ANNUAL REPORT 2008

The efficient, environmentally friendly and safe utilisation of energy

NORSK ENERGI

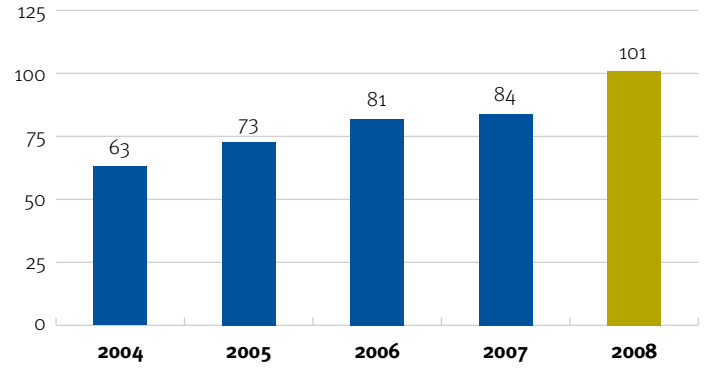
ENERGY • ENVIRONMENT • SAFETY

CONTENTS

Norsk Energi in brief

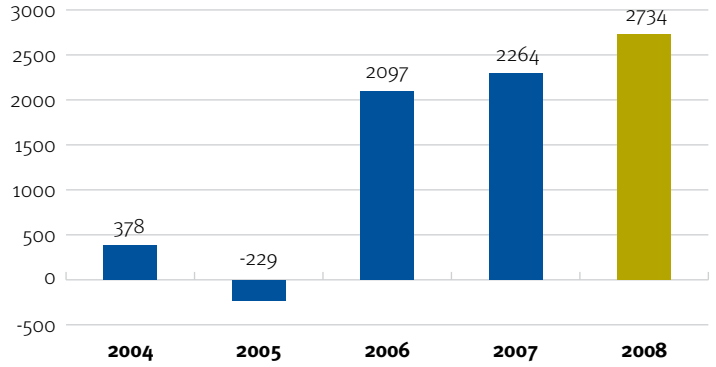
- Norsk Energi is a leading advisory forum within the field of thermal energy systems, founded in 1916. We support both Norwegian and international companies with consultancy, planning and design services, audits, studies, technology development and training.
- Our organisation is primarily associated with projects that reduce both energy consumption and harmful emissions: the expansion of district heating with environmentally friendly energy sources; energy efficient industrial processes and the fuel switch to renewable energy. Norsk Energi also conducts green audits, devises environmental strategies and identifies and develops international climate change mitigation projects.
- In addition to providing fee-based consultancy services, Norsk Energi also acts as an association for energy consuming and energy producing organisations. Norsk Energi is owned by its members.
- Norsk Energi is headquartered in Oslo with branch locations in Bergen and Gjøvik.

Operating revenues (in MNOK)



Revenues totalled 101 MNOK in 2008

Annual income (in 1000 NOK)



Annual results for 2008 were 2.7 MNOK

Highlights of 2008

- Norsk Energi topped 100 million NOK in turnover for the first time.
- Best ever annual revenues with an operating margin of more than 11% before profit sharing.
- Positive trends of increased number of female staff and reduced average age of members continued.
- New strategic plan agreed, with a focus on services linked to climate-related issues, renewable energy and energy efficiency improvements.
- Norsk Energi chosen by Gassnova as consultant for impact study for CO_2 capture at Kårstø.
- Norsk Energi chosen by Hafslund Fjernvarme as consultant for district heating plant at Rodeløkka, Oslo.

www.energi.no

A record year – continued high activity level

2008 was a historic year for Norsk Energi. Our revenue increased by 20 % and topped 100 million NOK for the first time ever. Thanks to solid efforts from our employees this resulted in high profits.

Despite the economic uncertainty and financial crisis, 2008 was an exciting and positive year for Norsk Energi. Our services within energy, carbon emissions and safety consultancy in the field of thermal energy systems are proving to be high demand products that have, so far, not been affected by the economic downturn to the same extent as other sectors.

Climate-related challenges are regarded, in the long term, as a greater challenge than the financial crisis and the authorities are prioritising means and measures that meet their climate-related responsibilities. For this reason there is still an active focus on projects that use renewable energy in district heating and local energy substations and on measures which lead to reduced CO_2 emissions. We have successfully participated in many interesting projects, such as Norway's largest district heating network in Oslo as well as the impact study for the CO_2 capture plant at Kårstø for Gassnova. Such projects contribute to make Norsk Energi an interesting and knowledge-developing workplace.

Within the industrial sector, there are of course greater challenges as a consequence of the fall in price of raw materials as well as a generally low demand for products and services. We were hoping to see several new heat recovery projects within power production. However, it is now uncertain whether these projects will be realised. It is very unfortunate if we do not manage to exploit the surplus heat that is available in Norwegian industry.

2008 has met our expectations in terms of our strategic plan to increase activities and productivity within selected specialist areas. The

Norwegian political agreement on Climate and the EU Renewable Energy Directive of December 2008 indicates that there will be high activity within our focus areas also in the future. The EU 20-20-20 package which may be implemented also in Norway will mean that:

- Emissions shall be reduced to 20% below 1990 levels by 2020
- Renewable energy will account for 20%
- Energy efficiency will be 20% better than it would have been without actions

It is a good feeling to work on projects that are regarded as priority actions by our society, in order to maintain the health of our earth.

Jon Tveiten
Managing director

Good advice for efficient, environmentally responsible energy consumption

Norsk Energi's core competencies contribute towards more efficient energy consumption and lower CO_2 emissions. We cover the entire spectrum of advisory services within the environmentally friendly, safe and profitable use of thermal energy. We are also experts at conducting greenhouse gas accounting and climate strategies in the area of international CO_2 quota projects. Climate appropriate energy consumption is our specialist subject!

This is how we work on environmentally responsible solutions:

District heating from renewable energy sources

District heating produced from renewable energy sources is the most environmentally responsible way to heat buildings. Norsk Energi's skills and expertise cover all phases of the development of district heating systems: heating plants, distribution network, substations and automated control systems. Together with our expertise in the use of renewable energy sources this makes Norsk Energi a leading centre of excellence for environmentally friendly district heating.
See page 7.

Energy efficiency improvements and energy recovery

Each year we help Norwegian companies reduce their energy consumption by millions of kWh. We analyse the current situation and suggest efficiency improvement measures, from changing simple routines, to more extensive reconstructions and system solutions such as steam recovery and the installation of heat pumps. It often turns out that even major investments can be paid off in just a few months. For companies in the process industry we can also comprehensively assist with the recovery of waste heat and process heat.
See page 8.

Changes in energy usage

Switching to energy from renewable sources leads to savings in terms of energy costs and CO_2 emissions. With our specialist expertise in both traditional thermal energy plants and the use of renewable energy carriers, we can provide assistance throughout the entire change process, from the first analysis to starting operation. We are familiar with all currently used energy carriers: biofuel, biogas, waste heat, heat pumps (sewage, sea and geothermal) solar thermal energy and pellets/powder. We also assist with the conversion from heavy oil to light oil and from oil to gas.
See pages 6 and 7.

Thermal energy production

Hot waste gases, combustion gas and waste heat from the process industry contain large amounts of energy that can be used in energy production instead of being released directly into the atmosphere. Projects that do so therefore contribute to significant

reductions in CO_2 emissions. With our long experience from the Norwegian and international smelting industry, Norsk Energi provides leading expertise in the use of process heat for profitable energy projects. We also have expertise in the design of combined power and heating stations based on waste heat or other renewable energy sources.
See page 9.

CO_2-capture

Norsk Energi has been involved in several projects for CO_2 capture at gas power plants, primarily linked to the integration of cleaning technology into power plants. With our recognised expertise in thermal energy, and experience from similar design and study commissions, Norsk Energi also provides process expertise and specialist knowledge in this new subject area.
See pages 12 and 15.

Green audits and climate strategies

How does a company affect the climate? What can that company do to reduce this impact? With our expertise in green audits and climate strategies, we support Norwegian companies by tackling these questions and planning new measures. We use recognised analysis and reporting methods that guarantee high quality and verifiable documentation. This work is often followed by a green audit and an environmental management system, comprehensive measures that also impact local pollution levels.
See pages 13 and 14.

> *”Carbon neutral energy consumption is our specialist subject!*

Impact studies

For major development projects it is important to clarify the effect they will have on the environment. Often this is a legal requirement. Norsk Energi has managed a whole range of such projects, where, in addition to emissions, noise and other environmental factors, we have also addressed safety conditions, the consequences for cultural monuments and various other factors. For each subject area, preventative measures are suggested, where necessary.
See page 15.

International climate change projects

Norsk Energi is actively involved with tradable emissions reduction projects under the Kyoto Protocol; Clean Development Mechanism and Joint Implementation mechanisms, on behalf of both Norwegian and international customers. Norsk Energi is one of only a few market specialists in Norway with the skills and experience to both identify and document such projects. We also assist the authorities in several countries to build up expertise and institutional framework for the Kyoto mechanisms.
See pages 10 and 11.

Planning and designing district heating plants is one of the core focus areas at Norsk Energi.

Leading experts in thermal energy

Norsk Energi is a leading provider of consultancy services within the field of thermal energy. Our activities encompass superior and strategic energy planning, systems for the production and distribution of thermal energy, process integration, energy efficiency management and waste heat recovery.

Our core activity areas are:

Distribution systems

- District heating and district cooling
- Steam and high pressure hot water
- Hot oil

Energy production based on:

- Bioenergy, heat pumps and other renewable energy
- Waste gases and combustible gases
- Waste energy

Our range of services builds on our solid expertise in specialised areas such as thermodynamics, combustion engineering, flow technologies, control engineering and construction.

Our key services include:

- Energy planning and strategic energy consultancy, including investigation into energy alternatives
- District heating: studies and design of production and distribution solutions
- Design of boiler and energy systems
- Design of combined power and heating stations
- Design of natural gas systems
- Design of high pressure equipment
- Energy recovery
- Energy production from high temperature waste gases and waste heat
- Dynamic simulation of energy
- Process integration of energy systems
- Automation, control and regulation
- Commissioning of energy systems (troubleshooting, modifications)
- Energy management in industry and buildings
- Renewable energy sources (heat pumps, biofuels etc)
- Water treatment

Comprehensive district heating expertise

In 2008 Norsk Energi's department for district heating and renewable energy was actively involved with a number of different district heating projects all around the country. These projects covered the whole spectrum of district heating technology, from design to commissioning and start-up of district heating plants, distribution networks and customer substations. Some of the projects Norsk Energi worked on in 2008 are presented here.

District heating plant by combined heat and power station

At the Bio-El Fredrikstad energy recovery plant, energy from over 50,000 tons of industrial and household waste will be converted, on an annual basis, into industrial steam, district heating and electricity. Norsk Energi played a key role in the establishment of this plant, with the principal responsibility for the power station's district heating plant, including the incorporation of two smaller existing heat stations.

Norsk Energi was also responsible for designing the interface between the district heating station and the rest of the plant. In addition Norsk Energi provided advice on the necessary operational procedures for the district heating system.

Working within a confined space and a short construction deadline made this an interesting and challenging project, which was commissioned by Fredrikstad Fjernvarme.

The plant, which started production in 2008, will initially have an annual district heat production rate of 40-50 GWh. Using the district heating network to the full this can be increased to 80-90 GWh. Altogether the plant will be able to achieve production of around 170 GWh, including 22 GWh el.

District heating and cooling from a heat pump installation

Two heat pump installations that collect energy from seawater are due to provide heating and cooling to two new building areas in Larvik. Norsk Energi has had the principal technical responsibility for both these projects, where more than 90 per cent of the annual energy supply will come from the heat pumps.

One of the installations is being built in Hammerdalen, an earlier industrial area which is now being converted for housing, offices and a business site.

Norsk Energi had the technical responsibility for the heat pump which supplies the new Farris Bad spa hotel in Larvik with energy for both heating and cooling.

Norsk Energi has designed the new pump and heat exchange station at the district heating station at Klemetsrud in Oslo.

The heat pump here will provide 2.7 times more heat than it uses in electricity. The effect is 1MW heat and 1MW cooling. The installation also includes a 4 MW oil boiler which will be used for reserve and peak loads.

In addition to the design of the complete installation, including specification of the pumps and components, Norsk Energi has also been responsible for construction management of this project.

The other heat pump was installed at Fritzøe Brygge, where it will supply the new spa hotel Farris Bad, a shopping centre, restaurants and housing with energy for heating and cooling. The heating effect here is also 1MW for heating and 1 MW cooling. Peak and reserve loads will be handled by an oil boiler with a capacity of 1.5 MW. For this project Norsk Energi was responsible for the overall design, specification of control systems and purchasing.

Hammerdalen Fjernvarme, owned by Treschow Fritzøe, was the customer for both the above projects.

Design of a new pump station at Klemetsrud

The new pump and heat exchange station at Hafslund's district heating station at Klemetsrud in Oslo forms a significant part of all district heating developments in Oslo. It includes both connecting the Klemetsrud plant to the existing district heating grid in the centre and the construction of a new line.

With the new 12 km long transmission line to the district heating network in the centre, the pump and exchange station could now handle a greater volume of both water and motion energy. In total it has a capacity of 1500 m^3 per hour and an output of 100 MW.

The pump and exchange station were designed by Norsk Energi, who also designed a new pressurization system. The system will regulate the natural volume expansions that occur as a consequence of the temperature changes in the district heating water.

In 2008 Norsk Energi was also involved with the construction of a section of the 12 km transmission line between Klemetsrud and the centre of Oslo.

Biofuel plant in Molde

At Årølia in Molde, Istad Nett has built a new biofuel-based district heating plant. The plant will supply district heating to local industry, including Årø airport, a large housing area planned and probably also a new planned hospital.

Norsk Energi had the overall responsibility for the design of the whole plant including an extensive electromechanical heating station as well as the transmission network and substations outside. In addition Norsk Energi also managed the work related to the purchasing of the electromechanical equipment.

The heating station consists of a bio boiler of 4MW and a gas boiler of 6 MW to supply reserve and peak loads. Preparations have been made for further installation of 4MW bio energy and 8 MW biogas. The plant has been built to use dry wood chippings with maximum 40 percent humidity so that a large amount of waste chippings can be used. The remainder of the fuel will be local forest chippings. The combined annual energy production will initially be around 5 GWh. When fully complete this can be increased to 20 GWh

New systems for energy management and other energy saving measures are reducing energy consumption at Stabburet's factories by 12 per cent.

Energy advisor to Stabburet

With technical assistance from Norsk Energi, Stabburet AS has introduced new systems for energy management at five factories. With subsequent energy economising in addition, this will lead to an annual reduction in energy consumption of 6.4 GWh, which equates to a saving of 12 per cent.

These five factories are in Brumunddal, Skien, Rygge (two factories) and one in Fredrikstad. While they all produce different products, from juice in Skien to meat products in Fredrikstad, they all have a relatively similar energy saving potential. Together they have a total annual energy need of 54 GWh.

Norsk Energi started by mapping how much energy could be saved at each individual plant. This also covered documenting information on current consumption, energy sources, suppliers, pricing etc, to ensure they had a sound basis on which to make further decisions. In addition, a range of immediate measures were identified which would quickly enable the factory to reduce its energy consumption.

Energy monitoring and tracking

This was followed up with the introduction of systems for weekly energy monitoring, registering data from all the energy and water gauges at each individual factory. Weekly tracking in this way makes it easier to spot fluctuations in energy consumption and to identify their cause. Experience shows that five per cent of energy consumption can be saved with the use of energy monitoring and tracking systems.

In addition a separate energy economising group has been formed with representatives from management, the technical department and production at each factory, to ensure that energy efficiency management is a natural aspect of Stabburet's commitment to ongoing improvements.

Enova support

In addition, Norsk Energi has produced a list of several more long term measures that are planned for implementation over a four-year period. In total 11 million NOK are to be invested in this project which has received 1.6 million NOK in support from Enova. As part of its cooperation with the organisation, Norsk Energi has also contributed to the formulation of the Enova application form and necessary reporting procedure.

Melting oven at Fesil Rana Metall.

Power production from the effluent gas of a smelting plant?

Considerable potential for energy recovery can be found in the smelting industry. Effluent gases from the smelting ovens include large amounts of waste heat at high temperatures, which is well-suited to the production of both electrical energy and district heating. With its leading expertise in the energy recovery from smelting plants, in 2008 Norsk Energi carried out several such projects in both Norway and overseas.

At **Eramet Sauda** Norsk Energi conducted a study on the potential use of effluent gases from the smelting works in power production. The questions raised prior to the study were essentially: How much energy is there in the effluent gases produced here? What would it cost to build a plant to use this energy for electricity generation? How much electricity would this produce?

During the production process at the Sauda plant CO gases are produced and these can be used in a steam boiler for the production of steam and power. According to Norsk Energi's calculations, around 100 GWh a year could be produced from this gas, which is currently flared. At the same time this would also considerably reduce NOx emissions at the plant. Any electricity produced would ultimately be transferred to the local electricity supply network.

Should this project be carried out, it will be conducted through cooperation between Eramet and Statkraft, whereby Eramet will contribute the necessary investments to the boiler systems and Statkraft the investments in the turbines and related equipment. Norsk Energi is now engaged by Statkraft to conduct further technical evaluations of the project plans.

At **Elkem Thamshavn**, Norsk Energi has been advising on the upgrading of the power production. Elkem Thamshavn is the only silicon plant in the world that produces electric power, up to 120-130 GWh each year. The current plans are to increase this to 190-200 GWh by investing in new steam boilers and making other improvements to the recovery process. A large amount of dust particles in the effluent gases created a challenge here when doing calculations. Norsk Energi has also been advising Elkem Thamshavn on a project for the use of part of the plant's excess heat for district heating.

A comprehensive study Norsk Energi has conduced for **Mo Industripark** shows that an annual amount of 113 GWh of electric power can be produced annually by recovering the energy in the effluent gases from **Fesil Rana Metall**. The energy is recovered by using the heat in the effluent gases to produce steam for a turbine generator and heat for the local district heating network. The study shows that the total estimated investment cost for this will be around 330 MNOK.

In 2008 Norsk Energi was also employed by the smelter plant Elkem Metal Chiotimi in Canada to find a technical solution for the recovery of 25 MW steam for resale.

A study conducted by Norsk Energi shows that a significant amount of energy can be recovered from the effluent gases at Fesil Rana Metall.

International climate change projects from concept to UN approval

Norsk Energi's international department provides technical and financial advices to industrial and district heating companies in the developing world and countries with transitional economies. In these same countries Norsk Energi also provides energy and environmental policy advisory services to the authorities as well as competence building for local experts in the sustainable use of energy and the development of climate change projects.

The main focus of the department is on the identification and development of profitable projects for energy economising, the use of renewable energy, sustainable resource management and actions to reduce harmful emissions.

As one of few consultancies in Norway, this department has the skills required to draw up project documentation that satisfies the UN's strict demands for the approval of international climate change projects under the flexible mechanisms of the Kyoto agreement. This documentation is a necessary aspect when developing projects that qualify for emissions trading under the Kyoto mechanisms Clean Development Mechanism (CDM) and Joint Implementation (JI).

In 2008 Norsk Energi was actively involved in assisting international institutions and the Norwegian authorities with developing the necessary documentation for a number of climate change projects. This included feasibility studies, business plans, Project Idea Notes, Project Design Documents and other necessary documentation. The most important customers were the Ministry of Foreign Affairs, the Ministry of the Environment, Norad, Nordic Environment Finance Corporation (Nefco) and the European development bank EBRD.

Training in Ukraine

One of the projects where Norsk Energi was involved was a large capacity development programme in Ukraine, on behalf of the Ministry of Foreign Affairs. This programme included training of a significant number of local experts in how to identify and document Kyoto projects. The participants came from companies with a great potential for energy economising and greenhouse gas emission reductions.

The work also involved the development of a number of different energy efficiency projects, which included measures linked to heat recovery, the use of heat pumps at steelworks, combined heat and power stations and biogas plants. In addition, Norsk Energi also assisted the Ukrainian department of the environment with advices on the development of CO_2 projects.

Under commission from EBRD Norsk Energi has outlined the potential for energy economising in Azerbaijan and Armenia. This picture is taken at a large cement factory in Azerbaijan.

FMO applications evaluated in Brussels

The Financial Mechanism Office in Brussels also benefited from Norsk Energi's expertise in energy efficiency and the use of renewable energy in 2008.

This office, which is linked to the EFTA secretariat in Brussels administrates the subsidy schemes that have been set up in connection with the management of Norway's and two other EFTA countries' EEA subscription. The arrangement was set up in connection with the expansion of the EU in 2004 and is used to reduce financial and social inequality in Europe.

Norsk Energi was tasked with the application processing and expert evaluation of a number of applications from Polish companies regarding subsidies for local district heating and energy economising projects.

New process systems planned at Ewos Florø

With the help of a new production line, the production of fish feed at the Ewos Fløro plant is to be doubled from 160, 000 tons to 320, 000 tons a year. All liquid-based processes and many other new installations at the new plant were designed by Norsk Energi.

The installations for the liquid-based processes include systems for the use and treatment of steam, gases, fish oils, vegetable oils, fish protein concentrate, remains and subgrade products and other liquids.

All in all the project includes the description, design and detailed drawings of a large amount of piping systems, valves, pumps and tanks to ensure an effective and reliable interplay between the different processes. At the same time Norsk Energi has also produced functional descriptions for the automatic controls for the new systems, including hundreds of automatic valves.

The design work was followed up by the production of tenders, the gathering of cost information and assistance with construction management. Norsk Energi also took part in the planning group for the new plant.

In addition Norsk Energi also assisted in the sub-design of systems for the use of seawater for the cooling of drying machines, safety analysis and advice on the efficient use of energy.

Previously Norsk Energi has also designed solutions for the recovery of energy from older gas-fired dryers at Ewos Florø with the help of heat pumps. This energy is used to heat up large storage tanks used for the raw materials used in feed production.

All liquid based processes at the new plant in Florø were designed by Norsk Energi.

In total 600-700 MNOK has been invested in the new factory site at Florø.

For another project in Ukraine, this time under commission from the Testing Ground Facility/Nefco, Norsk Energi took part in the energy efficiency project at a combined heat and power station in the town of Sumy in the north of the country.

This project included the replacement of a 40 year old steam turbine with a new and more effective turbine. This will result in much energy gain and lower greenhouse gas emissions.

Norsk Energi also created a business plan for investments and produced the necessary documentation to sell quota allocations from this project to interested international parties. The work was conducted in close cooperation with a local consultancy firm.

District heating project in Siberia

Under commission from the Norwegian quota fund, Testing Ground Facility, which is managed by Nefco, Norsk Energi also produced the necessary documentation for the sale of Kyoto quotas from a district heating project in the town of Strezhevoi in the western part of Siberia. There the local district heating company is planning to upgrade seven of 15 substations which supply both district heating and hot water.

Working for the quota purchaser NEFCO TGF Norsk Energi has drawn up energy efficiency measures for a district heating plant in the town of Sumy in Ukraine. By increasing the heat utilisation from the power plant it will be possible to shut down several ineffective old heating stations.

The prime goal of this project is to reduce energy loss in the distribution system with a corresponding reduction in fuel consumption and lower CO_2 emissions.

Energy analyses in Armenia and Azerbaijan

Norsk Energi also conducted an analysis for EBRD on the potential for energy savings in Armenia and Azerbaijan, as the basis for the establishment of a separate credit line for energy efficiency projects in these two countries. The analysis included both an overview of energy consumption, outlining obstacles to investment, and proposals for concrete projects. Aspects of this commission were carried out in cooperation with Econ Pöyry and local experts.

Norsk Energi's environmental consultancy is actively engaged by Norwegian industrial companies, energy companies and governmental authorities.

Giving advice for better environmental performance

Environmental and climate consultancy is one of Norsk Energi's key focus areas. With our extensive knowledge and vast experience in this field we play a significant role in helping Norwegian and international companies to improve their environmental performance in a profitable and effective way.

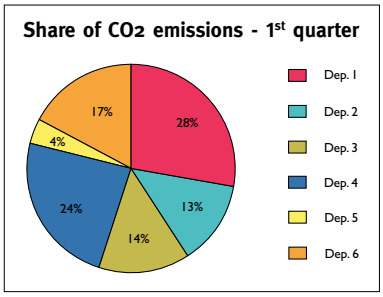
As consultants we assist at all stages of environmentally responsible projects from impact assessments and studies to design, contractual advice, planning, implementation of control systems, training and documentation. Activities also include research commissions.

Our environmental expertise is actively employed by Norwegian industrial companies, energy companies, governmental authorities and international institutions.

Our core services are:

- Climate strategies / carbon emission audits
- Environmental consultancy / environmental audits
- Environmental management
- Technical environmental analysis / cleaner production
- Impact studies
- Incineration optimisation
- Dispersion calculations for atmospheric emissions
- Incineration of waste and waste treatment plants, feasibility studies, design services, etc
- Concession applications
- CDM and JI projects
- Noise level testing, assessment and noise reduction measures

Norsk Energi's systems make it easy to keep an overview of important environmental factors.



Carbon emission and environmental audits: a necessary management tool

A carbon emission and environmental audit is both a management tool and a source of vital documentation for external use regarding a company's climate-related and environmental status.

With an environmental audit a company can:

- Account for its own impact on the environment
- Identify positive new environmental measures and financial savings
- Continuously improve its environmental performance
- Implement systems for environmental management
- Improve registration routines and improve the quality of operational data
- Neutralise its environmental impact either in part or as a whole through quota purchasing
- Outwardly prove its social responsibility and improve communication of environmental concerns.

Green audits and environmental analyses is a growth area at Norsk Energi, which has developed its own systems and measurement methods based on the internationally recognised Green House Gas Protocol. These are tools that give high quality, comparable data and can easily be adapted to suit different industry sectors and organisations. Norsk Energi's systems also include environmental and carbon indicators for the tracking and benchmarking of environmental performance.

A system for Esthetique

In 2008 Norsk Energi developed an environmental analysis system for the perfumery chain Esthetique, with its 79 branches and 400 employees based around the country.

> *Climate and green audits is a growth area for Norsk Energi*

While this chain, which specialises in international, exclusive cosmetic brands, does not have a great spot impact from the company itself, it wished to take its social and environmental responsibility seriously. An important aspect of this was to have an overview of its own environmental impact. Norsk Energi was therefore tasked to develop the structure for a green audit for the entire chain, as a tool with which to identify new environmental measures and a more environmentally efficient operation. By providing a better overview of the chain's most important environmental parameters, this audit will contribute to the perfumery's ongoing development of environmentally friendly operation and products.

Expanded into an environmental audit

The structure of the environmental audit that was prepared for Esthetique was developed as a carbon emissions audit, based on the Green House Gas Protocol, which was then expanded into an environmental audit by adding waste volumes and management of resources at the perfumeries. Esthetique will complete its registration of its stated environmental parameters in 2009.

Norsk Energi has developed a system for an environmental audit for the perfumery chain Esthetique, with its 79 perfumeries around the country.

Energy inspection advice

Commissioned by NVE, Norsk Energi has created a proposal for a scheme with which to conduct an energy inspection of boiler-, ventilation and cooling plants linked to the implementation of EU directive on energy performance of buildings in Norway. This work continues in 2009 with a revised proposal for inspection requirements and necessary paperwork together with instructions.

These inspection arrangements will constitute a significant part of the work to achieve greater energy efficiency in Norwegian buildings in a particular area. According to the new regulations proposed, periodic inspections are to take place of all air conditioning systems over 12kW and of all cooling systems over 20 kW.

Norsk Energi has assisted NVE with both consultancy and implementation of the directive on energy performance of buildings.

In designing the inspection documentation Norsk Energi took into account that it had to be sufficiently detailed to ensure that non-efficient plants would be revealed and simple enough to ensure that the inspections could take place relatively quickly. At the same time they were based on the premise that the content of the inspections should be clearly defined without room for simplification.

This work has been conducted in several stages in cooperation with the customer. The final stage of the work included conducting a practical test of the forms by ten suppliers of ventilation/cooling or boiler plants. Based on the results of this test, the forms were adapted to become even more user friendly while at the same time ensuring their useful effect was maintained.

In an earlier report to NVE, Norsk Energi has also produced a proposal for the qualification requirements for the inspectors involved.

Norsk Energi's environmental audits

Norsk Energi has developed both a carbon emissions audit and an environmental audit for the company's own business based on the Greenhouse Gas Protocol.

The carbon audit covers:

- Direct emissions of greenhouse gases: emissions from its own vehicles
- Indirect emissions of greenhouse gases: emissions from the production of energy that is used in the company's buildings
- Other indirect greenhouse gas emissions: restricted to emissions linked to business travels.

In addition, CO_2 emissions linked to journeys to work are also calculated, but these are not included in the greenhouse gas audit.

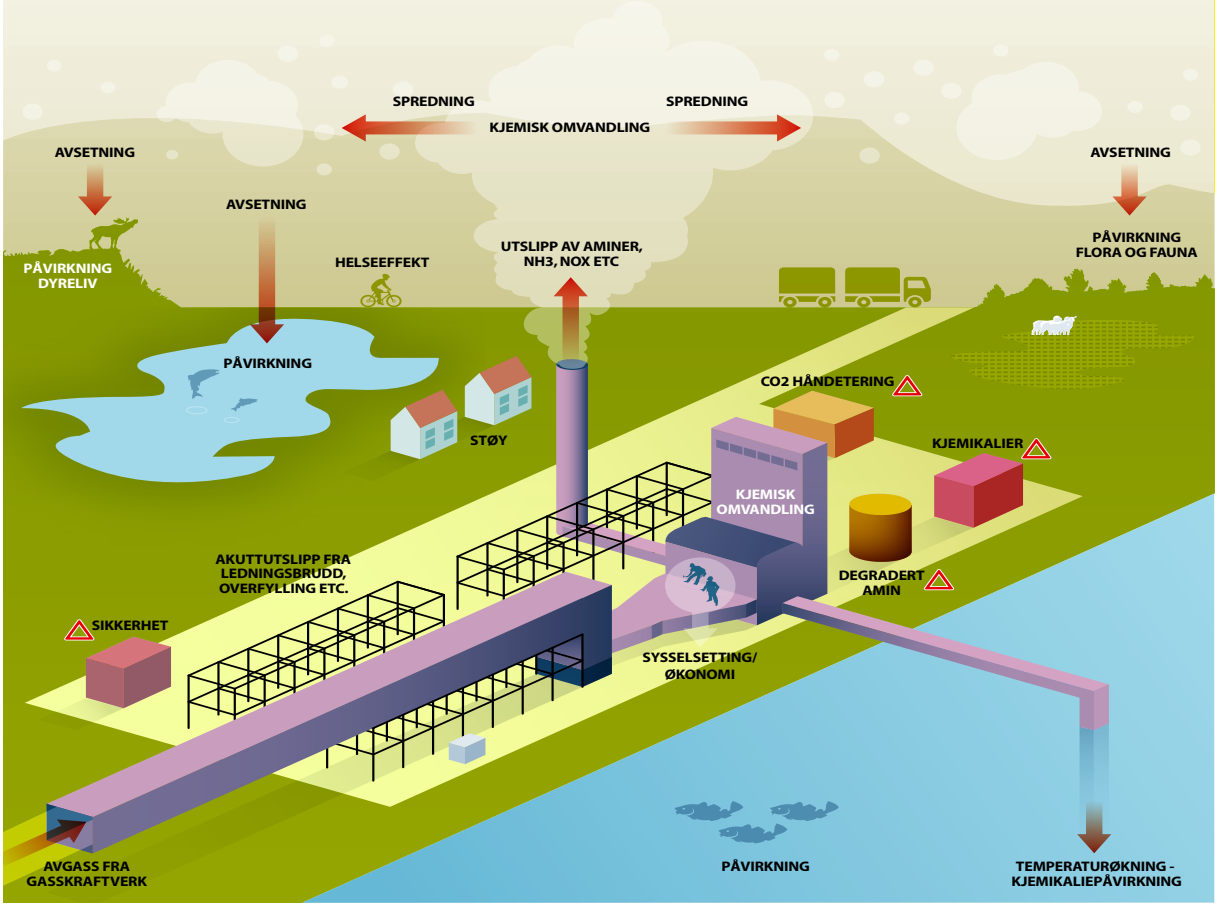
Norsk Energi's carbon emissions audit has been extended to an environmental audit with the addition of the following data:

- Total waste generated: paper, cardboard, plastic, electric, hazardous waste and residual waste
- Consumption of paper for copying / printing

The carbon emissions audit is also to be further developed to include data for other types of emissions (for example CO, NOx and dust particles) and data relating to the weathering from waste and resource consumption. This will form part of Norsk Energi's work to continuously improve its own environmental performance.

Here are the main key figures from Norsk Energi's carbon emissions and environmental audit:

Emissions to air	
Total CO_2 emissions in tons	136
Total CO_2 emissions, ton per man labour year	1.8
Total CO_2 emissions, ton per MNOK of revenue	1.6
Share of emissions in %, own vehicles	6
Share of emissions in %, energy consumption in buildings	27
Share of emissions in %, business travel	67
Transport	
Airtravel, total per man labour year	6.3
Energy consumption in buildings	
Electricity, kWh per m2	93
Heating, kWh per m2	79
Waste	
Amount of waste in kg pr man labour year	29.2
Degree of waste separation as a %	81
Resource consumption	
Paper for copying /printing per man labour year	8454
Paper for copying /printing, sheets per MNOK of revenue	7387



The impact assessment study includes a thorough analysis of the environmental consequences of the plant development.

Managed the impact assessment for CO_2 purification at Kårstø

On behalf of Gassnova, in 2008 Norsk Energi conducted a complete consequence analysis for the planned development of a CO_2 capture plant at the gas-fired power plant at Kårstø.

Norsk Energi won this assignment as leader of a consortium of several companies with leading expertise in different technical areas. The study was conducted following an impact study program determined by the Norwegian Pollution Control Authority (SFT) and will also need to be approved by the SFT after a call for public inputs. It will then become part of the basis for decision-making for the expansion of the CO_2 capture plant.

Preventative measures

The impact assessment gives a thorough analysis of the consequences the development will have on the environment and natural resources. Primarily, it gives an account of the consequences calculated for emissions to air, sea and water, both during construction and during operation of the plant. At the same time it suggests preventative measures and new environmental monitoring programs and systems for the site. The consequences of noise and waste from the plant are examined in the same way and suggestions made regarding noise reducing and waste minimising measures.

All this is followed by a safety analysis of the development, including suggestions for emergency preparedness. Aspects linked to the handling of sudden emissions of amines and liquid CO_2 from the plant are just one of several subjects evaluated in this way.

In a separate sub-study the consequences of the development for the landscape, outdoor life and cultural monuments are also discussed and preventative measures suggested. The effects on society, with emphasize on the local financial consequences, are also discussed in another separate sub-study.

In order to give interested readers a quick insight into the most important issues, the study includes a summary report covering the different areas with a short report of the consequences and preventative measures for each subject.

Cooperative project

This work on impact assessment was conducted in cooperation with the Norwegian Institute for water research, Ambio Miljørådgivning AS, Brekke & Strand Akustikk AS and Agenda AS, all of whom have contributed subsections within their specialist areas.

The planned capture plant will reduce CO_2 emissions from the gas power plant's flue gases, from 1.2 million tons per year to 0.18 million tons per year. Full-scale operation of the CO_2 plant is expected to start in 2011/2012.

Area classification is one of Norsk Energi's safety services.

Specialists in safety analyses

Norsk Energi provides a broad spectrum of services within the area of safety / HSE, from detailed technical studies to high level management and system consultancy. We are fully familiar with the statutory framework and the requirements demanded of organisations in terms of safety measures.

We conduct this type of work for a whole range of different sectors and specialist areas, in both the public and private sectors. Services are implemented by specially trained experts with extensive experience in the field of safety. Accurate documentation is an integrated aspect of every assignment.

Our core services are:

- Risk analysis at all project phases (planning, construction, operation) including HAZOP and ROS analyses (risk and vulnerability analyses)
- Safe job analysis
- Explosion evaluation, area classification, development of explosion protection documentation
- Dispersion calculations for sudden atmospheric emissions
- Emergency planning (analyses, plans and drills)
- HSE management systems / internal control / quality assurance
- Reliability and accessibility evaluations
- System audits (HSE)

Advisory role at Kårstø

On assignment to StatoilHydro, for the past year Norsk Energi has produced operational analyses and studies for the gas processing plant at Kårstø. This is the largest plant in Europe of its kind, with a capacity effect of around 0.8 GW. At a plant of this kind there are extremely high safety demands at every level and Norsk Energi's task has also included providing assistance to increase safety during energy production.

The main fuel at the site is methane, plus other gas processing components. This leads to variations in the composition of the fuel, and therefore varying air requirements during combustion. If the air supply during combustion is not adapted to suit the variations in the gas composition then this can become a risk factor.

Norsk Energi has also provided calculation routines in the boiler's burner control systems, for the combination of air and a mixture of different heating gases, so that a lack of air does not lead to a defective combustion processes.

Safety-related aspects are also connected to several of Norsk Energi's tasks at Kårstø:

- Effects of variations in water quality at the boiler house
- Reduction of noise and vibrations in the condensate systems
- Level surveillance in the steam drum
- Thermal transients in the steam drum
- Regulation of the steam heated reheating function in the distillation plant

As advisor in the area of steam and energy issues at Kårstø, Norsk Energi has made a significant contribution in connection with the choice of solutions for potential further expansion of the plant's steam and energy systems.

At the gas processing plant at Kårstø high demands are placed on safety and security at all levels.

Annual report 2008

Norsk Energi reached a milestone with over 100 MNOK in revenues, corresponding to a growth of more than 20 % compared to 2007. Profits for the consultancy business before profit sharing with employees was the best Norsk Energi has ever achieved, with a profit margin of over 11 %. The activity level throughout the year has been consistently high. The demand for our expertise within energy, the environment and safety within thermal energy systems has been increasing in most business areas.

Business summary

The objective of Norsk Energi is to promote operating economy, safety and environmental issues at association member companies and other employers of its services, through consultancy, training courses and research. The organisation is headquartered in Oslo with regional offices in Bergen and Gjøvik. In short, our business is about the effective, environmentally friendly and safe utilisation of energy.

For more than 90 years now, Norsk Energi has built up a solid reputation in its core business areas. Norsk Energi supplies services throughout all phases of a project, from prestudies to the start-up operation of plants. At the turn of the year Norsk Energi had 78 employees and executed around 600 commissions for a customer base of around 400.

Association activities

The general meeting, followed by the annual meeting took place 29th May 2008 at Telenor EXPO at Fornebu with around 60 attendees. The subject of the meeting was: climate, CO_2 capture and a renewable energy supply

INCOME STATEMENT in units of 1000 NOK

	2008	2007	2006	2005	2004
INCOME STATEMENT					
Operating revenue		83 643	81 487	72 686	63 311
Operating costs	96 366	79 609	77 898	72 304	62 133
Operating result	4 719	4 034	3 589	382	1 177
Income from financial items	- 922	- 889	-669	- 688	- 621
Tax costs	-1 063	-881	-823	312	-178
Annual return	2 734	2 264	2 097	- 229	378
BALANCE					
Assets					
Fixed assets	31 395	26 333	24 369	19 703	17 622
Liquid assets	20 008	18 044	15 802	13 858	18 342
Total assets	51 403	44 377	40 170	33 561	35 964
CAPITAL AND DEBT					
Equity capital	15 437	12 703	10 438	8 342	8 571
Deferred tax	2 435	1 372	0	332	254
Long-term debt	7 925	8 537	9 150	9 762	8 514
Short-term debt	25 606	21 765	20 091	15 457	18 879
Net capital and debt	51 403	44 377	40 170	33 561	35 964

NORSK ENERGI'S BOARD OF DIRECTORS. *From left to right: Svein Brokke, operations manager at Dynea, Tor Johansen, head of IT at Norsk Energi, Morten Røsæg, vice president at Hydro Olje, Odin Krogstad, general manager at Ecopro, Berit Helgesen, head of finance at Södra Cell Folla, Ole Rønning, chairman, project director at Gassnova, Håkon Kristian Delbeck, director of technology at Elkem ASA, Ronny Valjord, departmental manager at Norsk Energi og Harald Birekeland, senior consultant at Norsk Energi.*

in Bærum and Fornebu. The annual meeting was concluded with a dinner. The Energy and Environment prize (EMIL) was presented by Marit Sandbakk from Enova to Hunton Fiber AS for the company's efforts to reduce energy consumption at their factory in Gjøvik.

Membership activities numbers were maintained as previously with around 22 member visits. Membership numbers remained the same as the year before. At the end of 2008, a 100 paid-up members were registered.

The periodical "Norsk Energi" was published four times in 2008 and the magazine continues to be a well-respected trade publication for the sector.

Statement of annual accounts

In accordance with the Norwegian Accounting Act § 3-3 it is confirmed that the conditions exist for the continued operation of the company. The bases for this are the financial results for 2008, the forecast for 2009 and the company's strategic plan for the coming years. The company has a positive financial status.
The net operating revenue Norsk Energi achieved last year was 101.1 MNOK, an increase of 17.5 MNOK from 2007, equating to an increase of 21 %. Annual profit, after profit sharing was 4.7 MNOK. Annual profit after financial expenditure and tax costs is 2.7 MNOK.

The liquidity ratio II (ratio between liquid assets and short-term debt) was 0.8, roughly the same level as in 2007. The equity ratio was 30.0 % up from 29.8 % for 2007.

The project portfolio has been closely reviewed and losses relating to projects have been written off.

As the substantial part of income and expenses are traded in NOK, fluctuations in the exchange rate represent zero risk. The company is exposed to changes in the interest rate as debts are subject to a floating interest rate. The risk of other parties lacking the means to fulfil their obligations is considered low, as historically losses on accounts receivable have been minor. The liquidity of the company is at an acceptable level and the decision was made not to introduce measures that would alter the liquidity risk.

Organisational status

As of 31.12.08 the association had a total of 78 employees compared to 73 the year before.
New membership admissions for 2008 were 16.7% while resignations were 9%. The average age was reduced by 2.5 years compared to 2008 and was 45.4 years at the end of 2008.

Norsk Energi's scope of activity is in traditionally male-dominated specialist fields. However there is a positive trend in the number of women in Norsk Energi, with an increase of over 3 % to 23.1 % for 2008. There is one woman among the senior management team. The board of directors, including deputy members has a female share of 18 %. The company's goal is to be a place of work with complete equality between women and men and where there is no discrimination on the grounds of gender on issues such as pay, career progression and recruitment.

Working environment

Absence due to sickness was recorded at 6.4 % of total hours, compared to 3.9 % the previous year. Of this, sickness lasting more than 16 days accounted for 74 % of total absence, distributed over seven cases. This sickleave is high and the absence has

been analysed. Short term sickness is at a normal level, while long term leave is above average. Long term absence has been evaluated and is generally not related to work. The working environment is considered good, despite the high amount of sickleave. The working environment will be monitored and evaluated with a new audit in autumn 2009.

The working environment committee held regular meetings during 2008. Cooperation with the respective employee organisations was constructive and contributed positively to the running of the company.

External environment

One of Norsk Energi's products and focus areas is climate consultancy and climate audits. Now, for the first time, CO_2 emissions that are the result of Norsk Energi's business have been mapped.

Based on key figures and calculations, emissions were recorded at 136 tons / year, of which business travel accounts for the majority with 92 tons.

Work on our environmental strategy, goals and concrete initiatives for 2009 is on-going.

Strategy

During 2008 a strategic plan was developed which was approved at a board meeting in the autumn. Our vision for Norsk Energi is to be the partner of choice for thermal energy plants with a focus on energy efficiency, renewable energy, environment, climate and safety.

We have three main goals for the next five years that support our vision:

1. Norsk Energi's profitability level will be among the best in the business.
2. Norsk Energi will be the workplace and cooperative partner of choice within our specialist areas.
3. Norsk Energi's growth rate will be among the best within comparable businesses.

For each of these key goals various initiatives and action plans have been developed, which we will continue to work towards. Even though the financial crisis that hit during 2008 has caused a few changes to be made to the framework conditions, these plans remain valid as a management tool.

For 2009, growth in terms of both turnover and total number of employees is expected to continue, compared to 2008. Since the end of the financial year, no circumstances have occurred that would have had a significant effect on the evaluation of the association's end-of-year report and financial position.

Disposal of annual profit

The board suggests that the annual profit of 2, 773, 793 NOK is transferred to other equity.

Concluding remarks

During the course of 2008, seven general board meetings were held.

The financial results for 2008 were very positive. The board wishes to thank all employees for their positive efforts and is pleased that these positive results form the basis for the payment of an employee bonus.

Oslo, 21.04.2009

Ole Rønning Chairman	Håkon Kr. Delbeck Vice chairman	Morten Røsæg Board member	Berit Helgesen Board member
Svein Brokke Board member	Odin Krogstad Board member	Harald Birkeland Board member	Tor A. Johansen Board member

THE NORSK ENERGI MANAGEMENT TEAM. *From left to right: Ronny Valjord, head of department, Industrial, Hans Borchsenius, head of department, International, Hallstein Brandal, head of department, District Heating and renewable energy, Anders Meeg, acting head of department, Automation, Jon Tveiten, managing director, Tove Sigvartsen, head of department, Bergen, Tor Johansen, head of IT, Knut Sandvold, head of department, Gjøvik, Kjell Olav Nerland, head of department, Environment and Safety og Knut Helgesen, head of finance and administration.*

Norsk Energi: Employees

MANAGING DIRECTOR
Tveiten, Jon

ENVIRONMENT AND SAFETY
Nerland, Kjell Olav
Head of department

Andvik, Anne-Chr
Bjørneseth, Hege
Borgnes, Dag
Gjeitanger, Linda
Hansen, Bjørn
Kjerschow, Einar
Korsmo, Anna-Rita
Løseth, Magnus
Magerøy, Øystein
Semb, Lise Marie
Soma, Morten H.
Stemsrud, Torvald
Torstensen, Stine B.

INDUSTRY
Valjord, Ronny
Head of department

Brønlund, Thor
Eikrem, Tor Olav
Fauske, Hans A.
Holm, Arne Øistein
Kristiansen, Henriette
Kroken, Bjørn A.
Pettersen, Tore S.
Ragazzon, Raffaele
Sollesnes, Geir
Sveinsen, Anders
Sørlie, Bjørn
Vestvik, Tore

Control
Kristiansen, Tore
Christiansen, Jan
Elvebach, Arve
Norrud, Eivind

Training courses
Nordhus, Ruth

DISTRICT HEATING AND RENEWABLE ENERGY
Brandal, Hallstein
Head of department

Amundsen, Audun
Dersjö, Kristina
Duong, Thien Si
Engebakken, Jon A.
Ettestøl, Anders
Falck, Ida
Grinrød, Johan
Haugerud, Linda
Hjortaas, Trygve
Horve, Eirik Johan
Jørgensen, Knut M.
Knudsen, Bjørn E.
Stub, Anja
Tran, Tuan

AUTOMATION
Meeg, Anders
Acting head of department

Bostad, Erik
Bøe, Helge
Jønsberg, Christen
Næss, Øyvind

FINANCE AND ADMINISTRATION
Helgesen, Knut
Head of finance

Holtebu, Kari
Thorvaldsen, Eva
Verket, Anne

IT
Johansen, Tor A.
Head of IT

INTERNATIONAL
Borchsenius, Hans
Head of department

Ekern, Ole Fredrik
Faschevsky, Sergei
Glimsdal, Ann Iren
Sørensen, Åse

BERGEN
Sigvartsen, Tove
Head of department

Dåvøy, Odd W
Eide, Anders
Haugen, Jan-Ove
Krossøy, Kim
Næss, Bjørn Chr.
Schei, Inge
Storesund, Stian
Yksnøy, Thomas

GJØVIK
Sandvold, Knut
Head of department

Felde, Halvard
Kjøbstad, Terje
Myklestad, Hans M.
Sandvold, Ingebjørg
Skumsrud, Gjermund
Stensby, Jan Erik
Ulland, Oddbjørn

Association for energy consumers and producers

With around 100 members consisting of both energy consumers and energy producers, the association forms a collective professional arena for all issues relating to the production and consumption of thermal energy.

The association was established in 1916 under the name Norsk Dampkjelforening (Norwegian steam boiler association) with the task of gathering expertise on energy issues in one place. Today the association's prime goal is to promote operating economy, safety and environmental issues for its members, within the field of thermal energy.

Companies, institutions, groups or individuals who own or operate equipment that falls under these categories are eligible to become members of the association. Others can become passive members with the approval of the board, and consequently the association has members from both large and smaller companies as well as public authorities.

Members of Norsk Energi receive the following membership benefits:

On-site visits for active members
Annual visits with a review of the plant and/or evaluation of and discussions around particular circumstances, as agreed and prepared for in advance. The visit is followed by a written report or evaluation notes. On enrolment, the first visit is arranged as soon as possible following registration of the membership.

Member meetings
Topical subjects are discussed through lectures and speeches. The experience exchange represents an important aspect of these meetings.

The association's prime goal is to promote operating economy, safety and environmental issues for its members, within the field of thermal energy.

Annual meeting with annual shareholders' meeting
In conjunction with the annual general meeting, members meet to discuss professional issues with presentations on one or several topical subjects. The annual meeting takes place alongside the annual shareholders' meeting, at which the activities of the association and the accounts of the previous year are discussed, decisions are made and elections are held, in accordance with our statute.

Professional journal
In addition to topical news this quarterly journal also includes relevant information on topics such as energy and oil prices and new governmental legislation and taxes etc.

Discounts
Members pay a discount for Norsk Energi's courses and seminars and for placing adverts in the journal "Norsk Energi".

Preferential treatment in task allocation
Our statute states that "in the eventuality that workload exceeds the association's capacity, work carried out on behalf of members shall be prioritised".

Representation on official committees and bodies
We protect our members' interests through our presence on official committees and bodies.

Energy calendar
An annual calendar with an 18-page supplement containing practical information on energy, environmental issues and safety, is sent to all members.

Norsk Energi has expertise in all aspects of district heating system development.

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