

THE NORWEGIAN MONOPOLY REGULATION REGIME CONSEQUENCES FOR THE NETWORK COMPANIES

Øivind Torkildsen
BKK Distribusjon AS
PO Box 565
N-5002 Bergen
Tel.: +47 55 12 81 00
Fax: +47 55 12 82 00
E-mail: oivind.torkildsen@bkk.no

Hans Terje Ylvisåker
BKK Distribusjon AS
PO Box 565
N-5002 Bergen
Tel.: +47 55 12 81 00
Fax: +47 55 12 82 00
E-mail: hans-terje.ylvisaker@BKK.no

SUMMARY

This paper deals with the effects of the introduction of the monopoly regulation of the Norwegian network companies. The general trends are discussed, and for illustration purposes the power company BKK is used as an example.

The findings can be summarised as follows:

- *Structural changes like buying up and mergers, are already taking place, and are likely to increase;*
- *New organisational solutions seem to be imperative to enhance improved efficiency;*
- *Organisational changes are likely to give the highest short-term benefits;*
- *A change of competence profile is necessary. Information technology, customer oriented activities, economy management will be given more attention, while extent of traditional network operation skills will be reduced;*
- *To have the right competence will be more important than being able to execute all activities within own organisation;*
- *The investment level is expected to decrease during the first regulation period. This has, however, not yet materialised;*
- *Network tariffs will decrease in general, but in the longer term more diversity is foreseen, e.g. on basis of geography.*

THE NORWEGIAN POWER SYSTEM

The structure of the power supply system

The transmission and distribution of electricity in Norway is carried out by a large number of companies at three different levels: Statnett SF, a state-owned enterprise, owns by far the largest part of the main network and is responsible for tariffs, system operations and the development of the main network system. Some forty other network companies (regional companies and producers) each own small sections of the main network. Statnett SF has a leasing agreement with these forty companies, and the leasing costs have historically been passed on to the consumers.

Between fifty and sixty companies own and operate the regional network. Regional network companies are often vertically integrated in the sense that they also produce, sell, and to some extent distribute electricity at the local level. The regional network companies are mostly owned by local and/or regional authorities.

Around two hundred companies own and operate the distribution network. The distribution companies are mainly owned by the local municipalities, and offer a great variety in size, field of activity, organisational structure, ownership and other characteristics. The average distribution company has approximately five thousand customers.. The majority of the distribution companies also sell electricity, and some of them have local production

BKK

Since 1997 BKK has been a Group consisting of the parent company BKK AS and four wholly owned subsidiaries, covering the full range of power supply services:

- Norway's fourth largest power producer, with an installed capacity of 1.550 MW and an annual average production of 5,8 TWh. This accounts for 5% of the country's hydroelectric power production;
- owner and operator of the regional grid in the area, consisting of approx. 1.000 km of 132 and 300 kV lines and cables;
- responsible for power distribution in the city of Bergen and an increasing number of neighbouring municipalities. The distribution network includes approx. 12.000 km of high- and low voltage lines and cables;
- power sales to approx. 150.000 industry and household consumers.

The BKK Group has 900 employees and a total turnover of approx. NOK 3,2 billion.

The power market

The Norwegian Energy Act of 1991 prepared for one of the most liberal power markets in the world. Its basic idea was that traditional market mechanisms should determine the price of electricity, turning the production and sale of electricity into a market-based activity. An important pre-requisite for a well-functioning market is that all parties are

ensured full access to the market. In the Norwegian power market this was achieved for all end-users in 1995¹.

Nord Pool, The Nordic Power Exchange, is the world's first international commodity exchange for electrical power. Nord Pool organise trade in standardised physical (Elspot) and financial (Eltermin) contracts including clearing services to Nordic participants, and provides customer-support in Sweden, Finland, Norway and Denmark. Being the Nordic Power Exchange, Nord Pool plays a key role as part of the infrastructure of the Nordic electricity power market and thereby provide an efficient, publicly known price on electricity, both in the spot and the future/forward market.

KEY ISSUES OF THE REGULATION REGIME

Monopoly control

The Energy Act sets out the legal framework for the monopoly control of the Norwegian network companies. The transmission of electricity is a natural monopoly, and therefore subject to regulation. The Energy Act gives the Norwegian Water Resources and Energy Administration (NVE) delegated powers. Every network company that offers transmission of electricity – to consumers or others – is required to hold a concession issued by NVE. The concession holders are all obliged to offer tariffs of transmission which comply with specified rules.

The price of electricity is thus decided by the market, while it is NVE's main task as monopoly regulator to ensure that transmission tariffs reflect the cost of the efficient operation and maintenance of the networks and their investments. Efficiency is a key concept in this respect.

The regulation of monopolies involves two main activities:

- the design of a regulatory system – drawing up regulations;
- control of the extent to which these regulations are complied with .

1992-96: Rate of return regulation

The NVE's regulation has, since 1992, been based on a "cost-of-service" concept. When setting their tariffs, the network companies have been allowed to recover actual costs, including the cost of capital. Network costs generally consist of the following cost elements:

- operation and maintenance costs;
- depreciation on invested capital;
- return on capital employed, defined as the book value or depreciated historical cost of the network capital. Since 1993, NVE has determined the maximum permitted return on capital employed.

- line losses, i.e. physical losses in MWh, valued at the pool price of electricity

Mainly as a result of accidental variations in temperature, the actual income from tariffs may exceed or drop below the level required to recover actual total costs, as defined above. As part of the regulatory system, the network companies are obliged to repay excessive income – windfall profit – to consumers. Likewise, if actual income is not sufficient to recover all costs, tariffs can be increased in later years to make up for the difference. The network company is therefore not subject to financial risk as a result of temporary fluctuations in actual income.

After 1997: Income cap regulation

As of 1 January 1997, NVE has introduced an incentive-based regulatory model, in which the network owners are no longer guaranteed full cost recovery. By establishing a system whereby each network owner is allotted a permitted total income, the profit will in principle be the difference between this permitted income and the actual costs. To avoid excessive profits, there is an absolute restriction on return on capital. Likewise there is also a minimum rate of return, so that no network company can run into an actual deficit.

This regulatory system treats each network owner individually. Reported financial data for 1994 and 1995 for each network owner have been used as a basis for the new model. The frameworks have been so defined that, from 1997, the electricity utilities must make annual reductions in their costs in relation to a general percentage fixed by the NVE. In addition to this, from 1998, individual efficiency requirements have been calculated.

Reference [5] offers a more profound description of the regulation concept.

Reporting financial accounts and network data

The implementation of the regulation model outlined above, coupled with the need for control to ensure compliance with the established guidelines for calculation of transmission tariffs, gives rise to a need for financial and technical data concerning the activities of the electricity utilities.

The companies responsible for transmission of electricity are often also engaged in production and sale of electricity. In order to be able to check the figures for monopoly activities and activities exposed to competition against the official annual accounts, assess the scope of each activity, and reveal any cross-subsidisation between activities regulated by monopolies and other areas of activity, NVE also requires information concerning activities subject to competition.

Prior to the introduction of the Energy Act in 1991, the electricity utilities in Norway followed varying accounting practices, mainly municipal accounting regulations. These regulations are based on cash flow accounting, and do not include depreciation as an element of costs. The regulations therefore differ from normal business accounting practices. The Energy Act required that all electricity utilities should

¹ Limited to change of supplier on a quarterly basis, with a maximum fee of NOK 4000. The fee was abandoned in 1997, and change on weekly basis was introduced in 1998.

keep accounts in accordance with the provisions of the Companies Acts. It was further required that separate accounts should be kept for the monopoly part of the electricity utility. On this basis, NVE set up identical specifications of the accounting data that was required for all the electricity utilities.

The electricity utilities have been obliged to send accounts to NVE since 1993. The reports of accounting data are also sent to Statistics Norway, and the structure and content of the reports must therefore also satisfy their needs. The Official Statistics Act and regulations laid down by the Ministry of Finance contain provisions relating to administrative data systems and the co-ordination of official statistics.

Measuring the technical and economic efficiency

Based on the network companies' own reported data an individual efficiency is calculated, applying the so-called Data Envelopment Analysis (DEA). This is a technique where companies are compared with respect to how a set of input variables (production factors) generate a set of output variables (products). The best companies are those who produce maximum output for a given input.

The method has produced "efficiency score" for each individual network company, based on a comparison with some so-called "front" companies, that represent best demonstrated practice depending on different external condition.

The measuring method has its clear strengths and weaknesses that will not be further discussed in this paper.

Defining the yearly income cap

By the start of the present regulation period (1997-2001) a base income cap was calculated based on the companies' reported costs of losses, operation, maintenance and capital costs. For each subsequent year this income cap is regulated with respect to:

- the consumer price index;
- the cost of losses according to actual pool price;
- the growth in power supply, adjusted with a scale factor of 1/2, i.e. the income cap is increased by 1/2 of the power supply growth factor;
- the efficiency factor, consisting of a general component of 1,5%, and an individual component ranging from 0-3%. The income cap of a network company rated at 100% efficiency is thus subject to an annual reduction of 1,5%, whereas a low-efficiency company (<70%) will have its income reduced by 4,5% annually.

Network tariffs and energy readings

In Norway there is no direct control on prices or tariffs, but certain principles for tariff calculation are regulated. Among the provisions, one of them demands that the energy element of the tariff shall be tied to the marginal grid losses. The control of the tariffs is indirect in the sense that, as long as the income limit is not exceeded, the tariffs are not subject to

any formal approval by NVE. Only after complaints from customers, NVE will interfere.

The effects of free market access on energy reading requirements are summarised in the following table [3]:

1991	Introduction of the Energy Act Hourly metering requirement for change of supplier Local supplier has a significant market advantage NOK 5000 per year per customer stipulated as maximum fee for using a supplier other than the local supplier
1994	Maximum fee reduced to NOK 4000 per year per customer.
1995	Hourly metering requirement for change of supplier eliminated. Settlement based on the adjusted system load profile. Non-hourly metered end users can change suppliers on a quarterly basis. NOK 246 stipulated as maximum fee for changing suppliers. Network owners can collect up to NOK 4000 from each supplier for which regulating power is settled in his network.
1996	Hourly metering for electricity consumption in excess of 500 MWh per year. Standard GS2 file format requirement.
1997	Fees are eliminated.
1998	All end users can change suppliers on a weekly basis. Network owners must send settlement data by means of EDIEL.
1999	Hourly metering for all installations over 400 MWh. Messages regarding change of supplier must be sent by means of EDIEL.
2000	Mandatory continuous balance settlement. Reading of all end users at the end of the year.

To enhance energy consumption awareness NVE has from 1999 instructed the power companies to settle the accounts minimum four times per year, based on actual consumption.

Quality of supply

In every incentive-based regulatory model, there is always the risk that costs will be reduced and profit increased at the expense of the quality of services. The regulator must therefore find a way of making sure that the regulatory model safeguards the quality of delivery. The overall aim is to offer a quality of supply that reflects the customers' willingness to pay for this quality.

Given the high standard of the existing Norwegian power transport system there is no risk of a sudden deterioration of the quality of supply. However, in a long-term perspective various measures have been considered to establish a balance between quality and the customers' willingness to pay for this quality:

- defining the technical standard of the different aspects of quality;

- supervising the development, in number and time, of network failures and other quality aspects (on which NVE is currently collecting data);
- determining prices and instructing networks to pay compensation for energy that is not delivered;
- encouraging networks to come to an agreement with their customers on a system of compensation for energy not supplied (CENS).

CONSEQUENCES FOR THE NETWORK COMPANIES

Focus on increased efficiency

The aim of the 1991 Energy Act was to establish a clearer focus on efficient operation of the electricity supply business. The first reaction of the power companies on this new conceptual way of thinking was negative, as it was seen to represent a disturbance into the traditional and “well-proven” methods for power supply. However, the new ideas soon proved their justification, thus creating a new drive from public administrative thinking towards more business-like approach.

In this respect BKK represents a typical example: In 1991 distribution was carried out by a power company which was an integral part of the public services. The Energy Act started a process where efficient operation and cost reduction were focused upon, leading to a substantial restructuring of the company and its business areas, and significant economic results over the following 5-year period:

- 40% reduction of investment costs (nominal)
- 16% reduction of staff
- 40% reduction of network tariffs (nominal)

Benchmarking

Along with the increasing economic awareness the concept of benchmarking has gained momentum also in the power transport sector. Being monopolists with 100% market share and the network companies have realised that benchmarking is an efficient tool to create “competition” in a non-competitive market.

Various benchmarking-processes are already in use, ranging from pure internal benchmarking to comparison between groups of comparative companies. Benchmarking has been heavily encouraged by the Norwegian association of power companies (EnFO), who has been responsible for the unofficial “Norwegian championship for network companies” since 1994, with the participation of approx. 1/3 of all companies.

Benchmarking is also encouraged by NVE, who offers their own benchmark application tool free of charge in their internet pages [4]. Experiences from a pilot power company are summarised as follows:

- benchmarking exposes potential areas of cost reductions;

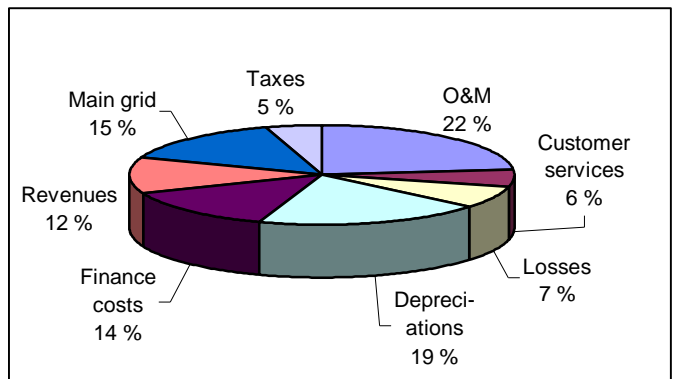
- benchmarking yields concrete results that are helpful in obtaining the organisation’s approval of changes;
- by networking with the management of other companies, better ways of doing business are identified.

Economic effects

The Regulator’s main objective behind the regulating regime was to ensure cost effectiveness in the power transport sector and thus reduce power transport service prices to their “right” level. As network tariffs now are a direct consequence of the income cap, tariffs have been reduced as income cap is subject to annual reduction.

The income reduction has to be met through cost reduction. Only a part of these can be influenced on a short term basis, the so-called reversible costs:

- O & M costs;
- customer service costs;
- revenues;



These costs normally account for 30-40% of the companies’ total costs, see figure above (BKK figures). A low-efficient network company with a 4,5% efficiency factor thus will have to reduce the reversible costs by 10-15% annually. It is too early to identify any effect in terms of tendency in revenues, but over the coming years it is expected that low-efficiency companies will face great difficulties in maintaining an acceptable revenue level.

In the longer term there will obviously be a pressure on investments. However, according to recent NVE statistics the investment level has shown no sign of decrease over the last five years.

Quality of supply

A major challenge in the new regulation regime is to maintain an adequate quality of supply while reducing operation and maintenance costs. Without any regulatory measures we may see a development on a short-term basis characterised by

- higher outage rate due to poor maintenance;
- longer outage time due to lower reserve preparedness;
- longer outage time due to reduced staff.

In the longer term these effects may be amplified through lower level of investment and reinvestment. And with a pure income cap regulation the network owner still will maintain his income, even though his network deteriorates.

To restrain this tendency, which is clearly undesirable from a network customer's point of view, NVE in 1998 introduced their concept for "Compensation for Energy Not Supplied" (CENS), planned to be put into effect by January 1, 1999. The proposal implies that customers shall be granted an economic compensation when electric power is not supplied due to outage². The proposal also presents compensation differentiated between groups of customers, household-/agriculture and industry, and between planned and unplanned outage:

<i>Customer</i>	<i>Planned outage³</i>	<i>Unplanned outage</i>
Household/agriculture	1,40	2,00
Industry	24,50	35,00

According to the NVE proposal the network owner is responsible for compensating all outages, also where his network is not the direct cause of the outage. In this case he has to reclaim the compensation from the responsible third party.

Ideally the compensation is meant to be repaid individually to the customers directly affected by the outage. This would, however, require on-line registration in every measuring unit, and with present technology this is not economic feasible. For this reason NVE has proposed that compensation initially is repaid through tariff reductions, i.e. all customers within the customer group will get their share of the compensation, irrespective of their individual quality of supply.

Calculation of energy not supplied will be based on load profiles, according to already established methods. In the case of BKK amount payable to customers would turn out be, based on the last years' outage figures:

	<i>Planned [MWh]</i>	<i>Unplanned [MWh]</i>	<i>Compensation [1000 USD]</i>
1995	601,6	212,3	1 500
1996	235,0	159,0	800
1997	348,6	220,0	1 145

This gives an average of approx. USD 1,15 million per year, corresponding to approx. 2% of the income cap.

By the end of 1998 NVE announced that the proposed date for the CENS-regulation would be postponed by at least one year. The decision was made based on relatively convincing reactions from a major part of the network companies, which main objections may be summarised as follows:

- the regulation will generate increased administration, and thereby higher costs, which cannot be justified by the positive effects of the regulation;
- administrative consequences are not fully considered;
- the arrangement may seem unjust for the network companies, as they have to compensate for conditions and incidents beyond their control, e.g. outage due to extreme weather conditions;
- the position towards third party with respect to liability and insurance is not taken sufficiently care of;
- the compensation rates do not reflect the real outage costs for the individual customer, thus the network companies are not given adequate incentives to enter into individual agreements on quality of supply and compensation rates with the customers;
- the method and basic data for the adjustment of the income cap is not sufficiently enlightened.

It is expected that a new proposal will be drawn up during 1999 where most of these objections will be complied with. It cannot be disputed, however, that it creates a major concern for the network companies to know that a compensation regulation will be introduced, without knowing the detailed contents and not to mention the full operational and economic consequences of the regulation.

Tariffs

The network tariff is strongly linked with the interaction with the network customers. The design of tariffs is a question of cost distribution as well as a means to impel the use of the power network in terms of consumption pattern, localisation and dimensioning.

Approximately one third of the network companies have already changed their tariff strategy as a direct consequence of the regulation regime. There appears to be a tendency to use tariffs more actively to achieve economic goals, and more diversity in terms of geography, load profile, time etc. is foreseen.

Structural changes

The power supply industry of Norway consists of a relatively high number of units operating in both the competitive and monopoly market. There is a clear restructuring tendency towards a reduced number of companies:

- Since 1991 there have been 39 cases of reorganisations where group companies have been established and/or power sales activity is set up in separate entities. The majority of these reorganisations involve vertically integrated companies, i.e. companies including both power transport, production and sales.
- Since 1991 there have been registered 74 cases of take-overs and mergers, including both whole companies and parts of companies.

There are some obvious mechanisms behind this process:

1. The power company owners are local authorities with stressed economies. Selling out gives a substantial cash

² An outage only qualifies for compensation when the duration is more than 3 minutes, and only when the outage occurs in the HV-network.

³ All values in NOK/kWh - 1 USD ≈ 7,50 NOK

inflow, and is more and more recognised to be an acceptable remedial action to improve local economy.

2. The monopoly regime inevitably puts a high pressure on cost reduction processes. More and more network owners realise that required cost reduction is unachievable within small units. The risk of poor and even negative results seems to become a realistic scenario, and thus selling out appears to be a required action.
3. There seems to be a growing awareness among the owners' representatives on their duties and responsibilities. The trend is a shift from a traditional political to a more modern business-based control.

Needless to say, the process is also opposed locally as there are strong emotional aspects in the issue of local ownership to what historically has been regarded as basic infrastructure.

Using BKK again as a typical example: Up to 1996 BKK was a production, transport and wholesale company. In 1996 it took over the municipal distribution company (Bergen Lysverker) as a result of an initiative from the local authorities, whose main objective was to strengthen the local economy. During 1997 and 1998 another four local power companies were bought. The company strategy is now to follow up this process, with a clear aim to establish one regional network company, and thus establish one connected power transport network on all levels.

Organisational changes

Parallel to the general restructuring tendency changes have also taken place within the company structures. Business awareness has been the driving force, and main objectives have been:

- to define core business;
- to identify key processes;
- to create ownership to the processes and thereby to distinguish between needed and more superfluous functions;
- to identify real costs;
- to establish customer awareness.

As a result an increasing part of network companies has drawn up a more explicit distinction between network owner functions on one hand and engineering and contractor activities on the other. In most companies separate units are established within the company, but outsourcing is becoming more and more an issue also in the network companies.

In BKK a full vertically integrated company was established in 1996. The distribution company had at that stage been through the above mentioned reorganisation process, and the "new" BKK is now a group with clearly defined business areas, and a clear distinction between ownership and support, engineering and contractor functions.

Consequently the power transport business area is divided into three main functional units:

- Network division, representing core business:
 - network ownership
 - network operation
 - network tariffs, incl. sale of network services
 - network information and documentation
- Engineering services division:
 - planning and design
 - protection and control equipment services
 - measurement services, incl. laboratory
 - installation control services
- Contractor division
 - plant erection
 - installation works
 - project management
 - store keeping

Manpower

The manpower situation is affected in at least two ways:

- a general reduction of staff to meet cost reduction requirements;
- a shift in competence profile to correspond to new challenges.

A general staff reduction of 13% has taken place in the Norwegian network sector over the last four years. A 1997 survey among network companies revealed that more than 50% have concrete plans for further reduction [6]. The group mostly affected is undoubtedly the craftsmen.

A noticeable emphasis on fields like economy, marketing, IT and other administrative and support functions has brought forward a need to change the competence profile of the network companies. So far we have not seen dramatic changes, but dominating issues in the coming years are likely to be:

- outsourcing
- short-term manpower contracts
- purchase of special competence
- retraining, from traditional craftsmen skills to more administrative skills

New business areas

As power transport is being strictly regulated, thus to a certain extent restraining the profit potential, an increasing number of network companies are exploring the prospects of finding new business areas where skills and experience from their core business can be used as a competitive element. One area appears to be more attractive than others: Telecommunications.

The most offensive commitment is taking place through two recently established Norwegian telecommunication companies, both being owned by different parties in the power supply industry (EniTel and EiTele). The business

concept is to make use of the high voltage grid as a nationwide access network for telecommunication services, in which the power network owners are active participants, e.g. through spinning of optical fibres on their overhead lines.

The next step is to develop technology to offer additional services accessed through the electricity supply wires to each individual customer, such as:

- telecommunication services such as telephone and Internet access
- television services, incl. "video on demand"
- alarm services

In this respect Norwegian power supply industry follows the international trends and development.

Another issue that is given increased attention is the concept of multi-utilities. Norwegian domestic energy supply has, with few exceptions, been synonymous to electricity supply. However, governmental energy policy seems to put renewed emphasis on gas and district heating as means for energy transport. Hence, the distribution companies, especially in the bigger cities in Norway, are now developing new business concepts where this is given broad attention.

Water supply and drainage could be additional services to include in a multi-utility function, but Norwegian circumstances do not seem to favour this.

FUTURE PROSPECTS

What are the challenges?

The last five to ten years have been dramatic for the Norwegian power supply industry in terms of altered external conditions. And more changes will come. NVE clearly states that new requirements will follow after the present regulation period (1997-2001). But NVE also says that increased efficiency shall pay, not only for the customers but also for the companies. This gives raise to new questions:

- What is a reasonable level on operation and maintenance costs, taking into account cost development and future improvement potential?
- Is the present method adequate in order to take care of investment and reinvestment capital costs?
- What share of the realised improvements in efficiency shall be kept within the companies when entering into a new regulation period?
- What influence shall changes in relative efficiency, i.e. compared to other power companies, have?

At present NVE has no answer to the questions, but will continue working along these lines in order to prepare for the next regulation regime. A key issue for the Norwegian network companies is therefore how to influence the process, both to ensure acceptable conditions as well as to create a higher degree of predictability.

Nevertheless, a survey carried out during the first year of income cap regulation showed that surprisingly few network companies had analysed the present regulation regime, its consequences and what strategic approaches to apply to meet the new challenges [6].

In the long run this may turn out to be the critical factor that separates the winners from the losers. There is an apparently inevitable tendency towards fewer and bigger companies, a trend that also seems to be encouraged by the authorities. The winners will be those who are able to demonstrate preparedness and willingness to transform quickly as external conditions so require. The losers will be those who think that business may be run as usual.

REFERENCES

- [1] Grasto, K.: "Incentive-based regulation of electricity monopolies in Norway - background, principles and directives, implementation and control system". NVE
- [2] "Financial and technical reporting". NVE 1998
- [3] Jonassen, T.: "The development of third party access in Norwegian power market". NVE 1999
- [4] "Benchmarking of Norwegian grid companies". NVE Publication no 23/1997
- [5] Wangensteen, I., Uthus, B., Berg, T.A., Rogn, M., Kellberg, J.: "Regulation of Norwegian distribution grid companies". CIRED 1999 session.
- [6] Grønli, H.: "Short-term adaptation to a new incentive-based monopoly regime" (Norwegian). Sintef Energy Research TR A4589