

NORWAY

1 Situation of renewable energy

1.1 Renewable energy technologies

After hydropower, which presently accounts for more than 99% of the electricity production, bioenergy is the most significant contributor to current renewable energy supply (RES) in Norway. RES (Renewable Energy Sources) accounts for about 4,5 % of TPES (Total Primary Energy Supply), largely from the use of waste heat in the pulp and paper industry and residential use of firewood.

Norway has 13 MW of installed wind capacity in ten windparks on the Norwegian coast, producing approx. 35 GWh/year. There is significant activity on wind monitoring and site assessments, and developers have applied for licences amounting to 1,5 TWh (375–500 MW). If approved, a number of new wind parks can be in operation by 2004.

Although other sources and technologies are also included in Norwegian strategies and policies for RES, the focus in this document will primarily be on wind, biomass, waste heat, and heat pumps.

2 Policy affecting RES

The Prospective Document NOU 1998:11 ("The Energy and Electricity Balance towards 2020"), recommends a number of actions to increase production of energy from renewable energy sources other than large hydro. Some of these recommendations are listed in the following:

- Investigate wind energy resources and actual projects. The investigation must also highlight grid connection possibilities and (local) environmental consequences.
- Improve the external conditions for investments in wind power through temporary economic stimulus. Similar measures for heat pumps and biomass should also be considered.
- Make local authorities obliged to investigate their own energy resources.
- Remove regulatory barriers against district heating.
- Consider economic stimulus for district heating systems with low business profitability, however still with socio-economic profitability.
- Secure stable budgets for RTD (Research and Technology Development) of new energy products and technologies

The government shows a will to stimulate the use of renewables in the state budget for 2000. Direct measures that will make renewables more profitable are actuated.

From 1 January 2000, the electricity tax was increased by approx. 44% to 1,06 eurocents/kWh (0,08 NOK/kWh) and in order to prevent transition from electricity to fuel oil, the fuel oil tax did also increase. These taxes will make biofuel more competitive. In addition investment grants related to new renewables can be applied for.

2.1 Institutional framework

Figure 1 shows how the public RES/RUE (Rational Use of Energy) work in Norway is organised. The role of the Ministry of Petroleum and Energy is to ensure that state funds are allocated rationally, draw up a long-term strategy for RES/RUE, and evaluate changes in the use of policy instruments.

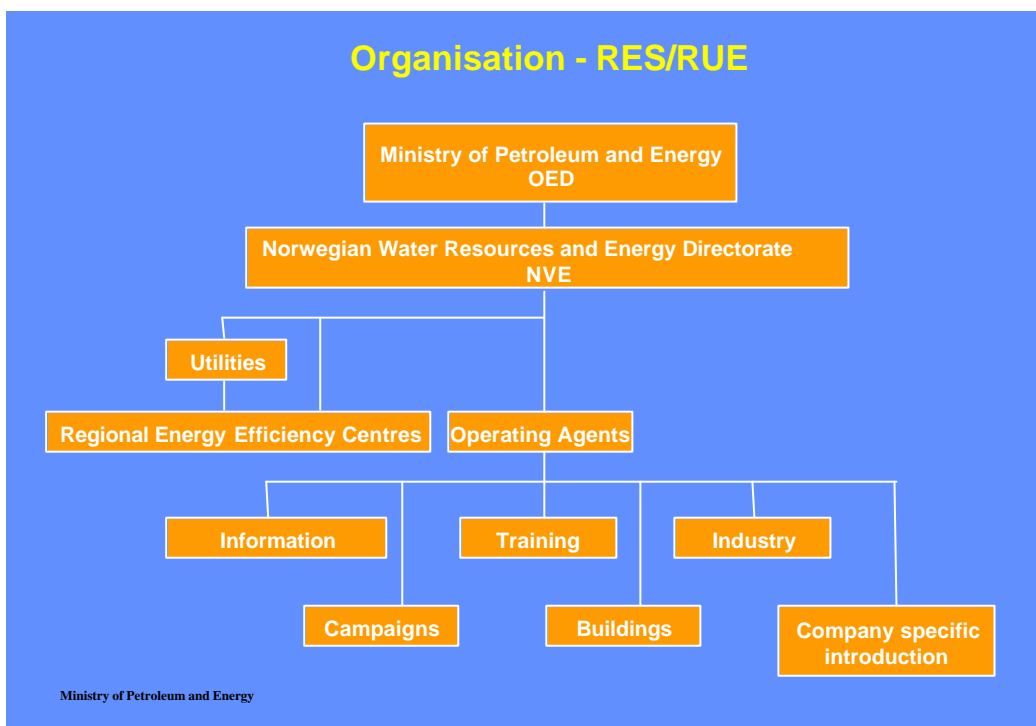


Figure 1 RES and RUE in Norway, Organisation

Experience after several years of efforts to improve energy efficiency and increase the use of RES shows that there still exist serious barriers to greater activity in this field. Low electricity prices and lack of knowledge are maybe the most significant ones in this respect. The market forces now set the electricity prices, and there are no expectations of dramatic increases in the electricity price during normal hydrological years. Information and training, together with the introduction of new energy technologies and similar measures will therefore remain the most important instruments available to the authorities.

The Norwegian Water Resources and Energy Directorate (NVE) is responsible for administration of governmental efforts in this field. To a great extent, NVE has chosen to delegate responsibility for practical implementation of the various measures to

operating agents outside the central government administration, and these were appointed in the course of 1995.

2.2 Sector programmes

2.2.1 Industry sector

Operating Agent, Institute for Energy Technology - Ife

The Industrial Energy Efficiency Network (IEEN) was established in 1989 as a joint initiative between the authorities and the industry. The current members, 600 enterprises from 13 industrial sectors account for a large proportion of energy use in land-based industry in Norway. Under the terms of Network agreements, the member companies are offered advisory services and energy auditing on condition that they commit themselves to report their energy and production data once a year to Ife. In the future, the IEEN will aim to extend its scope and focus more on activities to increase the use of renewable energy sources in the industrial sector.

2.2.2 Building sector

Operating Agent, Dr.Ing Ole Gunnar Sjøgnen – OGS

OGS is responsible for dissemination to the building sector through the established building networks, including local and regional activities in this area connected to the regional energy efficiency offices (REOs). OGS is also responsible for the establishment of new building networks, in order to have “full” coverage of the sector.

The successful experiences from the previously described IEEN has been used to build up networks also in the building sector, an activity that started in the beginning of 1996. The main differences between activities in the industry and building sectors are the number of networks and the use of REOs for the regional networks. So far, 45 networks have been established in the public sector; 10 on national level and 35 on county level. On the private side 10 networks have been established.

2.3 Cross sector programmes

2.3.1 Introduction of innovative energy technologies

Operating Agent, KanEnergi AS

The most important activity in this field is financial support to companies that introduce new energy efficient technologies or renewable energy technologies to the market. This includes efforts by the authorities to assist companies in marketing, market analysis, demonstration projects and further product development.

2.3.2 Information and training

Operating Agent, Information Centre for Energy Efficiency - Ofe

Another important instrument is the provision of training for key personnel in the private and public sector (consulting engineers, architects, operations personnel, installation contractors and decision-makers in private and public enterprises). The Information Centre for Energy Efficiency (Ofe), organises courses totalling to 4-5000 training days annually.

Large information campaigns in media with nation-wide coverage have been organised by a fifth operating agent, ACME AS.

2.4 Incentive measures

In the following, the incentives with regard to increasing the contribution of renewable energy sources to the Norwegian energy system will focus on wind power as a contributor to the electricity market, and biomass, waste heat and heat pumps as major contributors to the heat market

2.4.1 Electricity market

After the deregulation of the Norwegian power regime in 1991, renewable energy sources can compete on equal access terms as conventional sources (hydropower) at all grid levels. Transmission and distribution tariffs are set to reflect the costs to the network at all grid levels. Small renewable energy generation plants that can feed power to local distribution utilities may exploit competitive advantages from the reduced need for grid investments and reduction of line losses.

Wind power:

There is a political objective to increase the wind power generation capacity in Norway and the political target is to reach 3 TWh by 2010. The overall goal is to secure Norwegian self-supply with renewable electricity during a mean hydrological year. (Governmental White Paper nr. 4: 1996-97). Wind power gives the most feasible electricity production from new renewables. Subsidies are however necessary in order to make the plants feasible.

The state budget 2000 opens up for investment subsidies up to 25%. Furthermore, wind energy investments are currently exempt investment tax as well as half the energy production tax. Studies can be 100% funded. It is presupposed that projects that are supported are based on cost-effective technologies, and that each single turbine has a minimum size of 500 kW. Turbines should be gathered in parks, with a minimum size of 1500 kW in order to ensure minimum space requirements and to make them cost effective.

Support has also been given from the Norwegian Research Council, aiming to establish industrial activity for equipment deliveries (wings, hubs, control systems). A large

international manufacturer with base in Norway considers starting turbine production in Norway if there is established a significant home market.

2.4.2 Heat market

The stimulating measures related to making water based heating systems more cost effective will be given high priority in the years to come. ("Governmental White Paper nr. 1, 1998-99). This is due to the large annual variations in the hydropower production (precipitation) which makes the energy system vulnerable with regard to seasonal shortages. About 25 % (30 TWh) of the electricity is used for heating purposes and in order to release as much as possible of this kind of energy to other purposes, water borne heating systems in buildings is a basic condition.

The task shall be accomplished by information and education campaigns together with investment subsidies and grants. Additional measures like technology competitions may also be considered. Education and training of installation contractors will be emphasised in order to reduce costs and to promote introduction of renewable energy sources in combination with water-based heat distribution systems. There is also a policy for stimulating local authorities in development of waste heat, heat pumps and other renewables in relation with rehabilitation or new constructions. All new public buildings larger than 1000 m² are now obliged to install water borne heating systems.

Biomass, waste heat and heat pumps

In the report from the "Inter ministerial working group for biomass", dated 20. January 1997 that was established by the Ministry of Petroleum and Energy, the working group calls for increased use of biomass in order to improve the environment, enhance energy flexibility (variety) and possibilities for regional development. More recent strategies support the recommendations from this working group, and add further exploitation of waste heat from industrial processes, district heating and heat pumps and solar thermal to the priorities.

Within the "Heating System Scheme 2000", which is a follow-up to previous years schemes, the authorities have allocated up to 11 mill Euro for investment grants in 2000. The objective of this scheme is to increase the use of renewables, heat pumps and the utilisation of waste heat for heating and process purposes in a the most cost effective way. From experience this means that most of the grants are given to the industry, service sector, municipalities and energy and heat companies.

The scheme shall also contribute to the development of local markets for bioenergy as well as enhancing the development of infrastructure for water-based heat distribution systems. The scheme is meant to support the incremental investment related to exploitation of the above mentioned energy sources.

Including the "Heating System Scheme 2000", the energy authorities are aiming to support a significant number of projects during the period 1997-2000. The total support for the period is expected to reach between 30 –36 mill Euro.

2.5 Utilities, Regional Energy Efficiency Offices

Pursuant to the Energy Act of 1991, energy utilities which hold local area licences are required to implement certain energy efficiency measures vis-à-vis users in the area. Regional Energy Efficiency Offices (REO). The authorities have encouraged the establishment of REOs to organise such activities. The first office opened in August 1994 in Sør-Trøndelag County. By the end of 1998, REOs had been established in all 20 counties. The regional energy offices are responsible for local information and training activities and they collaborate with the other operating agents described above.

The REOs' activities are financed by a supplementary charge of up to 0,04 eurocents per kWh included in the distribution tariff at the lowest grid levels.

An important part of their work is to encourage local households, service sector and industry to make more use of renewable energy such as waste and biomass. This is accomplished through advisory services, courses and dissemination of information. Information related to biomass, water borne heating systems, heat pumps and energy efficiency in general are available and sent out when applied for or in connection with specific schemes.

One such scheme that is currently in operation is the “Flexible heating in buildings”-scheme, which target group is the service sector. About 13 of the 20 REOs have agreements with "Byggfakta" to notify them when new building projects are coming up. Through these agreements, the REOs have the possibility to influence the building owners to integrate flexible heating systems in the new buildings.

2.6 Transport

The use of renewable energy in the transport sector in Norway is not yet developed to a very large extent. Traditional diesel blended with biodiesel has been available on the market for some time. However, the majority of oil companies have refrained from introducing such products on a large scale due to uncertainty with regard to future taxation of blended diesels. In addition, the limited areas for agriculture in Norway make the potential for biodiesel production very little.

2.7 Research and Development policy

The NYTEK programme focuses on research and development aimed at efficient, renewable energy technologies, covering development efforts up to and including the field testing of a prototype. (Time frame: 1995 - 1999, Research Council contribution 11.7 mill Euro)

In this context, the concept ‘renewable energy’ refers to the traditional renewable new energy sources: solar, bio, wind, geothermal and wave energy. Other renewable energy sources such as ocean currents and salt gradients, in addition to micro hydropower (<10 MW), may also fall under the purview of NYTEK.

In recent years, the international market for renewable energy has been expanding rapidly in Europe as well as globally, with sales typically rising by 25 per cent annually.

Norway's supply industry should target these markets, and it should be possible to increase Norwegian participation in this area by establishing new businesses and/or expanding the scope of existing industry.

The programme will focus on areas that feature commercial opportunities for products made by Norwegian companies. The goals of the programme are to:

1. Develop products and systems which, preferably within a five-year period, pave the way for profitable Norwegian business activities related to efficient, renewable new sources of energy;
2. Lay the foundation for future public and private sector activities related to the development and use of efficient, renewable energy technologies;
3. Ensure a satisfactory level of expertise in selected areas at key research centres.

The highest priority will be assigned to the development of competitive products designed to improve energy efficiency and enhance the utilisation of renewable sources of energy. Approximately 70 per cent of the project funding is allocated to this, and contracts are to be signed with companies. Special importance is attached to projects that carry a high risk, but offer the potential of substantial wealth creation for Norway. The exploitation of bioenergy constitutes the greatest single market potential for Norwegian energy suppliers in the short term, and high priority will be attached to the development of competitive products and systems that can rapidly be launched on the Norwegian market. NYTEK co-operates with the Norwegian Water Resources and Energy Directorate (NVE) and the Norwegian Industrial and Regional Development Fund (SND).

Approximately 30 % of the project funding is spent on more basic R&D to promote new economic development in Norway. This covers the development of expertise in fields in which users include one or more co-funding companies or public agencies. These projects often also include studies related to doctoral degrees.

Importance is attached to the internationalisation of Norwegian companies. Accordingly, support will be provided for pre-projects aimed at drawing up applications for relevant EU research programmes. Participation in international collaboration requiring national funding, e.g. IEA and EUREKA, is considered on the basis of the same criteria as those applied to other projects. This emphasises the necessity of the multi-user approach, as NYTEK can cover a maximum of 60 per cent of the costs.