portfolio will enable further emission reductions and meet rising European demand for energy with low emissions. This transition will take time and will require significant financial strength for investment. Vattenfall's plans are already being executed. For example, in 2008, Vattenfall's investments in wind power positions Vattenfall as one of the world leaders in offshore wind power.

Society's future need for energy is the starting point

Vattenfall's business is to provide energy to society. Energy supply of the future is bound by a number of requirements: it must be secure, stable, affordable, meet the environmental requirements of tomorrow, and in all other aspects support sustainable development in society.

Vattenfall's long-term generation portfolio planning is based on society's future energy needs and society's confidence in different energy sources. Development of the generation portfolio and the transition to new energy sources will be gradual and will be based on available technology, resources and infrastructure. New technologies can be introduced when they meet society's need for affordable energy, i.e., when the cost of generation has reached a level that makes energy generation commercially viable.

Vattenfall believes that Europe will be successful in its efforts to boost energy efficiency. This is indicated by estimations of future energy consumption in Europe, where Vattenfall's projection is 10% lower than official EU projections. However, the total amount of energy needed will still be significant, and meeting this need will require the use of all available energy sources. There is no single solution.

How investment decisions are made

Vattenfall's long-term investment roadmap to 2030 represents a transition to new energy sources to ensure future value creation and to reach the tough targets on reducing CO₂ emissions. For further information on strategies and targets, see the section "Vision and strategy for sustain-

ability” (page 4). Vattenfall takes a strategic approach to its production portfolio. In addition to fulfilling criteria for profitability and risk profile, each long-term investment must support Vattenfall’s strategic direction, and the strategic fit is determined by three important aspects:

The environment: Investments should support Vattenfall’s environmental ambition or have a specific role in the transition to the energy system of the future. Vattenfall has set tough targets for CO₂ reductions, which has consequences on investment decisions. The wind power acquisitions made in 2008 are examples of preferred investments. Fossil-based power generation will meet this criterion when Carbon Capture and Storage (CCS) technology is mature enough to be applied.

Society’s confidence: Society and the market must have confidence in the energy sources in which the investment is made. For example, demands are rising in society for renewable energy sources such as wind power. This is reflected in the introduction of government support schemes to compensate for generation costs above market price. There is also support in general for energy sources that create job opportunities and contribute to regional development.

Security of supply: Investments must contribute to the secure supply of energy and stable energy prices. This is achieved by basing generation on fuels with high security of supply, and balancing some energy sources’ dependency on weather conditions (for example wind) with stable base power (such as coal and nuclear power) and regulatory power (such as hydro power). Without security of supply, there is a risk for temporary shortages and blackouts, which would have significant negative impacts on society. Stable and affordable energy prices are the result of low investment costs and secure supply of fuels at stable prices.

An example on how these criteria are applied can be seen in Germany, where lignite is an important source of stable base power, with a supply that is estimated to last hundreds of years. It is also the backbone of industry in the eastern parts of Germany and plays an essential role in the region’s economic development. CCS technology, makes lignite-fuelled generation a viable investment option.

More information regarding Vattenfall’s investment options can be found on the following pages, which provide in-depth information about different sources, their advantages and disadvantages, and the current cost of generation with a market price comparison.

Vattenfall’s investments will develop the generation portfolio

Vattenfall’s roadmap for its future generation portfolio points to increased diversity in energy generation. Profit-

able growth will support achievement of the company’s environmental ambitions by creating the strength and flexibility needed.

Fossil-based power generation by Vattenfall will be rejuvenated with the introduction of Carbon Capture and Storage (CCS) technology. By 2030, coal-fired generation employing CCS technology is estimated to make up approximately 16% of total generation, which will significantly contribute to lower CO₂ emissions per kWh in Vattenfall’s portfolio. CCS will initially be introduced where the emission reduction impact is the greatest, taking into consideration plants with high emissions as well as plants with a long remaining useful life.

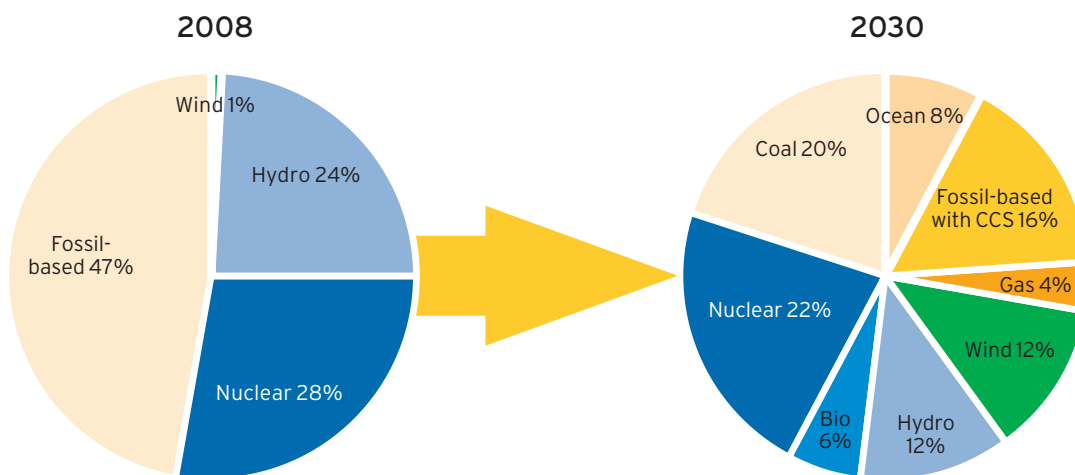
Wind power will grow significantly in Vattenfall’s portfolio. Through the investments made in 2008, Vattenfall is well on its way to becoming a world leader in offshore wind power. Investments will continue, and by 2030 wind power is expected to have equal weighting in the portfolio with hydro power. This will also require substantial investments in the electricity distribution grid.

Ocean energy, including wave and tidal power, encompasses technologies with immense potential. Ocean energy is also less weather-dependent than wind power, since waves are less variable in power and time. Vattenfall believes that by 2030, ocean energy will be as economically competitive as offshore wind, and the company’s investment plan includes various pilot projects in the years ahead. The Atlantic coastal areas in the U.K, Ireland, Norway and Denmark are well suited for ocean energy.

Bioenergy will play a role in heat and electricity generation, though not as a central energy source in the portfolio. Biomass, and especially residual products from other industries and waste, will be used in co-combustion with, and as a substitute for, fossil fuels when possible. Vattenfall addresses sustainability aspects in the use of bioenergy, including such factors as carbon neutrality, transport, and land use changes, such as the risk of deforestation and loss of biodiversity. Vattenfall takes a careful approach to bioenergy in its future generation portfolio.

Hydro power is an area where investments are attractive due to its low emissions and its potential as regulating power, which can be balanced against the use of other energy sources. The current expansion potential consists mainly of acquisitions outside Vattenfall’s existing markets. In 2008 a project planned in Vojmån, Sweden, was rejected by a local referendum. Other smaller projects will be continuously proposed. Hydro power will continue to play an important role at Vattenfall, but its share of total generation is expected to decrease to approximately 12% by 2030 due to the limited

Plans for Vattenfall's generation portfolio



Vattenfall's long-term investment roadmap represents a transition to new energy sources to ensure future value creation and to reach the tough targets on reducing CO₂ emissions. The roadmap for the future generation portfolio comprises an increased diversity in power generation and also reflects Vattenfall's intentions to grow. The roadmap is an example how Vattenfall's strategic ambitions are realised and is based on current knowledge and preconditions in terms of cost, environmental impact, society's confidence and security of supply.

Fossil-based power generation with Carbon Capture and Storage (CCS) technology is estimated to make up approximately 16% of

total generation. Wind power will grow significantly in the Vattenfall portfolio, and by 2030 ocean energy will be as economically competitive as offshore wind. Hydro power is an area where investments are attractive due to its low emissions and its potential as regulating power, and nuclear power is expected to continue as an important energy source. Bioenergy will play a role, though not as the most central energy source in the overall portfolio, and natural gas will probably play a minor role for Vattenfall also in the future. Other potential energy sources, such as geothermal and solar energy, are not predicted to be viable large scale options by 2030.

ability for expansion and growth of the total portfolio.

Nuclear power is important in Vattenfall's electricity generation. On account of its very low CO₂ emissions, environmental performance, competitiveness and safe operation, nuclear power will continue to be an important part of the energy system in the foreseeable future. Vattenfall believes that nuclear power is needed as a stable base power source and Vattenfall's roadmap calls for expansion of total nuclear power generation in markets where there is confidence in this source of energy. This includes renewing current capacity and potentially investing in new and more efficient capacity. However, the share of nuclear power in the total portfolio is expected to decline since other energy sources are expected to grow more.

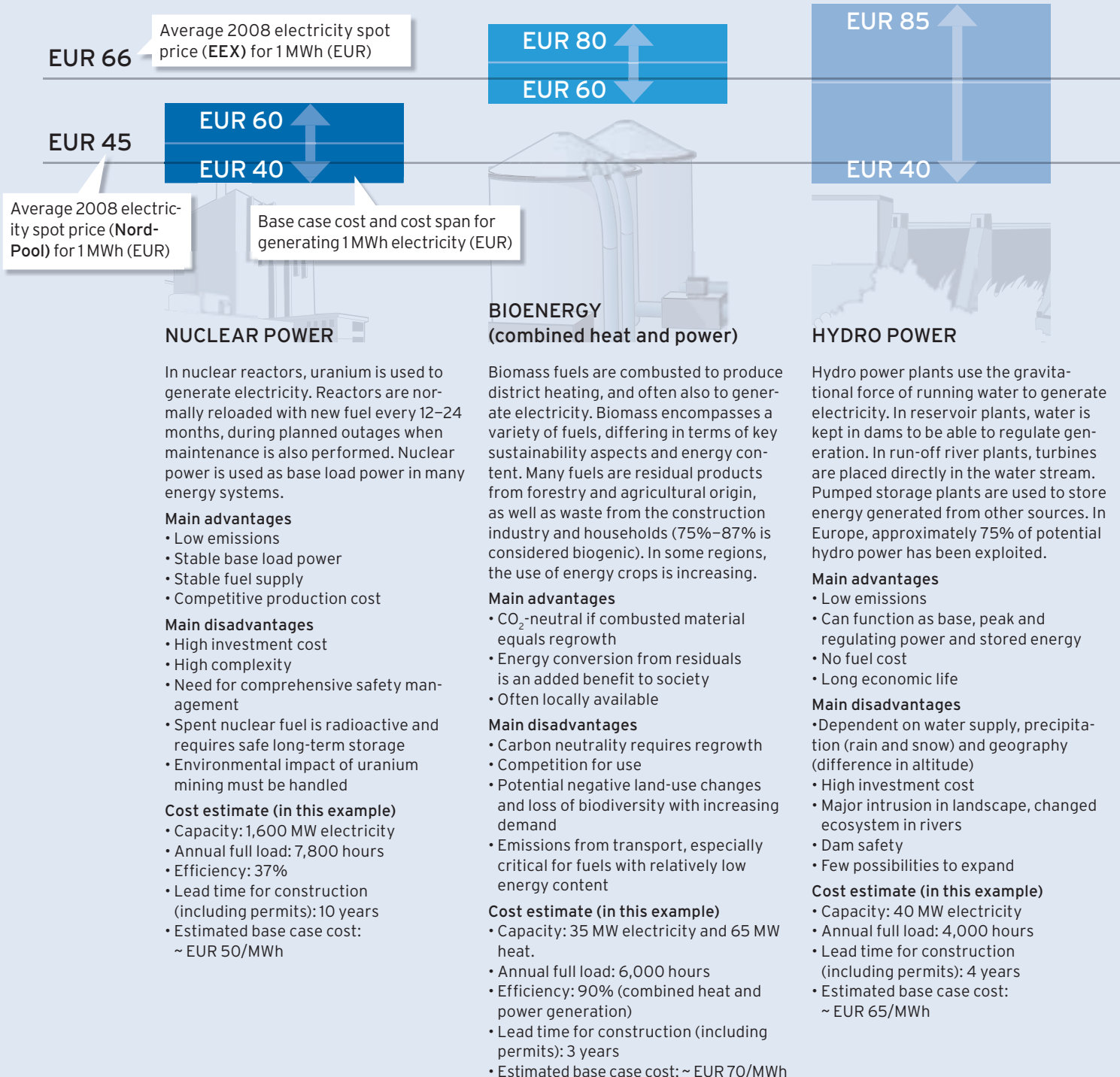
Natural gas will probably play a minor role in Vattenfall's generation portfolio also in the future. The most efficient way to use natural gas is in combined heat and power production (CHP). Nevertheless, gas is a fossil energy source of high cost and partly insecure supply conditions, and will in the long term require CCS technology to reach emission reduction targets, which will increase cost of generation.

Other potential energy sources, such as geothermal and solar energy, are currently not predicted to be viable large-scale options for Vattenfall's generation portfolio by 2030 given the available technology and cost of generation.

VATTENFALL'S ALTERNATIVES FOR NEW ENERGY GENERATION – PROS, CONS AND COSTS

Vattenfall's roadmap for its future generation portfolio is based on the advantages and disadvantages of the respective energy sources, and their respective roles in the energy system. Cost structures differ for the alternatives and depend on a variety of factors, such as fuel prices and the maturity of technology. Typically, new technology is more expensive, and cost decreases along with increased experi-

ence and larger scale. For investments to be profitable, the market price must cover all costs including cost of capital. In many countries, government support schemes and subsidies for renewable energy are being introduced to make these energy sources competitive. The cost calculations in this example are based on external sources and market fuel prices, as well as on Vattenfall's estimations on lead time.



NUCLEAR POWER

In nuclear reactors, uranium is used to generate electricity. Reactors are normally reloaded with new fuel every 12–24 months, during planned outages when maintenance is also performed. Nuclear power is used as base load power in many energy systems.

Main advantages

- Low emissions
- Stable base load power
- Stable fuel supply
- Competitive production cost

Main disadvantages

- High investment cost
- High complexity
- Need for comprehensive safety management
- Spent nuclear fuel is radioactive and requires safe long-term storage
- Environmental impact of uranium mining must be handled

Cost estimate (in this example)

- Capacity: 1,600 MW electricity
- Annual full load: 7,800 hours
- Efficiency: 37%
- Lead time for construction (including permits): 10 years
- Estimated base case cost: ~ EUR 50/MWh

BIOENERGY (combined heat and power)

Biomass fuels are combusted to produce district heating, and often also to generate electricity. Biomass encompasses a variety of fuels, differing in terms of key sustainability aspects and energy content. Many fuels are residual products from forestry and agricultural origin, as well as waste from the construction industry and households (75%–87% is considered biogenic). In some regions, the use of energy crops is increasing.

Main advantages

- CO₂-neutral if combusted material equals regrowth
- Energy conversion from residuals is an added benefit to society
- Often locally available

Main disadvantages

- Carbon neutrality requires regrowth
- Competition for use
- Potential negative land-use changes and loss of biodiversity with increasing demand
- Emissions from transport, especially critical for fuels with relatively low energy content

Cost estimate (in this example)

- Capacity: 35 MW electricity and 65 MW heat.
- Annual full load: 6,000 hours
- Efficiency: 90% (combined heat and power generation)
- Lead time for construction (including permits): 3 years
- Estimated base case cost: ~ EUR 70/MWh

HYDRO POWER

Hydro power plants use the gravitational force of running water to generate electricity. In reservoir plants, water is kept in dams to be able to regulate generation. In run-off river plants, turbines are placed directly in the water stream. Pumped storage plants are used to store energy generated from other sources. In Europe, approximately 75% of potential hydro power has been exploited.

Main advantages

- Low emissions
- Can function as base, peak and regulating power and stored energy
- No fuel cost
- Long economic life

Main disadvantages

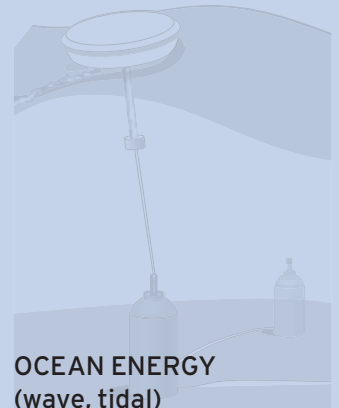
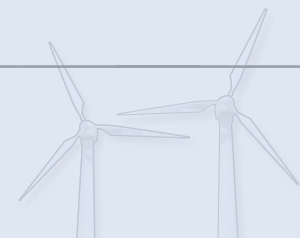
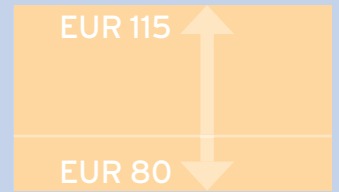
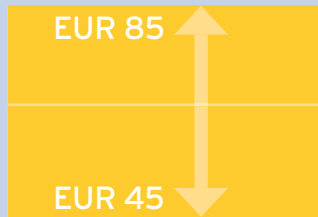
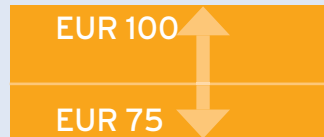
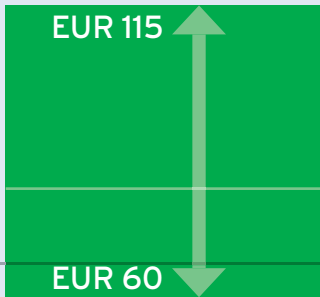
- Dependent on water supply, precipitation (rain and snow) and geography (difference in altitude)
- High investment cost
- Major intrusion in landscape, changed ecosystem in rivers
- Dam safety
- Few possibilities to expand

Cost estimate (in this example)

- Capacity: 40 MW electricity
- Annual full load: 4,000 hours
- Lead time for construction (including permits): 4 years
- Estimated base case cost: ~ EUR 65/MWh

WACC (Weighted Average Cost of Capital, discount rate) 7%. Inflation rate 2%. 2009 price level. Cost of CO₂ EUR 20/tonne.

Sources: Elforsk, www.power-technologies.com, www.olkiluoto.info, fuel market prices December 2008, average electricity spot prices 2008 Nord Pool (Nordic) and EEX (European Energy Exchange (Germany)).



WIND POWER
(offshore, land-based)

Electricity is generated by wind turbines, often built in clusters called wind farms. Power generation depends on wind conditions. Offshore locations generally have stronger winds, but construction and maintenance is more difficult. Therefore, offshore wind power is more expensive than land-based wind power.

Main advantages

- Low emissions
- No fuel cost

Main disadvantages

- Need for reserve power due to weather dependency (wind)
- Impact on landscape and noise
- Requires significant investments in the grid

Cost estimate (in this example)

- Capacity: 100 MW electricity

Offshore wind power:

- Annual full load: 3,200 hours
- Lead time for construction (including permits): 3 years
- Estimated base case cost ~EUR 90/MWh

Land-based wind power:

- Annual full load: 2,500 hours
- Lead time for construction (including permits): 2 years
- Estimated base case cost: ~EUR 70/MWh

NATURAL GAS

Natural gas is combusted to generate electricity and heat, often in CHP plants. Most new facilities are combined cycle gas turbines (CCGTs), where both steam and gas turbines are used, thereby increasing efficiency. Global demand for natural gas is on the rise.

Main advantages

- Lower emissions and higher efficiency than other fossil fuels when used in CHP plants

Main disadvantages

- CO₂ emissions (CCS for gas-fired plants would be expensive)
- Concerns regarding fuel availability (largest reserves are in politically unstable regions)
- Significant fuel price fluctuations create less stable energy prices

Cost estimate (in this example)

- Capacity: 800 MW electricity
- Annual full load: 6,000 hours
- Efficiency: 60%
- Lead time for construction (including permits): 4 years
- Estimated base case cost: ~EUR 85/MWh

Developing technologies

COAL USING CCS

Coal (hard coal and lignite) is combusted to generate electricity and produce district heating. Coal is a predominant energy source in the world, corresponding to 67% of electricity supply. With Carbon Capture and Storage (CCS), the CO₂ from coal combustion can be extracted, liquefied and stored under ground. CCS technology is expected to mature, leading to reduced cost over time.

Main advantages

- Stable base load power
- Low fuel cost
- Good fuel availability from politically stable regions, well functioning market

Main disadvantages

- Environmental impact of coal mining must be handled
- CCS technology not yet ready for commercialisation

Cost estimate (in this example)

The example refers to a lignite-fired power plant. Lead time for construction is ~10 years.

The estimated cost span is EUR 45–85/MWh. The cost estimate will be higher in an early commercial phase. CCS technology is expected to mature, leading to reduced cost over time.

OCEAN ENERGY
(wave, tidal)

Energy in waves, currents and tidal streams is used to generate electricity. For example, surface buoys may be used to absorb wave energy. Wave power is predicted to be the next commercial renewable energy source after wind power. Many potential pilot projects are currently in progress, and technology development is expected to reduce costs over time.

Main advantages

- Low emissions
- No fuel cost
- Less weather dependent than wind power

Main disadvantages

- Immature technology still under development, entailing high production cost
- Requires significant investments in the grid

Cost estimate (in this example)

The example refers to wave power. Lead time for construction is ~10 years.

The estimated cost span is EUR 80–115/MWh. The cost is expected to be higher in an early commercial phase. Ocean energy technologies are expected to mature, leading to reduced cost over time.

COAL-BASED POWER – NEW AND IMPROVED

Energy systems in the countries where Vattenfall operates

United Kingdom

Power generation in the UK reflects a diverse energy mix. In 2007, electricity generation was dominated by natural gas (40.1%), hard coal (35.2%) and nuclear power (16.0%). Hydro power and renewables contributed 5.9%, and net imports provided 1.5% of electricity supplied. The UK is the largest oil producer and exporter in the EU, and is also a large producer of natural gas. 40% of the country's economy relies on oil and gas. The country also has significant hard coal reserves.

Germany

Germany's electricity generation is based on 23% hard coal, 24.5% lignite, 22% nuclear, 13% gas and oil, and 14% renewables. The political decision has been made to phase-out nuclear power. Germany has significant lignite and hard coal reserves (40.8 and 23 billion tonnes, respectively). The mining of hard coal has been subsidised and will be shut down by 2018. Lignite mining is not subsidised (180 million tonnes mined in 2007). There are few oil and gas reserves.

Denmark

Until the early 1990s, coal was the dominant fuel used in the generation of electricity. Today 50% of Denmark's electricity is still generated using hard coal, 20% from gas and oil, and a growing percentage from renewable resources (27% in 2007, of which approximately 20% is wind power). There is no potential for hydro power and no nuclear power. Denmark has its own oil and gas reserves, but no domestic coal reserves.

Sweden

Almost half of Sweden's electricity requirements are met by nuclear power, and the other half by hydro power. A very small proportion is produced by fossil fuels and biomass, and an increasing amount by wind power. Sweden has almost no domestic coal reserves. Coal dependency has fallen dramatically since the 1930s, when half of Sweden's energy demand was covered by coal.



Poland

Poland's electricity generation is almost completely based on coal (94%). Since there is limited potential for hydro power, no nuclear power plants, large hard coal and lignite reserves and very few gas and oil reserves, coal is expected to continue to play a significant role in Poland's energy supply. The country conducts extensive hard coal and lignite mining (90 and 60 million tonnes, respectively, in 2007).

Finland

Electricity generation is based on 25% nuclear power, 15% coal, 15% hydro power, 11% gas, 7% peat and 11% biomass. In addition, Finland imports a relatively high percentage of its electricity from the Nordic region and Russia (14% in 2007). Finland has no domestic coal reserves, and in 2007, 7 million tonnes of hard coal were imported. Finland is building new nuclear power capacity.

Source: European Association for Coal and Lignite

Coal will continue to play a major role in Europe's energy system in the foreseeable future. Vattenfall is currently investing in a coal-fired power plant in Hamburg, Germany, to meet the region's need for energy. CO₂ emissions from coal-fired generation will be radically reduced when CCS technology is ready for commercial use.

According to the International Energy Agency's annual World Energy Outlook from 2008, coal will continue to be an important energy source globally as well as in Europe for decades to come due to its abundance, availability and lack of competitive large-scale alternatives.

The EU has several Member States in which indigenous coal, including hard coal and lignite, has a predominant role in the domestic energy market. Currently, approximately 30% of electricity generation in the EU-27 countries is coal-based. In some EU countries, coal accounts for more than 50% of total power generation.

Germany is the biggest coal consumer in the EU, followed by Poland. Europe can cover a significant percentage of its coal demand from own resources. With annual production equivalent to 315 million tonnes of coal, Europe accounts for 8% of world production. In addition, Poland and Germany are the leading producers of coal within the EU. Together, they account for two-thirds of total coal production in the EU.

New coal-based power to secure energy supply

Many EU countries cannot guarantee secure supply of energy without coal-based power generation. Coal and nuclear power are essential to cover base load electricity all over Europe. In Germany, plans to withdraw from nuclear power are making coal an even more essential source of base load power. Vattenfall's construction of a new hard coal-fired base load power plant in Moorburg, Germany, will guarantee a secure supply of electricity and district heating for the Hamburg metropolitan area.

In Vattenfall's opinion, the main challenge is to make the use of fossil fuels, such as coal, as efficient as possible and radically reduce CO₂ emissions by developing new technology. The Moorburg plant will replace old, inefficient capacity and reduce total emissions.

In addition to its availability, coal power is affordable and competitive, which is a major advantage. Other alternative fossil energy sources, such as gas or oil, have more limited reserves and are more influenced by the political situation in the world.



New Moorburg combined heat and power plant

One of the world's most modern and efficient power plants for the supply of electricity and district heat is currently being built in Hamburg-Moorburg. Located on the Elbe River on a site that was previously used for electricity generation, the Moorburg coal-fired plant will make use of the latest available technology in its construction. Once in operation, the plant will meet roughly 85% of Hamburg's electricity needs and 40% of its district heating needs.

The existing power plant in Hamburg-Wedel will reach the end of its economic and technological life by 2012, and Hamburg needs a new base for its electricity and heat supply. The basis for this project is to provide customers with a reliable and secure supply of electricity and heat. Secure

What are base and peak loads?

The term **base load** describes electricity or district heating demand that exists irrespective of all load fluctuations. This constant demand is met by power plants that operate 24 hours a day, 365 days a year. **Mid-load** is the demand that occurs during only certain hours of every day in addition to the base load. Short-term peak demand is called **peak load**. Various types of power plants are used to cover the different load types – for example, coal and nuclear power plants for the base electricity load, and gas power and pumped storage plants for peaks. Wind power and photovoltaic (solar) power generate variable power, i.e., fluctuations in the supply of energy with no relation to demand. Regulating power, such as hydro power, is used to balance short-term differences between supply and demand.

energy supply is essential for Hamburg. It is a must to ensure the existence of already established major industries and the city's ability to attract new business.

Prepared for climate-neutral energy generation

It is Vattenfall's intention to keep emissions from the Moorburg plant as low as possible. Vattenfall has set itself the tangible target of reducing CO₂ emissions per generated kWh by 50% in 2030 compared to 1990.

Consequently, in November 2007, Vattenfall made a pledge to the Hamburg Senate that, as soon as the technological, legal and economic criteria allow, the Moorburg power plant will be retrofitted with Carbon Capture and Storage (CCS) technology. With CCS, CO₂ can be removed from the power plant's flue gases for permanent storage underground. The precise date for implementation of CCS in Moorburg will be determined by a commission with equal representation from the city of Hamburg and Vattenfall. Vattenfall is a global leader in the development of CCS technology. (Read more in the 2008 Annual Report, page 16 or on the web: www.vattenfall.com/ccs.)

Supporting regional development

The Moorburg power plant will create and guarantee jobs. In the future, nearly 350 people will be employed in the operation and maintenance of the power plant by Vattenfall and suppliers. This will provide the 96 employees of the Wedel power plant, scheduled for closure in 2012, with an opportunity for continued employment. At peak times



Photographic illustration of the Moorburg Plant upon completion.

during the construction process, up to 2,000 workers will be employed at the construction site. In addition, service companies in the region will receive an extra boost, while the port of Hamburg will gain in status as an international port through the addition of four to five million tonnes of bulk freight.

Hamburg will benefit not only from the newly created jobs. Construction of the power plant and the district heating pipeline will generate some EUR 2.5 billion in investment for the city of Hamburg. Based on experience, it can be expected that approximately 30% of this investment sum will benefit companies in the metropolitan area. Starting in 2012, operation of the power plant will generate significant tax revenue for Hamburg in addition to the fees charged for the use of the cooling water and for the port.

Effects of introducing a new highly efficient power plant

The new power plant will have an electrical net efficiency rate of 46.5%, which is very high compared to power plants around the world. Through the cogeneration of heat and power (CHP), this will result in a fuel utilisation rate of up to 61%. The new Moorburg power plant, with its comparatively low specific CO₂ emissions, will contribute to pushing older, less efficient plants with higher emissions off the market. The phase-out and replacement of these older plants will result in an overall decrease in specific CO₂ emissions per kWh in Germany.

Vattenfall estimates that, once operating on a continuous

Stakeholder comments on the Moorburg plant

“Building the Moorburg power plant is the only way to ensure that the greater Hamburg area is supplied with affordable electricity and environmentally friendly district heat, while simultaneously contributing to the fulfilment of Germany’s climate targets.”

Frank Horch

President of the Hamburg Chamber of Commerce and Chairman of the Federation of Hamburg Industries (Industrieverband Hamburg, IVH).

“Today 10% of Germany’s electricity is based on gas. Lignite and hard coal account for half of the electricity market. To replace coal with gas, the input of gas would have to be nearly five times higher... So much gas is not available in the market, and it also would have a great impact on the price of electricity.”

Sigmar Gabriel

Federal Minister for the Environment, Nature Conservation and Nuclear Safety, government declaration to climate policy of federal government, 26 April 2007, Berlin.

“Fossil fuels, and especially coal, will continue to be used in the newly industrialised nations of India and China for a long time to come. And for this very reason, the leading technology countries must do all they can to ensure that technologies for the “clean” usage of coal are ready for use to a broad extent. And this also includes the capture and storage of carbon dioxide through CCS technology.”

Klaus Töpfer

Former Federal Minister for the Environment, Nature Conservation and Nuclear Safety and Executive Director of the United Nations Environmental Programme (UNEP) in Nairobi; quoted in the German newspaper Welt am Sonntag, 31 March 2008.

NGO criticism of Moorburg plant

Construction of the Moorburg plant has been criticised by nature conservation and environmental protection organisations such as Greenpeace as well as by national organisations such as BUND, Robin Wood, etc. Their argument against the Moorburg plant is that its size is not necessary for Hamburg’s energy needs, and that a smaller district heating plant would be enough. Opponents also argue that the Moorburg power plant will have a negative impact on the climate for decades to come and that it will prevent the development of renewable energies. They argue that alternatives such as gas power plants or block heating plants, and an increased usage of renewable energies, should be considered. According to these NGOs, a gas-fired plant combined with other technologies would have a lesser environmental impact.

basis, the Moorburg power plant will produce approximately 750 g CO₂ per kWh delivered to the grid (g/kWh net), compared with older coal-fired plants, which produce roughly 1,001 g/kWh. In total, this equates to an annual reduction of approximately 2.3 million tonnes of CO₂. This has been confirmed by an independent report from TÜV Rheinland, a provider of technical services (the report is published on www.vattenfall.de/moorburg).

Modernised district heating will reduce CO₂ emissions

Looking beyond electricity generation, further CO₂ reductions will be achieved through the modernisation and extension of the district heating system in Hamburg. This extension is in line with the decision by the German Bundestag to double the share of combined heat and power, to 25% of total electricity generation, by 2020. In order to achieve this, the extension of district heating systems is necessary, especially in major cities.

Today 415,000 homes are connected to the district heating network in Hamburg. By 2015 Vattenfall will supply around 425,000 homes with district heat, with this figure rising to 525,000 by 2030. The Moorburg power plant, with its high-performance efficiency, and as the largest supplier of heat in the Hamburg district heating network, will be key to meeting these targets.

Compared with decentralised gas heating, the district heat supplied by Moorburg will produce less than half the CO₂ emissions thanks to the efficiency of combined heat and power generation. Each home connected to the district

heating network – with an average area of 70 m² – will save one tonne of CO₂ annually (according to Vattenfall’s estimations). In the future, the extension of the Hamburg district heating system will lead to annual savings of approximately 160,000 tonnes of CO₂ emissions compared with heating from decentralised oil or gas-fired heating systems.

A power plant well within the statutory limits

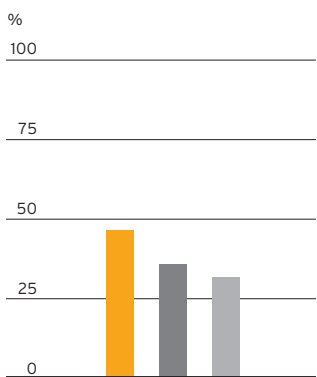
Owing to its modern flue gas cleaning system, the Moorburg plant also falls well below the statutory limits for airborne pollutants and noise pollution. Emissions will be minimised by highly effective measures such as flue gas denitrification, filtering using electric precipitators and flue gas desulphurisation. Consequently, the requirements for dust and sulphur oxides will be undercut by 50% and those for nitrogen oxides by 60%.

In addition, measures taken in the construction of the plant will reduce noise to a level that is lower than traffic and general noise levels in a city residential area.

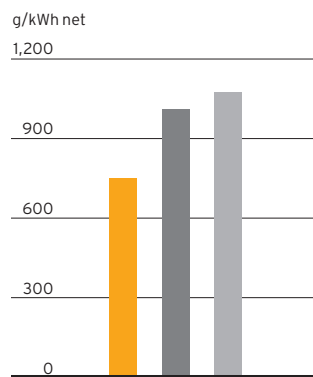
There are also other areas, beyond the statutory limits, in which Vattenfall is working to limit the effects of the power plant. For example, Vattenfall is committed to protecting the adjacent Elbe River, from which the plant will take its cooling water. The cooling system is designed to minimise any increases in temperature caused by the discharge of cooling water in the river, thereby protecting biodiversity.

Efficiency of the Moorburg plant

Net efficiency for electricity generation without district heat



CO₂ output per kilowatt hour of electricity generated



The new power plant will have an electrical net efficiency of 46.5%, which is very high compared with power plants around the world. The continuous cogeneration of heat and power will result in a fuel utilisation rate of up to 61%. The Moorburg power plant will produce approximately 750 g CO₂ per kilowatt hour delivered to the grid (g/kWh net), compared with approximately 1,001 g/kWh for older coal-fired power plants in the EU.

- Moorburg power plant
- EU coal-fired power plant average 2008
- Coal-fired power plants, worldwide average 2008

Source: Plant data and World Energy Outlook 2008, IEA




From 2007 to 2012 Vattenfall is building a new combined heat and power plant in Hamburg-Moorburg, Germany. Vattenfall's investment for the plant is valued at more than EUR 2.5 billion. The new Moorburg plant will provide approximately 85% of Hamburg's electricity and 40% of its district heating. The photo above shows the Moorburg building site in January 2009. At left is an artist's rendition of the Moorburg plant upon completion.



TECHNOLOGY AS A TOOL FOR REDUCING EMISSIONS

The Schwarze Pumpe power plant, located in Brandenburg, Germany, converts raw lignite from the Welzow-Süd open-cast mine into electricity. When operating at full capacity, it uses 36,000 tonnes of lignite daily. The Schwarze Pumpe power plant uses a combination of highly effective measures (such as low nitrogen oxide combustion, particle filters and flue-gas desulphurisation) to keep the plant operating comfortably within legal limits. The plant is also the site of Vattenfall's Carbon Capture and Storage (CCS) pilot plant.



Vattenfall is investing continuously to improve the environmental performance of its power plants. Taking a 30-year perspective on the reduction of emissions to air, the results have been significant. Vattenfall has virtually eliminated particulates, while SO₂ and NO_x emissions have been significantly reduced through modern technology. The plan now is to do the same with CO₂ emissions through the development of Carbon Capture and Storage (CCS) technology.

When burning fossil fuels, biomass and waste to generate electricity and heat, flue gas is produced, which needs to be cleaned before it is emitted into the atmosphere. The composition of flue gas varies depending on the fuel burned and the combustion process. Mostly, flue gas consists of water vapour, carbon dioxide (CO₂) and nitrogen. Nitrogen oxides (NO_x) and sulphur dioxide (SO₂) are formed during combustion from the sulphur in the fuel, and nitrogen in the fuel and air. When burning solid and liquid fuels, particles are also formed. In addition, flue gas contains a very small portion of pollutants such as hydrocarbons, carbon monoxide (CO) and gasified metals.

Reducing emissions from power plants is a concern all over the world. In Europe, emission reduction systems and regulations have been in place for some time. Vattenfall has been investing in state-of-the-art technology for decades, and systems and equipment for cleaning account for more than 60% of total plant size in combustion facilities. Over the years, the environmental performance of Vattenfall-operated plants has improved dramatically and tangible improvements in the natural environment can now be observed.

Emissions travel long distances, and downfall over one country may originate from many other countries. For example, in Sweden, the decreasing acidification of lakes, streams and forest soils is a result of the implementation of emission reducing technologies in other countries. The Swedish Environmental Protection Agency states that downfall of sulphur over Sweden decreased by 60% from 1990 to 2004, while nitrogen downfall decreased by 30% thanks to international agreements and focused environmental efforts.

First breakthrough – elimination of particulate emissions

The problems of pollutants in flue gases has been known for a long time, and studies of technologies to reduce pollutants have been conducted for more than a hundred years. The

first major technological breakthrough dates back to the start of the 20th century and involved the most obvious pollutant from combustion – particles. Today, the most common method of reducing particulate emissions in flue gases from large plants is through a collection device that removes particles using an electrostatic force, an Electrostatic Precipitator (ESP). This technology is used in all large coal-fired combustion plants. Today's ESP solutions can clean more than 99.9% of particulate matter from flue gases. The resulting ash is commonly used in the production of cement and concrete. Large amounts are used to recultivate landscapes after open-cast mining. Vattenfall makes use of almost all the ash produced from its power plants.

In smaller plants, an alternative technology to ESP involves the use of fabric filters, where the flue gases are passed through a finely meshed textile. Such filters have a lower initial investment cost than ESP, but the operating cost is higher. The possibility to use fabric filters depends on the size of the facility, the fuel used and the amount of particles. One advantage of fabric filters is that they are even more effective for removing micro-sized particles.

In the 1970s, environmental standards and regulations regarding particles were heightened. As a result, the existing technology was greatly improved. Vattenfall's plants have advanced systems for cleaning particles that far exceed the regulatory requirements. After the particle filters, the smokestacks and cooling towers emit only one visible fraction: water vapour, while the invisible emissions of SO₂, NO_x and CO₂ is then targeted.

Dealing with the problem of sulphur and acidification

Sulphur dioxide (SO₂) has also been a problem in the past, and still is in certain regions where the technology adoption is lagging. Since coal and oil contain sulphur compounds, their combustion generates sulphur dioxide (SO₂). When emitted to the air, sulphur dioxide reacts with water and causes acidification of water and soil. The environmental impact of SO₂ emissions from fossil fuel combustion has been known for a long time, and the first cleaning technologies were introduced in the 1930s. Using fuels with less sulphur content was an early method of reducing SO₂ emissions.

More advanced and effective methods for treating SO₂ emissions were developed and ready for use in the 1980s, including Flue Gas Desulphurisation (FGD). In this method, the flue gases are cleaned using wet scrubbers or dry sorbents that absorb the sulphur using limestone as an absorbing agent. The wet scrubbers used mostly by Vattenfall have an efficiency of over 98%. The desulphurisation process leaves a very useful by-product, gypsum. Vattenfall takes care of this valuable asset and sells it to building material manufacturers for the production of plaster board, among other things.

Advancements in technology and fuel have had a huge impact; today sulphur downfall is 10% of the levels during 1970s and 1980s, and the remaining downfall stems mainly from motor vehicle emissions.

As was the case for particulate emissions, development of sulphur dioxide cleaning technology has largely been driven by regulation, although many companies are also taking initiatives themselves to improve environmental performance on their own accord.

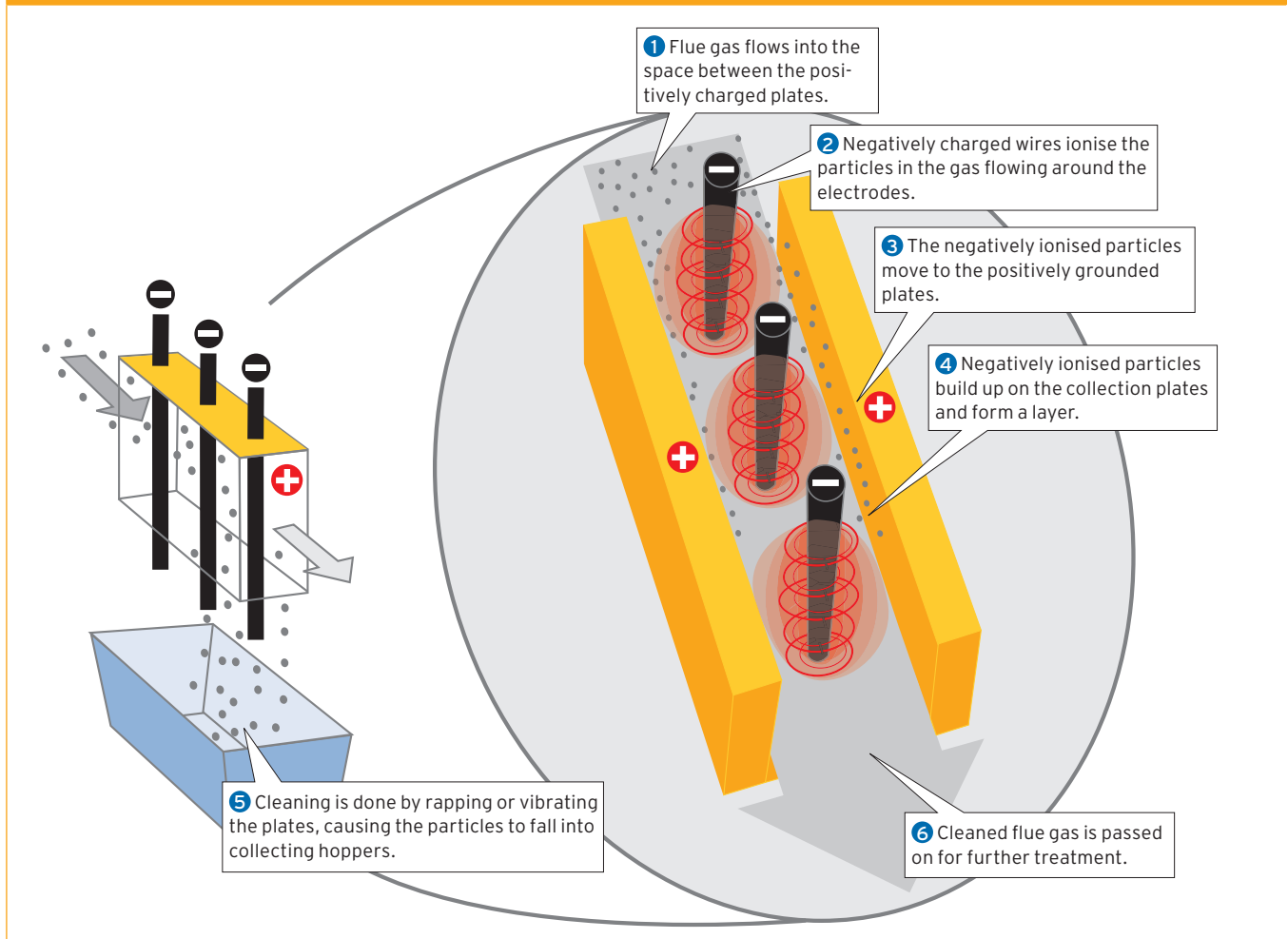
The main technologies used to fight emissions

Electrostatic precipitators (ESPs): The most basic precipitator uses a row of thin wires following stacks of large flat metal plates. The air stream flows through the spaces between the wires and passes along the plates. High voltage is applied between the wires and plates, creating a charge in the particles in the flue gas. The particles are forced by this electric field to collection plates, where they form a layer. This is then removed by vibration. The solution used today has evolved substantially with advanced discharge electrode designs and collection methods. Today's ESP solutions can clean more than 99.9% of the particles from the flue gases.

Fabric filters (FFs): Fabric filters are used in small power plants and have high collection efficiency, normally retaining 99.9% or more of the particles. Fabric filters are especially effective at handling micro-sized particles, while their technical complexity is still at a moderate level. Although the basic principles and design of fabric filters used today date back some 40 years, product development is still active. As fabric filters have higher operating cost than ESP solutions, focus is on developing more cost-efficient fabric filters.

Flue Gas Desulphurisation (FGD): FGD has been used to combat sulphur dioxide (SO₂) emissions for a long time, and today's solutions have been in effect since the 1980s. The flue gases are treated by bubbling them through a wet slurry containing water and limestone or lime that absorbs the SO₂. Other methods involve the spraying or injecting of dry sorbents. Scrubbers can reduce SO₂ emissions to an effect ranging from 50% to 99%. The modern wet scrubbers used mostly by Vattenfall have an efficiency of over 98%.

Technical concept of electrostatic precipitation



Selective Non-Catalytic Reduction (SNCR) reduces NO_x in conventional power plants by injecting either ammonia or urea straight into the furnace at a rather high temperature. The chemicals react with the nitrogen oxides in the flue gas, forming elementary nitrogen (N_2) and water. SNCR normally operates with around 70%–80% efficiency in reducing NO_x . SNCR is less expensive than systems using catalysts, because there is no cost for the catalyst, but often they are insufficient to meet emission requirements.

Selective catalytic reduction (SCR) converts NO_x gases with the aid of a catalyst into nitrogen (N_2) and water. Ammonia or urea is injected into the flue gas at a relatively low temperature, reacting with NO_x over a catalyst. SCR is substantially more efficient than SNCR, reaching efficiencies of more than 90%, but is more expensive. SCR solutions were introduced in the 1980s on a large scale. The adoption of SCR is very common in modern plants, as demands for reductions are set higher and higher.

Carbon Capture and Storage (CCS) technology is a method where CO_2 from fossil-fired power plants is captured, compressed into liquid form and permanently stored deep underground. Suitable storage sites include natural rock formations thousands of metres below the surface, which are similar to natural oil and gas reservoirs. The concept of applying CCS to power plants is new. However, parts of the technology already exist and are used in other applications. Currently Vattenfall is testing the technology in a new 30 MW_{th} pilot plant at Schwarze Pumpe in Germany. It is anticipated that CO_2 and all other emissions can be reduced to almost zero in this facility. (For further information see www.vattenfall.com/ccs.)

Nitrogen oxides are combated in two ways

Normal combustion emits nitrogen oxides, because nitrogen reacts with oxygen during combustion. This happens when anything is burned, from the smallest candle, to a wood fire, to biomass, as well as fossil fuel combustion. Nitrogen oxides (NO_x) have many adverse effects on the environment such as causing ground-level ozone that triggers respiratory problems, and contributing to acidification and eutrophication. NO_x and pollutants formed from NO_x, can be transported over long distances, following wind patterns.

There are two major ways of combating NO_x. One is through controlled combustion, and the other is with catalytic cleaning technologies and the injection of chemicals.

NO_x formation is dependent on temperature and oxygen availability, which is why the chief method of reducing NO_x involves adjusting temperatures and air flow during combustion. By using low NO_x burners or fluidised beds and controlling the level of oxygen in the boiler, NO_x formation can be limited. This is how NO_x emission levels are kept down in Vattenfall's lignite-fired plants.

Hard coal and biomass-fired plants usually cannot avoid higher formation of NO_x and need technologies to clean the flue gases from NO_x (see fact box). The technologies differ from plant to plant depending on their respective conditions and the emission requirements.

Like other pollutants, development of NO_x cleaning technology has been driven primarily by regulation, although some very effective incentives have also played a part. Sweden makes use of an incentive programme for reducing NO_x emissions. Companies that emit NO_x pay a fee based on the level of emissions. This fee is allocated to a pool, and each company receives money back from the pool in relation to the amount of energy it generates. In effect, low-emitting power plants can actually make money at the expense of high-emitting competitors. For Vattenfall this has been a constructive and favourable solution, in many ways more effective than traditional regulation.

The focus from now and onward

The cleaning technologies used to treat SO₂, NO_x and particulates are mature, well-established and highly effective,

and they have been used by Vattenfall for many years. In newly acquired facilities that have not adopted the latest technologies and equipment, work is done to bring them up to Vattenfall's standards.

In Poland, several projects have been carried out to modernise existing plants and meet higher environmental standards. In 2007 and 2008, Vattenfall conducted a large modernisation project at three plants in Warsaw. EUR 30 million was spent on modernisation and replacement of old electrostatic precipitators (ESPs), resulting in emission concentrations 50% below legal requirements. Vattenfall plans to invest an additional EUR 130 million to equip 14 boilers at the Siekierki CHP plant in Warsaw with desulphurisation equipment. This investment has been broken down into two stages: half of the plant will be equipped with desulphurisation by 2010, and the other half by 2011.

Vattenfall's greatest challenge moving forward is not the emissions that have an effect on the local and regional environment – such as SO₂, NO_x and particulates – but dealing with CO₂ emissions that contribute to global warming. Vattenfall believes that reducing CO₂ emissions is the overriding environmental challenge of our time. Further, Vattenfall believes that a global framework for reducing greenhouse gas emissions will be essential to solving this problem and has taken the initiative to propose such a programme to curb climate change.

In the long term, reducing emissions will make Vattenfall more profitable, and doing so proactively will give the company a competitive advantage. For this reason, Vattenfall is taking the lead in the development of a number of CO₂ emission-reducing technologies, including energy efficiency measures, a focus on renewable energy, nuclear power and Carbon Capture and Storage (CCS). In September 2008, a 30 MW_{th} CCS pilot plant was inaugurated in Schwarze Pumpe, Germany, which will give the company valuable experience that will be needed to develop demonstration plants and full-scale commercial power plants employing CCS. (For more information about Vattenfall's CCS efforts, see the 2008 Annual Report, the 2007 CSR report and www.vattenfall.com/ccs.)

For emission data, see the environmental performance section on page 56.



In 2001 Vattenfall initiated a Carbon Capture and Storage (CCS) research programme with the goal of developing commercial concepts for CCS technology at power plants by 2020 at the latest. Seen here are a few images from Vattenfall's CCS pilot plant at Schwarze

Pumpe in Brandenburg, Germany. The 30 MW_{th} pilot plant, which was inaugurated on 9 September 2008, provides a valuable opportunity to test technology that has so far only been tested in laboratories.

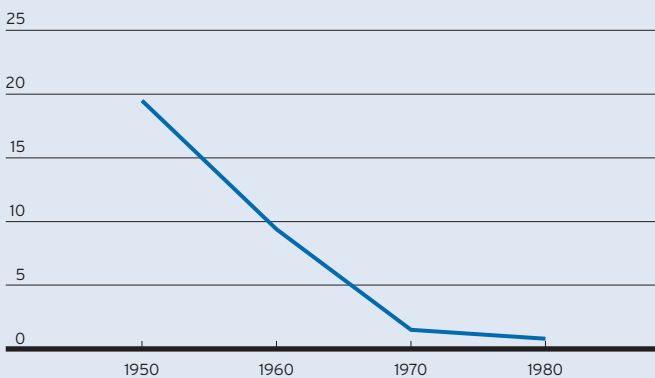
PROJECTS CONTRIBUTING TO DECREASED EMISSIONS – FROM 1930 INTO THE FUTURE

Many investments and development projects have been carried out to improve the environmental performance of power plants now owned by Vattenfall. The first measures were taken as early as the 1930s, by eliminating particles from the flue gas in coal-fired plants. Here are some examples of investments in plant technology that have virtually eliminated particles and significantly reduced SO₂ and NO_x emissions from Vattenfall's plants. Opposite are examples of planned projects, especially with the goal of decreasing CO₂ emissions.

1930–1980 The history of ESP in Germany

The first verifiable installation of an electrostatic precipitation system (ESP) in Germany was at the Hirschfelde power plant in Saxony in 1935–36, which enabled a reduction of particles by 75%–80%. At around the same time, ESP technology was installed in the Klingenberg power plant in Berlin. During the course of the 20th century, the introduction of flue gas fans led to higher flue gas velocities and increased particulate emissions. The use of pulverised coal burning also contributed this increase. Therefore, all power plants built after 1945 were fitted with ESP systems as a standard. During the communist era in East Germany, all systems and equipment in the power plants were operated at their capacity limits and beyond. This caused the boilers to leak and resulted in elevated flue gas emissions and relatively low efficiency of ESP systems. Improvements made from 1990 and onwards significantly improved the reduction of particulate emissions without the plants' technology having to undergo any major changes. Today, Vattenfall's power plants in Germany remove up to 99% of particulate emissions.

The amount of particulate emissions relative to the quantities of ash produced during firing %



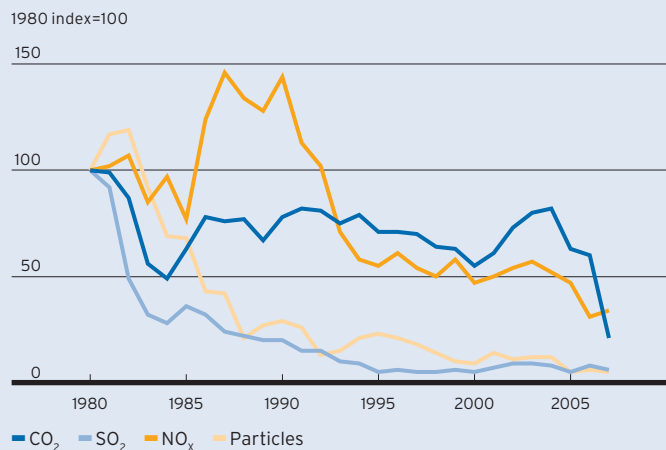
Source: K. Bers, Kraftwerk und Umwelt/Power Plant and Environment (1983)

1989–1991 Investments in Danish power plants

In 1989, a 250 MW_e coal-fired unit at the Amager power plant in Denmark was commissioned. The boiler was equipped with low NO_x burners and flue gas desulphurisation (FGD) from the onset. The FGD system was the first wet gypsum-producing FGD system installed at a Danish power plant. During the last 10 years, a NO_x removal degree of approximately 85% has been attained by optimising the low NO_x burners and retrofitting the boiler with an SCR system. SO₂ emissions have been reduced by lowering the sulphur content of the coal and through technical improvements to the FGD system, resulting in a desulphurisation degree above 97%.

In 1991, a 405 MW_e coal-fired unit at the Fyn power plant was commissioned. This boiler was equipped with low NO_x burners and FGD from the beginning. The dry by-product from the FGD is reused as

1980–2007 Reduction of emissions at power plants in Uppsala



Vattenfall's facilities in Uppsala, Sweden, generate electricity as well as district heat, cooling and steam. The main fuels are waste, peat, biomass and coal (oil and gas are used in auxiliary devices). A new waste incinerator, Block 5, was commissioned in 2005. Replacing other capacity with the modern Block 5 facility led to reduced emissions of CO₂ as well as SO₂, NO_x and particles. All modern flue gas-cleaning technologies are currently used in Uppsala, such as flue gas desulphurisation, low-NO_x burners, SNCR/SCR technology, ESP and fabric filters.

absorbent in the gypsum-producing FGDs at the Amager and Nordjylland power plants. To further reduce NO_x emissions, an SCR plant was commissioned in early 2008. Today the Fyn power plant has an estimated desulphurisation degree above 98%, and a NO_x-removal degree of approximately 85%.

In 1991, block 2 at the Nordjylland power plant was retrofitted with the first full-scale SCR plant in Denmark for reducing NO_x emissions. The SCR was part of the SNO_x plant – a combined flue gas cleaning method that reduces both NO_x and SO₂ from the flue gas. Today the Nordjylland plant, which also includes block 3 from 1998, has an estimated NO_x removal degree of approximately 82% and a desulphurisation degree above 99% for 2008.



2007 and onward Reducing emissions in Poland

Most of the 36 boilers at three plants in Warsaw have been thoroughly modernised or replaced during the past two years. The total cost – nearly EUR 30 million – was covered in part by funding from the EU. The technical solutions not only meet the legal requirement for emission concentrations of 100 mg/m³, but highly exceed it – the achieved emission concentration is 50 mg/m³.

At the CHP plant in Siekierki, fabric filters together with semi-dry desulphurisation have been installed, leading to particulate emission concentrations that are well below the legal requirement of 50 mg/m³ (8–12 mg/m³ lower).

At Vattenfall's second largest plant in Poland, CHP Żerań, most generation is based on fluidised bed technology. The main benefit of combustion in fluidised bed boilers is the reduction of SO₂ and NO_x emissions to the level required by the EU. Additionally, the environmental impact of the plant has been reduced through optimisation of purchased fuel quality – high calorific value and low sulphur content.

SO₂ and NO_x reduction efforts in Poland are ongoing. Stricter requirements will be applied in Poland in 2016, and work has begun to equip the Polish facilities with modern installations dedicated to improved flue gas cleaning. Vattenfall's broad base of experience in this area is expected to provide valuable support.



2008 CCS pilot plant at Schwarze Pumpe, Germany

On 9 September 2008, Vattenfall's 30 MW_{th} Carbon Capture and Storage (CCS) pilot plant at Schwarze Pumpe, Germany, was inaugurated. The pilot plant is an important milestone in efforts to achieve the goal of developing a commercial concept for CCS at coal-fired power plants before 2020. The purpose of the pilot plant is to validate and improve CCS technology. There are three main methods for capturing carbon dioxide. Vattenfall has chosen to test Oxyfuel combustion technology at the pilot plant, since it builds on existing power-cycle technology. It is also currently the most promising method with regard to costs for capturing carbon dioxide at power plants. The initial testing programme will run for three years. Thereafter, the pilot plant will be available for other tests. The plant is planned to be in operation for at least 10 years.



2013 Multi-block CCS demonstration plant in Aalborg, Denmark

On 5 February 2008 Vattenfall announced its intention to develop a full-scale Carbon Capture and Storage (CCS) demonstration plant in Denmark. By 2013, the Nordjylland power plant (Nordjyllandsværket) will release only small amounts of CO₂ to the atmosphere. Instead, the CO₂ will be captured and transported to a geological structure where it will be stored in a reservoir at a depth of 1–2 kilometres underground in northern Jutland. In 2008, studies were initiated to ensure that CO₂ storage is a

realistic possibility at Vedsted in northern Jutland. Based on the results of studies of the geological structure, an investment decision is planned for late 2010. If the storage proves feasible, the intention is to establish a full-scale CCS plant in 2013. The demonstration plant is a link between the pilot plant and the commercial concept that is to be developed.



EFFICIENT USE OF NUCLEAR FUEL

The reactor core in plants like Ringhals is re-formed and loaded with fresh fuel once a year. The work on calculating and optimising the design takes several months and requires extensive computer power and advanced calculation programs.

The use of nuclear fuel in power generation has come a long way. Today, fuel is used more efficiently thanks to improvements in fuel fabrication and how fuels are used in generation. This has resulted in less mining and reduced amounts of nuclear waste for the same amount of generated energy.

Together with a comprehensive safety management programme and responsible handling of nuclear waste, efficiency is a core aspect of nuclear power generation since it leads to economic as well as environmental benefits in society.

The importance of working with nuclear efficiency

Enhancing efficiency in power generation has positive effects both environmentally and economically. In nuclear power generation, the results of efficiency improvements in the use of nuclear fuel are very tangible. The environmental benefits are substantial – by producing more with less, uranium mining is reduced as is the need for handling spent nuclear fuel.

By decreasing uranium mining, the physical impact at mining sites can be reduced. Also, since there is less material to handle, indirect emissions (such as CO₂) from the mining, fuel fabrication process and transports are decreased.

Nuclear power generation uses very small amounts of fuel in the reactors compared with other types of energy generation in terms of weight. A single fuel pellet consists of 10 g of uranium and generates 4,000 kWh of electricity – which is the level of normal consumption for a single household. The fuel used in the reactor core is enriched uranium, where the uranium content has been increased to

3.5%–5% of the isotope U235, compared with 0.7% in the natural uranium. Vattenfall uses an estimated equivalent of 1,500 tonnes of natural uranium every year.

Handling nuclear waste is a key issue since it must be stored for a long time under very strict conditions. Efficient use of the fuel reduces the quantity of the waste. This is achieved by increasing fuel efficiency, for example by maximising burn-up (the rate at which the fuel is used up) and increasing the life span of fuels.

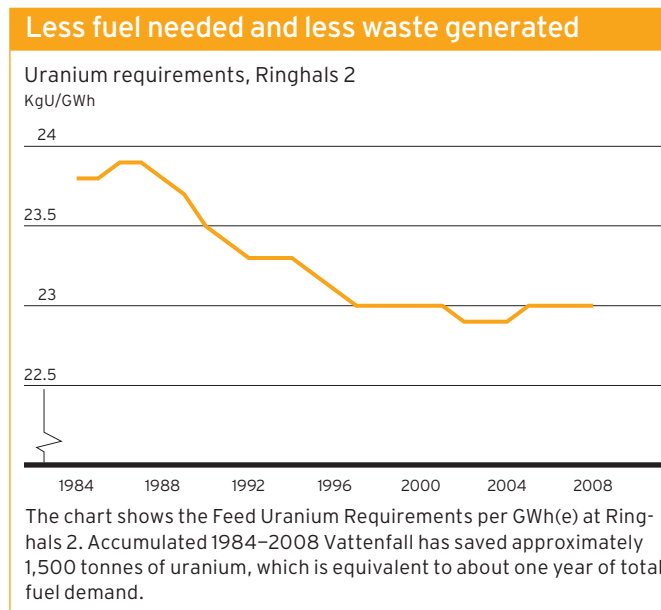
From an economic perspective, efficient use of nuclear fuel is a true cost-reducing measure. The efficiency-improvement work that is done contributes to stable and affordable electricity prices and a secure power supply.

How does Vattenfall improve efficiency?

Vattenfall’s work on improving fuel efficiency is twofold: suppliers are encouraged to further develop the fuels (both materials and the way they are constructed), while Vattenfall works on optimising the use of fuels in generation. Different types of fuel are used in different types of nuclear reactors.

Vattenfall works together with its suppliers and formulates demands and explains how the fuel is intended for use in the reactors. This information is crucial for suppliers in their work on developing a product that meets the demands and leads to increased efficiency. Vattenfall’s role as a purchaser is very important, and for more than 20 years, the company has been at the forefront of efforts to increase fuel efficiency. Collaboration between Vattenfall and its nuclear fuel suppliers has resulted in more advanced fuel technology and design, improved materials, and the possibility to use fuel with a higher degree of enrichment. In addition, Vattenfall makes demands on environmental and social standards for all its suppliers¹.

In Vattenfall’s nuclear fuel operation, highly skilled experts in nuclear physics, thermo-hydraulics, mechanical design and materials behaviour utilise the latest knowledge and calculation methods to optimise how the fuel is designed and how the reactor core is formed. This optimisation requires extensive computer power and advanced calculation programs. The reactor core is re-formed and loaded with fresh fuel once a year, and the work on calculating and optimising the design takes several months. Each fuel assembly is in operation for a period of 4–6 years, and when the core is reloaded, the spent fuel assemblies are



1) For additional information, see Vattenfall 2007 CSR Report

replaced by fresh ones and a new reactor core is designed for the upcoming power generation cycle.

All efficiency improvements are subject to a stringent safety management approach. Safety margins in all aspects of nuclear power generation are strictly regulated, and compliance is verified both internally within Vattenfall as well as by the supervising authorities. Improved calculation methods and knowledge about how the fuel works has made it possible to improve fuel utilisation while maintaining high operational safety.

From a technical perspective, a range of specific innovations and factors has contributed to increased efficiency (see the fact box opposite “How nuclear fuel efficiency is increased”).

Development of nuclear fuel cost



Ali Etemad, Executive Vice President of Vattenfall Nuclear Fuel, has more than 40 years of experience in the nuclear power industry. He has spent 27 years with Vattenfall and has been responsible for nuclear fuel procurement since 1984.

Efficient use of fuel has saved considerable amounts of uranium since the 1980s, but what has happened with respect to cost?

“Vattenfall’s present cost of nuclear fuel is in fact lower than in the mid-1980s. Considering that the cost of everything else has gone up since then, nuclear fuel costs have come down by a factor of 3 to 4 when adjusted for general inflation.

This is due to several factors, including the efficient use of fuel and the general market situation. In addition, Vattenfall’s effective supply and procurement strategy has made it possible to take advantage of prevailing market conditions to achieve a lower fuel cost.

Uranium prices have risen considerably during the past three years, which will affect Vattenfall’s future fuel cost. We continue to work with our supply policy and procurement strategy in an effort to minimise the impact of higher prices while at the same time securing our fuel supply.”

How far has Vattenfall come?

As a result of improved fuel efficiency, Vattenfall saved approximately 1,500 tonnes of uranium during the period 1980–2008, which is about 5% of all uranium used by the company during this time period, or the equivalent of about one year of total fuel demand. Vattenfall’s efficiency improvement efforts yielded better relative results in the early 1980s, but have levelled out since 1998. This is because there often is more to improve in the beginning of efficiency work. In pace with Vattenfall’s use of more effective and advanced techniques, the scope for improvements decreases. Also, the level of efficiency has increased as a result of higher uranium enrichment up to the levels that can be managed in the fuel fabrication plants. As a result, the focus of further improvements is put on reliable operation of the fuel.

Challenges of efficiency improvement work

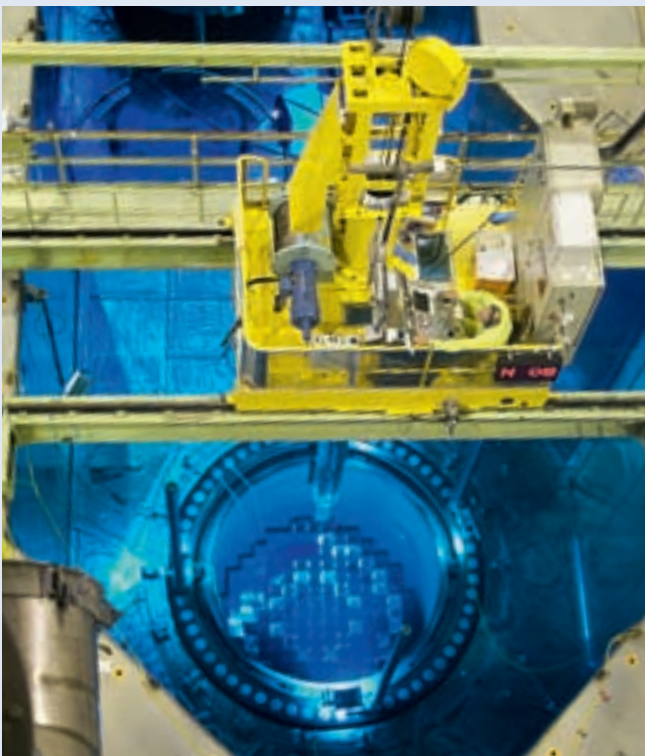
The challenge ahead is to continue to improve fuel materials and fuel design, such as by making fuels more reliable and thereby minimise stops in the operations. The reactor core and its surroundings exist in a very harsh environment due to high temperatures, pressures and radiation. This leads to high requirements on the design and construction of all equipment and materials used in the reactor. All materials undergo rigorous testing and controls, and independent measures and routines are in place to ensure the safety and reliability of the production process. In the future, it may be possible to use higher-enriched fuels than today, which would enable using the fuels longer and increasing the so-called burn-up (the rate of which the fuel is spent). But this requires new licensing and permits for fuel fabrication and handling, which is a global process that will take time.

Vattenfall continues to make improvements in its current nuclear power generation in terms of fuel and maintenance efficiency, and is committed to excellent safety and operational performance. But to make significant efficiency improvements in nuclear power generation, new and improved reactors with higher efficiency will be needed.

Additional information on Vattenfall’s nuclear operations can be found in the reporting section. For information on safety management, see page 64. For information on nuclear waste management, see page 47.

HOW NUCLEAR FUEL EFFICIENCY IS INCREASED

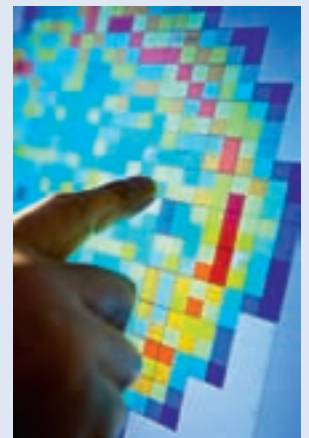
There are many technical innovations and improvements in fuel use that contribute to make nuclear power more efficient. Most of these innovations are interrelated; for example, improvements in the materials used in nuclear fuel construction make it possible to use higher enriched fuel. Higher enriched fuel contributes to a longer life span, which leads to more efficient use. Below is a presentation of the most important factors that have enabled Vattenfall to improve efficiency.



Optimised reactor core design

Nuclear power reactors are typically shut down once a year for maintenance and refuelling. Old, spent fuel assemblies with only a small amount of fissionable material remaining, are replaced by new fuel. Between 1/4 and 1/6 of the fuel is changed. The core design determines the quantity of new fuel and the location of the fuel assemblies in the reactor. The purpose is to put the fuel to optimum utilisation by appropriate locations of new and reused assemblies. Generally, fresh fuel generates more heat and is therefore surrounded by older fuel assemblies, in order to distribute the heat evenly and make the process stable.

Core design is a complicated optimisation process in which many conditions must be met. The maximum possible energy shall be extracted from the fuel, while ensuring conformance with all safety requirements. Consideration must also be given to the required operational flexibility. Good core design puts the fuel to good use and saves a great deal of money. During the past 20 years, skilled engineers, sophisticated calculation methods and computer programs have led to improved core design, thereby increasing the efficiency of the reactor process.



Improved materials and fuel construction

When nuclear fuel is fabricated, enriched uranium oxide is baked into ceramic pellets. The pellets are encased in metal tubes to form fuel rods, which are arranged into a fuel assembly ready for introduction into a reactor. Improved materials and construction of the nuclear fuel have significantly increased the reliability of the power generation process as well as fuel efficiency. Examples of construction improvements include increased accessibility of the cooling water in the fuel assembly, making the process more efficient, and improved materials that enable higher enrichment and thereby higher burn-up. Improved design of so-called "debris-catchers" has reduced the rate of fuel failure due to debris in the cooling water, thus improving fuel reliability.

Higher enrichment

Improved fuel materials and construction have contributed to a higher level of enrichment during the past 20 years, from about 3% to 4.5%. This has had a significant impact on fuel efficiency. The level of enrichment determines the amount of energy that can be extracted from the fuel. The higher the enrichment level, the more energy will be delivered by every kilogram of enriched uranium. But enrichment is costly, and a study is performed every year to determine the most economical level of enrichment for every reactor. When determining the enrichment level, consideration must also be given to the technical limitations of the fuel assembly. The aim of enrichment optimisation is to achieve the best possible overall economy. The analysis results in specification of the level to which the fuel should be enriched, and an estimate of the number of fuel assemblies that need to be purchased annually for each reactor.

Optimised fuel design

In fuel design, the properties that the individual fuel assemblies must have are determined. The aim is to produce a design that puts the fuel to maximum use for the coming years of operation. At the same time, the design must provide maximum flexibility for operating times, and it must meet all safety criteria. In order to extract as much energy as possible from the uranium, enrichment is distributed inside the assembly. This distribution ensures that the power will be more uniformly distributed and the best possible heat transfer from the uranium to the coolant will be obtained, thereby making power generation stable and efficient. Fuel optimisation is performed by Vattenfall.



A DIVERSE VATTENFALL PERFORMS BETTER

"Even though I haven't heard so much yet about Vattenfall's ambitions when it comes to diversity, my impression in meeting colleagues is that the company culture is based on equality and that we all have the same opportunity regardless of our background. One of the challenges that Vattenfall faces lies in stimulating interest in technology among women at earlier ages. We should be more proactive already at the primary school level and find new ways to communicate and enthuse. Technology is fun and should be a more natural choice for young women than it is today!"

FRANZISKA ZIMMERMANN, 26, Master of Engineering and trainee at Vattenfall Europe Heat since August 2008.

Vattenfall's internationalisation along with its strategic ambition of Continued Profitable Growth make diversity a necessity as well as opportunity to build a more profitable, effective and attractive company. Having a diverse workforce is essential for creating an innovative, performance-driven culture that supports Vattenfall's ambition to grow and lead the development of new energy technologies. Diversity also makes Vattenfall better equipped to understand different customer groups and their needs.

Equal opportunity and rights – Vattenfall's view

Vattenfall's Human Resources Policy expresses the company's view of diversity and equal opportunity as well as its importance: "We strive for diversity in teams and units in regards to gender, age, background and experience, enabling employees from different units and of different nationalities to work together". This policy is also reflected in Vattenfall's ambition regarding its human resources: "Our workforce should reflect the societies in which we operate". Vattenfall is committed to creating the same opportunities and rights for all employees, and to establishing diversity as a natural part of day-to-day activities.

One prerequisite for ensuring the same rights and opportunities is to strictly condemn every act of discrimination in all work-related situations. Consequently, Vattenfall's Code of Conduct clearly states that no employee shall be discriminated against or harassed with respect to employment or occupation due to their ethnic origin, skin colour, gender, religion, political opinions, national origin, social background or for any other reason.

Gender diversity has been a starting point for Vattenfall's work in this area. The target set for the Vattenfall Group is to increase the number of women managers in an effort to obtain an equal ratio between the number of women employees and women managers within the organisation. The minimal requirement for Vattenfall's work with diversity is that the company complies with equal opportunity laws in all countries where the company has operations.

Another target is to attain a more balanced age structure at Vattenfall. Many employees are set to retire during the next couple of years at the same time that the company has ambitious expansion plans. To address this challenge, Vattenfall is working actively with student relation activities, knowledge-sharing programmes and employee development.

With respect to ethnic diversity, the Vattenfall Group has set a target to mirror society, which poses a challenge since it is not legally allowed to collect specific data about employees' ethnic backgrounds. The first step is to review the recruitment process in terms of how applications from candidates with different ethnic backgrounds are handled. This is to certify that the ambition to mirror society has

been met in applications, and also ensure that there are no entry barriers for people with different backgrounds.

Diversity generates results

Vattenfall is convinced that by striving for diversity, it can build a more profitable, effective and attractive company by generating a number of tangible advantages.

A workforce with a multitude of backgrounds and experience is more innovative and willing to introduce different views and new ways of working. This is essential when creating a performance culture that supports Vattenfall's ambition to grow with profitability and lead the development of new energy sources. In addition, diversity leads to improved decision-making processes, because the risk for "group thinking" is reduced with increased diversity.

A diverse workforce is also better equipped to understand different customer groups and their specific needs and wants. This helps Vattenfall to tailor products or services for different markets and varying needs. In short, diversity provides Vattenfall with three very important competitive advantages in response to business challenges – innovative strength, flexibility and customer insight.

In order to continue to be a strong competitor and realise Vattenfall's vision to be a leading European energy company, Vattenfall must be an attractive employer. Employee surveys indicate that Vattenfall's support for a diversified workforce improves employee satisfaction, productivity and retention.

In conclusion, diversity contributes to innovation, performance, customer relationships and employee satisfaction – all of which are crucial for the company's continued development.

The challenge of achieving diversity

Vattenfall is aware of the multitude of challenges involved in achieving diversity throughout the organisation, and its ambitions are high. Launching effective and coherent measures that support diversity is a challenge of its own, and there are many factors that add to the challenge.

In just a few years there will be a shortage of engineers and technical staff in Vattenfall's operations, and it is expected that the energy industry will have to compete heav-



"I think that the progress inside the walls of Vattenfall largely follows the progress in society. One important change that I've seen during my years in the organisation is that women have acquired a much more prominent role and hold responsible positions as managers to a greater extent than before. The attitude that you as a woman always have to try a little bit harder, be a little bit better, than your male colleague is still common, but I also feel that we all have the same equal chances when it comes to applying for a position – and getting it!"

AGATA LATA CZ-STRASZAK, Controller, employed by Vattenfall in Poland since 2001.

ily for qualified candidates. The solution is to recruit from a larger and more diverse competence base than today. At Vattenfall, a link can be found between diversity and specialist knowledge. Working groups and units in which cutting-edge specialist competence is a prerequisite tend to be more diverse. In these groups, recruitment is done globally and with strict focus on competence requirements, which makes them good examples for the rest of the organisation. Vattenfall has much to gain from a recruitment process that evaluates and focuses only on the applicant's competence and experience.

An additional challenge concerning Vattenfall's objective to increase the number of women managers is associated with the fact that many managerial positions require engineering skills, and women engineers are scarce. There is a significant discrepancy between Vattenfall's projected recruiting need and the number of future engineering graduates who are women. Without enough qualified female

engineers, Vattenfall will fail in its ambition to increase the number of women in management positions.

An external study performed by the research institute Universum has ranked student perceptions of various potential employers. This ranking shows that female students in Sweden rank Vattenfall higher than their male counterparts do (Ideal Employer ranking 2008 Engineering). This is an advantage for Vattenfall to exploit further in its recruitment efforts.

Providing a work environment that allows a balance between work and family life is another challenge. Raising children is a natural part of life, but if the right conditions and mind set are not in place within the company, working fathers and mothers may be left behind. In the countries where Vattenfall operates, there are large differences in legislation and how Vattenfall's own benefits for employees are designed. Sweden has come far in offering all employees opportunities to create a more flexible working life. In



“Management needs to express much stronger and clearer support for diversity objectives than is the case today! Based on my experience, the issue of diversity has been limited to gender. Generally speaking, I think Vattenfall’s development when it comes to diversity reflects the progress made in the surrounding community. My impression is that achieving diversity was significantly higher on the company’s agenda in the past. The goals used to be tougher and more clearly worded, but have been compromised and grown more vague over the last decade. There is a culture that encourages us to continue working beyond retirement age. But from personal experience I can say that after 67 years of age, the company’s interest for you declines sharply.”

LENNART MEISTER, 68, investigator/project manager in the development, strategies and management systems organisation. Employed by Vattenfall in Sweden from 1974 to 2007, and serving in a consultant role from 2008.

addition to the statutory benefits provided to employees on parental leave, employees receive extra compensation from Vattenfall and are also given significant opportunities to reduce their working hours during their early years as parents. For employees in Poland, the situation is quite different, as they receive no benefits from the government or compensation from Vattenfall when on parental leave. In its future efforts to attract and retain talent, Vattenfall must ensure a sound balance between work and family life. The Universum study also indicates that in all countries where Vattenfall operates, engineering graduate students, regardless of gender, are looking not only for an optimal career, but also for a balance between work and their life outside work.

How Vattenfall acts to promote diversity

Vattenfall is an international company with operations in different countries with different cultures – not least dif-

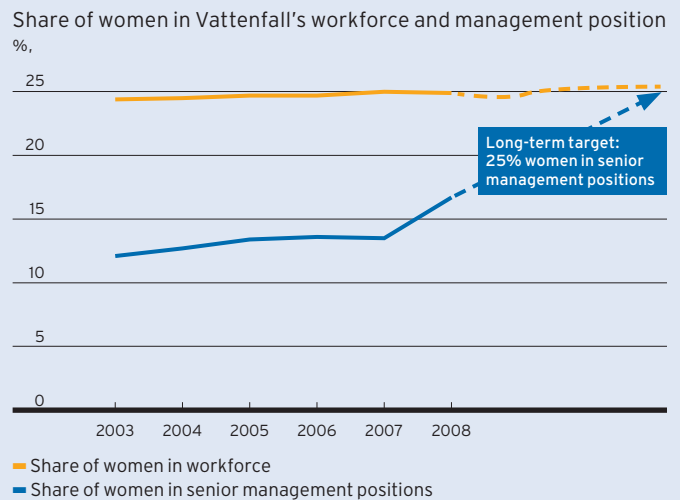
ferent working cultures. Similar to diversity in gender, age and ethnic origin, this poses a number of challenges but also opportunities. Vattenfall is convinced that when the initial obstacles are overcome and diversity and cultural multitude is fully exploited, this will make essential contributions to the company’s successful development. To achieve this, Vattenfall is working with targets, objectives and leadership commitment. At the Group level, initiatives are encouraged and co-ordinated to provide support to managers and HR staff in the different countries. In addition, all employees have the opportunity to raise and discuss questions in the area of equal opportunity through Vattenfall’s yearly “My Opinion” survey.

For additional information, see Labour practices in the reporting section, pages 66–72.

VATTENFALL HAS A LONG WAY TO GO IN ACHIEVING ITS MAIN DIVERSITY OBJECTIVE...

Vattenfall's focused diversity objective is to increase the number of women in management positions and to obtain an equal ratio between the number of women employees and women managers within the organisation.

The figures clearly show a gap between the share of women in senior management positions versus women in the workforce. Today 25% of the Vattenfall's employees are women, while only 17% of managers are women. The message from the most recent "My Opinion 2008" survey also points to the fact that more work needs to be done. One statement that scored low among women employees was "Men and Women have equal career opportunities at Vattenfall". Only 65% women agreed with the statement, compared with 77% for men. For Vattenfall, this shows that promoting equal opportunity is more important now than ever before.



...BUT ACTION IS BEING TAKEN

With the aim of supporting diversity, a number of initiatives have been started throughout the Vattenfall Group. Here are a few examples of such activities and projects.

At the Vattenfall Group level

- Vattenfall's International Network for Women is used as a communication forum for managers and leaders at Vattenfall. About 130 women managers and young potentials are active in the network. In addition, Vattenfall is also a member of a network organised by CSR Europe, "Women in Leadership Positions".
- In the Group-wide competence planning process, the organisation's current competence status and future competence needs are analysed on the basis of business plans. This gives a clear view of the age structure in the organisation. The process will ensure that the organisation has the proper skill sets from both the short- and a long-term perspectives.
- Vattenfall's Group-wide knowledge management initiative has secured the process of knowledge transfer. In order to safeguard existing know-how in complex areas of responsibility, and critical systems and components, knowledge transfer has been planned in detail and implemented. Also, as a multicultural organisation, Vattenfall has a need for employees with a broad base of international experience. International assignments are therefore of strategic importance not only as a means of knowledge transfer, but also as a process that fosters the development of both human resources and the company.
- In order to improve the recruitment process so that it evaluates and focuses on the applicant's competence and experience, it is becoming more common at Vattenfall to process applications anonymously. This is to ensure that only the applicant's skills are assessed and nothing else.



In Germany

- Diversity is highly integrated in the recruiting concept. Job profile descriptions are tailored to specific target groups, such as woman engineers. One way could be to highlight the message of “Work/Life Balance” at Vattenfall and advertise for a job with a picture of a woman. The same measures can be used to attract people from a certain cultural background as well.
- Co-operation with Femtec on promoting women with backgrounds in engineering and science. Mentoring programmes have also been developed to promote networking among women and create role models. To highlight the importance of work/life balance, “Keep-in-touch and re-entry programmes” are being developed for mothers and fathers following the early child-rearing years.
- To strengthen cultural diversity, mobility is being promoted through job rotation and exchange programmes. Seminars are also held on intercultural competence along with various forums for exchanging experience and know-how with expatriates. Language training is a standard development activity.
- Berlin has the largest Turkish population outside Turkey, so it is very important that Vattenfall’s staff at the Customer Service Centre in Berlin reflects this. The result is a centre that has the language abilities and cultural skills required to give Vattenfall’s customer base service that is beyond the expected.
- Another example of diversity can be seen at Vattenfall Trading Services in Hamburg, which is the most diverse company in the organisation with about 19 nationalities. In such a diverse environment the chances are good that the traditional way of doing things are challenged and new and different ways of working will be invented and tested.

In Poland

- In Poland, Vattenfall has launched various initiatives to prevent bullying and sexual harassment. During the year, articles were written in employee magazines to raise awareness of the issue, and external consultants have been called in to train management to deal with harassment. The HR department has presented clear guidelines on how to deal with harassment, and employees are given the opportunity to talk anonymously to an external consultant, should they wish to do so.

In the Nordic countries

- To obtain a more balanced age structure at Vattenfall in Sweden, employees are encouraged to continue working until the age of 65. Employees over the age of 58 have the opportunity to cut their working hours to 80%, while keeping their salary level at 90% and with no negative effects on their pensions.
- At the Ringhals nuclear power plant in Sweden, a local network for women managers was started in response to the large number of women managers leaving their positions after only a short period of time. At monthly meetings, members are encouraged to speak out, and the result is that the number of women managers has increased. In the last year alone, Ringhals gained about 10 new women managers, while the current managers are tending to stay in their position.
- The Nordic organisation is a good example of male managers taking paternity leave. During the last three years around 10% of Nordic male sales managers have taken parental leave every year.
- In Denmark, women stress that they not like to focus on the gender issues but on qualifications. Vattenfall in Denmark provides employees with flexibility in working hours and work places so it is possible for young parents with children to step into a position as manager and project manager.
- Vattenfall is a partner company in the Diversity Challenge, a student diversity competition that offers internships for students with a multicultural background. Currently, Vattenfall’s Business Group Nordic offers two internships.

WHAT WE HAVE ACHIEVED

Vattenfall reports in accordance with the Global Reporting Initiative's (GRI) G3 Sustainability Reporting Guidelines in order to measure performance and achieve transparency and international comparability in sustainability performance reporting. Vattenfall has applied the GRI guidelines since 2003 and reports on the A+ level as defined by GRI. For further information, see www.globalreporting.org



The reporting section

The reporting section follows the GRI indicator framework, dividing environmental, social and economic performance indicators specified by GRI in sections. In addition to reporting environmental, social and economic performance, Vattenfall also describes the governance structure and management systems in place, and provides a comprehensive content index according to the GRI standards (GRI Content Index found on page 42).

Report profile, scope and boundaries (3.1–3.11)

The numerical data provided in the reporting section refers to 2008. Significant events up until 17 March 2009 are also reported. Vattenfall has published annual CSR reports according to GRI guidelines since 2003. This report was published on 31 March, 2009. The previous report was issued in June 2008, covering performance in 2007. The scope of the report is the Vattenfall Group and its operations, which is the same as for the annual report.

Boundaries

Vattenfall has limited the reporting boundaries to areas in which the company has full control over data collection and information quality. For example, the downstream impacts of heat and electricity use are so widespread that it would be difficult to measure them in a reliable way.

No significant changes in size, structure, ownership or products/services affecting the report's scope have occurred during the reporting period. The investments in wind and ocean power in the UK are still in the planning stages, and remaining investments consist of participating interests in companies, i.e., ownership stakes of less than 50%.

Accounting principles

The financial data as well as most data related to human resources presented in the CSR report is taken from Vattenfall's audited annual accounts. The reporting currency of Vattenfall AB is Swedish kronor (SEK). The accounting principles for financial reporting are provided in Vattenfall's 2008 Annual Report.

The consolidation principles for environmental data are the same as for the financial statements, i.e., they include subsidiaries in which Vattenfall AB holds more than 50% of the voting power or in any other way has management control. This principle was fully implemented in 2007. Data for 2006 has been recalculated in accordance with the new principle.

Environmental data for the CSR report, including energy-related data, is collected via the Group's environmental reporting. Process and supporting software was introduced in 2007 to ensure high quality and consistency of collected data. This was used for the first time to report 2006 data. Group-wide definitions for all environmental parameters are used to enhance quality and facilitate comparisons across the Group. Where possible, reporting of historical data has been recalculated in line with these changes. This is explained in comments adjacent to the tables.

To allow for future comparisons for the Danish operations, these are included for the full year 2006, although they were consolidated in the Vattenfall Group on 1 July 2006.

Any other restatements or changes in environmental accounting are described in comments adjacent to the respective tables.

Reported CO₂ emissions are calculated based on fuel consumption. It should be noted that calculation methods differ from country to country. Calculation methods are stipulated by national legislation, among other things in connection with the EU emissions trading scheme.

All other emissions have either been measured (in cases where continuous monitoring equipment has been installed) or calculated based on periodic measurements.

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<h3>WHAT IS IMPORTANT TO VATTENFALL'S STAKEHOLDERS?</h3> <p>Vattenfall works on a constant dialogue with different stakeholder as a central part of the overall business. The interaction is an ongoing process to continue work on dialogue with those and institutions, to identify and address stakeholder concerns, to manage with legislation and NCA, and to manage with other regulations and obligations.</p> <p>The issues that are important for the company's stakeholders are identified through a stakeholder analysis, which is conducted in accordance with the stakeholder analysis and identification. In addition to the work on dialogue and identification, the stakeholder analysis is also used to identify the most important issues to the company's stakeholders. In the stakeholder analysis, the issues are ranked according to their importance to the company's stakeholders and the company's stakeholders. The most important issues are ranked according to their importance to the company's stakeholders and the company's stakeholders.</p>																																																																			
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health	GR27	Product safety and health	GR28	Product safety and health	GR29	Product safety and health	GR30	Product safety and health	GR31	Product safety and health	GR32	Product safety and health	GR33	Product safety and health	GR34	Product safety and health	GR35	Product safety and health	GR36	Product safety and health	GR37	Product safety and health	GR38	Product safety and health	GR39	Product safety and health	GR40	Product safety and health	GR41	Product safety and health	GR42	Product safety and health	GR43	Product safety and health	GR44	Product safety and health	GR45	Product safety and health	GR46	Product safety and health	GR47	Product safety and health	GR48	Product safety and health	GR49	Product safety and health	GR50	Product safety and health	GR51	Product safety and health	GR52	Product safety and health	GR53	Product safety and health	GR54	Product safety and health	GR55	Product safety and health	GR56	Product safety and health	GR57	Product safety and health	GR58	Product safety and 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CSR report materiality, pages 40–41
 The most material sustainability issues to Vattenfall's stakeholders have been analysed, and reference is made to the different sections of the CSR report, as well as to the 2008 Annual Report, for these issues.

GRI content index, pages 42–43
 Vattenfall provides a full content index according to the GRI guidelines to make it easier to navigate to certain areas of the report and to find information regarding a specific indicator.

Environmental performance		Environmental performance	
<h3>ENVIRONMENTAL PERFORMANCE</h3> <p>Vattenfall's environmental performance is based on a number of key indicators, including greenhouse gas emissions, energy efficiency, water consumption, and waste management. The company has implemented a number of measures to improve its environmental performance, including energy efficiency programs, water conservation programs, and waste management programs.</p>			
<h4>Management approach</h4> <p>Vattenfall's management approach is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its management approach, including stakeholder engagement programs, transparency programs, and accountability programs.</p>			
<h4>Vattenfall's Environmental Policy</h4> <p>Vattenfall's environmental policy is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its environmental policy, including stakeholder engagement programs, transparency programs, and accountability programs.</p>			
<h4>Vattenfall's key environmental aspects</h4> <p>Vattenfall's key environmental aspects are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its key environmental aspects, including stakeholder engagement programs, transparency programs, and accountability programs.</p>			
<h4>Water use</h4> <p>Vattenfall's water use is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its water use, including water conservation programs, transparency programs, and accountability programs.</p>			
<h4>Waste</h4> <p>Vattenfall's waste management is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its waste management, including waste management programs, transparency programs, and accountability programs.</p>			
<h4>Energy efficiency</h4> <p>Vattenfall's energy efficiency is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its energy efficiency, including energy efficiency programs, transparency programs, and accountability programs.</p>			
<h4>Greenhouse gas emissions</h4> <p>Vattenfall's greenhouse gas emissions are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its greenhouse gas emissions, including greenhouse gas emissions programs, transparency programs, and accountability programs.</p>			
<h4>Land use and biodiversity</h4> <p>Vattenfall's land use and biodiversity are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its land use and biodiversity, including land use and biodiversity programs, transparency programs, and accountability programs.</p>			
<h4>Health and safety</h4> <p>Vattenfall's health and safety are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its health and safety, including health and safety programs, transparency programs, and accountability programs.</p>			
<h4>Human rights</h4> <p>Vattenfall's human rights are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its human rights, including human rights programs, transparency programs, and accountability programs.</p>			
<h4>Anti-corruption</h4> <p>Vattenfall's anti-corruption is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its anti-corruption, including anti-corruption programs, transparency programs, and accountability programs.</p>			
<h4>Community relations</h4> <p>Vattenfall's community relations are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its community relations, including community relations programs, transparency programs, and accountability programs.</p>			
<h4>Product quality</h4> <p>Vattenfall's product quality is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its product quality, including product quality programs, transparency programs, and accountability programs.</p>			
<h4>Customer satisfaction</h4> <p>Vattenfall's customer satisfaction is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its customer satisfaction, including customer satisfaction programs, transparency programs, and accountability programs.</p>			
<h4>Employee satisfaction</h4> <p>Vattenfall's employee satisfaction is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its employee satisfaction, including employee satisfaction programs, transparency programs, and accountability programs.</p>			
<h4>Supplier satisfaction</h4> <p>Vattenfall's supplier satisfaction is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its supplier satisfaction, including supplier satisfaction programs, transparency programs, and accountability programs.</p>			
<h4>Environmental performance</h4> <p>Vattenfall's environmental performance is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its environmental performance, including environmental performance programs, transparency programs, and accountability programs.</p>			
<h4>Social performance</h4> <p>Vattenfall's social performance is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its social performance, including social performance programs, transparency programs, and accountability programs.</p>			
<h4>Economic performance</h4> <p>Vattenfall's economic performance is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its economic performance, including economic performance programs, transparency programs, and accountability programs.</p>			

Environmental performance		Environmental performance	
<h3>ENVIRONMENTAL PERFORMANCE</h3> <p>Vattenfall's environmental performance is based on a number of key indicators, including greenhouse gas emissions, energy efficiency, water consumption, and waste management. The company has implemented a number of measures to improve its environmental performance, including energy efficiency programs, water conservation programs, and waste management programs.</p>			
<h4>Life Cycle Assessment</h4> <p>Vattenfall's Life Cycle Assessment (LCA) is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its LCA, including LCA programs, transparency programs, and accountability programs.</p>			
<h4>Group Environmental Action</h4> <p>Vattenfall's Group Environmental Action is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its Group Environmental Action, including Group Environmental Action programs, transparency programs, and accountability programs.</p>			
<h4>Environmental indicators</h4> <p>Vattenfall's environmental indicators are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its environmental indicators, including environmental indicators programs, transparency programs, and accountability programs.</p>			
<h4>Materials used (EN2)</h4> <p>Vattenfall's materials used are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its materials used, including materials used programs, transparency programs, and accountability programs.</p>			
<h4>Water use</h4> <p>Vattenfall's water use is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its water use, including water conservation programs, transparency programs, and accountability programs.</p>			
<h4>Materials used that are new (EN2)</h4> <p>Vattenfall's materials used that are new are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its materials used that are new, including materials used that are new programs, transparency programs, and accountability programs.</p>			
<h4>Waste management</h4> <p>Vattenfall's waste management is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its waste management, including waste management programs, transparency programs, and accountability programs.</p>			
<h4>Environmental risk management</h4> <p>Vattenfall's environmental risk management is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its environmental risk management, including environmental risk management programs, transparency programs, and accountability programs.</p>			
<h4>Reporting of environmental, social and economic performance indicators</h4> <p>Vattenfall's reporting of environmental, social and economic performance indicators is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its reporting of environmental, social and economic performance indicators, including reporting of environmental, social and economic performance indicators programs, transparency programs, and accountability programs.</p>			
<h4>Business Groups (G) and business units</h4> <p>Vattenfall's Business Groups (G) and business units are based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its Business Groups (G) and business units, including Business Groups (G) and business units programs, transparency programs, and accountability programs.</p>			
<h4>Compliance with laws, agreements and frameworks</h4> <p>Vattenfall's compliance with laws, agreements and frameworks is based on a number of key principles, including transparency, accountability, and stakeholder engagement. The company has implemented a number of measures to improve its compliance with laws, agreements and frameworks, including compliance with laws, agreements and frameworks programs, transparency programs, and accountability programs.</p>			

Management approach – introduction to performance indicators
 In accordance with GRI, the environmental, social and economic sections are each introduced by a more general description of how Vattenfall approaches and manages the most crucial issues. The introduction provides the framework and context for the results conveyed by the reporting under each indicator.

Reporting of environmental, social and economic performance indicators
 Qualitative and quantitative information on indicators specified by the GRI guidelines. Vattenfall's aim is to provide a balanced and accurate presentation of the company's environmental, social and economic performance. In the sustainability reporting, a set of indicators (based on GRI) have been identified (Preferred Performance Indicators), which are of special importance to the company. These are highlighted on page 5 in the What we are doing section of the report.

WHAT IS IMPORTANT TO VATTENFALL'S STAKEHOLDERS?

Vattenfall carries on a constant dialogue with different stakeholders as a natural part of its everyday business. This interaction is an ongoing process in customer service, in dialogues with authorities and regulators, in media and investor relations activities, in meetings with neighbours and NGOs, and in meetings with owner representatives and others.

The issues that are important for the company's stakeholders are identified and managed in the everyday business activities and communication. In addition to this work, stakeholders are also invited to participate in specific surveys to identify and prioritise sustainability issues.

In spring 2008, for the 2007 CSR Report, two surveys were conducted internally and externally on the expectations on Vattenfall and materiality of various topics for the CSR report. These surveys are updated biannually to ensure that the CSR report targets key issues for Vattenfall's stakeholders. The overall conclusion was that external and internal stakeholders agree to a large extent on what issues are important for Vattenfall to focus on from a sustainabil-

ity perspective. In addition, the report itself is evaluated by external stakeholders every year.

For the 2008 report, this information has been complemented with an updated collection of topics from various existing stakeholder interfaces, such as Q&A documents, e-mail questions via websites, media coverage, dialogues with neighbours and other documentation. The result of this combination of information is a list of issues presented in order of priority in the table below. In general, issues related to environmental performance have been ranked as the most material (i.e., the most important). The issues that were assigned the highest importance were managing nuclear waste and reducing greenhouse gases. All material issues are covered in the report. In selecting which topics to describe further in the section "What we do", consideration has been given to the topics already covered in previous reports and topics planned to be covered in coming reports. Guidance on further reading in this report, previous reports and annual reports is provided below.

Materiality analysis – issues in order of priority

Issue	Description	Stakeholder	Development 2008	Further information
1. Nuclear waste	Waste from nuclear power generation is a concern for many stakeholders. Methods for final storage to safeguard human health and safety over the long time period of radiation are being developed. Vattenfall plays an active role in the ongoing activities, in Sweden through its ownership of SKB. In Germany the Federal Government is responsible for the final disposal of radioactive waste and the operators of nuclear power plants are responsible for interim storage.	Authorities Citizens NGOs Media	According to the Swedish time plan for permanent storage a decision on location will be taken during 2009. In Germany a repository for high-level radioactive waste is needed by 2030. The exploration of the foreseen site at the Gorleben salt dome is politically stopped.	Management approach Environment, EN22, 2005 CSR Report-Vattenfall webpages
2. Emissions	Vattenfall's emissions to air mainly derive from fossil fuel and biomass-fired power plants. NO _x , SO ₂ and particulate emissions have been reduced in most operations, but CO ₂ remains to be targeted in order to reduce climate impact. CO ₂ emission reductions can be achieved mainly through Carbon Capture and Storage (CCS) technology and increased generation from renewable energy sources. Half of Vattenfall's current electricity generation is low CO ₂ emitting (hydro power, wind power and nuclear power).	All	<ul style="list-style-type: none"> • Inauguration of CCS pilot plant in Schwarze Pumpe. • Investments in wind power in the UK. • Investment decision on desulphurisation at the Siekiarki power plant in Poland. 	pp.20–25 EN16–20 Annual report 2008 CSR Report 2007 pp. 12–15
3. Resource efficiency and management of production residues	Resource efficiency is fundamental for sustainability. Improving efficiency means society's need for energy can be met with less impact. Efficiency measures target all resources used in operations, including fuels, water, energy, capital, etc. Management of production residues is important for society. It includes handling hazardous waste but also re-use of residues when possible (for example production of gypsum in the flue gas cleaning processes, which leads to less use of natural mined gypsum in the construction industry).	Politicians Authorities NGOs Owner Capital providers	<ul style="list-style-type: none"> • Continuous efficiency improvements (see economic performance management approach). • Increased use of waste as a fuel (EN1–3). 	EN1–9, EN11–15

Issue	Description	Stakeholder	Development 2008	Further information
4. Supply chain practices and contracting	Vattenfall is expected to be a transparent and fair player in business. In procurement, UN Global Compact standards must be met, including human rights, labour standards, and environmental and anti-corruption standards. This is ensured by audits when deemed necessary.	Customers Authorities Politicians NGOs Employees Media	<ul style="list-style-type: none"> Group-wide code of conduct for suppliers established. Audits of large fuel suppliers performed. Vattenfall joined the UN Global Compact initiative as a business participant in June 2008. 	HR management approach, HR2, CSR report 2007
5. Security of supply	Vattenfall's role in society is to provide energy. Power outages and supply shortages have severe consequences. Expectations are placed on the energy system in terms of reliability, availability and affordability, in both the short and long term. Continuous efforts are made to ensure security of supply in the generation portfolio as well as reliability of distribution and transmission grids.	Customers Citizens Politicians Capital providers	Vattenfall invested approx. SEK 20 billion in electricity and heat generation in 2008, and SEK 6 billion in the electricity distribution and transmission grid.	Economic performance EU26–28 Annual report 2008
6. Operational safety	Safety is a primary concern in all Vattenfall operations. All stakeholders give high priority to nuclear safety, and Vattenfall has taken measures to strengthen Group-wide work on nuclear safety. Focus is also on dam safety in hydro power plants, safety around high-voltage grids, etc.	All	<ul style="list-style-type: none"> Safety processes in the nuclear power plants are emphasised. Accident rates were reduced by one-third between 2006 and 2008. 	EN management approach, pp. 8–9 CSR Report 2007
7. Investments in renewables	Vattenfall is expected to play a leading role in generation from renewable energy sources with the purpose of reducing CO ₂ emissions and securing a long-term supply of energy. The share of energy generation from renewable energy sources is increasing through a strong investment plan. Research and development (R&D) efforts aim at developing potential large-scale viable solutions.	All	<ul style="list-style-type: none"> Leading role in wind power development. Increased use of biomass. R&D and investments in ocean energy. 	EN5–7, Economic performance Annual report 2008
8. Employer practices	To ensure continued development of the company and to attract the right competence, Vattenfall strives to create a safe, healthy and stimulating work environment. This includes offering competitive benefits and training, ensuring diversity (age, gender and ethnicity) in the workforce and management, improving labour/management relations and assuming responsibility for occupational health and safety.	Employees and potential employees Politicians	<ul style="list-style-type: none"> The Management Planning and Competence Planning processes have been combined and give better output. The focus and follow-up on commitment targets has increased. 	pp. 32–35, LA1–14, HR4,
9. Land use and ecosystem impact	Energy generation and distribution has an impact on the landscape and ecosystems. Examples are the impact on rivers of hydro power, and the impact on landscapes from wind power and lignite mining. Vattenfall strives to manage this impact in a responsible manner through a number of programmes.	Neighbours NGOs Authorities Politicians Citizens	Continued efforts have been made to reduce ecosystem impact.	EN11–15, CSR report 2007 pp. 21–23
10. Customer service	Vattenfall aims to provide energy at fair and market-based prices. Prices are a major concern for customers in all markets, and taxation has a major impact on consumer prices. Vattenfall strives to provide excellent customer service. The customer offering also includes support for energy efficiency, which can reduce the total energy cost for customers, as well as a declaration of origin and information on environmental impact.	Customers Owner Capital providers	A trend-break in customer satisfaction index (CSI) in the Nordic. Increase sales of products with declaration of origin.	Product responsibility management approach, PR5
11. Economic performance and growth	Economic performance and growth is a fundamental requirement for Vattenfall to ensure funding for investments and enable the company to play an active role in developing future energy solutions. The long-term profitability target set on Vattenfall by the owner is 15% of return on average equity. Also, management is committed to maintain a single A debt rating.	Owner Capital providers Politicians Society	A number of acquisitions were made in 2008, especially in wind power in the UK. Vattenfall's economic performance was stable during 2008.	Economic performance, EC1–8
12. Stakeholder engagement and community relations	Vattenfall aims for open, transparent and perceptive communication with all stakeholders. This applies to neighbours and the local communities where the company operates, but also to society at large. Stakeholders' needs and expectations are important input in the planning of business operations.	Neighbours Citizens Politicians NGOs	Group guideline for stakeholder dialogue established, which will be implemented in 2009.	EU18, 4.14–4.17

GRI CONTENT INDEX

Following is a content index for indicators specified by the GRI guidelines and which are reported by Vattenfall. It includes indicator names and GRI identification numbers and provides references to the pages where relevant information can be found. In addition, relevant UN Global Compact Principles are indicated for each indicator. The Electric Utility Sector Supplement Pilot was published in autumn 2008. Those Sector Supplement Indicators that have been feasible to collect have been reported on:

Statements of status, boundaries and omission of indicators are provided in the respective indicator reporting text. The following core indicators are not reported on

- Emissions of ozone-depleting substances by weight (EN19). Ozone-depleting substances are used to a very limited extent within Vattenfall's operations, and the data is not aggregated at the Group level.

- The indicator "Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation" (EN26) is outside the boundaries set by the report.
- Percentage of products sold and their packaging materials that are reclaimed by category (EN27) is not relevant to Vattenfall's business operation.
- Percentage and total number of significant investment agreements that include human rights clauses or that have undergone human rights screening (HR1). In countries where Vattenfall operates these issues are controlled by legal frameworks, and thus data is not collected at the Group level.

Page reference

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1) The ten UN Global Compact principles

Human Rights

Principle 1 – Businesses should support and respect the protection of internationally proclaimed human rights.

Principle 2 – Businesses should make sure that they are not complicit in human rights abuses.

Labour

Principle 3 – Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining.

Principle 4 – Businesses should uphold the elimination of all forms of forced and compulsory labour.

Principle 5 – Businesses should uphold the effective abolition of child labour.

Principle 6 – Businesses should uphold the elimination of discrimination in respect of employment and occupation.

Environment

Principle 7 – Businesses should support a precautionary approach to environmental challenges.

Principle 8 – Businesses should undertake initiatives to promote greater environmental responsibility.

Principle 9 – Businesses should encourage the development and diffusion of environmentally friendly technologies.

Anti-Corruption

Principle 10 – Businesses should work against corruption in all its forms, including extortion and bribery.

PROFILE DISCLOSURE

For additional information on profile disclosure, see the fold-out of the inside cover of this report. In-depth information is provided in the 2008 Annual Report and on www.vattenfall.com.

Installed capacity (EU1)

	Business Group Nordic		Business Group Central Europe		Total	
	2008	2007	2008	2007	2008	2007
Installed capacity electricity & heat, MW¹						
Hydro power	8,362	8,417	2,894	2,894	11,256	11,311
Nuclear power	6,788	6,860	771	771	7,559	7,631
Fossil-based power	2,603	2,708	12,141	12,141	14,744	14,849
Wind power	568	556	43	43	611	599
Biomass, waste	300	361	102	102	402	463
Total electricity	18,621	18,902	15,951	15,951	34,572	34,853
Total Heat	4,354	4,987	13,518	13,483	17,872	18,470

1) Certain values for 2007 have been adjusted compared with previously published information.

Number of customer accounts (EU2)

	Business Group Nordic		Business Group Central Europe		Total	
	2008	2007	2008	2007	2008	2007
Number of electricity customers (Retail customers, small and medium-sized companies)	1,120,000	1,034,000	3,670,000	3,668,000	4,790,000	4,702,000
Volume, TWh Large electricity customers (industries, resellers, etc.)	49.9	49.0	44.0	36.3	93.9	85.3
Number of network customers	1,299,000	1,302,000	4,290,000	4,427,000	5,589,000	5,729,000

Length of transmission and distribution lines by voltage (EU3)

	Business Group Nordic		Business Group Central Europe		Total	
	2008	2007	2008	2007	2008	2007
Electricity networks						
Transmission grid, km	–	–	10,000	10,000	10,000	10,000
Distribution network, km	189,300	187,500	103,100	103,200	292,400	290,700

Allocation of CO₂ emission certificates (EU4)

The European Emission Trading Scheme (ETS) covers the vast majority of Vattenfall's fossil CO₂ emissions. The annual allocation is 53 million tonnes. Additional allowances are bought on the market.

Country	Allowance in million tonnes of CO ₂ , trading period 2008–2012
Germany	44.1
Poland	6.10
Denmark	2.70
Sweden	0
Finland	0.200

Significant changes during the reporting period (2.9)

Acquisition of wind power in the UK

Vattenfall acquired several British wind power companies:

- AMEC Wind Energy Ltd, one of the UK's foremost developers of commercial wind farms, with current projects corresponding to 500–750 MW.
- Eclipse Energy UK Plc, which is working with six wind power projects in the UK with combined capacity of more than 200 MW.
- Thanet Offshore Wind, which with 300 MW under construction is the UK's largest wind power project.

At the end of the year, Vattenfall also entered into a partnership with ScottishPower Renewables, a subsidiary of the Spanish company Iberdrola, to participate in the third round of tender bids to develop offshore wind power in the UK. The joint goal is to establish 6,000 MW of wind power (3,000 MW each).

Acquisition of stake in Polish energy company

In November Vattenfall acquired 18.7% of the Polish energy company ENEA S.A. The company, which is one of four state-owned energy companies, has 2.3 million customers and accounts for approximately 8% of Poland's total energy generation. ENEA S.A. has a mixed portfolio of small-scale hydro power plants as well as planned investments in wind power development projects, but relies predominantly on coal-based generation. Vattenfall today is the largest foreign energy company in Poland, and the acquisition strengthens Vattenfall's position in the Polish energy market.

New Group structure

A new Group organisational structure has been implemented with effect on 1 January 2009. A third Business Group, Pan-European, has been established, comprising three new Group-wide business units: Wind, Nuclear and Engineering. The new Business Group will also be responsible for European business development, focusing on efficient use of energy and biomass. The new organisational model will make Vattenfall better equipped to further improve its ability to reach its ambitious climate and growth targets and take advantage of cross border co-operation opportunities.

Nuon

In February 2009, after the end of the financial year, Vattenfall made an offer to acquire 100% of the shares in the Dutch energy group Nuon. Like Vattenfall, Nuon has an ambitious climate programme, including investments in offshore wind farms and its own pilot plant for CCS technology in Buggenum, Netherlands. A substantial share of Nuon's energy production is based on natural gas, and the acquisition gives Vattenfall important know-how in this area. The transaction is subject to the approval of at least 80% of the shareholders and the European Commission. Nuon and Vattenfall expect to complete the closing of this transaction in the second quarter of 2009, after which Nuon will form a third regional Business Group of Vattenfall – Business Group Benelux.

Awards received (2.10)

- In spring 2008 Vattenfall received an Emerging Technology Award for its CCS technology pilot project in Schwarze Pumpe from the Institute of Electrical and Electronics Engineers (IEEE), the world's leading organisation for electrical and electronics engineers (see www.ieee.org).
- Webby Awards for Polish web site – Interactive Energy Consumption Calculator (see www.webbyawards.com).
- 2008 IAA (International Advertising Association) Responsibility Award For Social and Environmental Communication – Gold winner TV/Film Social category (see www.iaaglobal.org).
- European Excellence awards for Vattenfall's Climate signature initiative, (see www.vattenfall.com/climatesignature and www.excellence-awards.eu).

ENVIRONMENTAL PERFORMANCE

Management approach

Vattenfall manages many different energy sources and technologies, all with different environmental characteristics and challenges. Most of Vattenfall's operations are strictly regulated by laws, regulations, and permits – on global, EU, national, regional and local levels. In addition to complying with regulations, Vattenfall considers environmental performance to be a foundation for sound business development, which improves the company's competitive position and protects the value of current and future assets.

Vattenfall's Environmental Policy

Vattenfall's Environmental Policy, which is valid throughout the Group, states that (extract):

Vattenfall's ambition is to be Number One for the Environment and to be recognised for this. This means that:

- We manage our operations with openness, effectiveness and accountability and, for each energy source and type of technology, we strive to be best in class.
- We do our utmost to choose modern, efficient and environmentally effective technologies while making a sound assessment, balancing environment and economy when making investments.
- We strive to increase our use of energy sources and technologies that have low emissions of carbon dioxide and other emissions.
- We invest in Research and Development to improve energy efficiency in our operations, in renewable and low emission energy sources and to reduce carbon dioxide emissions from power plants based on fossil fuels.
- We have a structured and systematic approach to taking environmental aspects into account, including setting requirements and targets as well as performing follow-ups. We handle this as an integral part of our business management. We assess environmental, social and ethical performance when selecting suppliers, contractors and business partners.

Vattenfall's key environmental aspects

Vattenfall's key environmental aspects include energy and resource efficiency, emission reduction, management of waste and production residues, responsible land use and biodiversity protection. This is further described under the respective headings below, and in the Environmental Indicators.

In addition, as an energy utility with large market presence and purchasing power, Vattenfall strives to ensure that its activities to improve environmental performance also target suppliers, customers and policy makers:

- Supplier criteria are developed to ensure that UN Global Compact standards are met in procurement. These are described in Vattenfall's code of conduct for suppliers. Supplier audits are performed and Vattenfall may provide support to improve a supplier's environmental work (see also Human rights management approach).
- Vattenfall provides retail and industrial customers with support and expertise regarding energy efficiency measures (see EN5–7 and PR3).
- Information on the environmental impact of Vattenfall's energy generation is also provided, and in many markets, Environmental Product Declarations (EPD) are available (see EN5–7 and PR5).
- In relation to policy makers, Vattenfall is actively taking initiatives and entering into dialogue to stimulate the development of frameworks needed to reduce environmental impact from energy generation while at the same time meeting society's need for secure energy supply. Vattenfall has launched a Climate Map, stretching across industries, in an effort to quantify the global potential for reducing greenhouse gas emissions by 2030.

Energy efficiency

Energy efficiency is one of the most important environmental aspects for Vattenfall. Improved efficiency in power plants means that society's need for energy will be met while using less resources and causing less environmental impact per generated unit of energy. Many development and investment programmes aim to increase energy efficiency.

Emissions

The most significant environmental impact from Vattenfall's operations that remains to be handled is from CO₂ emissions from fossil fuel combustion in energy generation, both in terms of quantity and effect on global warming. Vattenfall believes that curbing CO₂ emissions will be the overriding challenge of our time and a defining issue for the power industry. Therefore, Vattenfall has laid out the strategic direction of dramatically reducing emissions from energy generation by developing low CO₂-emitting technologies and reshaping Vattenfall's energy generation portfolio during the coming 20 years.

Vattenfall has set the target to reduce emissions of CO₂ per kWh in the generation portfolio. The long-term target is a 50% reduction by 2030 compared with 1990. Vattenfall's climate vision is to be climate-neutral by 2050 (2030 in the Nordic countries). As a result, significant investments are currently being made in viable renewable energy sources, such as wind and ocean energy, in the development of coal-fired power generation using Carbon Capture and Storage (CCS) technology, and in increased capacity of nuclear power generation. Improved energy efficiency is also essential for ensuring that customers' and society's needs for energy are met while at the same time reducing emissions per kWh.

Vattenfall believes that a global framework for reducing greenhouse gas emissions will be essential to solving the problem and has taken the initiative to propose such a programme for curbing climate change.

Other significant emissions from Vattenfall's operations, which are reduced by flue gas cleaning, are sulphur dioxide (SO₂), nitrogen oxides (NO_x) and particles. Small amounts of other greenhouse gases, such as nitrous oxide (N₂O) and methane (CH₄), are produced in boilers when any fuel is combusted. Sulphur hexafluoride (SF₆) is still used in some electrical equipment. Vattenfall strives to reduce emissions as far as possible applying advanced technologies to emit below national and regional requirements.

Materials use

The largest quantities of materials used by Vattenfall are fuels for electricity generation and heat production. The main fuels are lignite, hard coal, natural gas, biomass, peat, waste and oil. In nuclear power plants, the fuel is uranium. Lignite is mainly excavated in Vattenfall's own mines. Other fuels are purchased. Fuel efficiency is part of energy efficiency improvement measures.

Other large quantities of materials include auxiliary chemicals used mainly for flue gas cleaning, for example, limestone, ammonia and urea. Improved flue gas cleaning normally leads to increased use of these chemicals. See also "Emissions" and "Waste and mineral by-products".

In construction and maintenance of power plants, distribution networks etc., the materials used are concrete, steel, wiring, cables, etc. This is an important part of life cycle impact from energy sources that have no fuel input, such as hydro power, wind power and ocean energy. (See further information on life cycle analysis on page 48 and PR3 on page 59.)

Hazardous substances such as PCB, mercury and asbestos occur in smaller amounts in Vattenfall's operations. A long-term strategy has been applied for managing and phasing out undesirable substances.

Water use

Water is used in many operations in Vattenfall. In mining, ground water is removed, cleaned and returned to water bodies. In hydro power plants, the energy source is running water in rivers. In combustion power plants, as well as in nuclear power plants, water is used for cooling. Vattenfall takes a water balance perspective on the management

of water use, considering impacts from water withdrawal as well as discharge. Impacts from water use include, for example, temperature changes and the impact on biodiversity in surrounding water bodies. Risks for emissions and leakages, for example of oils, into water bodies are carefully monitored and preventive measures are taken.

Land use and biodiversity

The nature of Vattenfall's operations, with large power plants, dams, open-cast lignite mines, wind farms and electricity networks, has a physical and visual impact on the landscape. The affected areas have differing biodiversity value, and the conservation processes and actions differ accordingly.

Before starting new construction or major rebuilding work, environmental impact assessments are carried out, including impacts on biodiversity. Vattenfall strives to harmonise operational facilities with the landscape and the environment, and is committed to the protection of flora and fauna in the surrounding area. This is often a requirement of the operation permits granted by the regulatory authorities for the operation of power plants, and processes to obtain permits and protect biodiversity are well established within Vattenfall. This work is done in co-operation with national and regional authorities.

Waste, residues and by-products

Vattenfall's operations generate different types of waste and residues. Nuclear power plants generate radioactive waste. Combustion of solid fuels such as coal, biomass and waste generate ashes that can be reused and mineral by-products, such as gypsum.

Radioactive waste

Vattenfall operates nuclear power plants in Sweden and Germany. It is Vattenfall's responsibility to have reliable and acceptable solutions for the management of nuclear waste. High-level radioactive waste, which consists primarily of spent nuclear fuel, must be carefully shielded during the handling and transportation phases. It takes one hundred thousand years for the radioactivity to decline to the level that occurs in the quantity of uranium ore from which the fuel was originally fabricated. Vattenfall supports research and development for permanent storage solutions for radioactive waste, a process that is conducted according to different time plans in Sweden and Germany.

In Sweden, SKB, the Swedish Nuclear Fuel and Waste Management Company, has developed a solution for permanent storage, and the process is now in the final phases of selecting the location, which is expected to be announced in 2009. The choice is between Oskarshamn and Östhammar municipalities, which have both volunteered to host the repository. Evaluations consider several factors, such as extensive requirements on the bedrock characteristics and long-term safety, environmental impact, supporting infrastructure and local acceptance. The first Swedish nuclear waste may be deposited in the final repository by 2020 at the earliest. Until then the spent nuclear fuel – high level radioactive waste – is being stored at a central interim storage facility in Oskarshamn. The Swedish radioactive operational waste is stored in the final repository, SFR. This is a central facility for disposal of short-lived low- and intermediate-level waste from both nuclear power plants and hospitals. SFR is located near the Forsmark nuclear power plant in the municipality of Östhammar, 50 metres beneath the bottom of the Baltic Sea.

In Germany, studies and underground exploration have been conducted on the possibility of using the salt mine in Gorleben as a final repository for highly radioactive waste, however, no further exploration has been done since 2000. The German ministry for the environment intends to look into alternatives to Gorleben. Its goal to set up new safety requirements for final storage in 2008 was not realised. In Germany, interim storage facilities are situated at the nuclear power plants and operated by the nuclear power companies. A repository for wastes with negligible heat generating (low and intermediate level wastes) is under construction at the Konrad mine. Start of operation is planned for 2013.

Costs associated with the final disposal of nuclear waste from today's electricity generation are borne today. It has been taken into consideration that a significant part of costs for the deep disposal of high-level radioactive waste occurs many years after production has been closed down. In Sweden, the nuclear power companies continuously pay fees

to a state-controlled fund (the Swedish Nuclear Waste Fund), which is intended to cover all costs associated with waste storage and the decommissioning of nuclear reactors. In Germany, costs associated with the final disposal of nuclear waste shall be borne by those who produce the radioactive waste. The provisions built up for nuclear waste and decommissioning, however, remain within the nuclear industry, that is, the utility companies, energy companies and research centres. These provisions are reported in their respective financial statements. See also EU8.

Re-use of residues, ash and mineral by-products

The burning of solid fuels and cleaning of flue gases result in large amounts of useful ash and gypsum, which are considered as by-products. When ashes and by-products substitute other materials, it leads to less consumption of new resources. It also significantly reduces the amount of ash that has to be deposited, which leads to shorter transports and less emissions.

Most ash and mineral by-products from Vattenfall plants are re-used, and increased use is encouraged. Studies show that the risks associated with using ash as construction material are very small. Vattenfall undertakes research efforts together with the construction industry to improve the use of ash.

Waste management

Depending on different national legislation, some of the ash generated in Vattenfall's power plants also falls under waste legislation. Vattenfall strives to enable re-use of ash by applying quality and environmental standards. Hazardous waste is treated according to permits and regulations.

Waste from construction and the decommissioning of power plants, distribution grids, etc. is handled according to the respective national legislation. Vattenfall strives to stimulate re-use and recycling of construction waste. For example, discharged distribution poles are used for energy recovery, see EN22.

Most waste from Vattenfall's administrative offices, such as paper, etc. is recycled, and many offices minimise the use of paper cups, etc. in order to reduce the amount of waste. Waste from IT is handled locally by the vendor of the equipment, or by assigned specialised companies.

Environmental impact of products and services

The direct environmental impact of Vattenfall's main products, electricity and heat, is very small. Most impact refers to the generation and distribution of energy, such as emissions, resource use, etc., where a life cycle perspective is taken. Additional environmental impact is described below.

Operational safety

Safety is a fundamental aspect and basic requirement for all of Vattenfall's operations. Negative impact on human health and safety is minimised through comprehensive safety work and well-established risk management systems. Within the nuclear operations area, the Vattenfall Group co-ordinates all safety work through the Chief Nuclear Officer, who reports directly to the CEO (see also EU20).

Dam safety is an important aspect of hydro power, since a dam failure could have serious consequences, causing substantial property damage and a threat to human life. The risk of a dam failure is extremely small, and current requirements are calculated for water flows that statistically occur every 10,000 years. Vattenfall has invested actively in improved dam safety and is active in the industry's dam safety work. International audits indicate that Vattenfall's dam safety has a very high standard.

Risks for incidents, contamination and significant spills are carefully monitored, managed and mitigated locally (at the plant and regional level). Examples of risks include oil leaks from transformer stations and oil filled cables in the distribution grid, accidental discharges to water from power plants (for example, hydro power plants), etc. Training in co-operation with local authorities to prepare for possible incident scenarios is regularly carried out in parts of the organisation.

In addition, incidents, including such where there is a risk for environmental impact, are handled according to Vattenfall's Incident and Crisis Management (ICM) framework, which is applied to enhance preparedness and provide effective and proactive ways of handling events that could lead to an incident or crisis (see EU20).

Continued on page 48

Life Cycle Assessments

Vattenfall uses Life Cycle Assessments (LCAs) as one method to analyse and estimate the environmental impact of its operations “from the cradle to the grave”. For additional information, see PR3.

Electromagnetic fields (EMF)

Vattenfall complies with recommended and legal guidelines regarding electromagnetic fields (EMF), see PR1.

Noise levels around power plants

In addition to other environmental aspects, some power plants also generate noise. Most permits include requirements on noise levels, which are carefully monitored during the construction and operation of power plants.

Benefits from heat and electricity use

Electricity and district heating are efficient carriers of energy. Therefore, centralised energy generation often leads to improved efficiency, with less impact per kWh compared with other energy use. For example, replacing an oil-fired furnace for household heating with a heat pump will radically decrease the total CO₂ emissions for the household, while the use of electricity would increase. Another example is a plug-in hybrid car, which produces less emissions than a car that uses fossil fuel. Vattenfall is contributing to research and development on future use of electricity and heat in order to generate sustainability advantages in society (see EU7).

Environmental management

Vattenfall governs environmental issues at all organisational levels. Environmental performance is a business responsibility and is described in the Vattenfall Management System, which applies for the entire Vattenfall Group.

Environmental goals and performance

At the Group level, Vattenfall sets long- and short-term business planning targets for reducing CO₂ emissions (see EN16–18). The long-term development of Vattenfall's generation portfolio requires significant investments, which are co-ordinated at the Group level. At the Business Group and business unit levels, additional environmentally related targets may apply.

Environmental management system

At the Vattenfall Group level, environmental data from operations is reported and consolidated annually in a dedicated reporting process. In addition, reporting on qualitative issues, such as risks and incidents, is done quarterly to the Executive Group Management.

Vattenfall's Group Environmental Management System includes annual Environmental Management Reviews where corrective actions can be initiated. Most parts of Vattenfall have their own environmental management sub-systems aligned with recognised standards, many of which are certified. Thirty-five units are covered by ISO14001, eight power plants are covered by EMAS, and eight by other recognised environmental management systems. The certificates cover approximately 50% of installed capacity or approximately 30% of revenues.

Organisational responsibility for environmental performance

Regarding environmental issues, the Vattenfall Group Management focuses on strategic development, long-term development and financing, managerial principles and deviation analyses. Based on targets set by the Executive Group Management, each Business Group and business unit has full responsibility for planning, carrying out, following up on and developing its business. This includes taking responsibility for environmental concerns.

Business Groups (BG) and business units

All organisational units are required to have access to relevant competence to manage environmental aspects. All units are responsible for their environmental performance, for identifying, prioritising and implementing initiatives and activities to improve environmental standards and fulfil the strategic ambition to be Number One for the Environment. In addition, each unit shall monitor and manage environmental risks.

Group Environment function

Vattenfall's Group Environment function manages and follows-up environmental issues within the Group and ensures that an efficient and competent environmental organisation is in place at the Group level to support the organisation. The Group Environment function also monitors and evaluates environmental opportunities and risks of importance for the Vattenfall Group and the Vattenfall brand. The Group Environment function creates and supports platforms for sharing best practice within the Vattenfall Group. The Head of Group Environment executes the functional responsibility for environmental issues as described in the Vattenfall Management System and is the Environment Management Representative for the Group.

Environmental Committee

The Group Environmental Committee is an advisory function to help set strategies and support the Group Environment function. It is also a meeting place for sharing best practice and identifying cross-border benefits from extended co-operation within Vattenfall. The Committee is chaired by the Head of Group Environment. It has members representing all Business Groups.

Centres of Excellence

As a major player in the European electricity market, Vattenfall has considerable experience and knowledge in the environmental field and is a key dialogue partner for European and national policy makers. Under the Vattenfall Group Environmental Committee, the following five Centres of Excellence have been established: Air quality, Soil protection, Water protection, Waste and by-products, and Chemicals management.

The Centres of Excellence monitor and analyse policy developments and serve as a forum for information exchange and knowledge transfer, within Vattenfall but also externally.

Environmental experts

Vattenfall has significant environmental competence across the organisation. Vattenfall consultants provide expertise in energy efficiency, environmental and sustainable strategies, etc., and participate in projects and initiatives not only throughout the Vattenfall Group, but also in other industries, thereby stimulating knowledge transfer.

Environmental risk management

Environmental risks are monitored, managed and mitigated locally in Vattenfall. The Group Environmental Risk Management approach includes six different components:

- Environmental Debt – Established debt, in relation to existing regulatory conditions
- Legal & Regulatory Risk – Relating to future changes in regulatory conditions
- Environmental Risk – Relating to future event resulting in environmental damage
- Health & Safety Risk – Relating to future event with an impact on health or safety
- Incidents – Incidents having occurred, with a potential for environmental damage
- Accidents – Accidents having occurred, resulting in environmental damage

Environmental risks (qualitative as well as quantitative estimations of probability and consequences) are reported and aggregated at the Vattenfall Group level annually.

Training and awareness on environmental issues

Training is important as a foundation for awareness and environmental work. E-learning on important environmental issues is available for all employees. Environmental issues are included in management training programmes.

Compliance with codes, agreements and frameworks

Vattenfall is a signatory of the UN's Global Compact, which is the underlying framework of Vattenfall's overall sustainability work, and as such it has the most important influence. Environmental law sets an important regulatory framework for Vattenfall's operations, and a wide range of legal instruments in this field are relevant for Vattenfall.

Environmental indicators

Materials used (EN1)

(Fuels are reported under EN3–4)

Limestone, ammonia and urea are used in flue-gas cleaning equipment. Use of these chemicals results in lower emissions, with considerable positive effects for the environment. Long-term structural changes leading to reliable trends can only be seen over at least a 10-year period. The proper measurement time frame would be an investment

cycle that lasts 30–40 years. Across the Group, inventories have been taken of hazardous substances such as asbestos and PCBs, and a plan has been applied to phase out these substances. The result in Poland, for example, indicates that there is no asbestos and no PCB in the heat operation, and a plan to phase out PCB in the electricity distribution operation has been launched. In Germany PCB has been phased out. Materials used for construction in the Nordic power plants can be found in Environmental product declaration (EPD) on www.environdec.com.

Materials used

ktonnes	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
Lime expressed as CaO	6.33	0.05	19.1	926	7.00	958	1,010	1,050
Ammonia	0.779	0	2.26	4.34	0	7.37	7.77	8.55
Other chemicals for flue gas cleaning	0.878	0	23.9	4.38	0	29.1	25.6	7.86

The lower use of lime in 2008 compared with 2007 is due to decreased fossil-based generation in Germany. Other chemicals for flue gas cleaning consist mainly of ammonium hydroxide and the dry scrubber by-

product from the Fyn power plant in Denmark, which since 2007 is recycled in flue gas cleaning at the Amager and Nordjylland power plants.

Materials used that are waste (EN2)

Waste, both industrial waste and household waste, is a small but important part of Vattenfall's fuel mix. It is used for heat production and electricity generation, both in waste incinerators as well as in co-combustion with other fuels. Almost 100% of the waste is from external sources, and the use of waste as a fuel is increasing since society is depending on efficient energy recovery, with low emissions, of combustible waste fractions that cannot be recycled. Power plants that have a permit to combust waste are strictly regulated in terms of flue gas cleaning and ash management (see EN22).

Waste incinerators are located in Uppsala, Sweden, and in Hamburg

and Lauterbach, Germany. Waste incineration plants in Rostock and Rüdersdorf, Germany will be commissioned in 2009.

Co-combustion of waste is carried out at four large lignite-fired power plants in Germany. A maximum of 5% waste is combusted together with the lignite. Vattenfall will continue trials and evaluations for further co-combustion.

Some small and medium-sized heating plants in Sweden also use industrial waste. Vattenfall does not currently use waste for electricity or heat production in Poland, but investigations regarding different options are being made with the support from Vattenfall in Germany and the Nordic region.

Materials used that are waste

	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
Amount of waste as fuel for electricity and heat generation (TWh)	1.76	0.04	0	5.41	0	7.21	6.64	5.71
Percentage of combustion fuel input that is waste	37.8%	1.8%	0%	2.8%	0%	3.1%	2.8%	2.4%

The use of waste as fuel is rising steadily, since using non-recyclable waste for energy recovery is an important service to society. No new waste incinerators were commissioned in 2008. The higher use of

waste as fuel in 2008 is due to increased generation in existing facilities and increased co-combustion.

Energy use (EN3–4)

Vattenfall's major energy use consists of fuels. Uranium is used in nuclear power plants to generate electricity. Fossil fuels (lignite, hard coal, oil and natural gas), peat, biomass fuels and waste are used for the generation of electricity and heat. Electricity is also generated in hydro power plants and wind power plants, where there is no fuel.

The generation of heat and electricity is dependent on many factors, such as the weather and market conditions. During cold winters, demand for heat and electricity is higher, resulting in more generation, often with higher emissions. In a very dry year, there is less availability of hydro power, and other generation – possibly fossil-based – will increase. This is also the case when nuclear power plants are not in operation. The energy market is also affected by the overall economy, fuel

prices, etc. For additional information, see the 2008 Annual Report.

The largest energy consumption, other than fuels, is electricity for operating power plants. This electricity is derived primarily from own generation, and data is not gathered at the Group level. The environmental impact from this electricity is accounted for in reporting. Reported energy generation is net generation, after subtracting internal consumption in power plants. The second largest source of consumption consists of losses in energy transfer. Electrical resistance in power lines and transformers inevitably causes technical distribution losses. Mining is the third largest source of energy consumption after Vattenfall's power plants, consuming 1.3 TWh electricity from Vattenfall's own generation, since large amounts of ground water and overburden material (mostly sand) have to be redistributed.

For energy efficiency measures, see EN5–7.

Total use of fuels for generation of electricity and heat

TWh (uranium in tonnes)	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
Lignite	0	0	0	144	0	144	149	145
Hard coal	0	0	14.8	26.9	17.6	59.3	61.6	64.0
Gas	0.002	0.851	0.975	10.9	0	12.7	12.5	14.2
Waste biogenic	1.53	0.039	0	3.45	0	5.02	4.62	3.70
Electricity (used in electric boilers, heat pumps and pumped storage plants)	0.042	0	0	3.8	0	3.9	3.90	4.67
Biomass excl. peat	1.69	0.709	0.501	0.349	0.159	3.41	3.53	3.53
Waste non-biogenic	0.231	0	0	1.97	0	2.20	2.02	2.01
Oil	0.198	0.052	0.297	0.863	0.134	1.54	1.25	1.32
Peat	0.837	0.487	0	0	0	1.32	1.06	1.14
Other	0.129	0.005	0	0.9	0	1.0	0.940	0.969
Total	4.66	2.14	16.6	193	18	234	241	241
Uranium	146	0	0	0	0	146	136	169

Total external sales excluding trading of electricity, heat and fuel

	Sweden	Finland	Denmark	Germany	Poland	Other countries	Spotmarket	Total 2008	Total 2007	Total 2006
Electricity (TWh)	44.8	5.23	2.05	88.0	10.2	7.68	31.4	189	194	
Heat and cooling (TWh)	4.05	1.59	4.71	14.7	10.6			35.6	36.2	35.0
Lignite (million tonnes)				2.4				2.4	2.6	2.6

Total generation of electricity

TWh	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
Hydro power	33.0	0.7	0	3.0	0	36.7		
Wind power	0.417	0.006	1.30	0.026	0.065	1.81		
Nuclear power	46.2	0	0	0	0	46.2		
Combustion (fossil, biomass etc.)	0.38	0.30	5.95	65.8	3.66	76.1		
Total	80.0	1.01	7.25	68.8	3.73	161	166	169

	BG Nordic	BG Central Europe	Total 2008	Total 2007
Electricity generation 2008 Annual Report	90.7	72.4	163	168

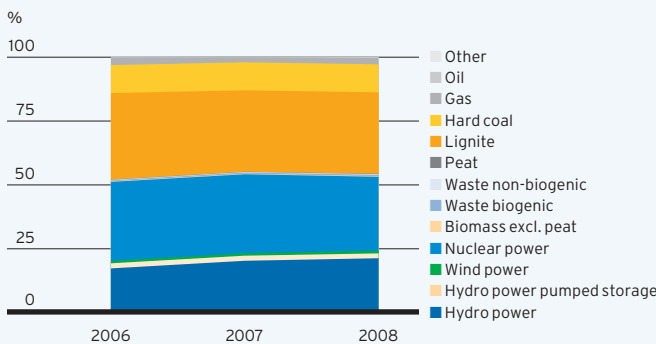
Total production of heat and cooling

TWh	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
Heat and cooling	3.90	1.55	4.71	17.6	10.7	38.5	38.1	40.1

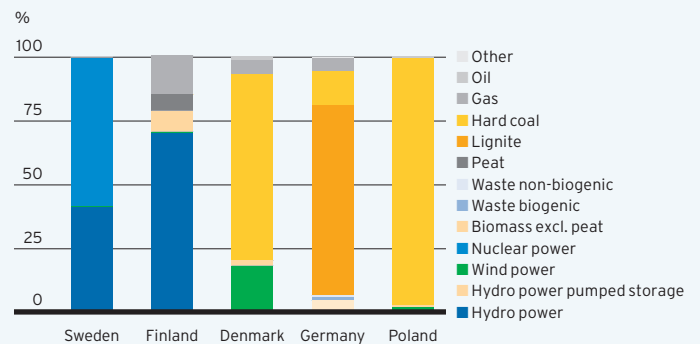
Generation data is reported in the CSR report as well as the annual report. Definitions in the CSR report have been adjusted to enable comparisons of environmental performance, while some annual report definitions include effects from commercial agreements such as deliveries to and from minority owners etc. For electricity generation, adjustments of definitions mainly apply to hydro power plants in Business Group Nordic. For heat and cooling, the CSR report refers to heat produced, while the annual report refers to heat and cooling sold. Heat production figures for 2007 have been adjusted to the CSR report definition.

Total electricity generation decreased in 2008 compared with 2007. Hydro power generation increased. Nuclear power generation decreased, mainly due to the outage of the Brunsbüttel nuclear power plant in Germany, but also to shutdowns and planned outages at the Ringhals and Forsmark nuclear power plants in Sweden. Fossil-based generation decreased mainly due to lower availability and planned outages of coal-fired plants in Germany and lower generation in Denmark. Wind power generation increased as a result of the new Lillgrund wind farm and favourable wind conditions. Electricity generation based on biomass and waste increased.

Electricity generation mix 2006–2008

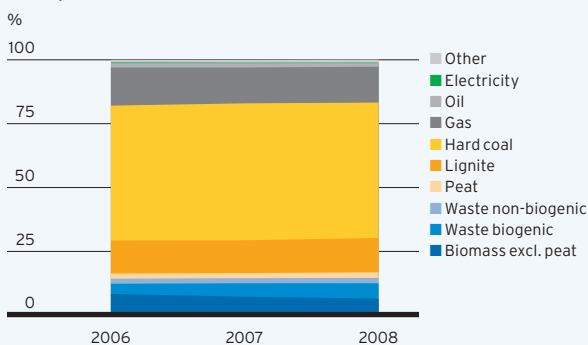


Electricity generation mix 2008

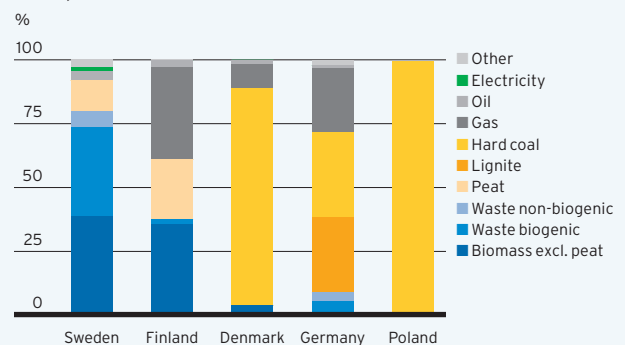


The allocation of electricity generation to fuel is a calculation based on simplified assumptions for multifuel power plants.

Heat production mix 2006–2008



Heat production mix 2008



The allocation of heat production to fuel is a calculation based on simplified assumptions for multifuel power plants.

Energy-efficient and renewable energy-based products (EN5–7)

Energy efficiency and increased generation from renewable energy sources are fundamental components of Vattenfall's environmental strategy. Declaration of origin for electricity sales is being implemented across the Group.

Initiatives to improve efficiency

Initiatives and activities to increase efficiency are performed across Vattenfall's operations, and efficiency measures in power plants target both direct and indirect energy use. Continuous improvement work is long-term, and data on energy savings is not currently gathered at the Group level, since measurements are very complex. Each unit strives to increase energy efficiency, since this has a direct impact on financial and environmental performance, which is measured. Examples of specific energy efficiency projects in the Group:

- Upgrading programmes, capacity increases and improved environmental performance of hydro power plants and nuclear power plants in the Nordic countries are ongoing.
- The new coal-fired power plant in Moorburg-Hamburg, Germany (see Coal-based power – new and improved, pages 14–19) will increase the energy efficiency ratio of the German portfolio thanks to the combination of heat and power generation

- In Germany, continuous improvements are being made in generation efficiency. Examples of measures in 2008 include the start of a test plant for pre-drying lignite, efficiency improvements at several pumped storage plants, and improvements of heat exchangers at the Boxberg power plant.
- In Warsaw, Poland, generation has been concentrated to the biggest and most efficient plants, CHP Siekierki and CHP Żerań. This is a result of co-operation with the local heat distributor, which is owned by the local government. The central generation dispatch centre plays a key role in optimising the generation process as well as enabling the selection of the most efficient generation devices. The solution is based on the Scandinavian model of heat market management. As a result, two peak-load plants (HP Wola and HP Kawęczyn) remain inactive even in winter-time, which means that the combustion of 80,000 tonnes of heavy oil has been replaced by high-efficiency cogeneration combustion instead.
- The second step of Polish emission reduction involves a large-scale project to exchange and modernise power generation, which is currently being planned. The new units will have the highest technical generation efficiency and will be CCS-ready.
- In January 2009, the heat accumulator at CHP Siekierki was commissioned. It is the first large-scale Polish implementation of this solution, which is taken from Scandinavia. It enables the accumulation of heat during the day for distribution during the evening and night. This leads

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to improved efficiency from co-generation while at the same time meeting daytime demand for electricity. Also, there is less need to start-up peak water boilers at nighttime, when heat demand increases. It is estimated that the use of peak load units will be reduced by nearly 30%.

- In Poland, where improvement potential remains high, investments are being made in the electricity distribution grid to reduce distribution losses, thereby improving energy efficiency and reliability.
- A number of research and development efforts are targeted at energy efficiency, see EU7.

Vattenfall's energy consumption related to other operations than energy generation is minute compared to the generation operations. Work targeting this consumption includes:

- Monitoring business travel and improved travel policies. In 2008, the decision was made to offset CO₂ emissions from all business travel in the Group. This is co-ordinated centrally at the Group level based on reported travel data and will be implemented in 2009.
- Improved energy efficiency in administrative office facilities.
- In 2008 a Green IT initiative was established at the Group level to ensure that IT use is efficient and contributes to reduced CO₂ emissions, for example through improved energy efficiency and increased video-conferencing capacity.

Promoting renewable electricity and heat production

Renewable energy is sold directly to consumers in all of Vattenfall's main markets.

- In Sweden, customers can choose to purchase electricity with Environmental Product Declaration (EPD) from wind power and hydro power. Electricity from nuclear power with EPD is also available.
- In Germany, electricity with declaration of origin is offered to industrial and private customers.
- In Poland, electricity with environmental declaration is offered to industrial and private customers.

Vattenfall has significant investment programmes to increase renewable energy generation across the Group. See Economic performance management approach, page 73. For additional information on the fu-

ture generation portfolio, see The challenges of investing in new energy, page 8.

Promoting customer energy savings

Vattenfall actively supports industrial and retail customers in energy efficiency improvements. (See also Product responsibility management approach and PR5.) Examples across the Group are:

- Customers can get advise on energy savings at customer centres in all countries.
- An energy efficiency programme launched in 2007 by Vattenfall BG Nordic continued providing customers advice in 2008 on how to improve their energy efficiency. The programme also included participation by Vattenfall experts on nationwide TV.
- An energy advisory service is provided to industrial customers in Poland in co-operation with Silesia technical university.
- The continued launch of Cobra, an innovative street lighting product developed by Vattenfall in Sweden.
- Vattenfall engineering consultants offer energy advisory services to industrial customers, including consultation, data acquisition, analysis and solution design.
- 1,000 households in Hamburg, Germany have been given the opportunity to apply for "energy checks", which entitle them to a visit by Vattenfall experts to give advice on how to save energy.
- Vattenfall offers energy advisory services at the new Vattenfall customer centres in Berlin and Hamburg, Germany. Vouchers were distributed from October until December in the city centres and via newspapers. Every visitor also received a low-energy light bulb.

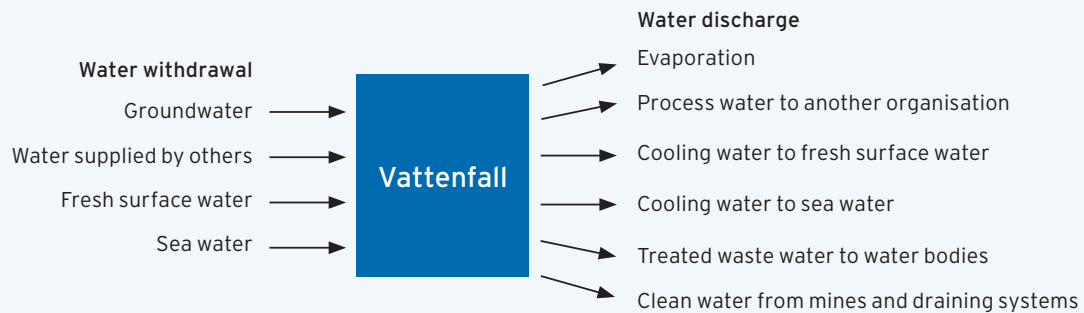
Vattenfall also supports research and development on future use of electricity to improve energy efficiency in society. Examples are:

- Development of plug-in hybrids in co-operation with Volvo
- Vattenfall Germany is taking part in a project to test and develop hydrogen busses.
- Testing of MINI E electric cars together with the BMW Group in Berlin. The first ever test drives on the streets of Germany's capital Berlin are now a reality. The cars are being charged up at Vattenfall's first charging station in Berlin-Treptow.

Water use, discharge and effects on biotopes (EN8-9, 21, 25)

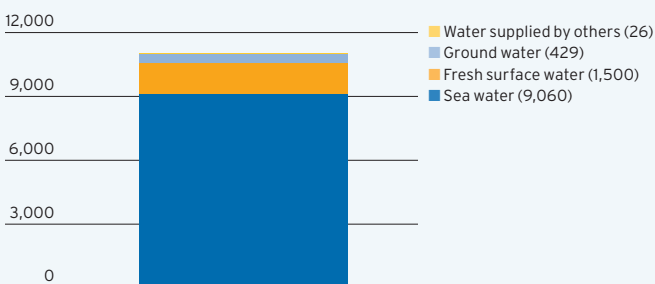
Vattenfall has performed a thorough analysis to assess the largest streams and impacts from the use of water in the Group. This analysis

has resulted in the reporting of a total of ten water parameters, covering both water withdrawal and water discharge.



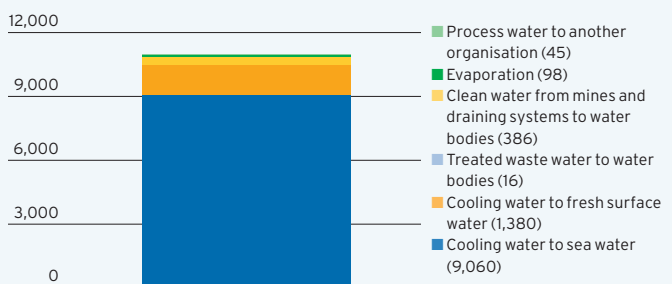
Water withdrawal 2008

Million m³



Water discharge 2008

Million m³



Use of water for cooling

The cooling process at nuclear power plants and combustion power plants requires water, and cooling water is taken from rivers, lakes and the sea.

The largest amount of cooling water is used in Vattenfall's nuclear power plants in Sweden and Germany, and most of the water is taken from the sea. The temperature increase from discharges of cooling water is monitored and kept within specific limits for each respective plant. In terms of the plant's environmental performance, the benefits of efficient cooling radically exceeds the small temperature increase that is the effect of discharging cooling water into a large water body.

Power plants with inland locations, using cooling towers, use significantly less water. For example, Vattenfall's lignite power plants use state-of-the-art industrial cooling systems, with cooling towers and closed cooling cycles, demonstrating water consumption generally less than 2 m³/MWh.

Use of water in lignite mining

The water sources most significantly affected by withdrawal of water are around Vattenfall's lignite mines in Germany: Jänschwalde, Cottbus-Nord, Welzow-Süd, Nochten and Reichwalde (no mining is currently being conducted at Reichwalde).

In 2008, approximately 411 million m³ of groundwater was removed to make fuel extraction possible. The removed groundwater is cleaned and thereafter used to cover the freshwater requirements of the nearby lignite-fired power plants, thereby sparing other water sources. Vattenfall's need for freshwater is well below the amount of removed groundwater, and the treated excess groundwater is made available to nearby municipalities and industries. Even though Vattenfall and the surrounding municipalities and industries make use of the water, most of the cleaned groundwater is returned to rivers and lakes.

"Eco-water inlets" are used to support protected rivers and watercourses around the mines from running dry as a result of lowered groundwater levels during mining. About a fourth of the extracted mine water is used for this purpose.

To further limit the impact of lowering the groundwater when draining the mines, "sealing wall" technology has been developed by Vattenfall. Inflows from watercourses, valley plains or wetlands are sealed off by underground sealing walls on the periphery of the open-cast mine, when this is required depending on the geological and hydrological conditions. To date, Vattenfall has built sealing walls 7 km and 9 km in length along the Jänschwalde and Cottbus-Nord open-cast mines, respectively. In 2009, construction of a further sealing wall will be started at the Reichwalde open-cast mine, and in 2010 a sealing wall will be dug at the Welzow-Süd open-cast mine.

Hydro power

Vattenfall owns and operates hydro power plants in Germany, Sweden and Finland. In Germany, pumped storage power plants are used to store energy from other energy sources. River regulation and reservoirs for hydro power and pumped storage power have an impact on the natural water flow of rivers as well as on the surrounding landscape. For each hydro power plant, permits regulate how flows are allowed to fluctuate. In some cases, it is ecologically motivated to determine a so-called instream flow, or minimum flow, to ensure a continuous water perimeter. This means that the flow is never allowed to fall below a set minimum level. It can be adjusted over time so that it reflects the variations of the natural flow, but at a lower water level. A combination of instream flow, weirs and other physical adjustments can be very efficient at enhancing the conditions for aquatic organisms. The area of suitable fish habitat increases and the flow acquires a more diverse pattern, which benefits most aquatic life but also riverbank vegetation. Re-creating spawning areas is another way of promoting fish populations. These measures have been performed in some of the rivers where Vattenfall operates hydro power plants.

Hydro power plants have a significant impact on biodiversity in rivers and streams, especially fish spawning grounds and the ability of fish to reach them. For this purpose, fish ladders for salmon and trout have been constructed on some of the regulated rivers where spawning areas exist upstream of the power stations. Every year, Vattenfall Nordic plants more than 1.3 million fish in rivers and streams.

A number of initiatives and investments are taken to improve the efficiency and environmental standard of Vattenfall's hydro power (for additional information, see www.vattenfall.se):

- Mobile environmental ambulances – an emergency response system for oil leaks in both flowing and still waters – have been developed by Vattenfall in Sweden together with Skellefteå Kraft and Statkraft. Three such ambulances are stationed along the Skellefte River and are equipped with absorption material, pumps, petrol-fuelled generators, inflatable dingies, outboard motors, etc.
- Expenditures on dam safety and improvement programmes amount to more than SEK 1 billion during the period up until 2013. Planned activities include modernisation and improvements of construction as well as installation of monitoring equipment.
- A research programme aimed at proposing socially and economically viable measures for improving environmental conditions for hydro power is currently being conducted by Vattenfall in co-operation with Swedish government agencies for energy, fishing and environmental protection and Elforsk, the Swedish electrical utilities' R&D company.
- A new and improved fish passage is being built at Stornorrfor, and will be ready in summer 2009. The new ladder will improve both upstream and downstream migration of fish past the power plant. A large development project is currently studying the possibilities to further improve the conditions for fish populations as well as for recreational fishing in the area.
- At the Nordic hydro power plants, several projects are aiming to reduce the amounts of oil used to reduce the risk of oil leaks. When upgrading plants, one standard measure involves replacing oil-lubricated bearings with water-lubricated bearings. A pilot project in Älvkarleby in 2008–2009 will be testing the use of water and glycol in the hydraulic systems of dam hatches.

Biodiversity values of water bodies

Due to the diverse nature of Vattenfall's operations and large number of sites, information on protected status and biodiversity values of water bodies is handled locally as it is most efficient. Information is therefore not gathered at the Group level.

Examples of activities to protect and support biodiversity have been provided in the sections "Use of water in lignite mining" and "Hydro power" above. A further example can be seen on the Vistula River in Warsaw, where Vattenfall operates CHP plants and discharges heated water into the river. This is a so-called Natura 2000 area, where Vattenfall is supporting a Life+ project initiated by the local government to protect biodiversity along the Vistula River.

Land use and biodiversity (EN 11–15)

Vattenfall's most significant land use pertains to electric distribution corridors, power plants – especially hydro power plants – and lignite mining operations in Germany. Due to the diverse nature of the operations and the large number of sites, information on protected status and biodiversity values of sites is handled locally as it is most efficient. Information is therefore not gathered at the Group level.

Vattenfall has developed the Biotope Method, an assessment tool for quantifying the impacts on biodiversity of land and water use. Impact assessments of Vattenfall's Nordic generation are described in Environmental Product Declarations (can be found at www.environdec.com). For impacts in the supply chain, see HR2.

Land use in lignite mining

Vattenfall's lignite mining in Lausitz, Germany, is conducted in open-cast mines, which claim land areas. The impact on the landscape is considerable when the cast is open, but mining and re-cultivation of mined areas are two phases of the same operation.

Re-cultivation planning starts during the early planning stages of mining. The interests of authorities and business as well as the concerns of the local community are taken into consideration in the early planning. All affected stakeholders are invited to take part in the process. (See also Impact on society, management approach and SO1, EU19, EU21.)

All land used for open-cast lignite mines is acquired by Vattenfall. Co-operation with potential future land users and local stakeholders creates a solid basis for making productive use of the land after concluding mining activities.

Continued on page 54

Re-cultivation programmes aim to achieve a natural, pre-industrial landscape. The objective is to allow for sustainable agriculture, forestry and water management in the post-mining areas in combination with desirable biodiversity, a harmonic landscape and possibilities for outdoor life. The factors that characterise the new landscape are soil quality, land and water distribution, and topography. Lakes are planned into the post-mining landscape. The preparatory shaping work for lake creation is done already during the mining operation.

During the active operational period of Vattenfall's five lignite mines in Germany, 159 km² have been claimed up until now. Land use in 2008 was 5.77 km² (5.66 km² in 2007). Large quantities of land mass are redistributed in order to enable lignite extraction from the open-cast mines. In 2008, a total of 459 million m³ of land mass (449 million m³ in 2007), mainly sand, was moved to extract 58 million tonnes (59.5 million tonnes in 2007) of lignite. A total of 4.2 km² (4.9 km² in 2007) were re-cultivated, of which 1.33 km² have become forestlands.

Vattenfall owns and operates 380 km of railway in Germany. Rail is used for transporting lignite from mines to power plants. Rail is also used to transport lime to the power plants and ash and gypsum from the plants. The railway is connected to Deutsche Bahn at two junctions. Vattenfall owns and operates its own fleet of engines and wagons.

Land use and biodiversity around electricity distribution corridors

Electricity networks also have an impact on large land areas. Overhead transmission and distribution lines, in particular, claim significant land areas. In some cases, this has a positive impact on biodiversity. In Sweden, studies show that many rare species have found refuge around overhead distribution grid lines thanks to the regularly recurring right-of-way clearance. Sections of Vattenfall's Swedish power line corridors have been declared "Natura 2000" areas. This means these areas

represent valuable natural habitats to be preserved with the help and support of the EU, with the aim of protecting biodiversity.

Electricity networks claim land areas, and the length of transmission and distribution grid lines provides an indication of the land areas used. The lengths of Vattenfall's local and regional distribution grid lines are 187,800 km in the Nordic region, 26,200 km in Poland and 77,000 km in Germany. In the cities of Berlin and Hamburg, the networks are mainly served by underground cables. In addition, Vattenfall has 10,000 km of transmission grid lines in Germany.

In 2008 Vattenfall's Nordic Distribution operations were certified according to ISO 14001.

Land use for power plants

Power plants, offices and other buildings use limited land area.

Reservoirs and hydro power plants have a significant impact on the landscape. Vattenfall's most significant impact comes from the large reservoirs for river regulation in Sweden, involving both natural lakes and inundated land. Inundated land area amounts to approximately 640 km². Storage capacity varies from a few months to more than a year. The change in water levels of the various reservoirs varies from 2 metres to 34 metres. Storage capacities of the reservoirs range from 300 million m³ to 9,500 million m³. Some of the Swedish reservoirs are natural lakes. Vattenfall has established a number of protected areas along the Lule River in Sweden, which has proved to harbour several rare and threatened species, protecting them from future exploitation.

In Poland, Vattenfall has decided to reclaim a former ash disposal field located in the Greater Warsaw area. The ash may be reused in the construction of a bridge nearby, thereby reducing the need to transport material from other locations to the site. The reclaimed area may be used for city development once Vattenfall has completed ground decontamination operations.

Greenhouse gas emissions (EN16-18)

The predominant greenhouse gas emission, and most significant environmental impact of Vattenfall's operations, consists of the direct CO₂ emissions from fossil fuel combustion for electricity and heat production. Emissions of other greenhouse gases than CO₂ and emissions from other activities than direct energy generation amounts to 0.7 million tonnes of CO₂-equivalents, which corresponds to approximately 1% of the reported CO₂ emissions¹⁾. Emissions from use of electricity (scope 2 according to the Greenhouse Gas protocol) are included in direct

emission, since most electricity used is from Vattenfall's own generation.

CO₂ emissions are dependent on weather conditions (see also EN3-4). During cold winters, demand for heat and electricity is higher, resulting in more generation and consequently more emissions. During a very dry year, when there is less availability of hydro power, generation from other – possibly fossil-based – energy sources will increase. This is also the case when nuclear power plants are not in operation. This makes it difficult to monitor short-term trends in CO₂ emissions.

CO₂ emissions

Million tonnes	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
CO ₂ from electricity generation	0.099	0.062	3.03	67.6	2.03	72.8	75.0	74.5
CO ₂ from heat production	0.324	0.267	2.23	2.87	4.02	9.71	9.73	10.3
Total	0.424	0.328	5.26	70.4	6.06	82.5	84.7	84.8

Rounding differences, affecting the last significant digit, may occur in this table. Only CO₂ from fossil fuels is reported. Peat is included as a fossil fuel, although the Intergovernmental Panel on Climate Change (IPCC) classifies it as a category of its own, between renewable and fossil. Allocation between electricity and heat in combined heat and power (CHP) production is done according to local practice.

Total CO₂ emissions from Vattenfall's power plants were lower in 2008 compared with 2007. This is a result of a decrease in fossil-based generation, mainly due to lower availability and planned outages of coal-fired plants in Germany and Denmark. In Sweden, CO₂ emissions increased

in 2008 compared with 2007 mainly due to an outage in the CHP plant in Uppsala in 2007, which resulted in a changed fuel mix. In addition, reduced nuclear power generation in 2008 caused the start-up of fossil-based peak load plants in the fourth quarter.

1) 90% of these emissions are N₂O emissions and the remaining 10% are CO₂ emissions from operations, business travel and facilities, and emissions of other greenhouse gases.

Emissions of CO₂ per kWh generated energy

g/kWh	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
CO ₂ from electricity generation	1.24	61.3	418	981	545	453	453	441
CO ₂ from heat production	83.1	172	473	163	377	252	255	255

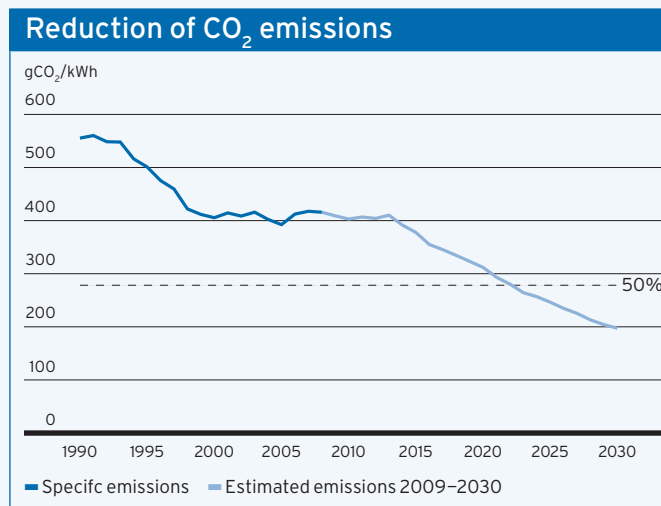
Only minor variations exist in specific CO₂ emissions (per generated kWh) between 2007 and 2008 at the Group level while there were variations at the country level. In general, increased generation in low-emitting generation such as nuclear power, hydro power and biomass combustion leads to a reduction in specific CO₂ emissions. This is also the case for increased energy efficiency in power plants. Vattenfall's long-term targets for CO₂ reductions are set on specific emissions rather than total, since society's need for energy must be met while CO₂ emissions are reduced.

Reduction of greenhouse gas emissions

Vattenfall has set targets for reduced CO₂ emissions. The long-term target is a 50% reduction of CO₂ emissions per unit of generated electricity and heat in existing own operations until 2030, compared with 1990 levels. The short-term business planning target is a 2% reduction, corresponding to 2 million tonnes, in own operations from 2009 to 2011. Vattenfall's climate vision is to be climate-neutral by 2050 (2030 in the Nordic region). These radical reductions will be made possible by developing the generation portfolio towards low CO₂ emitting generation.

Activities and investments to reduce CO₂ emissions include increasing generation from renewable energy sources, equipping coal-fired power plants with Carbon Capture and Storage (CCS) technology, and increasing capacity of nuclear power. In addition, improvements are being made to existing technology in an effort to increase efficiency, resulting in reduced emissions per generated unit of electricity and heat. See EN 3-4 Energy efficiency.

Investments and work on reducing emissions are long-term. A fundamental requirement is that society's need for secure energy supply and stable energy prices is met.



Renewable energy

- In 2008 significant investments were made in wind power projects, making Vattenfall a world leader in offshore wind power. The Thanet Offshore Wind project in UK will have installed capacity of approximately 300 MW. The acquisition of UK-based Eclipse Energy, an energy developer primarily focused on wind, as well as of AMEC Wind Energy Ltd, enables Vattenfall to take an active role in UK wind development. Furthermore, Vattenfall has entered into a partnership with the Scottish giant in the industry of renewables, ScottishPower Renewables, to make joint bids for additional offshore wind development.
- Co-combustion of biomass fuels is increasing. In Poland, the aim is to diversify the fuel mix and 5% of the Żerań and Siekierki power plants' fuel source will be converted to biomass by 2011.
- The "MaxBio" programme in the Danish power plants was established in 2008 and will lead to a dramatic increase in biomass use. An estimated 724,000 tonnes of coal per year will be replaced by biomass by 2018, which will lead to a 27% reduction of CO₂ emissions.
- Development of ocean energy continues and is expected to be the next commercial renewable energy technology after wind power. Vattenfall is co-operating in wave power pilot plants off the coast of Norway and western Sweden. A co-operation agreement regarding wave power development was signed with Irish Wavebob in March 2008, and in January 2009 Vattenfall acquired 51% of the Irish site development company for ocean energy, Pandion Ltd.
- In June 2008, Vattenfall's plans for a new hydro power plant in Abelvattnet, Sweden, were approved by the environmental court, which will enable the construction of a new hydro power plant that will generate 14.2 GWh electricity per year. The planned completion date is 2010.

Coal using Carbon Capture and Storage (CCS)

Vattenfall is a leader in the development and commercialisation of CCS technology. See also Technology as a tool to cut emissions on page 20 and 2008 Annual Report page 16.

- In September 2008, a 30 MWth CCS pilot plant was inaugurated in Schwarze Pumpe, Germany, which will provide valuable experience needed to develop demonstration plants and full-scale commercial power plants.
- In February, 2008 Vattenfall announced the intention to develop a full-scale CCS demonstration plant in Denmark. By 2013, the Nordjylland power plant (Nordjyllandsværket) will be equipped with CCS.
- A demonstration plant is planned for Jämschwalde, Germany, by 2015. Feasibility studies were initiated in 2008.

Nuclear power

Nuclear power generation has very low emissions and plays an important role in Vattenfall's strategy to reduce CO₂ emissions from electricity generation in the markets where it is accepted. Significant investments are being made to further improve operational efficiency and fuel efficiency in the Group's nuclear plants, thereby reducing environmental impact per generated kWh of electricity. In parallel, continuous efforts are being made to ensure excellence in safety management. For additional information see EU20.

Ozone-depleting substances (EN19)

Ozone-depleting substances are used to a very limited extent within Vattenfall's operations and are not a significant issue in the context of overall environmental impact. Hence, there is no aggregate reporting at the Group level.

Emissions to air (EN20)

CO₂ is the predominant emission to air from Vattenfall's operations, see Greenhouse gas emissions (EN 16–18).

Other emissions to air include SO₂, NO_x and particles, which have decreased in recent decades due to the modernisation of generation

facilities and installation of flue-gas cleaning equipment. In 2008, decisions were made to further invest in flue gas cleaning in Poland, see also Technology as a tool to cut emissions, page 20.

Emissions of SO₂, NO_x and particles¹⁾

ktonnes		Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
SO ₂	From generation of electricity	0.092	0.038	0.769	46.5	7.79	55.2	59.1	56.0
	From production of heat	0.308	0.272	0.720	1.18	14.7	17.1	19.8	21.2
	Total	0.401	0.310	1.49	47.7	22.4	72.4	78.9	77.2
NO _x	From generation of electricity	0.155	0.121	1.71	44.1	3.16	49.3	52.3	50.9
	From production of heat	0.734	0.637	1.48	1.72	6.02	10.6	13.2	13.2
	Total	0.889	0.758	3.19	45.9	9.18	59.9	65.5	64.0
Particles	From generation of electricity	0.005	0.005	0.143	1.30	0.429	1.89	2.09	1.76
	From production of heat	0.070	0.051	0.093	0.034	0.918	1.17	1.49	1.82
	Total	0.076	0.056	0.24	1.34	1.35	3.05	3.58	3.58

1) Rounding differences, affecting the last significant digit, may occur in this table.

Emissions of SO₂, NO_x and particles per kWh generated energy

g/kWh		Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
SO ₂	From generation of electricity	0.001	0.049	0.093	0.636	2.07	0.334	0.357	0.331
	From production of heat	0.070	0.197	0.153	0.070	1.35	0.449	0.518	0.530
NO _x	From generation of electricity	0.002	0.155	0.206	0.604	0.838	0.298	0.316	0.301
	From production of heat	0.166	0.460	0.315	0.102	0.556	0.278	0.346	0.329
Particles	From generation of electricity	0.000	0.006	0.017	0.018	0.114	0.011	0.013	0.010
	From production of heat	0.016	0.037	0.020	0.002	0.085	0.031	0.039	0.045

Emissions of SO₂, NO_x and particles per kWh of generated energy from Vattenfall's power plants are decreasing steadily as a result of improved flue gas cleaning and increased generation from low-emitting energy

sources. A significant proportion of the reduction of NO_x emissions is a result of the installation of SCR equipment at the Fyn Power Plant in Denmark in early 2008.

Waste and mineral by-products (EN22)

Waste includes radioactive waste from nuclear power plants, by-products from combustion power plants (including ash), and other treated waste.

Radioactive waste

Nuclear power plants in Sweden and Germany generate radioactive waste. The handling of radioactive waste is further described under management approach. The amount of spent nuclear fuel was lower in 2008 and 2007 compared with 2006 due to outages at nuclear power

plants. The amount of medium and low-level radioactive waste and nuclear core components depends on ongoing projects in the nuclear power plants and which year the waste is deposited.

Radioactive waste

	Sweden	Germany	Total 2008	Total 2007	Total 2006
Medium and low-level radioactive operational waste (m ³)	3,650	21.8	3,670	1,290	488
Nuclear core components (tonnes)	0.273	0	0.273	10	4.5
Spent nuclear fuel – assemblies taken out (tonnes)	206	0	206	202	245
Spent nuclear fuel – original uranium content (tonnes) ¹⁾	147	0	147	148	176

1) Original uranium content is a subset of assemblies taken out

Treated waste

Handling ash from waste incineration is strictly regulated. Ash is reused to the greatest possible extent, and smaller fractions with high metal content are deposited at special sites. Fly ash from Uppsala waste incineration plant is sent to Langøya, Norway for reuse as filling material. Amounts of waste vary from year to year depending on type of operation, ongoing construction work ,etc.

A significant quantity of waste in the Nordic distribution operation consists of discarded poles from overhead distribution grid lines. The Swedish distribution network alone uses approximately 1.2 million poles, most of which are impregnated with creosote. When poles are replaced, the discarded poles are used as fuel at the Ludvika Heat power plant. In 2008, 15,000 poles were used as fuel.

Treatment of waste

Treatment of waste		Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
Hazardous waste excl. radioactive	Recovered	1.58	0.051	0.058	75.1	0.137	77.0	79.0	45.3
	Deposited	0.233	0.23	1.20	19.5	0.540	21.7	19.5	43.3
Non-hazardous waste	Recovered	4.10	2.39	3.79	173	9.90	193	267	156
	Deposited	17.7	0.117	0.377	19.0	1.25	38.4	24.3	27.7

By-products

The most significant by-products are ash from lignite and hard coal-fired plants, and gypsum from flue-gas desulphurisation. This gypsum is sold to Europe's gypsum and cement industry.

Ash from lignite power plants is mainly used in the open-cast mining area for landscaping the post-mining environment. Ash from Vattenfall's hard coal combustion in Germany is used as a component in construction materials. In Poland, 100% of the ash from coal combustion is currently used, for example in road construction. Most of ring roads of the neighbouring cities have been built using ash from Vattenfall plants.

Ash from the CHP Siekierki plant meets the requirements of the EN 450 norm and is therefore a product that may be used for production of concrete. In Denmark, all coal ash and gypsum is used primarily for industrial purposes, e.g., in the building and construction industry. Almost all ash from heat operations in Sweden is recycled, mainly as construction and filling material, such as in road construction. Some of the ash from biomass combustion is spread in forests as fertiliser.

In 2008, in countries where fossil based generation decreased, this also resulted in less ash produced. As biomass fuel use increases, ash from biomass fuels also increases.

Total by-products¹⁾

Total by-products ¹⁾	Sweden	Finland	Denmark	Germany	Poland	Total 2008	Total 2007	Total 2006
Fly ash	10.3	14.5	250	4,430	475	5,180	4,980	4,930
Furnace bottom ash	5.29	1.06	25.8	1,070	55	1,160	1,170	1,250
Ash from biomass fuels	47.5	2.99	0.165	13.6	0.0	64.2	55.2	46.9
Slag from waste incineration	56.4	0	0	231	0.0	287	275	276
Gypsum	0.608	0	51.4	2,860	0.0	2,910	3,060	3,090
Other by-products	4.24	0	28.5	44.6	0.0	77.4	61	86.2
Total	124	18.6	355	8,650	531	9,680	9,590	9,690

1) Rounding differences, affecting the last significant digit, may occur in this table.

Spills and contamination (EN23)

No significant spills were recorded in 2008.

Risk for spills and other contamination is monitored, managed and mitigated locally. Incidents that could possibly result in significant environmental impact, such as spills, leaks and contamination, are reported according to Vattenfall's Incident and Crisis Management (ICM) framework, see EU20.

Many of Vattenfall's facilities have been operating for a long time. Work is under way to identify land that was contaminated during times when environmental awareness was lower and environmental legislation was less rigorous. Contaminated land exists in the Nordic countries, Germany and Poland. Known contaminated sites have been identified and characterised. Action to restore such land is taken when necessary and in dialogue with the authorities.

Monitoring programmes have been developed. For example, all potentially contaminated sites around Vattenfall's facilities along the Lule River have been identified, and potential risks associated with the contamination have been assessed. In accordance with established programmes, necessary measures will be adopted no later than 2010. The plan for taking care of contaminated land is progressing on schedule.

In order to reduce the risk for oil leaks from electricity distribution operations and transformers in water protection areas, Vattenfall has a programme in force in Sweden for exchanging pole-mounted transformers with ground stations. An inventory taken in 2008 shows that out of a total of approximately 40,000 transformation stations, 1,474 are situated in water protection areas, and out of these, 200 are pole-mounted.

Fines and incidents (EN28)

During 2008, Vattenfall implemented a Group-wide Incident and Crisis Management (ICM) organisation. For additional information, see EU20.

Environmental incidents and the handling of fines are regulated under Vattenfall's environmental policy, stating that Vattenfall shall comply with existing laws, regulations and permits and take preventive and/or remedial action in order to reduce environmental impact as well as make advance assessments of the environmental impact of new activities. When accidents occur, Vattenfall acts to minimise the damage, restore any damage caused and take precautionary measures to avoid future incidents. On a quarterly basis, all Group functions, business units and shared service centres report on progress in environmental protection as well as on accidents and incidents regarding environmental impact.

In Sweden, two legal actions have been reported pertaining to remediation costs for after-treatment measures to repair damage to the environment on an industrial site. The two claimants state that according to the Swedish Environmental Code, liability for remediation of the polluted site still rests with the Swedish state. The liability claim rests on the Swedish state's role as previous owner of the property and operator of the now closed-down thermal power plant. The Ministry of Enterprise, Energy and Communications has decided that both cases are to be handled by Vattenfall Nordic. The likely outcome for Vattenfall is hard to predict.

Environmental protection expenditures and investments (EN30)

Vattenfall strives to take environmental aspects into account in all decision-making and investment planning. Investments aiming to improve environmental performance are not specifically reported.

For information on investments made in 2008 and planned investments, see page 73, Economic performance management approach.

For information on research and development (R&D) spending, see EU7.

SOCIAL PERFORMANCE

PRODUCT RESPONSIBILITY

Management approach

Vattenfall's main products are heat and electricity. The nature of these products implies that when used correctly, they have little direct adverse impact on the environment, public health and safety. Vattenfall works actively with energy efficiency, in its own operations as well as by providing customers with advice and support on improving their energy efficiency. Vattenfall also informs customers about safe use of electricity and provides information on electromagnetic fields based on current research in this area.

Managing product responsibility issues

Vattenfall takes an advisory role in helping customers save energy. What the company can control pertains to the generation and distribution of electricity and heat and the use of the resources it requires. Vattenfall is actively working to avoid and reduce any adverse impact of its operations, including emissions, effluents, waste and noise from power plants.

Customer health and safety

Most health and safety issues associated with Vattenfall's products arise when customers use electricity to operate other products, not from the electricity itself. Although there are certain direct risks in the use of electricity, these are usually negligible in correct everyday use. The same applies for heat and cooling.

Vattenfall's marketing and sales functions have a high-profile role in promoting safety by informing customers about safety issues in connection with their use of electricity. Information to customers is generally communicated in brochures, newsletters and marketing material in all countries. Customers are also continuously informed through Vattenfall's websites and at customer service centres in all countries. The information that Vattenfall provides ranges from electricity safety in general, to safety measures during thunderstorms and power outages.

Product and service labelling

In addition to information regarding safety, Vattenfall strives to take an advisory role in helping customers save energy.

For example, Vattenfall Nordic has launched an energy efficiency programme to inform customers on energy efficiency and promote an active dialogue. The programme has a dedicated website, Energy Guide, that provides advisory services and useful information. The website allows visitors to calculate the effects of changes in energy consumption habits and to find out if a potentially higher initial investment will be compensated by a decrease in energy costs. In Sweden and Finland, Vattenfall has conducted several high-profile campaigns on wind power. In Germany 50,000 students participated in the Vattenfall Klimaakademie, and a thousand households received extensive advice on energy saving issues. Customers are also continuously informed through Vattenfall's websites and at customer service centres in all countries.

Marketing communications

Vattenfall complies with international codes, such as the ICC International Code of Advertising Practice and the OECD Guidelines for Multinational Enterprises. In the countries where Vattenfall operates, the company complies with national legislation, which often is more stringent than international codes and frameworks.

Customer privacy

Vattenfall's Communication Policy states that "Confidentiality is strictly applied with regard to relations or agreements with customers and business partners. The same applies to information about employees or former employees of Vattenfall."

This is further elaborated upon in the Group Instruction on Legal and Business Ethics Principles, which states, among other things: "Information concerning a natural person (personal data) shall be handled with respect for the individual's privacy at all times. The Vattenfall Group shall always endeavour to ensure that personal data is processed with the individual's consent. Personal data that may be regarded as sensitive may only be processed if there are strong reasons to do so and it is clear that the legal conditions have been met. No one is allowed to disclose personal data to a person outside the Vattenfall Group unless it is clear that the legal conditions for doing so have been met. It shall be noted that in certain cases there might be specific reasons for keeping personal data confidential."

Both the Communication Policy and the Instruction on Legal and Business Ethics Principles apply throughout the Group. Furthermore, a number of laws are in effect that govern citizens' right to privacy, such as through EU directives concerning the protection of data privacy.

According to the Vattenfall Management System, all of Vattenfall's external websites are required to provide information about the Group's privacy policy, including information about cookies. This shall be the case also when it is not a legal requirement. This information can be found on a specific Privacy Policy page on the websites, available via a link on the page footer.

Compliance with codes, agreements and frameworks

Vattenfall has adopted and complies with several product responsibility frameworks:

- Vattenfall complies with all customer privacy laws and regulations, such as national legislation based on EU directives concerning protection of data privacy.
- Vattenfall meets the requirements on product information and electricity labelling stipulated by EU directives.
- Vattenfall was the first company in the world to receive an Environmental Product Declaration (EPD) in accordance with ISO 14025.
- Vattenfall meets the requirements on unbundling according to national legislation (based on EU directives), thus enabling the customer to choose electricity supplier without being discriminated by the customer's distribution company. (See also Work against anticompetitive behaviour, page 63.)

Organisational responsibility

Vattenfall provides information on the safe use of electricity to customers via different communication channels. Responsibility for communication with customers lies with the marketing and sales functions. For further information, see the Product and service information (PR3) indicator.

Goals, performance and risks

Vattenfall does not control the use of its products, and the products are neither a liability nor a risk to the company as such. However, Vattenfall acts immediately whenever safety risks are discovered and actively promotes energy efficiency. Vattenfall does not track performance regarding product responsibility other than measuring customer satisfaction (which to some extent correlates with how customers perceive information).

Programmes that improve access to electricity services (EU22)

In the Nordic countries, Vattenfall is obligated to deliver access to the electricity grid to customers even if they have poor credit scores. In such cases a cash deposit must be paid in advance. If no such means are available, social services are contacted to arrange for payment of the deposit.

In addition to programmes in Vattenfall's markets, Vattenfall is engaged in the World Economic Forum's Energy Poverty Action (EPA), which is a private sector initiative to reduce energy poverty by bringing effective energy delivery and use to under-served villages and peri-urban areas. Together with two other utilities, Vattenfall has formed an alliance that is currently developing its first projects in this area. In one of these projects, a village in southern Lesotho will be provided electricity by a combination of grid extension and solar cells.

Accessibility of information on safe use (EU23)

Customer centres and websites are important sources of customer information. Vattenfall strives to support groups with special needs by making its websites more available and user-friendly. The basis for this work is the Group Web Access Initiative and the Web Content Accessibility Guide, which provides a set of international guidelines.

Vattenfall's customer centres are staffed with foreign language speakers, and some information material is produced in different languages. One example is in Berlin, where customer information on energy savings is available in Turkish.

Performance indicators

Health and safety impacts (PR1)

Vattenfall actively strives to take the initiative in detecting serious hazards that pose a risk to customers, especially with respect to incorrect use. For example, in Poland Vattenfall promotes use of district heating instead of water heated in individual, hazardous old systems based on gas boilers.

Power lines, like any electrical device, generate electromagnetic fields (EMFs). Concerns have been raised about whether electricity could be hazardous to people's health, and whether EMFs could cause cancer or any other disease. Over the past thirty years considerable effort has been dedicated to investigating this issue. The research is ongoing, and there is a range of divergent views. However, the balance of scientific evidence to date suggests that normal levels of EMFs do not cause diseases. Vattenfall actively monitors related international scientific work in this field and complies with the international industry standard set by the International Commission on Non-Ionizing Radiation Protection as well as any related national regulatory requirements. Vattenfall contributes to the collaborative research undertaken by Elforsk (the Swedish Electrical Utilities R&D company).

Product and service information (PR3)

Vattenfall complies with local regulatory requirements regarding product information and labelling, and issues regarding this are dealt with by the local marketing organisations. Vattenfall meets the product information requirements on electricity labelling in national legislation (based on EU-directives), which require that electricity suppliers provide information to all customers on the fuel mix and environmental performance (minimum CO₂ emissions and radioactive waste).

In addition, Vattenfall describes its environmental impact in a transparent and detailed manner using life cycle assessments and environmental product declarations. Vattenfall uses life cycle assessments (LCAs) as one method to assess the environmental impact of its operations "from the cradle to the grave". LCAs have led to improved environmental performance in many areas, including reduced use of water in operations, reduced risk of oil leaching to soil and water, and increased recycling of materials. Vattenfall was the first company in the world to receive an Environmental Product Declaration (EPD) in accordance with ISO 14025.

Customer satisfaction (PR5)

Customer satisfaction index	Retail customers		Corporate & Industrial, SME ¹⁾	Corporate & Industrial, Large ¹⁾
	2008	2007	2008	2008
Electricity sales				
Sweden	69	62	62	64
Finland	66	65	62	70
Germany	62	67	57	64
Poland	73	73	62	65
Distribution				
Sweden	68	59	61	62
Finland	64	62	60	n/a
Germany	61	64	58	63
Poland	74	73	62	65
Heat				
Sweden	65	62	62	n/a
Finland	67	73	70	n/a
Germany	n/a	n/a	59	n/a
Poland	68	n/a	84	n/a

1) The segmentation of measurements for Corporate and Industrial customers (both SME and Large) has been changed since 2007. Comparable data is therefore not available

Customer satisfaction issues have gained increased attention during the last couple of years and will continue to have high priority in the future. In 2004 Vattenfall adopted a set of customer satisfaction requirements and targets to measure its performance in fulfilling the strategic ambition to be Number One for the Customer.

Targeting and measuring customer satisfaction

In 2007 Vattenfall adopted five target areas, one for each of its strategic ambitions. The target for the strategic ambition to be Number One for the Customer is based on Vattenfall's Customer Satisfaction Index (CSI) for its retail customers. The target is broken down into individual targets for the Business Groups: Nordic (Sweden, Finland) and Central Europe (Germany and Poland), as well as for all the Group's sales, distribution and heat business units.

The Business Groups draw up business plans, which describe how the customer satisfaction targets will be reached. The targets are followed up in the same manner as financial targets.

Targets are set in comparison with leading service companies (mainly the major power, telecom and insurance companies) in Europe and are communicated in the business planning directives that are issued to the organisation once a year. The long-term target is that customer satisfaction, as measured by Vattenfall's Customer Satisfaction Index (CSI), should be in the top tier among the leading competitors in each market. Customer satisfaction should also be on the same level as leading actors in similar industries, such as telecom. This implies a long-term CSI target above 70 for retail customers and above 65 for corporate & industrial customers.

Formal instructions are issued that direct the way in which CSI measurements are carried out, such as what questions are to be asked, scales for the answers, the statistical analysis method to be used, sample sizes, reporting format and survey timing. This ensures that figures are comparable to the European Performance Satisfaction Index (EPSI).

As of 2008, Vattenfall's CSI process has been more centralised in order to improve the quality and comparability of measurements. The objectives are to enable transparent internal and external benchmarking, to use CSI as a strategic tool, and to use links with other stakeholder measurements in the future. During the year a Group-wide CSI process co-ordinated at the Group level was developed, including common customer segmentation for CSI purposes, questionnaires, sampling methodology, survey approach, analysis model, and reporting and presentation structures. This new Group-wide CSI process was used for the first time in the 2008 CSI measurements covering the retail, SME and some B2B large customer segments in all markets. In 2009 the Group-wide CSI process will be optimised and the scope will be extended to cover also the reseller and MEGA segments.

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In 2008, Vattenfall's customer satisfaction index (CSI) for the Group as a whole was 64, which is a stable result compared to last year. However, the trends varied significantly between Vattenfall's markets. In the Nordic region, there was a strong positive development of the CSI results compared with last year. The Swedish results, in particular, were substantially stronger for most of the segments compared with 2007. The results indicate an increase of trust for the industry as a whole in the Swedish market. On the other hand, Vattenfall's CSI scores in Germany showed a sharp decline for retail and SME customers due to a combination of poorly managed price increases and a tarnished image caused by problems with the nuclear power operations. However, results from additional measurements during the autumn showed that the negative trend has been reversed and that CSI scores are slowly improving. In Poland, Vattenfall's CSI scores remained at a steady high level, particularly for retail customers.

Image and price have a very large impact on customer satisfaction scores, and a tarnished company image or an increase in prices leads to lower customer satisfaction scores in all markets and vice versa.

Trends in customer satisfaction

As markets develop, the same trends for customer satisfaction scores can be seen in all three geographic areas:

- fairly high levels of satisfaction in regulated or recently deregulated markets (Poland),
- then a drop in ratings when the competition increases, price pressure intensifies and supplier switching increases (Germany),
- and after that a gradual pick-up and gain of new customers as a result of hard work and price strategies (Sweden).

Actions to improve customer satisfaction

In 2008 Vattenfall took a variety of actions in all its geographical areas to maintain and increase customer satisfaction, mainly on the operational level:

- Investments in more weather-secure air cables in Finland and Sweden have resulted in significantly lower interruption rates.
- Work to ensure security of supply in Germany is contributing to continuous high satisfaction scores.
- Installation of automatic meter reading for all of Vattenfall's distribution customers in Finland was completed at year-end 2007, and by the end of 2008 more than 99% of distribution customers in Sweden had automatic meter reading. This will improve billing and service.
- In Finland and Sweden, new billing systems have been implemented with the aim to improve the efficiency of customer contacts. In Germany, work on development of a new billing system is in progress.
- Reorganisation of the contact centres in Finland, Sweden and Poland has been completed, resulting in improved customer service as well as the continuous improvements in service centre staff training. A positive effect could be seen in Sweden, where retail customers gave higher scores for customer service in 2008.
- In Germany, the Vattenfall Centers were relaunched, and a Customer Board was introduced.
- In Finland, an instant messaging service has been introduced for customers facing an outage. In Sweden, where instant messaging service already exists, an improved interactive voice response for customer with power interruption has been implemented.
- Since January 2008 Finnish distribution customers are also compensated if an outage exceeds 6 hours.
- A lot of effort has been put into providing customers in the Nordic region, Germany and Poland with information and advice on energy efficiency.
- Originally launched in 2007, the "Restore public trust" campaign was continued in response to a decline in public confidence in Germany.
- A set of new products was launched in Sweden at the end of 2007 to increase Vattenfall's competitiveness in the residential segment, and in Finland the pricing strategy and structure were adapted to ensure more competitive price levels.
- In Poland Vattenfall is taking the lead in the deregulated market when it comes to simplifying processes and developing new products, such as electricity with a price guarantee and an online product. Vattenfall has been frequently cited in the media as an expert on the liberalisation process of the energy market.

Responsibility in marketing communications (PR6)

Vattenfall complies with international codes, such as the ICC International Code of Advertising Practice and the OECD Guidelines for Multinational Enterprises. In the countries where Vattenfall operates, we also comply with national legislation, which is often more stringent than international codes and frameworks.

Non-compliance with regulations and codes (PR7)

No incidents of non-compliance with regulations and codes were reported in 2008.

Customer privacy and customer data (PR8)

No complaints regarding breaches of customer privacy were reported in 2008.

Laws and regulations on products and services (PR9)

No reported incidents of non-compliance with laws and regulations concerning the provision and use of products and services were reported in 2008.

Number of injuries and fatalities to the public (EU24)

In 2008 Vattenfall has been ordered to determine the cause of an accident in one case. The outcome is pending.

Number of residential disconnections for non-payment (EU26)

There are cases when people do not pay for their residential electricity for a variety of reasons. In such cases electricity companies may disconnect a customer from the grid until the payment has been made. Vattenfall strives to ensure rapid reconnection after payment, in order to minimise the length of time for such disconnections. During 2008, Vattenfall's distribution operation in the Nordic countries had a total of 3,532 disconnections due to non-payment. Data on the duration of the disconnection is not gathered at the Group level.

Power outage frequency and average power outage duration (EU27–28)

Vattenfall's electricity distribution operation strives to provide high quality service with uninterrupted power supply and consistent voltage. However, power outages occur, most of which are for planned maintenance, although some are also unplanned, for example due to extreme weather conditions.

System Average Interruption Frequency Index (SAIFI)

SAIFI is the average number of interruptions that a customer would experience and is measured in units of interruption per customer. It demonstrates the reliability of Vattenfall's electricity supply.

$SAIFI = (\text{total number of customer interruptions}) / (\text{total number of customers served})$. For Vattenfall's Nordic distribution operation, the accumulated SAIFI for 2008 was 2.40 interruptions/year.

System Average Interruption Duration Index (SAIDI)

SAIDI is the average outage duration for each customer served, and is measured in units of time. Duration demonstrates Vattenfall's ability to restore power in a timely manner.

$SAIDI = (\text{sum of all customer interruption duration}) / (\text{total number of customers served})$. For Vattenfall's Nordic distribution operation in 2008, average interruption time per customer was 236 minutes.

HUMAN RIGHTS

Management approach

Vattenfall conducts its business in regions where rules and regulations governing basic human rights have a long history and are well established. For example, working conditions, freedom of association, and bans on forced labour are regulated not only on a constitutional level but also on a more detailed level.

Many human rights issues are also monitored by various authorities, unions and non-governmental organisations. Vattenfall will always adhere to laws, regulations and good practices that are in accord with human rights, regardless of region. These human rights issues are handled as a normal, day-to-day part of business within the general management framework. Although Vattenfall conducts its business in regions with well-established regulation, there is a risk for human rights violations within the supply chain. Vattenfall therefore works actively with compliance in the supply chain.

Vattenfall's position on human rights issues is expressed in the Code of Conduct, the code of conduct for suppliers, the Human Resource Policy and by commitments under the UN Global Compact.

Code of Conduct

Vattenfall shares the values expressed in various international and national laws that uphold human rights. These values affect all business activities, and any deviations from these fundamental values are unacceptable. Vattenfall's Code of Conduct regulates interaction with business partners, suppliers, employees and the community. (extract)

- Owner – "Our responsibility means following the owner's directive that exists and acting in accordance with generally accepted business practices, as well as our policies and instructions. We are to discharge our responsibilities well with respect to our customers, employees, the environment and the community."
- Customers – "Our responsibility to customers means that we must supply products, services and solutions that fulfil customers' expectations as to quality, security and environmental care. In our customer relations we must also act in accordance with sound business and marketing practice."
- Business partners and suppliers – "Responsibility to business partners and suppliers means that we must work on the basis of high standards of business ethics and integrity and that we must support national and international organisations' work to establish and maintain strict ethical standards for companies."
- Employees – "Responsibility to our employees means that we must respect employees and their rights, offering safe and sound working conditions, non-discriminatory terms and constantly developing occupational skills and competence to ensure job satisfaction and development opportunities for the individual employee."
- Community – "We must express our support and show respect for the protection of internationally recognised human rights and we must ensure that we are not a party to crimes against human rights and that we always take into consideration health, security and the environment so as to contribute to sustainable development."

In order to grant this right, the Code of Conduct also regulates its institutionalisation: "If an employee or manager feels the need to discuss ethical issues, and cannot do this with their superior, they can contact the human resources department, local employee representative or the internal auditors."

Global Compact

Vattenfall joined the UN Global Compact initiative as a business participant in June 2008. However, since 2003 Vattenfall has supported the Swedish government's "Globalt Ansvar" initiative (Swedish Partnership for Global Responsibility), thereby committing to adhere to the United Nations Global Compact and the OECD's guidelines for multinational companies.

Investment and procurement practices

As the fifth-largest generator of electricity in Europe and the largest producer of heat, Vattenfall sources substantial amounts of fuel as well as several billion Euros of material and services to operate its business. To be perceived as a Benchmark for the Industry, Vattenfall must ensure that procurement is handled in a responsible manner. Regardless of whether the company is mining lignite in own operations, purchasing other fuels through a partner or contracting a partner to perform maintenance in power plants, Vattenfall sets high standards.

Several strategies, programmes and policies have been adopted to manage these issues:

- In September 2008 Vattenfall adopted a Group-wide code of conduct for suppliers, which makes the UN Global Compact the basis for the minimum requirements made on all suppliers.
- In order to make sure that all suppliers accept the code of conduct for suppliers and live up to the minimum standards, Vattenfall's Group Procurement has developed a solution where all suppliers are asked to go through a qualification process. The process is managed in the Vattenfall Supplier Bank, a web-based solution that can be accessed via Vattenfall's website. The Vattenfall Supplier Bank solution is gradually being rolled out across the Vattenfall Group, starting in Sweden in autumn 2008, followed by other countries in 2009.
- Vattenfall performs on-site audits of fuel suppliers against the code of conduct for suppliers/UN Global Compact (described in indicator HR2).

Non-discrimination

Vattenfall does not tolerate any form of insulting behaviour or harassment at work or in work-related situations. Everyone is to be treated with respect. This applies to all areas, including recruitment, salary, benefits, work environment, education, promotion and leadership. It also applies not only to employees, but to all people in contact with Vattenfall, including customers and potential employees in the recruitment process. Each and everyone in contact with Vattenfall should always be treated with respect regardless of his or her background and traits.

Vattenfall's anti-discrimination work is derived from the Group's Code of Conduct, which states "No employee shall be discriminated against or harassed as regards employment or occupation due to race, skin colour, gender, religion, political opinions, national origin, social origin or for any other reason." This promise is reiterated in Vattenfall's Human Resources policy, see Labour practices.

Indigenous rights

Vattenfall's operations have both natural and cultural environmental impacts. Mainly two indigenous and minority groups are directly affected, the German Sorbs and the Nordic Samis:

The Sorbs is a minority group that lives in eastern Germany in areas where Vattenfall has considerable operations. Vattenfall sponsors the Sorb organisation Domowina in eastern Germany, thereby demonstrating its support of the Sorb culture and its survival in the region. Domowina and Vattenfall want to strengthen their existing constructive co-operation in the future. Toward this end, in 2007 representatives from Domowina and Vattenfall adopted a joint declaration in which Vattenfall has expressed its support of the Sorbian population in the mining regions by ensuring the preservation of their social and ethnic identity. Initiatives include promotion of the Sorbian language, economics and tourism, support of Sorbian media, traditions and art, and documentation of Sorbian history and development.

In northern Sweden, Vattenfall operates many hydro power plants. The Samis, an indigenous population of formerly nomadic, reindeer-herding people, have inhabited the northern parts of Norway, Sweden, Finland and Russia since ancient times. The Samis are an ethnic minority in Sweden today, with their own language and a rich cultural tradition.

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Vattenfall's hydro power expanded from the beginning of the 20th century until the 1960s, and naturally, the building of hydro power plants in the northern parts of Sweden had an impact on reindeer husbandry. Vattenfall is engaged in a continuous dialogue with Sami communities, as with all stakeholder groups. A large number of mitigation programmes have been initiated and sponsored by Vattenfall, including construction of alternative crossing routes for reindeer herds.

In addition, Vattenfall is helping to preserve Sami cultural heritage by supporting cultural projects, such as sponsorship of the Ajtté Sami Museum in Jokkmokk, as well as other small-scale cultural preservation projects. A more organised dialogue between Sami villages affected by hydro power and Vattenfall is currently being developed.

Guidance on dealing with indigenous groups is provided for in Vattenfall's Code of Conduct as well as through adoption of Global Compact Principles.

Freedom of association and collective bargaining

Freedom of association is both constitutionally guaranteed and governed by a number of specific laws in the regions where Vattenfall operates. These laws are adhered to throughout the organisation. See HR5.

Preventing child and forced labour

In the regions where Vattenfall operates, the use of child and compulsory labour is prohibited by a number of specific laws. These laws are adhered to throughout the organisation. See HR6–7.

Complaints and grievance practices

A Group-wide whistle blowing system is being implemented; see also "Governance of CSR", page 77.

Performance indicators

Human rights screening (HR 2)

Vattenfall wants all suppliers to accept and act according to the UN Global Compact. To ensure this, Vattenfall adopted a Group-wide code of conduct for suppliers in 2008 with the purpose:

- to be a Group-wide platform for promoting the right behaviour for enduring, trustful and sustainable business relations, and
- to increase supplier awareness of Corporate Social Responsibility.

Vattenfall's Group-wide code of conduct for suppliers was signed by the CEO in September 2008. Since then it has been communicated both on the web and by requests that have been sent out to a couple thousand suppliers, asking them to accept the code by registering and performing a self assessment in the Vattenfall Supplier Bank ("VSB") via Vattenfall's website. Vattenfall's suppliers are now required to be registered in the VSB, and in due time purchasers will not be able to order from unregistered suppliers. The type of self-assessment depends on the risk assessment of the suppliers and their deliveries. To date more than 3,200 suppliers are qualified on the different levels of the VSB database, and the number is growing steadily.

The risk assessment of nuclear fuel and hard-coal suppliers has led Vattenfall to pay continuous on-site visits to suppliers in these areas in order to conduct audits against the code of conduct for suppliers. The number of audited fuel suppliers is steadily increasing.

To date 25% of Vattenfall's significant suppliers in all steps in the nuclear fuel supply chain have undergone human rights screening, which is a documented procedure for auditing suppliers' policies, communication and implementation of practices in order to respect and support human rights. Each year two to four audits are performed of suppliers in the nuclear supply chain. These audits also cover other aspects of the UN Global Compact, such as labour standards and environmental impact. Since 1 July 2008, all new nuclear fuel contracts include a clause on compliance with the principles of the UN Global Compact.

To date 14% of Vattenfall's hard coal supply has undergone auditing against the ten principles of the UN Global Compact. Since the start of 2007 Vattenfall has included a clause on compliance with the UN Global Compact in nearly all hard coal contracts, and every year two suppliers are audited based on a risk assessment.

Human rights training (HR3)

All Vattenfall employees are obligated to know and act according to Vattenfall's Code of Conduct, which contains basic information about human rights. The Code of Conduct is part of the management system and is available to employees via the intranet.

Vattenfall is carrying out compliance seminars for all purchasers in Vattenfall during the period autumn 2008–spring 2009. The seminars include training on the code of conduct for suppliers/UN Global Compact.

Discrimination incidents (HR4)

No cases of discrimination were reported in 2008.

Freedom of association or collective bargaining (HR5)

In the regions where Vattenfall operates, freedom of association is both constitutionally guaranteed and governed by a number of specific laws. These laws are adhered to throughout the organisation.

- Nordic countries: Freedom of association is guaranteed by Swedish and Danish law. Finland's constitution guarantees everyone fundamental rights and general freedom of association. In Vattenfall's Nordic operations, both the companies and employees utilise their freedom of association.
- Germany: Article 9 of the German constitution ensures freedom of association and collective bargaining and provides the legal basis for union and employer association. Furthermore, the constitution guarantees that all attempts to restrict or interfere with this right are declared void and illegitimate.
- Poland: Trade unions have freedom of association and collective bargaining in Poland. This is described by the "Trade Unions Act", which is part of Poland's labour law. Collective agreements and social funds have to be negotiated with the trade unions.

Preventing child and forced labour (HR6–7)

In the regions where Vattenfall operates, the use of child and compulsory labour is prohibited by a number of specific laws. These laws are adhered to throughout the organisation.

Vattenfall opposes all forms of child labour and forced and compulsory labour. Vattenfall considers forced and compulsory labour to be contrary to the Group's core values and the Code of Conduct as well as to its commitments under the UN Global Compact.

When Vattenfall employs minors for summer jobs, apprenticeships and so on, this is done in accordance with national legislation which governs the type of work minors may perform and their working hours, such as only allowing for safe work with limited working hours during school holidays.

IMPACT ON SOCIETY

Management approach

Energy is a basic requirement in modern society. Vattenfall serves society by delivering the energy needed to make society work and become prosperous. Vattenfall also plays an important role in society as an employer and business partner, and corporate citizenship is emphasised in markets where the company operates. Vattenfall's responsibility is to contribute to sustainable development of society while providing energy solutions that meet customers' – and thus society's – needs.

All activities are guided by Vattenfall's core values:

- Openness: "We tell what we know and show the whole picture of what we do. Our business is not only transparent in a passive way; we also actively seek dialogue with our stakeholders."
- Accountability: "We take responsibility for everything we do and act as a responsible citizen in society."
- Effectiveness: "We strive to do the right things in the right way. This goes beyond mere process-related efficiency. It is important not only how we do things, but also what we do."

Preventing corruption and bribery

Vattenfall works against corruption in all forms, including extortion and bribery. Vattenfall's business ethics principles state that no employee may offer or receive improper benefits or benefits that may be regarded as improper remuneration in order to obtain, retain or direct business or in order to secure any other improper advantage in business conduct. Such prohibited benefits (bribes, etc.) include cash, items, pleasure trips or services of another nature.

The key to anti-corruption work is to educate all managers and others with extensive external contacts on all levels of the organisation about internal and external rules and, for management, to ensure compliance with these rules. Vattenfall has Annual Group-wide to the board reporting in place in order to ensure compliance.

Moreover, Vattenfall has signed an anti-corruption initiative launched by the World Economic Forum in co-operation with Transparency International and the Basel Institute of Governance. Vattenfall thereby supports 'Partnering against Corruption – Principles for Countering Bribery' (the PACI Principles), derived from Transparency International's 'Business Principles for Countering Bribery'. Adherence to the PACI Principles means adopting a zero-tolerance policy on bribery and a commitment to develop a practical and effective internal programme for implementing this policy. More information about the PACI Principles and definitions can be found at www.weforum.org. In May 2006, Vattenfall also became a Principal Corporate Member of Transparency International Sweden, part of a network against corruption headquartered in Berlin.

Preventing anti-competitive behaviour

Vattenfall has a range of principles, policies and rules designed to ensure that it does not engage in anti-competitive behaviour. Effective and fair competition is vital to ensuring market efficiency. Competition rules are important tools that serve this purpose. As it is truly beneficial from a business perspective, the Vattenfall Group is dedicated not only to complying with competition rules, but also to acting in accordance with business standards that meet the highest expectations from customers and the public.

Vattenfall's Code of Conduct states: "We are to carry on our business activities effectively and in fair competition. We do not enter into or carry into effect restrictive agreements with competitors."

Vattenfall has also adopted specific antitrust and competition rules designed to ensure fair trade and practice in the market. An antitrust compliance programme has been initiated by the Executive Group Management (EGM) and is part of Vattenfall's global leadership development programme. This programme supports Vattenfall's core values of openness, accountability and effectiveness while fostering an overall common business culture and attitude.

The key to anti-corruption work is to educate all managers and others with extensive external contacts on all levels in the organisation about the internal and external rules and, for management, to ensure compliance with these rules. Vattenfall has a monthly Group-wide reporting system in place in order to ensure compliance. In addition, this is reported annually to the board.

A specific issue related to competition among energy utilities is unbundling. Vattenfall complies with unbundling rules. These rules form part of national legislation, based on EU directives, and state that the transmission and distribution business must be separated (for instance placed in separate legal entities) from other businesses, especially the electricity generation and sales businesses. Accordingly, the regulated monopoly business is separated from the businesses under free competition. Compliance with unbundling rules is essential to ensuring that Vattenfall only uses fair means of competition. For instance, Vattenfall's transmission and distribution companies may not discriminate against generation and sales companies from outside the Vattenfall Group. In return, Vattenfall also expects transmission and distribution companies from outside the Vattenfall Group to not discriminate against Vattenfall's generation and sales business.

In cases of non-compliance, Vattenfall's management may, in accordance with internal instructions, take all necessary actions. Employees found responsible for a breach of the instructions and/or competition rules are held accountable. Depending on the nature of the breach, appropriate disciplinary actions, not excluding dismissal, will be considered and taken.

Public policy

The energy sector is a complex industry that is highly dependent on public policy and political decisions. Being a large energy supplier, Vattenfall is an important actor in society and actively participates in the public debate and democratic process. For example, one major challenge that society and Vattenfall faces is to increase generation from renewable energy. A number of factors must be taken into account when planning for new energy, such as environmental concerns, public confidence, and legal and regulatory aspects. All public policy work at Vattenfall aims at creating the best possible conditions for providing energy to society at commercial grounds.

Through openness and transparency, Vattenfall strives to maintain a continuous dialogue with decision makers and other stakeholders on regional, national and international levels. All activities are handled according to Vattenfall's Business Ethics Principles, which stipulate that all actions and activities must be based on full respect for democratic principles as well as for laws, rules and regulations.

Vattenfall's main operations are in the countries in which the company is a provider of electricity and heat: Finland, Denmark, the UK, Germany, Poland and Sweden. In addition, Vattenfall is active on the European scene, primarily through the Vattenfall European Affairs Office in Brussels.

Policy

Vattenfall's Code of Conduct regulates the company's approach to interaction with society. The Code is based on the company's philosophy and core values. The Code of Conduct describes, among other things, the company's responsibility with respect to the owner, customers, employees, the environment, the business environment and the community. High ethical standards must be maintained in all actions and in all contexts.

Compliance with codes, agreements and frameworks

Vattenfall has no specific, formal framework for managing societal interaction and support. Instead, it relies on several principles and tools, for example:

- The company's philosophy, Business Ethics Principles and Code of Conduct.
- Vattenfall has formed a stakeholder platform and surveys stakeholders' expectations and opinions. This forms a basis for operational and reporting matters, such as for improving this report.
- Vattenfall supports and complies with the principles of the UN's Global Compact.
- Partnering against Corruption – Principles for Countering Bribery (the PACI Principles).

Organisational responsibility

Organisational responsibility for managing societal impact and interaction follows the regular governance structure. Organisational responsibility for managing the impact of operations (including sponsoring and donations) is handled by the respective business units. However, some of these tasks are centralised or managed in co-operation with Group functions.

With respect to community and public policy development, a separate organisation exists within Vattenfall – Vattenfall Public Affairs, under Group Communication. This is a wide-ranging function that co-ordinates Vattenfall's positions on key issues and is the direct link to Vattenfall's owner – the Swedish state.

The most senior position in public policy matters is the Head of Group Communication, who is also a vice president of the company.

Public affairs functions exist in every country in which Vattenfall operates. The Group Public Affairs function co-ordinates activities between countries. Activities are conducted in close co-operation with Vattenfall's European Affairs Office in Brussels.

The General Counsel of the Vattenfall Group (who is also Head of Group Function Legal Affairs) co-ordinates the guidelines, instructions and follow-up of measures to prevent corruption and anti-competitive behaviour. It is the responsibility of each manager in the line organisation to ensure compliance (e.g., by implementing local instructions) and

to report on this compliance. The line organisation also reports all major disputes to Group Function Legal Affairs regularly and on specific cases

Training and awareness

Vattenfall's managers and employees throughout the Group carry on a continuous dialogue with stakeholders in society. Vattenfall strives to improve communication skills at all levels of the company, for example through media training and workshops.

Vattenfall offers training programmes on corruption, public policy and anti-competitive behaviour. For example, in the Antitrust Compliance Programme developed and implemented by Vattenfall's Executive Group Management (EGM), one-day seminars are held at which discussions are conducted on Vattenfall business cases and how to apply the Company's rules in different situations. The participants prepare for each seminar using a special e-learning tool. The target group is all managers at the Business Group and business unit levels as well as other employees with extensive external and competitor contacts. The objectives of these seminars are to:

- Ensure a shared basic understanding of the rules and how to comply with them and Vattenfall's internal values, policies and rules,
- Support a shared Vattenfall business attitude and a shared corporate mind-set, and
- Enable delegation of responsibility for compliance with the rules.

Goals, performance and risk pertaining to impact on society

Customer Satisfaction Index

Vattenfall has set a customer satisfaction target to measure success; the aim is to achieve a Customer Satisfaction Index score of 63 for retail customers for the period 2008–2010. The long-term goal is 70. For further information, see the indicator PR5.

Vattenfall Reputation Monitor

Vattenfall is interested in how society perceives the company and in people's opinions about the company, and strives to continuously improve stakeholder relationships. One important tool to collect feedback from all stakeholder groups is the annual Vattenfall Reputation Monitor (VRM), which measures awareness, reputation and preference of Vattenfall – among many other parameters – and by statistical simulation suggests actions areas for improvement.

Risk

Vattenfall's operations are exposed to a number of risks that affect earnings and the balance sheet. To manage these risks, Vattenfall has established an organisation and risk management process. Governance takes place through a set strategy and established body of rules. To be able to effectively manage manageable risks, methods and models are being continuously developed to measure and evaluate risks and their management. Read more about risks in the 2008 Annual Report.

Political risk is defined as the commercial risk that can arise as a result of political decisions. Examples of this are price regulation in electricity distribution and transmission, uncertainty regarding a new political majority, or changes in finance policies. In connection with acquisitions and other investments, this type of risk is managed by adjusting the cost of capital. Another type of political risk stems from changes in the rules governing the energy industry. These can concern such factors as changed taxes, environmental surcharges, changes in how natural monopolies are regulated, and political goals for the energy system. This type of risk is more difficult to predict and protect against. To mitigate this risk, Vattenfall conducts active business intelligence activities and maintains contacts with decision-makers in relevant markets. Vattenfall also belongs to various national and international trade organisations.

Non-compliance can have considerable financial consequences, especially with regard to anti-competitive behaviour. Furthermore, there is an obvious risk of damage to the Vattenfall brand.

Vattenfall has a zero-tolerance policy regarding the soliciting and accepting of bribes, and it expects its suppliers to respect this position. Internally, prevention of corruption and anti-competitive behaviour is

mainly regulated by instructions at different levels in the Group. With respect to Vattenfall's suppliers, Vattenfall's code of conduct for suppliers has been adopted as part of the agreement with suppliers. Prevention of corruptive behaviour is followed up by regular reporting to the responsible Group functions. This regulation, in turn, is audited by the Internal Audit function. In 2008 a Group-wide seminar for purchasers focusing on compliance was developed and held for the first time (see HR2–3).

Including stakeholders in decision-making processes (EU18)

Vattenfall's stakeholder dialogue is conducted on many levels throughout the Group, centrally at the Group level as well as on a local operational level. Vattenfall has identified its stakeholders by mapping the impact Vattenfall has on certain groups, or the impact that these groups have on the company. Stakeholders are involved in many decision-making processes, especially changes affecting the specific stakeholder group, such as people living in the vicinity of the company's operations. For additional information, see Impact on society SO1, EU19, EU21 and Governance of CSR, 4.14–15 and 4.16–17.

Emergency management and contingency planning (EU20)

Incident and Crisis Management (ICM) within the Vattenfall Group is steered by Group instructions that are part of the Vattenfall Management System (VMS). The purpose of ICM is to ensure that all types of incidents and crises are managed in a professional, secure and responsible manner. The main objective is that the organisation shall always be prepared and equipped to perform effectively in an incident or crisis situation. Incident and crisis handling must be an integrated part of the daily business activities in order to be able to handle extraordinary situations that can occur.

The basic requirement is that all units within the Vattenfall Group whose operations involve risks that may lead to an incident or crisis must be able to manage any such incident or crisis. This implies that:

- Analysis must be performed of all risks that may lead to a crisis.
- Business continuity plans shall be in place if the risk is unacceptable.
- An emergency management plan shall be in place.
- An emergency management group shall be appointed, prepared and trained.
- There must be capacity for taking care of personnel and family who are affected by a crisis.

Functional Group instructions are also in place, which contain more detailed requirements for business continuity planning. One example is the Group Instruction for Information Security, which lays out special requirements for business continuity management.

In 2007 and 2008 the Vattenfall Group developed a new Group-wide Incident and Crisis Management (ICM) concept that broadens the scope of crisis management. It includes a new Group-wide ICM organisation, which was operational by 1 July 2008. The ICM unit includes Duty Officers for Crisis Management and Crisis Communication with 24/7 responsibilities, at both the Group and Business Group levels. Vattenfall's Executive Management Group also appoints Directors-on-Duty, who also have 24/7 responsibilities. The ICM organisation focuses on monitoring events, supporting the line organisation, and when needed (extraordinary circumstances) taking the lead in incidents and crisis situations.

The Vattenfall Group is currently building up an Enterprise Risk Management framework, which also includes quarterly risk reporting. Security risks and other risks that could lead to potential ICM risks are included in the ERM reporting. Vattenfall AB's board of directors holds a yearly risk seminar, which also covers ICM risks.

Vattenfall has nuclear operations in Sweden and Germany. Nuclear safety is a central concern, which also includes extensive requirements for continuity planning and emergency management. This is handled in close co-operation with national authorities. From 8 February 2007 through 28 April 2008, Vattenfall AB's board of directors had a safety committee that was tasked with closely monitoring and overseeing nuclear safety within the Group. The committee was dissolved in accordance with the Safety Committee's recommendation, since it had been

a temporary measure and had fulfilled its purpose since the recommended actions had been implemented, especially through the appointment of a Chief Nuclear Officer who reports directly to CEO on nuclear safety. In 2008, Vattenfall further raised its nuclear safety ambitions and set the goal of becoming Number One in Nuclear Safety in the industry within five years. Measures taken include the appointment of a new independent Vattenfall Nuclear Safety Council, with external and international participants. The new organisation as of 1 January 2009, with a new Group-wide Nuclear power business unit as part of the new Pan-European Business Group, will enable this development. In spring 2008, the OSART review performed at Forsmark concluded that Vattenfall's safety management maintains a good international standard.

In 2008, four events classified as INES level 1 have occurred in Vattenfall's nuclear power plants in Sweden (none in Germany):

- June, Ringhals 2, insufficient flow from two pumps in the auxiliary feedwater system.
- August, Ringhals 3, deviation in fuel design compared with specification.
- August, Forsmark 2, a closed valve in the reactor emergency core cooling system caused one out of four parallel trains to be not operable.
- October, Forsmark 3, one broken control rod out of a total of 169 control rods.

All events have been attended to, and measures taken.

Vattenfall also participates in various national programmes and forums regarding critical infrastructure protection.

Performance indicators

Managing impacts of operations and displacement (SO1, EU19, EU21)

Access to energy is a prerequisite for the function and development of society. Vattenfall's responsibility as an energy company is to provide energy solutions that meet customers' and society's needs. Vattenfall strives to manage the impact of its business in a responsible way, balancing the needs of different stakeholders.

It is important for Vattenfall that the people living in the vicinity of the company's operations are not affected more than necessary. Regardless of the type of impact the operations may cause, Vattenfall as a company tries to be as receptive as possible to the needs and demands of affected stakeholders. Vattenfall has therefore established processes to interact with communities when planning for new operations. This is to ensure that everybody has an opportunity to have their say and suggest possible improvements.

Resettlement and mining operations

Vattenfall's lignite mining operation in Germany has a direct impact on communities, and several small communities have been resettled as a consequence. During 2008 no people were resettled, but resettlements are planned for the future. For this purpose, a formalised socially acceptable resettlement process is used to ensure that Vattenfall is a Benchmark of the Industry by handling the issue with great care and respect. The resettlement programme involves all aspects, from financial compensation to preserving the social structure in the village. At the beginning of the resettlement process an assessment is performed which involves all citizens. The assessment results in a specification of social requirements (Soziales Anforderungsprofil, SAP). The resettling community and Vattenfall then sign specific resettlement agreements that address the following points:

- All inhabitants will be moved to a common location together. New villages are connected to existing communities. If there is no access to services (e.g. schools, utilities, healthcare) in the existing community, new institutions are built. This way both communities benefit.
- The resettlers are included in the overall process of resettlement and are involved in shaping it. The resettlers are part of a working group together with Vattenfall and the county. As part of this working group, the resettlers are fully involved in the complete process of resettlement. It is the resettlers who decide on the new location, usually by choosing between up to five different locations. The next step is that all resettlers are given the opportunity to choose their new place of

property and direct neighbours. Furthermore, all residents' requests and suggestions are considered, such as clubs and social associations of the resettled and the new communities.

- The affected villages are developed and preserved until the time of resettlement.
- Property owners are compensated on the basis of their existing property by providing them with adequate family-based replacement property with no need for new funding.
- A tenant action concept provides a number of guarantees, including acceptable rents in rented apartments at the resettlement location.
- Small businesses are preserved and continued.
- Community life in clubs and associations is kept functioning and is supported. The resettled community has all necessary infrastructure to conduct social activities, sports or other recreational activities, including stadiums and community centres. Items of cultural heritage, such as historical monuments or buildings, are transferred to the new location. Furthermore, funds are raised to support social and sports activities, events such as anniversaries and local traditions, social work and economic development.
- For the move itself, an action concept is drawn up together with the resettling and the absorbing communities.
- The move is carried out in the shortest time possible.

Three villages have been resettled since 2001, and there are plans to resettle one more village in 2013.

Resettled villages

Year	Village	Resettled inhabitants
2001	Geisendorf	45
2003	Horno	350
2006	Haidemühl	650
2013	Trebendorf/Schleife	260

The northern Swedish community of Kiruna, where Vattenfall is the electricity network owner, is being resettled as a consequence of the mining operations of the Swedish company LKAB. Vattenfall has co-operated with local authorities (Kiruna Municipality, the Norrbotten County Administrative Board, the Swedish Road Administration and the Swedish Rail Administration) and LKAB on stakeholder expectations and the planning of the new grid. Requirements were that it should be flexible to adapt to changing plans for the future locations and meet high environmental standards. Most construction in central Kiruna is now completed and the first relocation will take place in 2010. Costs for the new distribution grid, approximately SEK 400 million, are being shared by LKAB and Vattenfall.

Risks related to corruption (SO2)

Business units are analysed for risks related to corruption (and anti-competitive behaviour) as part of the general risk reporting of the Vattenfall Group. All operating units without exception are part of this reporting and analysis system.

Anti-corruption policies, procedures and training (SO3)

Training in antitrust compliance has been conducted since 2005. All managers and other employees with extensive external contacts are required to participate in at least one antitrust compliance seminar or in a similar education programme.

During 2008, 82 employees participated in antitrust compliance training, and by year-end a total of 1,129 employees had completed the training. The goal is that all staff with extensive external contacts shall go through the training. It is the responsibility of each Business Unit to decide which staff to educate.

Actions against corruption (SO4)

It has been reported that one employee was disciplined in 2008.

Public policy positions and development (SO5)

Dealing with climate change is a significant issue for Vattenfall. Vattenfall fully recognises the risks of climate change and wants to contribute constructively to efforts to find solutions to the problem. Accordingly, Vattenfall has engaged in this issue internationally and launched a global initiative – Combat Climate Change (3C) – which demands that climate issues be integrated into the world of markets and trade. The 3C initiative is aimed at creating a global alliance of companies that are willing to take the lead in demanding integration of climate issues into the world market and facilitate trading through a global framework that will come into force in 2013. Vattenfall is responsible for co-ordinating the initiative. Other companies are welcome to join.

Political contributions (SO6)

Vattenfall does not give support to political parties, politicians or related institutions. Other contributions to society are summarised under 4.16–17 (page 80). Vattenfall is a state-owned company, and shares in the company are not publicly available.

Legal actions pertaining to anti-competitive behaviour (SO7)

At Vattenfall Poland, one legal action pertaining to anti-competitive behaviour was reported during the year. The outcome for Vattenfall was favourable.

The Swedish Competition Authority is investigating whether Vattenfall AB (Heating) has over-priced heating in Uppsala and thereby violated the prohibition on abuse of dominant position regulated in paragraph 19 in the Swedish Competition Act (Konkurrenslagen). The investigation has been ongoing at the Swedish Competition Authority since at least 2005. The likely outcome for Vattenfall is judged to be favourable.

Sanctions (SO8)

A total of fifteen sanctions for non-compliance with laws and regulations were reported in 2008. The total monetary value is not collected at the Group Level.

LABOUR PRACTICES

Management approach

Vattenfall's employees are the backbone of its business success. Their talent is a precious resource comprising individual knowledge, skills and qualifications. In the future, the most significant success factor for Vattenfall will be having people with the right competence. Therefore, one of Vattenfall strategic ambitions is to be an Employer of Choice. This means that Vattenfall strives to create a work environment that enables the company to attract, develop and retain people with leading competence and promotes top performance.

Vattenfall's Human Resources (HR) Policy states: "Work at Vattenfall shall provide opportunities for development in a safe, healthy and stimulating environment." The policy also describes the role that corporate culture plays in the company's business approach: "Vattenfall's company philosophy and steering model are characterised by our three core values: openness, accountability and effectiveness. These values form the basis of our corporate culture and are the foundation from which we work towards our overall vision." The purpose of the corporate culture is to encourage strong employee commitment and enhance Vattenfall's attractiveness among potential employees.

Vattenfall's Human Resources Policy, Code of Conduct and other instructions are part of the Vattenfall Management System (VMS) and form a platform for the management of responsible labour practices within Vattenfall.

Employment

During the coming decade, demographic changes will lead to increased

competition for potential employees as a significant number of the company's employees are approaching retirement. In combination with plans for growth and large investments, this leads to significant recruitment needs and makes the ability to attract, retain and develop the right competence a critical business success factor.

Market oriented salaries and benefits – including performance-based compensation – are a prerequisite for being able to recruit and retain competent employees. Vattenfall offers competitive salaries and benefits and strives to be an employer that rewards strong performance, identifies potential and applies flexible solutions to facilitate employees' work. Accordingly, Vattenfall offers individual and differentiated salaries with focus on performance and potential.

Vattenfall has an international assignment process, and the number of employees stationed abroad is steadily increasing. In view of the company's international operations, mobility across national borders is highly important.

Labour/management relations

The annually recurring My Opinion employee survey covers a wide range of issues and aspects. Through My Opinion, employees have an opportunity to express their opinions about everyday work, managers and the company. The tool is used throughout the organisation as a basis for action plans to improve the work environment. Best practices derived from the action plans are shared and become a useful tool for management.

In addition, local actions are taken in all countries and include open-door initiatives in which employees can meet with management, team meetings, and forum/chats on the intranet regarding current issues of employee interest.

The overall participation rate in the MyOpinion survey was 69% in 2008.

Occupational health and safety

The Human Resources Policy states that that Vattenfall shall provide "a safe, healthy and stimulating environment". This is further elaborated upon in Vattenfall's Health and Safety Policy, which states the objective that no employee shall be injured or fall ill due to his or her work situation.

Top management is involved in health and safety work by setting and monitoring safety goals. Vattenfall's managers also serve as role models by promoting health and safety-oriented behaviour. To promote high levels of health and safety, Vattenfall maintains a continuous improvement process.

Vattenfall works actively to improve employees' health by offering regular health check-ups and taking preventive measures according to national legislation. The company is active in supporting employees with prolonged illnesses so they can return to work.

Employee well-being and safety is measured by health and safety indicators and by reviewing health and safety-related questions in the My Opinion employee survey.

Vattenfall treats contractors' employees in the same way as its own employees regarding health and safety issues. Contractors are expected to follow Vattenfall's health and safety standards and this is followed up on regular basis.

Training and education

Vattenfall provides opportunities for all employees to develop as professionals and individuals. Vattenfall's Human Resources Policy emphasises the importance of competence development, and states: "It is important that our managers possess business and professional skills as well as social and leadership competence. Our competence development supports the business operations and emphasises learning as a continuous process. To reach our goals we freely share our skills, knowledge, resources and opportunities."

Learning is regarded as a continuous process. The approach to competence development is that skills are developed primarily in daily work and through participation in different projects. There is no Group-wide policy regarding training and education; instead, local country-specific regulations apply.

Vattenfall has two internal institutions for competence development, Vattenfall Management Institute (VMI) and Vattenfall Business Institute (VBI). VMI is designed for management development and offers both general management training as well as advanced programmes at the strategic level for senior managers. Development programmes for func-

tional specialists such as financial control, HR, procurement and communications are offered by VBI.

The Talent Management process is a holistic process designed to define, attract, develop and retain the talent Vattenfall needs to meet future challenges. The process includes Management Planning and Competence Planning. Project managers and key players will be added to the Talent Management process as of 2009 and a succession planning process for these positions will be developed.

Management planning

Excellent leaders are key drivers of the company. Vattenfall has developed a Group-wide leadership model to evaluate and assess managers and young potentials. The annual management planning process provides an overview of management capacity in the Group as well as information to support succession planning. To ensure a high rate of internal succession, Vattenfall focuses on early development of its leaders. International leadership training programmes are conducted in order to help leaders develop their ability to work under rapidly changing conditions and in different cultures.

Competence planning

The annual competence planning process analyses the organisation's current competence status and future competence needs on the basis of business plans, and identifies competence gaps. The purpose of the process is to ensure that the organisation has the proper skill sets from both the short-term and a long-term perspectives. All units shall prepare action plans to ensure sufficient competence in the future. The action plans cover areas such as efficiency improvements, implementation of new technology, skills development, recruitment, job rotation, trainee programmes and the use of consultants.

Examples of training programmes within Vattenfall:

- In Sweden the Vattenfall Professional Training Programme provides concentrated training programmes, courses and seminars in areas such as health and safety, electrical/mechanical safety, project and process management, personal development and languages. In 2008 Vattenfall's "Young Graduate Programme" was held for the third time in Sweden. It offers young academics an opportunity to gain practical experience in limited-time projects.
- In Finland Vattenfall conducts a local management and leadership programme called "Vesimies Programme". This is an ongoing programme that is revised annually to reflect the needs of the target group and the business objectives. Customer service training is offered, and SAP-related training programmes have been launched for large groups in the Finnish organisation.
- In Denmark a competence model has been developed for each unit, competence evaluations have been performed, and gaps have been identified. Based on the gap analysis, a strategic competence development programme will be created every year. Training and development related to operational excellence has been in focus.
- In Germany the new development programme for young potentials – "Career start-up" – got off to a successful start in 2008. It aims to identify potential business leaders, develop and prepare them for future management responsibilities, and ensure the availability of successors for executives. This is a particularly important aspect in view of the current age structure of executive staff. The programme will also help keep performers loyal to the company. Furthermore, vocational training programmes for young people are offered on an ongoing basis to some 1,600 apprentices. Additionally, the 2008 training catalogue describes over 300 courses, workshops and seminars.
- In Poland, a review of strategic competence planning resulted in three main activities from 2007 to 2009: proactive employer branding, knowledge- and competence-sharing, and being the "employer of choice for employees of choice". An employer branding audit, participation in local job fairs, the organisation of apprentice programmes and active recruitment processes are examples of actions that have already been taken.

Diversity and equal opportunity

Vattenfall's Human Resources Policy states the company's view of diversity and equal opportunity as well as its importance (extract): "We strive for diversity in teams and units in regards to gender, age, background and experience, enabling employees from different units and of different nationalities to work together".

The policy relates to Vattenfall's ambition that the workforce should reflect the societies in which the company operates. Vattenfall is set to create the same possibilities and rights for all employees, and establish diversity as a natural part of operations.

A prerequisite for achieving the same rights and possibilities is to strictly condemn every act of discrimination in all work-related situations. Consequently, Vattenfall's Code of Conduct clearly states that no employee shall be discriminated against or harassed as regards employment or occupation due to his or her ethnic background, gender, religion, political opinions, social background or for any other reason.

Goals and activities to improve diversity:

Diversity	Goal	Actions
Ethnic background	Vattenfall will mirror society in terms of ethnic background.	Partner company in the Diversity Challenge, a student competition that offers internships for students with a multicultural background. Vattenfall offered two internships in 2008. Focus on recruitment process to ensure possibilities for people from diverse backgrounds to apply and succeed with their application.
Age	Obtain a more balanced age structure at Vattenfall.	Use output from the competence planning process as a basis for student relations activities, knowledge transfer programmes and general competence development.
Gender	Attain an equal ratio of female managers to female employees, see LA 13.	Focus on gender diversity in the succession planning and management planning process as well as in competence development measures.

For additional activities and initiatives to improve diversity, see "A diverse Vattenfall performs better" (pages 32–35).

Human Resources Policy

The Human Resources (HR) Policy is a part of the Vattenfall Management System and applies throughout the Group. It states (extract): "Vattenfall strives to create a work environment that attracts and develops people with leading competence and encourages top performance. By continuously developing and improving our human resource work, we are recognised – externally as well as internally – as a highly attractive employer. This human resource work contributes to our business operations and to greater competitiveness. We address all issues according to local practice, and our actions are always accountable and socially responsible. We facilitate change and are constructive and open to new possibilities and models."

The HR Policy describes Vattenfall's approach to five areas: culture and organisation, leadership, competence development, work environment, and compensation and rewards. Relevant extracts of the policy are provided in the sections above.

Regarding implementation, the HR Policy states: "Implementation of the Human Resources Policy is the responsibility of everyone within Vattenfall, but managers play a key role. Our managers should, in their daily work and through projects and activities, ensure compliance with the Human Resources Policy. We also co-operate with and consult the employee representatives. The co-operation should be straightforward and based on accountability."

Compliance with codes, agreements and frameworks

Vattenfall is a signatory of the UN's Global Compact. By complying with the Global Compact's principles regarding responsible labour practices, Vattenfall adheres to international frameworks such as the core conventions of the ILO and the OECD development guidelines for multinational companies.

Organisational responsibility

Group Function Human Resources (Group HR) supports and assists management teams at the Group and Business Group level in the management of Vattenfall. Group HR has functional responsibility for human resource issues at Vattenfall and provides expert advice on matters of importance to the company. The head of Group Function Human Resources is also a Senior Vice President and member of EGM.

Group HR issues directions and objectives for different areas and provides models and tools for the local units when appropriate. The work of Group HR is mainly performed in various national and international projects. Most HR-related activities, however, take place locally in the different units.

Group HR focuses on continuous improvement and value creation by developing and providing high-performance programmes and tools, including Talent Management, Organisational Development and Compensation & Benefits.

Training and awareness of labour/human resource issues

Responsibility to business partners and suppliers means working on the basis of high standards of business ethics and integrity and supporting national and international organisations' work to establish and maintain strict ethical standards for companies.

Goals, performance and risks pertaining to human resources

Vattenfall's human resource performance is defined in terms of employee commitment, excellent leaders and the right competence. The annual My Opinion employee survey is designed to measure this. The survey covers a broad range of aspects that reflect Vattenfall's company culture and that have an impact on employee commitment.

One of the categories measured in My Opinion is job satisfaction. In 2008 a score of 80% was recorded for this category. Job satisfaction is defined as one of three Commitment Drivers in the Vattenfall Group (together with Company Management and Environment & Society). In 2008 the commitment score was 70% , which is a small increase from 2007. Commitment targets are part of every business unit's business plan for the coming three years.

Vattenfall's long-term target is the commitment level of High Performance companies, which is 81%.

Processes to ensure the availability of a skilled workforce (EU15)

Ensuring the availability of a skilled workforce is one of the most important areas from a human resources perspective. During the next decade, 16% of Vattenfall's employees will retire, which means the company must attract, recruit, develop and retain skilled employees. The annual Competence Planning process has been implemented to analyse the organisation's current competence status and future competence needs on the basis of business plans.

Every recruitment is an investment for the recruited person, the recruiting unit and for the Vattenfall Group. Vattenfall has adopted a recruitment instruction to ensure recruitment of the right employees. Recruitment is a long-term commitment for the Vattenfall Group; the aim is to recruit people not for a specific job, but to take the Group's long-term needs into consideration.

Performance indicators

Workforce (LA1, EU16)

Average full-time equivalents

	2008			2007		
	Men	Women	Total	Men	Women	Total
Sweden	6,947	2,179	9,126	6,689	2,009	8,698
Denmark	580	104	684	553	100	653
Finland	279	211	490	276	214	490
Poland	2,086	626	2,712	2,110	649	2,759
Germany	15,111	4,649	19,760	15,093	4,677	19,770
UK	6	3	9	0	0	0
Other countries	18	2	20	23	3	26
Total	25,027	7,774	32,801	24,744	7,652	32,396

Full-time equivalents (person-years) refers to all employees within the company/unit with the following exceptions, Students (Werksstudenten, Praktikanten), thesis graduates (Diplomanden), holiday workers, staff temporarily employed for less than three months, staff on leave of absence for more than 3 months, staff on sick leave for more than 3 months (in Germany for more than 42 days). The number of person-years is the number of employees re-calculated into full-year employees. For example 2 half-time positions are equal to one full-time equivalent. Employment categories are not defined in Vattenfall and data is therefore not divided between categories. Certain values have been adjusted compared with previously published information.

Total headcount (as of 31 December)

	2008			2007		
	Men	Women	Total	Men	Women	Total
Sweden	6,940	2,354	9,294	6,867	2,286	9,153
Denmark	604	114	718	563	107	670
Finland	286	239	525	304	255	559
Poland	2,150	643	2,793	2,123	660	2,783
Germany	15,956	5,269	21,225	15,803	5,265	21,068
Other countries	25	8	33	1	0	1
Total	25,961	8,627	34,588	25,661	8,573	34,234

Headcount includes all employed individuals who are working.

The increase of total headcount in "other countries" refers to a transfer of personnel to a new Group-wide function with responsibility for IT infrastructure. An increase in mining and generation operations has led to an increased number of employees in the Group.

Subcontractors

Contract workers are used, for example, during maintenance and re-loading of nuclear power plants, in daily operations, and to temporarily fill competence gaps. These contracts are handled locally, and statistics are not gathered at the Group level. Vattenfall does not track or calculate how large a portion of the work that is performed by workers who are legally recognised as self-employed.

Apprentices and seasonal employees are hired when needed. Consultants are used both during peaks in the work load and as a source of additional competence.

Employee turnover (LA2)

Net employment creation

	2008	2007	2006
Sweden (including residual)	158	52	175
Denmark	58	37	626
Finland	-19	-47	22
Germany	164	-256	-390
Poland	13	-64	-69

Employment creation, comparable units

	2008	2007	2006
Sweden (including residual)	289	128	175
Denmark ¹	n/a	36	16
Finland	-4	68	-4
Germany	300	470	-259
Poland	99	-51	-69

Employee turnover, %

	2008	2007	2006
Sweden (including residual)	4.3	4.5	3.0
Denmark ¹	n/a	7.8	0.2
Finland	7.8	4.1	4.3
Germany	1.1	1.0	2.0
Poland	4.3	5.5	3.4

Notes:

1) Danish data not available at publication.

Net employment creation consists of the net change in the total number of employees at year-end 2008. It includes units that were incorporated or divested during the period.

Employee turnover is based on the number of employees holding permanent employment who have left the Vattenfall Group of their own accord. Employee turnover data according to gender or age is not gathered at the Group level.

An increase in mining and generation operations has led to an increased number of employees in the Group.

Employee benefits (LA3)

Employee benefits differ between the countries where Vattenfall operates.

Germany

Most employees are paid according to the Group Collective Bargaining Agreement that took effect on 1 January 2007. However, this agreement does not apply for exempt and executive employees. The Collective Bargaining Agreement stipulates that employees shall receive, in addition to their collectively bargained monthly salary, a special annual payment (equivalent to one month's pay). In addition, employees are entitled to a performance bonus based on their individual performance (0%–120% of their monthly pay) and a pay element that is based on the company's performance (65% of monthly pay at 100% EBIT). In addition, employ-

ees are entitled to long service awards after serving 25, 40 or 50 years for the company, and to a EUR 500 childbirth grant.

Poland

A range of benefits are offered, including private health care, electricity allowance, pension plan, reimbursement for prescription glasses, additional paid days off and jubilee rewards. Various social funds have also been set up to support sports activities, and loans for employees with favourable terms are offered.

Sweden

Examples of employee benefits include company-paid prescription medicines, 90% of salary during the first 90 days of illness and after that 80% of salary, parental leave (270 work days at 80% of salary), free occupational health service for all employees, company-paid sport activities and company-paid pension amounting to 65% of salary after the age of 65.

Finland

Employee benefits include restructuring support, health care services, working lunches, support for sports and cultural activities, use of holiday cottages, and anniversaries. Pensions and insurance are provided in accordance with Finnish legislation.

Denmark

Employee benefits include group life insurance, group accident insurance, critical illness insurance and health care insurance. Employees covered by the Industrial Agreement are entitled to extra days off, while Vattenfall offers other employees five extra days off.

Differences in benefits between full-time and temporary or part-time employees:

- In Germany, employer contributions to the company pension scheme are not paid until an employee has served two years for the company. Most temporary employees are therefore not eligible for such payments. A group accident insurance plan is in place for exempt and executive staff, a service that is not provided to other employees.
- In Finland there are differences in support in cases of redundancy and parental leave (according to the collective agreement).
- In Sweden there are differences in company cars, which are regarded as a flexible benefit.
- In Denmark all employees with more than one month of employment are offered the above-mentioned forms of insurance, which are regulated by law (Ligebehandlingsloven – the Equal Opportunities in the Labour Market Act). Extra days off are offered after 9 months of employment.
- In Poland there is no difference between part-time and full-time employees regarding benefits.

Collective bargaining agreement coverage (LA4)

Employees represented by trade unions

%	2008	2007	2006
Sweden	85	85	85
Denmark	70	70	70
Finland	85	82	77
Germany	70	70	70
Poland	44	58	48

Employees covered by collective bargaining agreement

%	2008	2007	2006
Sweden	98	98	98
Denmark	44	44	45
Finland	96	96	96
Germany	98	98	98
Poland	92	92	89

Employees in other countries (total 33) are not covered by collective agreements.

Operational changes (LA5)

Collective agreements and regulations regarding operational procedures differ between the countries where Vattenfall operates.

- In Germany, the Human Resources department is closely engaged in extensive restructuring processes, e.g., by answering questions concerning labour law. Communication campaigns and change management activities depend on the complexity of the restructuring process. Vattenfall is obligated to inform the works council in a comprehensive manner about all relevant company-related matters, and the works council has the right to be consulted about specific strategic decisions and company changes. Vattenfall acts in accordance with the Works Council Constitution Act.
- In Finland, operational changes are partly regulated by collective agreements, but mostly by law, and terms of notice range from 1 to 6 weeks, depending on the employee's length of employment.
- In Sweden, operational changes are partly regulated by collective agreements, but also by the Co-determination Act (MBL), and terms of notice vary from 1 to 12 months.
- In Denmark, the handling of significant changes in operations are regulated by the Salaried Employees Act (Funktionærloven), and notices must be given on an individual level.
- In Poland, Vattenfall generally informs unions or work councils in advance with a reasonable time frame – usually 10–12 weeks in advance. If a reduction concerns more than 10% of the workforce, there is a special procedure that needs to be followed in co-operation with trade unions.

Health and safety committees (LA6)

Health and safety committees are organised at the operational level. The committees deal with local problems and provide management with suggestions for improvements. Vattenfall's employees are well informed about initiatives and programmes that contribute to safe working conditions.

The My Opinion survey, which is conducted every year among all Vattenfall employees, includes health- and safety-related questions. The category Health Index measures employees' mental and physical condition. Vattenfall scored 76% on the Health Index in 2008 (i.e., 76% of employees evaluate the category positively). In the Safety category, questions are asked about the safety level of the company. The Safety category score was 76% in 2008. It is the responsibility of every unit to evaluate My Opinion results and take necessary action. More than 75% of the total workforce is represented in formal joint-management/worker health and safety committees.

Sweden

In Sweden, all companies with more than 50 employees have their own safety committees with representatives from the company, the unions and one safety representative. Some of the major companies have more than one safety committee. The safety committee at the company level is normally chaired by the president, and in some companies by the head of human resources. Every workplace with five or more employees has at least one safety representative. Policy issues and follow-up are conducted by a joint Swedish Work Environment Council.

Finland

In Finland, safety officers are appointed at every workplace with ten or more employees. The safety officers represent the employees and work in co-operation with the employer on health and safety issues at the workplace. The 1973 Health and Safety Supervision Act requires employers to appoint a safety officer to take responsibility for health and safety activities. Workplaces with 20 or more employees have safety committees consisting of employer and employee representatives, which serves as a forum for co-operation on health and safety.

Denmark

In Denmark, workplaces with ten or more employees are required to have a safety group. Workplaces with 20 or more employees have safety committees consisting of employer and employee representatives, which serve as a forum for co-operation on health and safety. In addition, employers are required to appoint a safety manager in charge of daily health and safety activities.

Germany

German legislation requires that companies with more than 20 employees have a safety committee. Some of the major companies also have central health and safety committees with representatives from management, employees, company doctors and experts. At Vattenfall in Germany, health and safety committees are established at the Business Group level in addition to local and business unit levels. The Business Group level includes a committee in which members of management and employee representatives set fundamental principles for occupational health and safety. The health and safety committees at the business unit level deal with matters that are relevant for the operations of the respective business units.

Poland

Polish labour law requires all companies with more than 250 employees to have their own safety committee in an advisory role. There are equal numbers of employer representatives including a health and safety responsible, and employees' representatives including social work inspectors. The chairman is a person appointed by the employer and the vice chairman is the social work inspector. The safety committee reviews workplace safety and hygiene, gives opinions about safety measures taken by the employer, devises corrective measures for safety conditions and co-operates with the employer to meet safety requirements. Some of the major companies, or companies with multiple locations, have more than one safety committee. The safety committees' activities involve all employees. In addition to the safety committees, employers with more than 100 employees must have a special health and safety function for controlling and advising purposes, while employers with fewer than 100 employees must employ an external person.

Injuries, absentee rates and fatalities (LA7)

Figures are reported from all parts of the organisation on a quarterly basis as part of the regular reporting system. An accident reduction programme that was started in 2006 had lowered the accident rate at work by a third by year-end of 2008.

Injuries, absentee rates and fatalities

	2008	2007	2006
Reported accidents at work (per 1,000 employees)	7.3	8.7	11.1
Commuting accidents (per 1,000 employees)	4.5	3.9	5.0
Number of lost days per employee due to accidents	0.1	0.1	0.2
Sick leave (%)	3.1	3.1	3.4
Work-related fatalities	2 ¹	7 ²	4 ³

Figures are reported from all parts of the organisation on a quarterly basis, as part of the regular reporting system. Accident is defined as an acute incident that occurred in the course of work, and which resulted in personal injury. Staff accidents includes electrical accidents. Commuting accident is defined as accidents occurring during travel to or from work. Work-related fatalities include external contractors. For the occupational disease rate (ODR), qualitative data is not available at the Group level. However, occupational diseases are followed up in accordance with national practice by the health and safety organisation and management.

- 1) On 23 January, a contractor was hit by a falling object during maintenance of a high voltage cable in Hamburg, Germany. On 10 November, one employee died in a commuting accident.
- 2) Employee – Electrocutation during maintenance work on 30 kV cable Riddarhyttan, Sweden, 14 September; Contractor – Fall from 40 m high pylon, Bad Tennstedt, Sachsen-Anhalt, 17 May; Employee – commuting accident in car, Mulchwitz, Sachsen, 24 June; Contractor – fall from height, Boxberg power plant, 7 August; Contractor – fall from height while dismantling a work platform, Markersbach pumped storage plant, 28 September; Employee – crushed between a truck and a wheel loader, Reichwalde open-cast mine, 22 November; Employee – crushed under a transformer while replacing it, Berlin-Tempelhof, 1 Dec.
- 3) One external subcontractor bled to death following an accident with a grinding machine, two workers from external contractors died in a scaffolding erection accident, and one contractor died when he was hit by a falling tree, when cutting a tree under/near one of Vattenfall's power lines.

Support regarding serious diseases (LA8)

Vattenfall's various companies have a long tradition of promoting good health of employees and of measures to prevent incidents and serious diseases. Accordingly, preventive medical check-ups are provided in compliance with the national health and safety legislation in the respective countries. Employees exposed to night shift work, noise, heat, hazards to eyesight, work on heights, chemicals, ionising radiation, dust, etc., can seek medical assistance and undergo additional tests from various specialists if needed. Employees who have been exposed to high risks, such as exposure to asbestos, undergo regular follow-up examinations to provide early diagnosis of related diseases.

In addition, various measures are offered to employees, such as back training courses and health promotion events. In large parts of the organisation, vaccination programmes for influenza and other diseases are further elements of health protection. Medical emergency aid is an integral part of occupational safety and health protection. Vattenfall has a permanent first aid training programme for employees. All employees have access to individual counselling and assistance by professional social workers or psychologists. Reintegration and disability management programmes have been established.

Health and safety and union agreements (LA9)

Health and safety are strategically important matters for Vattenfall, and co-operation with the unions is an important aspect. Regulations differ in the countries where Vattenfall operates.

- Guidelines in Finland are essentially in accordance with law or collective agreements – Vattenfall makes sure that these guidelines are followed.
- In Denmark, health and safety matters are covered by the Health and Safety at Work Act (Arbejdsmiljøloven).
- In Sweden, health and safety matters are covered by the Work Environment Act (Arbetsmiljölagen). In addition to this, the energy sector is covered by a collective agreement that specifies health and safety issues in more detail. Swedenergy's committee for Health, Environment and Safety works as an advisory board for overall policy issues and other tasks of common interest, such as education concerning work environments and occupational health services for employees in the energy sector.
- In Germany no direct agreements exist between unions and companies regarding health and safety issues. Many basic needs involving employees are regulated by law. Agreements covering health and safety issues are made by the company and the works council. This mostly happens in joint management/employee health and safety committees and health and safety committees in the works council. In this way, the works council is involved by setting policy, instructions and guidelines regarding health and safety issues. Additionally, certain formal agreements between Vattenfall and the works council are in place. Formal agreements include work-related medical checks, handling health and safety issues in electronic data processing, protection of non-smokers, personal protective equipment, health and safety for computer work and accident investigations.
- In Poland, no special agreement exists with trade unions on health and safety matters, as everything is regulated by the Labour Code and related laws. Unions are entitled to choose internal work inspectors in the company. Unions co-operate with the employer and supervise health and safety matters in the company through internal work inspectors. The employer and the union must agree on health and safety matters. Together with other companies in Poland, Vattenfall has signed an external collective agreement with the trade unions.

Training of employees (LA10)

Vattenfall provides opportunities for all employees to develop, both as professionals and individuals. Vattenfall regards learning as a continuous process. The company's approach to competence development is that skills development occurs mainly during daily work and through participation in various projects. Therefore Vattenfall does not aggregate information about the number of training days per employee. To enhance managers' knowledge about Vattenfall's vision and strategic ambitions, the Vattenfall Management Institute (VMI) conducts management development programmes. In 2008, 253 managers participated in such programmes. The number of participants in different competence programmes is presented in the table below.

According to the annual My Opinion employee survey, in 2008 71% of employees responded that they receive enough training and opportunities for development. These results are benchmarked with high performance norms, which score 4% better. Every Vattenfall company that receives result reports is responsible for analysing and preparing action plans.

Competence programmes, 2008

Target group	Number of participants	Days
Young Potentials	120	8
Managers	253	12
Middle	25	9
Executives	30	9
Human Resources	16	6
Controllers	24	6
Purchasers	23	6
Communication	23	6

Programmes for skills management and lifelong learning (LA11)

Vattenfall offers various training programmes to make sure that employees have the skills necessary to maintain high performance and fulfil the company's strategic ambitions as well as to facilitate personal development and life-long personal learning. Several assistance programmes to support employees who are retiring are in place.

Skills management and learning

	Yes	No
Internal training courses	X	
Funding support for external training or education	X	
Sabbatical periods with guaranteed return	X (Germany)	X (Nordic)
Pre-retirement planning for intended retirees	X (Nordic)	X (Germany)
Retraining for employees intending to continue working		X
Severance pay (individual)	X	
Severance pay that takes age and years of service into account	X	
Job placement services	X	
Assistance when retiring	X (Nordic)	X (Germany)

Performance and career development reviews (LA12)

Reviews on performance and career development are important ways of ensuring that Vattenfall's work environment and competence development objectives are met. Following is a summary of results from the My Opinion employee survey:

Performance and career development reviews	
Sweden	86% of employees received a formal performance appraisal and review during the year.
Finland	All employees received a formal performance appraisal and review during the year.
Denmark	94% of employees responded that they have had a detailed discussion to clarify their job objectives, and 71% said that their manager has given feedback related directly to their performance and improvements.
Germany	In Germany, employee dialogues have become an integral element of individual employee development since 2005. The programme's foremost aim is to support employee development through well co-ordinated measures designed to enhance employees' professional and personal skills and foster a culture distinguished by openness and trust between supervisors and employees. Vattenfall's collective bargaining agreement in Germany includes an integrated procedure to review employee performance. Such appraisals are performed by the employees' immediate supervisors, who discuss the performance appraisal together with the employee. To enhance performance, an annual bonus can be paid. For non-tariff employees, a goal agreement system is applied. By the start of each year, supervisors and their employees discuss the employees' personal goals, and the achievement of set objectives is reviewed by the end of the year in a further joint dialogue. The policies and procedures concerning the employee dialogue are valid for all tariff and non-tariff employees.
Poland	85% of employees have received a formal performance appraisal and review during the year. In 2008 a common Appraisal Policy was implemented, which regulates employee evaluation rules, along with a related development policy that describes training and competence development.

Composition of governance bodies (LA13)

Composition of governance bodies (Managers)

Percent		2008	2007	2006
Group level	Women	7	2	4
	Men	10	5	13
Group functions	Women	9	6	6
	Men	24	29	23
Sweden	Women	22	18	16
	Men	57	59	58
Denmark	Women	0	0	0
	Men	4	4	1
Finland	Women	0	1	1
	Men	2	5	5
Germany	Women	3	1	2
	Men	95	86	85
Poland	Women	1	5	3
	Men	18	23	19
Total Women		42	33	32
Total Men		210	211	204
Total		252	244	235

The numbers refer to end-of-year figures.

Categories:

- Group level – Board of Directors (appointed by AGM) and Executive Group Management.
- Group functions – Managers within Group functions.
- Country level – Business Group management, business unit management and company presidents.

Data on age groups is not available. Data on minority groups may not be collected by law.

The increase in the number of managers is mainly due to a larger number of male managers in Finland and Sweden.

Ratio of salaries of men to women (LA14)

The ratio of salaries of men to women differs between the countries where Vattenfall operates:

- In Finland, women's salaries are about 88% of men's, but in similar positions they are nearly equal.
- In Sweden the salary differences are about 10% and in the management category, women's salaries are 91% of men's.
- In Denmark, women's salaries are an average of 74% of men's, ranging from 65%–95% of men's, depending on employee category.
- In Germany, a gender breakdown of salary data is not collected.
- In the Polish energy sector, women's salaries are about 85% of men's salaries. When it comes to Vattenfall the percentage varies between 72% and 100%, depending on the tariff category. The differences are mainly the result of many men working in shifts, for which they have additional allowances. However when comparing non-shift positions, women's salaries are from 85% to 96% of the level for men.

Safety training for contractors (EU17)

All contractor and subcontractor employees working at Vattenfall plants and on Vattenfall facilities receives the necessary health and safety information. The content and the extent of instructions and training depends on the working area and the working tasks of the contractor and subcontractor employees. Preventive health and safety measures cover essential dangers related to Vattenfall's facilities, plants and processes, and are adapted to the specific national legal requirements of the specific plant or facility.

As a part of its procurement process, Vattenfall ensures that suppliers, their subcontractors and sub-suppliers act according to the Vattenfall code of conduct for Suppliers. This includes complying with the respective countries' health and safety legislation and ensuring that employees have undergone the necessary health and safety training. Vattenfall's Code of Conduct for Suppliers was introduced in 2008 and will be implemented in all parts of the Vattenfall Group in 2009.

Instructions and training are carried out in the decentralised line organisation, and data is not aggregated at the Group level.

ECONOMIC PERFORMANCE

Management approach

Securing the future through economic value creation

Vattenfall strives to be a Benchmark for the Industry, with focus on operational efficiency and value creation. Expanding with good profitability is a prerequisite for contributing to sustainable development of society.

Measuring and managing performance

For a capital-intensive company like Vattenfall, it is important to generate a satisfactory capital return. Long-term value creation can be measured by operating profit less the required return on net assets to meet shareholder's return requirement. The overall long-term financial requirement for Vattenfall from its owner is a 15% return on equity (ROE) after tax. This is translated to a Group-wide return target that is expressed as a return on net assets before tax and financial costs (operating profit as a percentage of average net assets). The return target is currently 11% and is based on a balanced consideration of the financial targets. This target, in turn, is broken down into individually defined targets for each business unit, according to which operations are managed. The main reason for this reformulation to individual targets for each business unit is that Vattenfall's operations have widely varying conditions – mainly different asset bases in terms of size and age. Moreover, the company's equity and net financial income and expense are not distributed over the business units. The basic principle for this target formulation is that asset-intensive operations are assessed according to their return on the asset base, while service operations are assessed according to their operating margin.

Financial targets

Vattenfall's vision to be a leading European energy company is conditional upon economic value creation and profitable growth. These are the starting points for the Group's financial targets, which in turn are the platform for the business planning process at the business unit level. The financial targets are long-term, which means that they are to be evaluated as averages over a business cycle (approximately 5–7 years).

Main goal is long-term sustainable economic value creation

Creating economic value by generating a competitive return over time is Vattenfall's overriding financial objective, since the Group's other strategies are based on a requisite level of financial strength. The owner's required rate of return is used as the basis for setting targets for profitability, dividends and financial risk. The Board reviews the proposed targets and decides to propose them to the Annual General Meeting, where the owner then makes the final decision. Vattenfall's four current financial targets are:

- **Profitability.** The owner's long-term return target is that profit after tax will amount to 15% return on average equity. Translated to the Group's long-term required level of profitability, expressed as the return on net assets, this corresponds to a return of approximately 11% before tax and financial costs.
- **Dividend policy.** The aim is that the dividend over the long-term shall amount to 40%–60% of profit after tax. However, the yearly decisions on the dividend shall take implementation of the company's strategy, financial position and other economic targets into account.
- **Ratings.** It is Vattenfall's intention to maintain a long-term credit rating in the single A category from both Moody's and Standard & Poor's.
- **Cash flow interest coverage.** The cash flow interest coverage ratio after maintenance investments should amount to 3.5–4.5 times over the long-term. For a complete definition, see the 2008 Annual Report.

Vattenfall's investments

In 2008 Vattenfall invested a total of SEK 42.3 billion in energy generation, distribution and acquisitions.

Investments 2008

SEK Billion	
Hydro power	1.26
Wind power	2.57
Biomass, waste and peat	1.92
Nuclear power	3.58
Fossil-based electricity and heat	10.2
Electricity distribution	6.31
Acquisitions (shares and other)	16.4
Total	42.3

Five-year investment programme

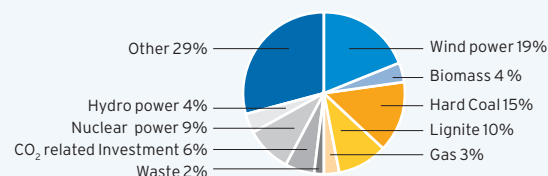
Investment planning is done long-term, and at the Vattenfall Group level, five-year investment plans are established. Investments are made in current operations and technologies that are viable and competitive for large-scale energy generation. In addition, Vattenfall conducts research and development activities within potential new energy sources and technology improvements (see EU7).

Vattenfall's growth target together with the target of reducing CO₂ emissions with 50% by 2030 and the climate vision to become climate-neutral by 2050, creates significant investment needs.

Five-year investment programme 2009–2013

SEK billion	
Wind power	37.2
Biomass	6.7
Hard Coal	27.7
Lignite	19.8
Gas	5.9
Waste	3.3
CO ₂ related Investments	11.4
Nuclear power	16.9
Hydro power	7.1
Other including distribution	55.0
Total	191.0

Five-year investment programme



Research and development activities (EU7)

Vattenfall's research and development (R&D) is distinctively directed towards supporting the Group's strategic ambitions and contributing to reductions in CO₂ emissions and an increased share of renewable fuels in the generation mix. The company's R&D focuses on improving energy efficiency in all segments of the value chain for energy supply – from fuel extraction, generation, and transmission to end uses of electricity and heat, including fuels for transportation. In addition, R&D work aims to prepare the company to meet new requirements, to address new business opportunities and to devise future energy solutions and thereby guide the company in its long-term strategies. R&D is also an important link between Vattenfall at present and the company's strategic ambition of Continued Profitable Growth, both through acquisitions and organic growth.

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The joint-Group R&D operations are aimed at long-term and visionary disciplines and topics of shared importance within the Group. Progress in technological development is introduced on a larger scale in operations when permitted by the commercial conditions. The two most important strategies for Vattenfall's long-term R&D and demonstration activities are climate change abatement and the role of the energy sector in the conversion to a long-term sustainable society.

Vattenfall is not a research and development company in the traditional sense, since does not develop equipment, but sets requirements and finds intelligent uses of equipment in energy systems. In some cases and under special conditions, Vattenfall co-operates with equipment suppliers in joint development projects.

To support Vattenfall's strategic ambitions and to help the Group achieve its long-term goals, R&D activities are performed in joint-Group R&D programmes. In 2008, R&D expenditures amounted to SEK 1,700 million, broken down among the various programmes as follows: renewables (10%), operational efficiency (8%), nuclear power (30%), energy efficiency (7%), Carbon Capture and Storage (43%) and new technologies (2%).

Provisions for decommissioning of nuclear power sites (EU8)

Vattenfall's nuclear power operations in Sweden and Germany have a legal obligation upon the cessation of production to decommission and dismantle the nuclear power plants and to restore the plots of land where the plants were located. Further, this obligation also encompasses the safeguarding and final storage of spent radioactive fuel and other radioactive materials used by the plants. The provisions include future expenses for the management of low- and medium-level radioactive waste.

For the Swedish operations, current estimations are that all of the provisions will result in disbursements after 2018. Current plans for the decommissioning of the German nuclear power operations entail about 94% of the provisions resulting in cash flows after 2010. For 2009 and 2010, respectively, disbursements are estimated at about 3% of the provisions per year.

Provisions for future expenses of nuclear operations

Changes in 2008, SEK million	Sweden	Germany	Total
Balance brought forward	21,869	7,944	29,813
Provisions for the period	47	-	47
Discounting effects	1,068	437	1,505
Revaluation (within the balance sheet)	5,496	2,494	7,990
Provisions used	-783	-241	-1,024
Provisions reversed	-	-129	-129
Translation differences	-	1,576	1,576
Balance carried forward	27,697¹	12,081²	39,778

1) Of which approximately 22% pertains to the dismantling, etc. of nuclear power plants and approximately 78% to the handling of spent radioactive fuel.

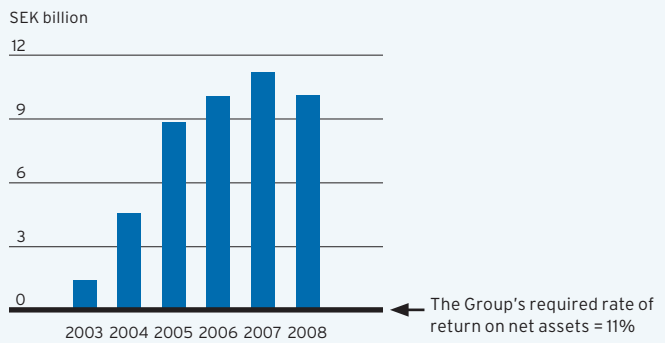
2) Of which approximately 58% pertains to the dismantling, etc. of nuclear power plants and approximately 42% to the handling of spent radioactive fuel.

Performance indicators

Economic value generated and distributed (EC1)

Economic value generated

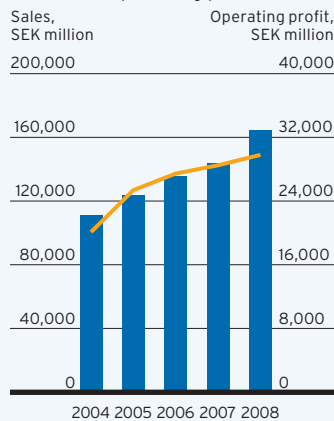
Value creation



The difference between achieved EBIT and the Group's required rate of return (expressed as 11% return on net assets) = an economic value that is generated by the operations every year, before tax.

Figures for 2004 and onward are calculated according to IFRS.

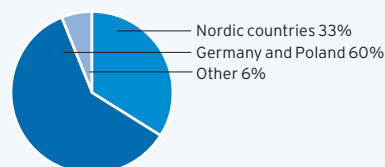
Sales and operating profit



■ Sales
— Operating profit¹

1) Excl. items affecting comparability.

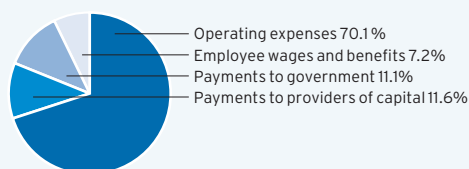
External net sales 2008 – breakdown geographically



Net sales as stated in the Annual Report for 2008, Note 6 to the consolidated accounts. See also Note 7 for a definition of segments.

Economic value distributed

Overview of economic value distributed 2008



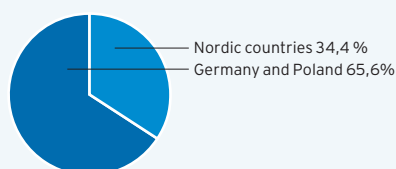
Note on operating expenses: The cost of all goods, materials and services is based on the information in Note 6 to the 2008 Annual Report and calculated as follows:

External net sales minus depreciation/amortisation/impairment losses/reversed impairment losses and operating profit, less employee wages and benefits and excise taxes.

Voluntary contributions and investment of funds in the broader community (includes donations) are not included in the above graph, see 4.16–17

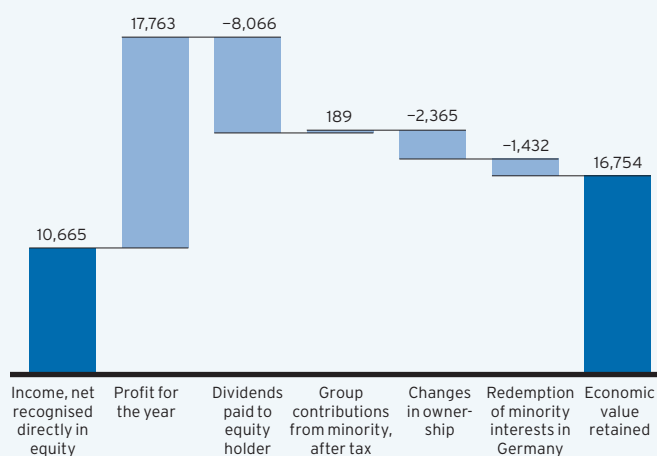
Payment to government 2008

Total taxes SEK 10,209 million.



Economic value retained 2008

SEK million



Financial implications due to climate change (EC2)

Major environmental issues representing financial risk/adverse financial impact

Vattenfall's business environment contains several uncertain factors that are related to climate change. Risks and opportunities are considered and managed throughout the organisation.

Examples of physical risks include changes in weather patterns, water shortages and warmer water temperatures that could affect cooling of combustion plants, more frequent and intensive storms that could have an impact on transmission and distribution networks, and hydro power dam safety, which could be affected by higher precipitation levels. An example of a regulatory risk that affects business is the post-Kyoto EU emission trading scheme, which will affect long-term investments.

Major environmental issues that represent an economical/financial opportunity

Focus on climate change will likely lead to higher demand for sustainable, efficient energy systems. The ability to provide heat and electricity with inherent efficiency and the potential for clean and sustainable generation technology could prove to be a tangible competitive advantage. Vattenfall is investing heavily in renewable energy generation and views renewable energy as a significant business opportunity.

Commercial success for Carbon Capture Storage (CCS) technology would contribute to a renaissance for lignite-fired power plants. As Vattenfall is taking the lead in CCS technology in the utility sector and has its own lignite mines, this may prove to be not only good business, but also a way to profitably bridge towards future energy solutions. Additionally, providing customers with tools to decrease their energy consumption is a small business today, but Vattenfall is investigating possibilities for expansion.

Coverage of benefit plan obligations (EC3)

Defined contribution pension plans

Defined contribution pension plans are post-employment benefit plans according to which fixed fees are paid to a separate legal entity. There is no legal or constructive obligation to pay additional fees if the legal entity does not have sufficient assets to pay all benefits to the employees. Fees for defined contribution pension plans are reported as an expense in the income statement in the period they apply to.

Defined benefit pension plans

Defined benefit pension plans consist of other post-employment benefit plans than defined contribution pension plans. The Group's defined benefit pension obligations are calculated separately for each plan in accordance with the Projected Unit Credit Method by calculating employees' current and past service cost. Estimated future salary adjustments are taken into consideration. The net obligation comprises the discounted present value of the total earned and estimated future salaries less the fair value of any plan assets. The discount rate consists of the interest rate on the balance sheet date of a first-class corporate bond with a lifetime that corresponds to the Group's pension obligations. When there is no deep market in corporate bonds of this kind, the market rate yield on government bonds with an equivalent lifetime is used instead.

When benefits in a plan are improved, the proportion of the increased benefit attributable to the employees' past service cost is reported as an expense in the income statement on a straight-line basis distributed over the average period until the benefits are wholly earned. If the benefits are fully earned, an expense is reported directly in the income statement.

For actuarial gains and losses, the so-called corridor rule is applied. Actuarial gains and losses arise from the effects of changes in actuarial assumptions. The corridor rule entails that the part of the accumulated actuarial gains and losses that exceed 10% of the greater of the obligations' present value and the fair value of plan assets is reported in the income statement, starting in the year after that they arise, over the expected average remaining service period for the employees covered by the plan.

Continued on page 76

When the calculation leads to an asset for the Group, the reported value of the asset is limited to the net of unreported actuarial losses and unreported past service costs and the present value of future repayments from the plan or reduced future payments to the plan.

Government financial assistance (EC4)

Government grants

Grants are reported at fair value when it can reasonably be assumed that the grant will be received and that the Group will meet the conditions of the grant. A grant tied to a non-current asset reduces the book value of the asset. A grant intended to cover expenses is reported in the income statement as Other operating income. Government grants received, balance brought forward, amount to SEK 4,586 million (4,294). Accumulated interest reported as an asset, totalling SEK 912 million (757), is included in cost of buildings.

Spending locally-based suppliers (EC6)

Vattenfall's policy is to support competition where possible. Vattenfall will always buy from the supplier that is the most competitive and that fulfils established requirements. Although Vattenfall is an important contributor to the business life in the regions where it operates, local suppliers will never be favoured just on basis of being local. Furthermore, sourcing will turn more global as more of the world's suppliers gain access to the European markets. Vattenfall's procurement function embraces this development.

However, local and regional suppliers are competitive and still receive a large share of Vattenfall's order volume (86% in Nordic countries, 98% in Germany and 99.8% in Poland)¹.

1) Since the 2007 CSR report, the definition of "order volume" for EC6 has been harmonised. It now strictly excludes purchases of electricity, electricity grid fees, taxes and charges as well as internal transactions between Vattenfall companies. In the Nordic countries, the figure for 2007 is 80% according to the new definition.

Local workforce and management (EC7)

In the countries where Vattenfall operates, local residents represent the recruiting base. In regions where Vattenfall is one of the biggest employers (e.g., Cottbus in Brandenburg, Germany), local residents are the base for employment. In metropolitan areas, there is a mixture of local residents and people from different regions.

Local workforce is the base of setting up new business for Vattenfall, so knowledge of local people is the backbone of operations. When growing through acquisition, Vattenfall takes over the employee responsibility of local residents/people already working at the plants.

Investments and services for public benefit (EC8)

Vattenfall creates and distributes what is perceived as a common good, hence it is hard to separate and distinguish investments by the degree of public benefit. Most investments made represent public benefit in one way or another. For additional information see 4.16–4.17, EN3–4, EN5–7, EN16–18 and EU7.

GOVERNANCE AND CSR MANAGEMENT

The parent company of the Vattenfall Group, Vattenfall AB, is a Swedish public limited liability company with its registered office in Stockholm, Sweden. Vattenfall AB is subject to the provisions of the Swedish Companies Act (Aktiebolagslagen). This means that the company has a board of directors that is appointed by the Annual General Meeting and which consists of non-executive directors. According to law, the board also includes employee representatives. The board of directors in turn appoints the CEO, who is also the President of Vattenfall AB and responsible for attending to the day-to-day management of the company pursuant to guidelines and instructions issued by the board of directors.

The Group's corporate governance is based on applicable Swedish and foreign laws and regulations as well as the companies' Articles of Association and other documents, such as the Vattenfall Management System. Where applicable, Vattenfall also complies with the rules and regulations for companies with shares listed on Nasdaq OMX Stockholm (the Stockholm Stock Exchange).

Vattenfall adheres to the Swedish Code of Corporate Governance and considers it as one of several important sets of governing regulations for external reporting and communication. Vattenfall also adheres to the Swedish state's ownership policy. The departures that Vattenfall makes from the Code are mainly due to the company's ownership structure – Vattenfall has only one owner, while the Code is written primarily for listed companies with broad ownership.

Governance and direction of CSR

Vattenfall does not have a separate CSR organisation. CSR issues are governed at the Group level as an integrated aspect of all other business matters. The overall strategic direction is set at Group level, and the Business Groups are managed through the strategy planning and business planning processes, in which requirements are formulated, and through the Group steering documents. The day-to-day running of operations is decentralised.

Overall CSR responsibility at the Group level rests with Vattenfall's CEO. The Group Functions shall monitor the Business Groups with regard to the Group Functions' respective areas of functional responsibility. Each Group Function has been assigned authority and responsibility throughout the entire Vattenfall Group within its area of expertise and responsibility. As concerns financial compliance, the Compliance Officer within Group Function Finance has specific responsibility for compliance in relation to accounting and to parts of the Vattenfall Management system. The Compliance Officer thereby requires representation letters from the line organisation. The line organisation reports all major disputes to the Legal Affairs Group Function regularly and on specific cases.

In 2008, work was started on implementation of a Group-wide whistle blowing system. A whistle blowing system has been implemented in the German organisation and will be fully implemented in the other parts of the Group in 2009. The concept of the system is that all employees, managers, consultants, contractors and suppliers who want to report a violation of law or a breach of certain internal regulations can contact one of Vattenfall's external ombudsmen. Such local ombudsmen will consist of lawyers acting according to professional discretion, and will exist in all of Vattenfall's core countries. To the extent the informant gives his/her consent, the ombudsman will forward information to the local compliance steering group. At the Group level, a Group Compliance Committee has been established and is responsible for communication and co-ordination of compliance issues, identification of necessary actions, recommendations for better practice and analysing whistle-blowing cases.

A comprehensive disclosure of how Vattenfall is governed (with respect to GRI-indicators 4.1–4.3, 4.5, 4.7–4.8, 4.10) can be found in the 2008 Annual Report and on the corporate governance section on www.vattenfall.com.

Recommendations to highest governance body (4.4)

The shareholder's direct influence over the company is exercised at the Annual General Meeting, which is the highest decision-making body in the company. Since 2005, Vattenfall AB holds open Annual General Meetings. The reason for this is to offer not just the owner's representative but also the general public the opportunity to attend and pose questions to company management directly.

The Swedish government has established a separate division for state enterprises within the Swedish Ministry for Industry, Employment and Communications that, like other owners, governs and issues recommendations by different means, such as:

- Nomination of the Board of Directors, which is the highest governance body;
- Adoption of the Articles of Association, which stipulate the framework for Vattenfall AB's operations;
- Nomination of auditors;
- Approval of principles for compensation and other employment terms and conditions for board members and senior executives.

In order to clarify the Swedish state's view on certain issues, and to attain unity among the administered companies, the Swedish government has established a State ownership policy, which forms part of the Swedish government's annual report on state-owned companies (a link to this policy can be found in the corporate governance section of www.vattenfall.com). The policy regulates the Annual General Meeting, the board nomination process, the composition of the board, assessment of the board's work, directors' fees, committee work, the appointment of auditors and the responsibility of the board, among other things. The policy requires Vattenfall AB to apply the Swedish Code of Corporate Governance, however with some exceptions, as described in Vattenfall's Corporate Governance Report.

The Swedish government has furthermore established guidelines for external reporting, guidelines for terms of employment for senior executives, rules of procedure for the board and for managing certain information-related issues. In addition, the Swedish government has identified certain crucial policy issues concerning social responsibility that state-owned companies shall adhere to. This applies to such areas as equality, the environment, diversity, the work environment and the company's role in society.

Board processes to ensure conflicts of interest are avoided (4.6)

No specific processes exist, however, the rules on conflicts of interest in the Swedish Companies Act apply. For further information, see Vattenfall's 2008 Annual Report and www.vattenfall.com.

Board procedures for management of sustainable performance (4.9)

As stated in the board's rules of procedure, the board must annually discuss the Group's strategic plan and the Group's total risk exposure. At board seminars held each year, the board receives more detailed information about and discusses Vattenfall's long-term development, strategy, competitive scenario and risk management.

Antitrust issues and major disputes are reported annually to the board. The most important policies and instructions relating to finance, risk, the environment, etc. (including the Code of Conduct) are to be approved by the board.

The board also has an audit committee which assists the board on issues regarding financial risks and reporting as well as external auditing. The committee is thereby responsible for preparation of the board's work

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to ensure the quality of Vattenfall's financial statements. Furthermore, the audit committee is responsible for the application of the Code of Corporate Governance. The board's risk management process is further described in the Corporate Governance Report and on the corporate governance pages at www.vattenfall.com.

Precautionary principle (4.11)

Vattenfall has established an enterprise risk management (ERM) process. The ERM process aims to create transparency and risk awareness and to support management in business decisions and in business planning within the Group. The ERM process is defined as a process applied in strategy setting across the company. This process is designed to identify and manage potential events and developments that may affect the achievement of objectives, according to the enterprise risk appetite.

The Chief Financial Officer (CFO) has overall responsibility for the Group's financial activities and risk management, and ensures compliance with the Group's policies and instructions in this area. A Group risk committee has been established to support the CFO in these issues. The risk committee is chaired by the CFO and is primarily tasked with ensuring qualitative risk management in the Group by, for example, approving risk management methods, ensuring standardised routines for risk management and risk reporting, and proposing mandates and limits. The Group also conducts an annual environmental risk evaluation. The results of this evaluation are presented to the Executive Group Management and to Vattenfall's risk committee. Environmental risk management is co-ordinated with other risk management.

More information about Vattenfall's risks and risk management is provided in Vattenfall's 2008 Annual Report.

CSR initiatives and principles endorsed (4.12)

In June 2008, Vattenfall joined the UN Global Compact initiative. However, since June 2002 Vattenfall has participated in "Globalt Ansvar" (Swedish Partnership for Global Responsibility). By participating, Vattenfall has undertaken to support and respect the UN Global Compact initiative and to follow the OECD guidelines for multinational companies.

In February 2005, Vattenfall endorsed the Partnering Against Corruption Initiative of the World Economic Forum (PACI) and the PACI Principles for Countering Bribery. PACI is driven by the private sector with the mission to help consolidate industry efforts in fighting bribery and corruption and shaping the evolving regulative framework.

Principal memberships in associations and organisations (4.13)

Vattenfall AB participates in a number of associations of various kinds. These include, among others, the Combat Climate Change (3C) initiative, the Global Roundtable on Climate Change, the European Energy Forum and the Centre for European Policy Studies (CEPS).

Furthermore, the company is a member of various standardisation associations and stakeholder organisations, such as the International Standards Organisation (ISO) and GRI Organisational Stakeholder.

Vattenfall AB also holds various positions in a number of industry and member organisations. An example is the Union of European Electric Industry (EURELECTRIC), which is chaired by Vattenfall's CEO, Lars G. Josefsson, who was elected in June 2008 for a term of 2 years. In addition, Vattenfall is a member of national and international chambers of commerce, national energy associations, and generation-specific associations, such as the World Association of Nuclear Operators (WANO), the European Wind Energy Association (EWEA), the British Wind Energy Association (BWEA), as well as heat associations, such as Svensk Fjärrvärme ("Swedish District Heating").

Stakeholders and identification (4.14–15)

Vattenfall has identified its stakeholders by mapping the impact Vattenfall has on certain groups, or the impact that these groups have on the company. The following major stakeholder groups have been identified through impact assessment:

- Society: Neighbours, citizens, media, politicians, authorities, non-governmental organisations, potential employees, sub-contractors and competitors
- Customers: Private customers, business and industrial customers
- Internal: Employees, employee representatives, unions and managers
- Financial: The owner (the Swedish state), capital providers

The characteristics of stakeholder relations are described on the opposite page, and stakeholder dialogue is described in 4.16–17.

Stakeholders and identification (4.14–15), cont.

Main group	Stakeholders	Attributes and description
Society	Neighbours	Neighbours are people living close to Vattenfall plants and operations who are directly affected by the company's activities. It is very important for Vattenfall to keep an open dialogue with neighbours, since they influence public opinion. Vattenfall meets its neighbours in face-to-face meetings with the purpose of providing information and taking neighbours' needs into account in decision-making processes.
	Citizens	Vattenfall has an effect on citizens in all countries in which it operates, mainly as a provider of electricity and heat, but also as an employer and taxpayer. Vattenfall is owned by the Swedish state, which makes Swedish citizens stakeholders in the sense that they can be regarded as indirect owners of the company. Vattenfall paid SEK 6.9 billion in dividends to the Swedish state for 2008.
	Potential employees	Vattenfall's long-term business planning involves analyses of the company's future competence needs. Mostly, the company needs people with a technical background and good commercial knowledge to work in the core business. But there is also need for people with knowledge and skills in such areas as environment, IT, project management and general management. Vattenfall's company philosophy and core values are the foundation for the corporate culture. It is important that potential and current employees share this mind set.
	Media	Energy is high up on the media's agenda. As one of the largest players in the European energy industry, Vattenfall is in focus. The national media in all markets – including tabloids, daily newspapers, business newspapers, radio and TV – monitor Vattenfall's development very closely. Local media has a particular interest in Vattenfall, especially in areas in which the company conducts its operations. Recently, Vattenfall has also attracted growing interest from international business media. Media coverage is of utmost importance for Vattenfall, since independent media have a substantial influence on public opinion. Vattenfall maintains an open and constant dialogue with key media to update them developments within the company while also being available as a knowledgeable partner in energy-related issues.
	Politicians	Vattenfall interacts with politicians on at the local, national and European levels. The purpose of these contacts is to increase general knowledge about Vattenfall and the energy industry and thereby enhance the quality of decision-making by mutual support in terms of expertise and knowledge. Relationships are based on respect, trust and openness.
	Authorities	Vattenfall maintains an ongoing open dialogue with authorities involved in the energy sector. This is of great importance since authorities in a wide sense set the rules of the electricity market. Vattenfall has a need to understand how authorities want the energy sector to develop, and it is in the company's interest to increase the authorities' knowledge about Vattenfall and the rationale behind company actions. The dialogue is based on openness and respect for the fact that the authorities monitor the electricity market.
	Non-governmental organisations (NGOs)	It is of utmost importance for Vattenfall to build relationships with NGOs based on mutual understanding and respect. Vattenfall conducts dialogues at European, national and local levels, for example regarding the Carbon Capture and Storage (CCS) project.
	Customers	
Retail customers		Vattenfall offers a variety of electricity and heat services to households in Finland, Germany, Poland and Sweden. A wide range of fixed, variable and tailored pricing options enables customers to choose the most suitable solution. In many markets, electricity with declaration of origin is also available. Vattenfall has made a number of improvements in recent years, such as the introduction of a Customer Ombudsman and taking the lead in installing remote meters and issuing disruption guarantees. Many initiatives have subsequently come to be regarded almost as the industry standard.
Business and industrial customers		Vattenfall provides the public and private industry sectors with electricity and heat, and also offers a variety of energy-related services. Vattenfall caters to the specific needs of each industrial operation. Electricity purchases can be combined with energy solutions and operation and maintenance services to increase efficiency and lower costs. Vattenfall is a long-term partner in large-scale energy projects.
Internal	Employees	Vattenfall has more than 34,000 employees in total, of whom 62% are located in Germany, 30% in the Nordic countries and 8% in Poland.
	Employee representatives	Vattenfall has employee representatives in representative bodies such as the European Works Council (EWC–Vattenfall), local co-determination bodies, supervisory boards and commissions. Vattenfall's board of directors includes three employee representatives.
Financial	Owner (the Swedish state)	For information about the owner, see the Corporate Governance section on www.vattenfall.com .
	Capital providers	These include bond investors, such as insurance companies, pension funds, hedge funds and asset managers, and other lenders, such as banks and credit institutions. Vattenfall's total net debt in 2008 was SEK 66 billion.

Stakeholder engagement (4.16–17)

Working in the energy sector is a great responsibility, and providing energy without any environmental and social impact would be impossible. By listening to its stakeholders, Vattenfall can more easily distinguish challenges, opportunities and weaknesses related to its vision to be a leading European energy company. Stakeholder information makes Vattenfall better understand what actions to take and what priorities to make. Information provided by stakeholders includes, for example, concerns regarding climate change, renewable energy sources, security of supply, energy efficiency and equality policies.

Stakeholder communication is a part of daily business. Every day numerous meetings take place between Vattenfall employees and people with an interest in the company's business and activities. Examples of regular stakeholder communication include one-to-one meetings with customers, business partners, governmental representatives, local authorities and NGO representatives, dialogues with permit-issuing

authorities, consultations regarding environmental impact assessments, investor meetings, annual general meetings, employee dialogues and negotiations. Vattenfall's stakeholder interactions rely on four basic principles: to listen, to focus on issues instead of solutions, to make stakeholder consultation a part of the day-to-day business, and to make sure to respond to the feedback received from stakeholders regarding information practices.

Vattenfall's stakeholder dialogue involves all stakeholders. See also EU18 and SO1, EU19, EU21.

Vattenfall's approach to stakeholder consultation is best exemplified in the company's Code of Conduct, which states "Our actions should always be understandable in the eyes of others around us, and we should always make an extra effort. We should listen and hold an open dialogue with those affected by our activities. Meeting us should be easy."

Examples of Vattenfall's Stakeholder Consultation during 2008 are shown below.

Stakeholder group	Central level (Group)	Local level (Business Groups, business units)
Society	<ul style="list-style-type: none"> Participation in numerous international dialogues on climate change, including the G8 roundtable on climate change, Globe and World Economic Forum. Ongoing dialogue with a broad spectrum of stakeholders in the EU, such as European institutions, various non-governmental organisations, trade associations and think-tanks. The Annual General Meeting, which is open to the general public. Direct dialogue with opinion-makers in Sweden that have an impact on or are impacted by Vattenfall. Group-wide Brand Reputation Index measurement. Publication of the CSR Report. Materiality analyses and rankings, and stakeholder expectations. 	<ul style="list-style-type: none"> Contacts with affected stakeholders regarding acceptance for the construction of new plants and infrastructure. For example, the Lillgrund wind farm and resettlement in Lausitz. Student relations are handled locally with well defined key universities, colleges and other schools and with specific messages for the defined target groups. Special emphasis is put on encouraging women to choose a technical education. A series of debates with Polish politicians and industry representatives about issues such as foreign investment in Poland and restructuring of the energy sector. "Vattenfall replies" – a dialogue forum in local newspapers for the local community in Silesia, Poland. Contacts with local NGOs, such as regarding the new hard coal-fired plant in Moorburg, Germany. Co-operation with local communities, such as by financing technically oriented schools and education, for example in Jokkmokk in northern Sweden. A number of dialogues have been carried out with local stakeholders, residents, etc. in the area surrounding the Nordjylland power plant (Nordjyllandsværket) in Denmark, in an effort to inform about the future CCS plant that will be installed in 2013. In November 2008 a municipal referendum was held for the residents of Vilhelmina in northern Sweden on co-operation with Vattenfall to develop the existing hydro power flow downstream in order to extract more energy. The residents voted no and Vattenfall closed the pre-study.
Customers	<ul style="list-style-type: none"> Group-wide Brand Reputation Index measurement. 	<ul style="list-style-type: none"> Customer Satisfaction Index measurements. Customer events.
Internal	<ul style="list-style-type: none"> The annual My Opinion employee survey. European Works Council – dialogue with employee representatives. Group-wide Brand Reputation Index measurement. Continuation of CEO employee dialogue meetings – 6 meetings with a total of 170 employees were held during the year. Annual management conference gathering 250 executives. 	<ul style="list-style-type: none"> Continued implementation of company philosophy, core values and Code of Conduct. Annual individual development dialogues between managers and their employees. Discussion of My Opinion results and action planning in all work teams.
Financial	<ul style="list-style-type: none"> Group-wide Brand Reputation Index measurement. Annual General Meeting – open to the public. Capital Markets Day, an event that gathers analysts, investors, bankers and financial journalists in a dialogue with Vattenfall's senior management on the strategic direction of the company. Conference calls (webcasts) with capital providers and journalists with the opportunity to ask questions. Investor presentations and one-to-one meetings with capital providers. Annual review meetings as well as ad hoc meetings with rating agencies (Standard & Poor's and Moody's). Publication of annual and quarterly reports. 	

Other contribution to society – Voluntary contributions and investments

Vattenfall strives to be a good corporate citizen, which is manifested through various sponsorship and support activities. According to Vattenfall's Group Instruction on sponsoring, all sponsoring projects should include activities that are of benefit to society, and priority is given to projects with extensive positive social impact. The most important contributions are collected and aggregated at the Group level.

In 2008 Vattenfall spent SEK 195 million on voluntary contributions, including donations. Vattenfall sponsors a variety of projects within the areas of humanity and ethics, the environment, culture and sports, and community. Following are some examples:

Humanity and ethics

- The World Childhood Foundation – Through the support of more than 100 projects in 14 countries, the World Childhood Foundation works to create a brighter future for the world's most at-risk children – street children, children living in institutions, young mothers and sexually abused children. Vattenfall is one of the World Childhood Foundation's major partners.
- Donations of coal to centres for the sick and homeless in Poland.
- In Sweden Vattenfall has a sponsorship agreement with Fryshuset, a Stockholm-based foundation working with young people.

The environment

- The "Combat climate change!" school competition. In co-operation with the National Geographic Society, Vattenfall supports this sustainable energy competition for European students aged 14–19.
- Heureka's Vattenfall Planetarium in Finland is one of the most modern digital planetariums in Europe. The shows consist mainly of animated planetarium films based on the newest technology, and the theatre has been fully renovated. Vattenfall Planetarium and Heureka give Vattenfall a unique opportunity to communicate about the environment, climate change and energy efficiency in a creative way. The planetarium hosts approximately 285,000 visitors per year, of whom many are children and youths.
- In Hamburg, Vattenfall has provided support since 1994 through Vattenfall's environmental foundation. To date support has been provided to more than 90 projects related to environmental care while providing social value.
- Through the German foundation Stiftung Lausitzer Braunkohle, Vattenfall provides support to projects on research and development, education and environmental protection in the Lausitz region.
- Vattenfall is a sponsor of "Clean Up the World" in Poland, a community-based environmental campaign that inspires and empowers communities from every corner of the globe to clean up, fix up and preserve the local environment. In collaboration with the primary partner – the United Nations Environment Programme (UNEP) – Clean Up the World brings together businesses, community groups, schools and governments in a range of activities and programmes that are making improvements to local environments.

Culture and sports

- Vattenfall sponsor a variety of sports activities, including sponsorship of regional ice hockey, basketball and football teams and the Berlin half-marathon in Germany, national ski teams and the Swedish Olympic Committee in Sweden, and local football clubs in Denmark.
- Since 2004, in Germany Vattenfall has been an exclusive partner of the Brandenburger Tor in Berlin, one of the most famous historical-cultural monuments in Germany.
- Vattenfall sponsors the historical Forsmark Bruk ironworks, thereby contributing to the preservation of this 16th century works and its surroundings.
- Vattenfall sponsors West Swim Esbjerg in Denmark. West Swim Esbjerg is one of the largest swimming competitions in northern Europe, and 1,800 competitors ranging from children to elite swimmers.

Community

- Vattenfall subscribes, through Vattenfall Inlandskraft, substantial financial credit for small and medium-sized enterprises in the inner regions of Norrland, a remote and sparsely populated region in the northernmost part of Sweden where Vattenfall has many hydro power plants.
- Vattenfall supports the German Quadriga award. Quadriga is awarded to four personalities from political, business, social and cultural life who through their commitment set an example for new departures, rejuvenation and pioneering spirit.
- Vattenfall was the main sponsor of Tällberg Forum, an organisation aiming to support world leaders on issues related to sustainable development by arranging an annual forum in Tällberg, Sweden, and other activities.
- In the Lausitz region, Vattenfall provides occupational training to apprentices in its in-house training centre and participates in a local citizen contact group, while a co-operation agreement has been signed with a science college in Leipzig (Hochschule für Wissenschaft).
- Many of Vattenfall's power plants have visitors' centres, which provide information to the public about the plant's operations and promote dialogue between the local communities and Vattenfall.

ASSURANCE REPORT

To the readers of Vattenfall AB:s 2008 Sustainability Report:

Introduction

We have been engaged by the board of directors to perform an assurance engagement related to Vattenfall AB:s Sustainability Report 2008. It is the board of directors and the executive group management that are responsible for the continuous activities regarding environment, health & safety, quality, social responsibility and for the preparation and presentation of the sustainability report in accordance with applicable criteria. Our responsibility is to express a conclusion on the Sustainability Report based on our examination.

The scope of the assurance engagement

Our assurance engagement has been performed in accordance with FAR SRS (the institute for the accountancy profession in Sweden) draft recommendation "RevR 6 Assurance of sustainability reports". An audit is aimed at obtaining a reasonable level of assurance for our conclusion. An audit includes examining on a test basis, evidence supporting the amounts and disclosures relating to quantitative and qualitative information in the sustainability report. A review consists of making inquiries, primarily of persons responsible for sustainability matters and for preparing the sustainability report, and applying analytical and other review procedures. A conclusion based on our review does not provide the level of assurance as the conclusion of our audit. Since this constitutes a combined assurance engagement, our opinion regarding the audit and the review will be presented separately.

Our assurance engagement includes the following areas with the purpose to either provide a reasonable assurance (hereafter referred to as audit) or limited assurance (hereafter referred to as review):

1. Our review comprises the Sustainability Report.
2. Our audit includes the following information presented in the Sustainability Report:
 - a. Financial information, GRI-indicator EC 1
 - b. Head count, GRI-indicator LA 1
 - c. Information regarding Carbon dioxide emission from the plants within ETS
 - d. Information regarding Carbon dioxide emission from the plants in Uppsala and Borsigstrasse, not included in ETS
 - e. Information regarding SO_x and NO_x emissions from the plants in Jämschalde and Siekierki

Our assurance engagement does not include:

- information regarding previous year's comparative figures and information.
- information on the internet, referred to in the Sustainability Report
- GRI Sector supplements (EU)
- any information relating to future performance (i.e. goals, expectations or ambitions)

The criteria used in the course of performing audit and review procedures are based on applicable parts of the "Sustainability Reporting Guidelines, G3 issued by the Global Reporting Initiative (GRI) suitable for the sustainability report, and specific measurement and reporting principles developed by the company. We consider these criteria to be suitable for our assurance engagement.

Review procedures

Our review has included the following review procedures:

- An update of our knowledge and understanding for Vattenfall AB:s organization and activities
- Assessment of suitability and application of criteria in respect to stakeholders need of information

- Assessment of the result of the company's stakeholder dialogue
- Interviews with responsible management, at group level, subsidiary level and at selected business units with the aim to assess if the qualitative and quantitative information stated in the Sustainability Report is complete, correct and sufficient
- Share internal and external documents to assess if the information stated in the Sustainability Report is complete, correct and sufficient
- Evaluation of the design of systems and processes used to obtain, manage and validate sustainability information
- Evaluation of the model used to calculate Carbon dioxide, SO_x and NO_x emissions
- Analytical review of reported information
- Reconciliation of financial information against company's Annual Report 2008
- Assessment of the company's stated application level according to GRI:s guidelines
- Overall impression of the Sustainability Report, and its format, considering the information's mutual correctness with applicable criteria
- Reconciliation of the reviewed information against the sustainability information in company's Annual Report 2008

Audit procedures

Our audit has included the following audit procedures:

- a. Examining the design and function of relevant internal controls within the systems and processes used to obtain, handle and validate information
- b. Reconciling the presented financial information, GRI-indicator EC 1
- c. Reconciling the presented information regarding head count, GRI-indicator LA 1
- d. Examining the data collection processes regarding Carbon dioxide emission and audit of presented information against internal and external documents regarding Carbon dioxide emission from plants within ETS
- e. Examining the data collection processes regarding Carbon dioxide emission and audit of presented information regarding Carbon dioxide emission at site in Uppsala and Borsigstrasse, outside ETS
- f. Examining the data collection processes regarding SO_x and NO_x and audit of presented information regarding SO_x and NO_x emissions at site in Jämschalde and Siekierki

We consider the evidence collected, during our review and audit, to be sufficient and relevant in order to support our conclusions listed below.

Conclusions

Our conclusion based on our review

Based on our review procedures nothing has come to our attention that causes us to believe that the information in Vattenfall AB:s sustainability report 2008, included in our review, has not, in all material respects, been prepared in accordance with the above stated criteria.

Our conclusion based on our audit

Based on our audit procedures we believe that the information in Vattenfall AB:s sustainability report 2008, included in our audit, has in all material respects, been prepared in accordance with the above stated criteria.

Stockholm, March 17, 2009
Ernst & Young AB

Hamish Mabon
Authorized Public Accountant

Göran Tyréus
Authorized Public Accountant

GLOSSARY

3C Combat Climate Change. A global initiative, launched by Vattenfall, aimed at creating a global alliance of companies that are willing to take the lead in demanding integration of climate issues into the world market and facilitate trading through a global framework that will come into force in 2013. Vattenfall is responsible for co-ordinating the 3C initiative.

Annual full load Annual full load is the number of hours a plant would operate at maximum capacity to generate the plant's annual energy output. (Annual full load x Capacity = Energy generation.) Full load hours differ from actual hours of operation since plants do not operate at full capacity at all times during the year.

Base load A term that describes electricity or district heating demand that exists irrespective of load fluctuations. This constant demand is met by power plants that operate 24 hours a day, 365 days a year. (See also peak load.)

Bioenergy Bioenergy is generated by the use of biomass fuels.

Biogenic The term means something generated by living organisms and is used to differentiate between waste fractions that are biogenic compounds (such as food residues, paper, etc.) and fossil compounds (such as plastic etc.).

Biomass Biomass refers to products, waste and residues from agriculture, forestry and related industries, as well as the biogenic fraction of industrial and municipal waste.

Biomass fuel Biomass fuels are solid, liquid or gaseous fuels with biomass origin, which are used for energy purposes. (This is contrary to biofuel, which predominantly refers to gaseous and liquid fuels used for transportation.)

Business Group (BG) Vattenfall is organised into three Business Groups: Vattenfall Central Europe, Vattenfall Nordic and Vattenfall Pan-European. The Business Groups comprise Business Units and Shared Service Centres.

Business Unit (BU) Vattenfall's business operations are conducted through Business Units with full responsibility for accounting, controlling, profitability and value creation.

Capacity Capacity is the maximum ability of for example a power plant to generate electricity or an electricity distribution grid to transfer electricity. It is usually measured in megawatt (MW). It can refer to input (fuel or thermal capacity, MWth) or output (electric capacity, MWe or heat capacity).

Carbon dioxide (CO₂) Carbon dioxide is naturally present in the atmosphere and involved in photosynthesis, but is also formed during combustion. The chemical formula is CO₂. Carbon dioxide is necessary for life on earth to exist. It is a greenhouse gas in the atmosphere, see GHG.

CCS Carbon Capture and Storage involves technologies for isolating carbon dioxide from flue gas (at combustion plants) and storing it. This means that a significantly lower amount of CO₂ is emitted into the atmosphere.

CHP Combined Heat and Power. CHP plants generate both electricity and heat.

Climate change Increase of the global temperature caused by a higher concentration of greenhouse gases in the atmosphere, adding to the natural greenhouse effect.

CSR Corporate Social Responsibility. A concept whereby companies integrate economical, social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis.

Deregulate Abolishing monopoly rights and obligations to open up for competition. Used in this report as a synonym for liberalisation.

District heating A method for distributing heat energy for heating a number of buildings from a central location. To achieve this, hot water is circulated through a system of pipes, usually underground.

EEX European Energy Exchange, the German electricity exchange.

Efficiency The efficiency of a power plant denotes the percentage of the input energy that is converted into electricity and/or heat.

EMAS Eco Management and Audit Scheme. European Commission regulations for environmental management and auditing.

Energy Several different forms of energy exist, for example potential energy, kinetic energy, thermal energy, and electromagnetic energy. Energy is measured in joule (J) or watt-hours (Wh), meaning power (watt) multiplied by time. It is common practice to use an appropriate prefix, such as kilo for 1,000, mega (M) for 10⁶ (1,000,000), giga (G) for 10⁹ or tera (T) for 10¹² (1,000,000,000,000).

EPD Environmental Product Declaration. An ISO standard for certified environmental product declarations (see www.environdec.com).

ESP Electrostatic Precipitator. Cleaning device that removes particles in the flue gas from combustion power plants using electrostatic charge.

ETS EU ETS, the European Union Emissions Trading Scheme. Emission trading is a market-based approach to provide economic incentives for achieving reductions in the emissions of pollutants. EU ETS is the largest multi-national emissions trading scheme in the world and is a major pillar of EU's climate policy. The first trading period was 2005–2007 and the second current trading period is 2008–2012.

Fabric filter Cleaning device that removes particles from the flue gas on combustion plants using a fine mesh textile filter.

Fossil fuels Fossil fuels are originally formed from vegetation and microorganisms that have been transformed into coal, oil and natural gas over the course of millions of years. Today, fossil fuels are the world's biggest source of energy, supplying some 80% of all used energy.

FGD Flue gas desulphurisation. Technology to remove sulphur dioxide in flue gas from combustion power plants, often using lime (calcium oxide) or limestone (calcium carbonate). A common by-product from FGD is gypsum.

Gas Natural gas is a fossil fuel consisting mainly of methane. Natural gas is commercially produced from oil fields and natural gas fields. It is used in power generation, transportation etc. and is most often transported in pipelines. Biogas is formed when organic matter decays.

Generation Generation of electricity. (Usage: generation of electricity, production of heat)

GHG Greenhouse gases — gases in the atmosphere that contribute to the greenhouse effect, such as carbon dioxide, methane and nitrous dioxide (N₂O).

Global Compact The UN Global Compact is an initiative to encourage businesses worldwide to adopt sustainable business practices and comprises of ten principles in the areas of human rights, labour, environment and anti-corruption.

GWh A measurement of energy. Abbreviation of gigawatt-hour, or 10⁹ (1,000,000,000) watt-hours.

Hard Coal Hard coal is a black, sedimentary rock type with a carbon content of 84–91%. See also fossil fuel.

Hydro power Hydro power plants use the gravitational force of running water to generate electricity. In reservoir plants, water is kept in dams to be able to regulate the generation. In run-off river plants, turbines are placed directly in the water stream. Pumped storage plants are used to store energy generated from other sources. In Europe, 75% of potential hydropower has been exploited.

IAEA International Atomic Energy Agency. UN's centre of cooperation in the nuclear field. IAEA works with its member states and multiple partners worldwide to promote safe, secure and peaceful nuclear technologies (www.iaea.org).

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IEA International Energy Agency. An independent energy-related organisation connected to the OECD. The IEA has 23 members, all of which are industrialised countries. The organisation works to reduce dependency on oil via energy conservation and the development of renewable energy systems.

ISO14001 An international standard to certify environmental management systems.

Joule Unit of work or energy. 1 joule = 1 watt second = 2.7778×10^{-4} watt-hour. Since joule is a small unit, giga joule (GJ) is often used, 10^9 Joules, which is equivalent to 278 kWh.

KWh Unit of energy. Abbreviation of kilowatt-hour, or 1,000 watt-hours.

Lignite Lignite is a soft brown type of coal, with characteristics that places it somewhere between hard coal and peat. Lignite has a lower energy content and different characteristics than the longer-compacted hard coal.

MW, MW_e, MW_{th} A unit of power (energy per unit of time). See also capacity.

MWh Unit of energy. Abbreviation of megawatt-hour, or 10^6 watt-hours.

MyOpinion Vattenfall's annual employee survey.

N₂O Nitrous oxide. A greenhouse gas.

NordPool The Nordic electricity exchange.

NO_x Nitrogen oxides (NO and NO₂) are formed when nitrogen reacts with oxygen during combustion. NO_x have many adverse effects on the environment such as causing ground-level ozone that triggers respiratory problems, and contributing to acidification and eutrophication.

Nuclear power In nuclear reactors, uranium is used to heat water to generate electricity. Nuclear reactors are normally reloaded with new fuel every 12–24 months, during a stop when maintenance also is done. Nuclear power is used as a base load power in many energy systems.

Ocean energy Energy in waves, currents and tidal streams is used to generate electricity. For example, surface buoys may be used to absorb wave energy. Wave power is predicted to be the next commercial renewable energy source after wind power. Many potential pilot projects are on-going and technology development is expected to reduce costs over time.

Oil A mixture of different hydrocarbons usually called crude oil. Crude oil cannot be used directly, but is a raw material that is refined at an oil refinery into a range of products. See also fossil fuel.

OSART Operational Safety Review Team, an IAEA programme under which international teams of experts conduct in-depth reviews of operational safety performance at nuclear power plants

Oxyfuel combustion A type of CCS technology. The Oxyfuel combustion process eliminates nitrogen from the flue gas by combusting the fuel in a mixture of oxygen and recycled flue gases. After combustion, the flue gas is cleaned. The cleaned flue gas primarily consists of CO₂ and water vapour. By cooling the flue gas, the water vapour condenses thereby creating an almost pure CO₂ stream. The CO₂ can be compressed, dried and further purified before being transported to a storage site.

Peak load Short term peak demand of electricity or district heating is called peak load (see also base load).

Peat Peat is an accumulation of partially decayed vegetation matter and forms in wetlands or peat lands, variously called bogs, moors, muskegs, pocosins, mires, and peat swamp forests. Peat is not classified as biomass or as fossil fuel according to IPCC, although it could be defined as slowly renewable.

Renewable energy Energy from natural resources that are renewable, or naturally replenished. For example wind, solar, geothermal, wave, tidal, hydropower, biomass and biogas.

SCR Selective catalytic reduction. Technology to reduce nitrogen oxides in flue gas by converting it into nitrogen (N₂) and water using a catalyst.

Scram A non-planned shut-down of a nuclear reactor.

SNCR Selective non-catalytic reduction. Technology to reduce nitrogen oxides in flue gas by injecting ammonia or urea into the furnace.

SKB Svensk Kärnbränslehantering AB. Swedish Nuclear Fuel and Waste Management Company, tasked with managing Swedish nuclear and radioactive waste in a safe way. Partly owned by Vattenfall.

SO₂ Sulphur dioxide is formed when fuels containing sulphur compounds, such as coal and oil, are combusted. When SO₂ is emitted to the air, it causes acidification of water and soil.

Sustainable development Defined by the Brundtland commission (UN's commission on environment and development) in 1987. "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Thermal power Electricity generated via a heating process, such as a gas turbine or a steam cycle in a coal-fired or nuclear power plant (compare CHP plant).

TWh Unit of energy. Abbreviation of terawatt-hour, or 10^{12} watt-hours.

UN United Nations

Unbundling Unbundling rules form part of national legislation, based on EU directives, and state that transmission and distribution business must be separated (for instance placed in separate legal entities) from other businesses, especially the electricity generation and sales businesses. Accordingly, the regulated monopoly business is separated from the businesses under free competition.

Uranium A silvery-gray metallic chemical element with the highest atomic weight of the naturally occurring elements, it is approximately 70% denser than lead. Uranium is weakly radioactive and occurs naturally in low concentrations (a few parts per million) in soil, rock and water. It is commercially extracted from uranium-bearing minerals such as uraninite. When used in nuclear reactors, uranium is enriched which means that the content of the isotope U235 has been increased.

Value chain Process for creating value. Within the power industry this includes the generation, transmission, distribution and selling of electricity.

Waste incineration Waste incineration plants generate heat and/or electricity. As combustible waste mainly consists of organic (biogenic) material waste is considered to mainly generate bioenergy.

Wind power Electricity is generated in wind turbines, often built in clusters called wind farms. Power generation depend on wind conditions. Offshore locations generally have stronger winds, but construction and maintenance is more difficult. Therefore, offshore wind power is more expensive than land-based wind power.

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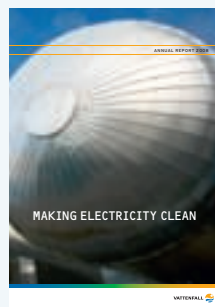
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Photo cover:

The carbon dioxide captured in Vattenfall's pilot plant in Schwarze Pumpe is intermediately stored in two large tanks awaiting transport to its permanent storage.

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