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### Energy Conservation and Electricity Sector Liberalisation: towards a Green and Competitive Electricity Supply?

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## 4. Denmark

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**In this article, three cases contributing to energy conservation in Denmark are studied. It is concluded that energy conservation developments in Denmark were initiated, and are mainly carried by end-users and policy makers as sector-external actors, rather than by the utilities themselves. The competitive situation of Danish utilities appears to be a very important factor determining their position towards energy conservation. Hence, it is recommended to Dutch policy makers to pay more attention to the role of sector-external actors in stimulating energy conservation. Competition should be used actively as an instrument towards a sustainable electricity supply, rather than as a parallel goal to energy conservation.**

Energy conservation has become one of the main targets of Dutch energy policy. As the electricity sector in the Netherlands presently is in the middle of a large reorganisation process, it is important to address the question how the organisational structure of this sector influences the realisation of energy conservation targets. This article will present some recommendations for the future Dutch electricity supply based on an analysis of the Danish situation.

Energy conservation is defined here as a reduction in the use of fossil fuels and nuclear energy as primary-energy sources for electricity supply. With this definition, three broad fields of energy conservation can be identified:

1. Reduction in the demand for electricity;
2. Use of renewable primary-energy sources;
3. More efficient use of fossil fuels.

Each of these fields of energy conservation consists of a large range of options. This article will examine one case study per field of energy conservation distinguished. These are the development of wind energy,

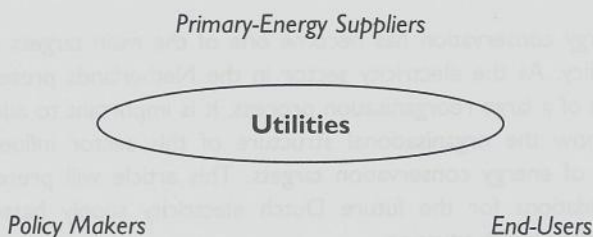
small-scale cogeneration of heat and power and the establishment of a legal obligation for 'Integrated Resource Planning' in Denmark. After an introduction to the method of analysis used and an overview of Danish electricity supply in general, these cases will be analysed in subsequent sections. Case descriptions and analyses are based on literature, documents and interviews with people involved in Danish electricity supply.

## Method of Analysis

The analysis of the relationship between energy conservation and organisation of electricity supply given here is part of a larger research project in which the situation in various countries is examined. However, in this article the Danish situation will be regarded as a single case from which lessons can be learnt for Dutch electricity supply.

Crucial in this respect is how 'organisation of electricity supply' is interpreted: Central to this organisational framework are in any case the utilities. As such can be regarded all companies whose primary business activity is generation, transmission or distribution of electricity.

The realisation of energy conservation by utilities is determined by an *external dynamics*, in which several *actors* try to influence the position of these companies externally (Figure 4.1), as by an *internal dynamics* - *factors* that are related to the electric utilities themselves (Figure 4.2).



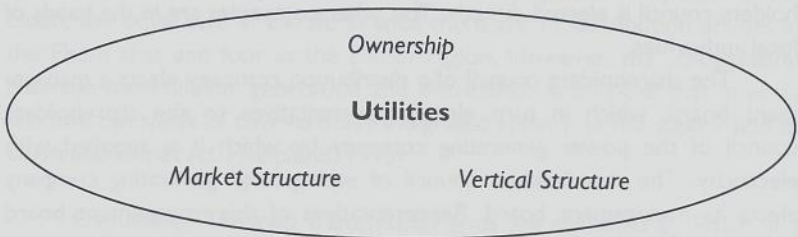
**Figure 4.1** External Dynamics of Electricity Supply

On a national and European level three sector-internal factors have been in the centre of interest in recent years: *market position*, *ownership* and *vertical structure* of utilities. The introduction of competition, unbundling of generation, transmission and distribution as well as privatisation are organisational developments that have been realised in several European countries, including the Netherlands. In other countries they are on the

agenda for the near future. Therefore it seems obvious to examine what is the importance of these factors for the realisation of energy conservation.

Concerning the external actors, three important groups can be distinguished which are at the beginning and end of the electricity supply chain, or who influence the position of utilities by formulating policy guidelines. These are, respectively, the *primary-energy suppliers*, the *end-users* and the *policy makers*.

Of course, the internal and external variables mentioned are not the only ones that are of importance to the relationship between energy conservation and organisation of electricity supply. Nevertheless, these six variables form a framework for analysis that can be used in practice to allow a comparison of the several cases examined.



**Figure 4.2** Internal Dynamics of Electricity Supply

## Danish Electricity Supply

The electricity sector in Denmark consists of two regions with separate transmission grids. Electric utilities in both regions co-operate in a pool system which is co-ordinated by two independent grid operating organisations: Elsam and Elkraft. The Elsam area contains the peninsula of Jutland and the island Fyn, whereas Elkraft is responsible for the Sealand region, which also includes Copenhagen.

### *External Dynamics*

**Primary-Energy Supply;** In the past, Denmark was largely dependent on the import of petroleum. Since the seventies, this dependency has been reduced by a gradual shift to imports of coal. Imported coal now has become by far the most important primary-energy source for electricity supply. Natural gas hardly played a role in electricity and heat production until the 1980s. In recent years however, its share is steadily expanding as a

result of the increasing exploitation of the gas fields in the Danish part of the North Sea.

In 1994, the share of coal in total primary-energy supply to the so-called 'transformation sector', which includes electricity as well as heat production, amounted to 74.6%, natural gas 9.1%, petroleum 7.8% and renewables 8.4%. Incineration of waste by far had the largest share in the percentage for renewables (4.7% out of 8.4% for all renewables). Other important contributors were energy generation from straw (1.2%) and wind energy (1.0%) (DEA, 1994).

**End-Users;** End-users in Denmark can influence the organisation of electricity supply by a system of direct and indirect elections. Most of the distribution companies in Denmark are co-operations, of which the shareholders council is elected directly. The other companies are in the hands of local authorities.

The shareholders council of a distribution company elects a management board, which in turn elects representatives to the shareholders council of the power generating company by which it is supplied with electricity. The shareholders council of each power generating company elects its management board. Representatives of this management board together form the management board of the grid operators Elsam and Elkraft (Hvelplund, 1995).

Furthermore end-users can exert influence as generators of electricity, in particular as (co)owner of wind turbines and as shareholders in one of the many small co-operative district-heating companies. The latter play an important role in Denmark: especially in rural areas heat to end-users is mostly supplied by these organisations, which are independent from the electric utilities. In total there are 330 district-heating companies, mainly co-operative. In five larger urban areas the heat-suppliers are owned by local authorities.

**Policy Makers;** Energy policy in Denmark, in particular planning of generation capacity and tariffs as well as energy conservation policy, is the responsibility of the Ministry of Environment and Energy. The Danish Energy Agency (DEA) has an important executive task here.

As both production planning and tariffs are determined by policy makers who are not directly involved in generation, transmission or distribution of electricity, the possibilities for external interference are substantial. In the past, the possibilities for such an interference have been used several times, for instance to introduce a system of energy taxes in 1991. These taxes are based on the relative CO<sub>2</sub> emissions per primary-energy

source used (Ministry of Energy, 1993), which provides incentives for wind energy, but also for natural gas as compared to coal and petroleum.

The primary goal of energy conservation policy as formulated in the 'Energy 2000' policy report is to reduce CO<sub>2</sub> emissions by 20% in 2005 compared to 1988. In the 'Energy 21' report, published in 1996, an additional goal to reduce CO<sub>2</sub> emissions by 50% in the period 1988-2030 was formulated.

### *Internal Dynamics*

**Vertical Structure;** Transmission, generation and distribution of electricity are the responsibility of separate, unbundled organisations. There are nine generation companies in total, each transmitting electricity to several distribution companies. Seven of these companies co-operate within Elsam, the other two in Elkraft. In total there are 71 distribution utilities in the Elsam area and four in the Elkraft region. However, the co-operation between transmission, generation and distribution is so close that in practice one can speak of two vertically integrated systems under supervision of Elsam and Elkraft (cf. Hvelplund, 1995).

**Ownership;** The two transmission grids are operated by Elsam and Elkraft. In both areas, Elsam and Elkraft are owned by the generation companies. In turn, distribution companies are the owners of the generation companies. Distributors are either co-operatives of end-users, or owned by local authorities. Hence, formally - through the system of elections - the whole system is in the hands of end-users.

**Market Position;** Distribution companies have a monopoly in electricity supply in their region. Since Elsam and Elkraft operate the grid and co-ordinate electricity trade, including imports and exports, there is a de-facto monopoly in generation and transmission. All organisations in the electricity sector are non-profit organisations, which means that any profits have to be transferred to end-users through the tariffs. A temporary rise in tariffs is allowed to raise funds for new generation capacity.

### **Renewables: Wind Energy**

In 1995, the share of wind energy in the generation of electricity (exclusive heat production) was 3.5% (DEA, 1995), a percentage that is not achieved by any other country. Danish wind turbine industry is the largest in the world, having a turn-over of 4 billion Danish Crowns in 1995, of

which 3.5 billion export, and over 9000 employees (Miljø & Energi Ministeriet, 1996). In the future, the wind energy capacity will be expanded drastically. Target of the energy policy report 'Energy 21', published in 1996, is to extend the presently installed capacity of 600 MW to 1.500 MW in 2005, and even to 5.500 MW in 2030.

For the analysis of this up to present very successful development it is necessary to turn to history of wind energy in Denmark. One of the first developments in the area of wind energy in Denmark was the construction of an experimental turbine by the electric utilities in a village named Gedser in 1956. After having been in operation for some years, and having proved that the generation of electricity by wind turbines was technically quite well possible, the turbine was shut down. At that time, this way of electricity generation was not considered economically feasible.

After the energy crisis in 1974, some individuals decided to pick up the idea of wind energy again. This was the beginning of the establishment of windmill co-operatives and also of a increasingly rapid development of wind power: the yearly installation rate of wind power, having been 10 MW pa over the years 1976-84, grew to around 25 MW pa in 1985 and to 50 MW pa in 1988 (Ministry of Energy & DEA, 1990). The technical knowledge necessary for this development was supplied in particular by the 'Nordvestjysk Folkecenter', an environmental NGO where experimental designs of wind turbines and other forms of renewable energy were tested.

Important reasons for the growth of co-operative wind energy were, apart from the savings on private electricity demand, the tax deductions for co-operative entrepreneurs, the subsidies for the construction of turbines and the height of the pay-back rates that utilities had to pay for electricity delivered to the grid by the co-operative wind turbines.

In the beginning of the nineties, the rapid development of wind power seemed to come to an end. Pay-back tariffs were reduced and the costs for connection to the grid rose. Moreover, the co-operative system appeared to have come to its limits. For individuals, the share they could take in a wind turbine co-operative was limited to an amount equal to 8.000 kWh/year and share-holding was legally limited to turbines in the individual's own municipality. Since in the early days the average size of a windmill was 55 kW, providing around 80.000 kWh per year, the number of shareholders to be found was limited. With increasing capacity per turbine, also more shareholders had to be found. A solution was found here by a change of legislation, by which the maximum share allowed per person was increased, and also shareholding in turbines in neighbouring municipalities was approved.

Until 1985, the role of utilities in wind power was limited to some large-scale experimental turbines. In that year, after intervention by Parliament, Elsam and Elkraft signed an agreement with the Ministry to build a 100 MW wind turbine capacity over the years 1986-1990. A second programme for another 100 MW was agreed for the years 1992 to 1994. In 1996, a new three-year programme started in which the utilities aim to add wind turbines with a total capacity of 200 MW to the existing capacity.

The target of the first programme was achieved as late as 1992, two years after the planned date. The second programme was also delayed. As a consequence, only 140 MW of 540 MW totally installed capacity in 1994 was owned by the utilities, the rest was in the hands of co-operations. One important reason for the delays, as various people interviewed noted, was that in particular Elsam stood aloof to wind energy in the past. Elsam, on the other hand, claims that problems to find suitable locations and to obtain local approval for wind parks were responsible for the delays that occurred in the action programmes (Elsam, 1994a).

A conclusion that can be drawn from this case is that end-users as external actors were a main driving force behind the success of wind energy in Denmark. In particular the system of co-operative ownership of wind turbines, which has been actively supported by policy makers, has played an important role.

In the past, electric utilities in Denmark have been rather hesitant to adopt wind energy. The influence of policy makers was needed to get them more actively involved in this new technology, in particular to adopt the action plans for wind energy. Primary-energy suppliers do not seem to have played an important role in the development of wind energy.

It is remarkable that despite the success of co-operative wind turbines owned by end-users, utilities appear to meet difficulties in obtaining local approval for large-scale wind parks. It seems that the disadvantages of wind turbines, such as noise and adverse effects to the landscape, are easier to accept to locals if they can financially benefit from these turbines. The latter could also be an explanation for the fact that the influence end-users in theory can exert on utilities did not lead to a more active stimulation of wind energy by these companies. Another explanation could be that the indirect election system 'filters away' the positive opinions of end-users towards wind energy before the Elsam/Elkraft level is reached, where decisions over future production capacity are taken (Hvelplund, 1995).

In the field of wind energy, the constellation of sector-internal factors in Danish electricity supply up to present did not lead to a performance by utilities which can measure up to that of the co-operatives. Neither the end-user 'ownership' of utilities, the non-profit tariff system, nor the possi-

bility to pass on any investments in renewables (as well as non-renewables) to end-users via the tariffs could contribute to such an achievement.

Although there are differences in installed wind power capacity of utilities within the two systems, in particular the differences between the Elsam and Elkraft system are noteworthy. This seems to be a result of the close co-operation and integration within the two systems, which generally leads them to present one policy vision externally.

The large lead in installed capacity makes the co-operative turbines owned by end-users to a certain extent a competitor to the capacity to be installed by utilities. Moreover, the latter are legally obliged to buy electricity fed into the grid by this 'competitor'. This is particularly relevant in the Elsam region, where 83% of the wind turbines are owned by co-operations (Elsam, 1994).

Another reason for the fact that Elsam seems to be less inclined to follow national policy in the field of wind energy could be accounted to the difference in corporate culture between Elsam and Elkraft, which was mentioned by various respondents. One of the persons interviewed suggested that these different cultures could possibly be attributed to the locations of the two organisations. The location of Elkraft in Copenhagen would simplify a regular exchange of employees with the Danish Energy Agency (DEA) as an executive policy actor. Such an exchange would take place much less between the DEA and Elsam, which is located at the other side of the Great Belt, in Fredericia.

### **More Efficient Use of Fossil Fuels: Small-Scale Cogeneration**

The history of small-scale cogeneration of heat and power (CHP) in Denmark is much shorter than that of wind energy. In 1986, as a result of an agreement between the Government and the opposition in Parliament, a goal was set to install 450 MW small-scale CHP before 1995. Part of these power plants would have to use biomass (straw, wood, biogas) as primary-energy source, the others were planned to be fuelled with natural gas.

For the year 2005, a potential of 1500 MW CHP was considered to be realistic (Ministry of Energy, 1990; 1993). In 1996, 1200 MW (80%) of this long-term target was already realised (DEA, *personal communication*). Hence, the implementation of this technology seems to prosper. Long-term goal is to supply the major part of electricity and heat in future by cogeneration plants running on natural gas and partly on biomass. A goal set in 1993 is to provide 10% of total energy needed in the year 2000 by biomass (Miljø & Energi Ministeriet, 1996).

In this case the role of the utilities Elsam and Elkraft is quite different as well. In the Elsam area in particular co-operative district-heating companies are, by constructing new generation capacity and conversion of existing coal-based district-heating plants, the driving force behind the developments. In 1994 they generated almost 40% of total heat production in the Elsam region (Elsam, 1994b). As a reaction to the rapid growth of this decentral CHP Elsam announced at the end of 1995 its intention not to sign any new contracts with decentral heat producers. The argumentation for this was that, as a result of the cogeneration of electricity and heat a surplus of electricity would be generated on days at which heat demand was very high. However, an intervention of the Minister forced Elsam to pull back from its position. A protest of Elsam in this matter was not approved by the European Commission.

Elkraft, on the other hand, reacted to the CHP developments by trying to get hold of most CHP capacity in its region. Most of the heat produced in the Elkraft-area (90%) is generated in large-scale plants owned by the Elkraft utilities. Moreover, half of the small-scale capacity is also owned by these companies (Elkraft, 1995).

Similar to the case of wind energy, in this case it can be concluded that external actors - which are here district-heating companies - play an important role. Various respondents noted that for the development of small-scale CHP the aspect of competition between central and decentral generation capacity, even more than in the wind energy case, has been important to the utilities: it is possible to interpret the position of both Elsam and Elkraft as a strategy to retain a dominant position with respect to cogeneration plants in electricity generation.

It seems plausible that the difference in method used is partly determined by the difference in influence district-heating companies in either area have. In the Elsam region the latter organisations historically have a strong position, which is much less so in the Elkraft region. That makes it much easier for Elkraft to retain its dominance by trying to be involved in most new CHP capacity.

In this case also a strong influence of policy makers is found. They initiated the development of small-scale CHP and support this development since that time by a CO<sub>2</sub> levy on primary-energy sources. Reasons for this policy involvement in small-scale CHP can be found in the overall environmental policy targets, as well as in the intention to reduce dependency on imported primary-energy sources - which since 1980 has led to an increasing exploitation of the gas fields in the domestic part of the North Sea. Primary-energy suppliers as external actors only played a limited role in the stimulation of CHP.

## Management of End-User Demand: Integrated Resource Planning

Integrated Resource Planning (IRP) is a planning method aiming to systematically compare and gear demand and supply options in the electricity sector. This means that options for energy conservation by influencing the demand of end-users are included in long-term planning of new generation capacity on equal terms with supply-side options such as cogeneration plants, energy from renewables and conventional plants. By an amendment of the electricity law in 1994 (DEA, 1994b), IRP became an obligatory planning method for the Danish utilities. Up to present Denmark is the only country in the European Union where such a planning method became obligatory. Previous to the amendment Elsam and Elkraft have taken part in a pilot project in order to gain insight in the way IRP could be adapted to the Danish situation (Elsam/Elkraft, 1994).

Although the implementation still has to get shape - it was as recent as the end of 1995 that Elsam and Elkraft presented the first detailed plans for their region - the adoption of Integrated Resource Planning as the obligatory method of planning in the electricity sector in Denmark can be seen as a modest success for energy conservation by way of influencing demand.

Reasons for the utilities to start with the IRP project were, according to a report published by Elsam and Elkraft, the CO<sub>2</sub> target of Government as well as the need to pay more attention to customer relations in a future European electricity market (Elsam & Elkraft, 1994). The exact contribution of either factor is hard to determine, but the CO<sub>2</sub> target is clearly imposed externally by policy makers.

On the other hand, the second factor - the need for improvement of customer relations - seems quite well to be influenced by sector-internal considerations. Here too, in particular the market position of utilities appears important: in a future liberalised market, in which end-users can choose from which supplier they wish to buy electricity, the binding of customer is of the utmost importance to utilities.

It is therefore remarkable that end-users up to now did not have an influence on the outcome of the IRP process in Denmark. This is even more important as the outcome of an integrated resource plan is not an invariable objective fact, but strongly depends on the initial assumptions made (for instance regarding to external costs). Hence, some of the interviewed persons called the outcome of the present IRP studies into question, as these studies still foresee a very important role for coal as a primary-energy source in future.

## Conclusions and Recommendations for Dutch Electricity Supply

The ambitions for energy conservation in Denmark as expressed in the overall CO<sub>2</sub> emission reduction targets are set much higher than those in the Netherlands; 50% emission reduction in the period 1988 - 2030 is quite another dimension as compared to 3% over the years 1990 to 2020 in the Netherlands. In this light the claims made by the Dutch Third White Paper on energy look somewhat dubious. It is claimed that: 'with the goals set in energy conservation and renewables until the year 2020 the Netherlands have formulated ambitions which, as far as is known, have not been expressed or supported by policy in any other country' (EZ, 1995, p.7).

In Denmark not only more ambitious goals have been set, but also in the several fields of energy conservation significant successes have been obtained. It is perhaps for this reason that Danish authorities want to retain their influence on electricity supply in future. In Energy 21 a clear preference for renewables and CHP is expressed.

Although it is certainly not the intention to lead the way in liberalisation, presently in Denmark it is planned to liberalise the market for users with an electricity demand of over 100 GWh pa, including distribution companies. However, there are presently only six industrial end-users who have a demand above this level. Moreover, in view of the practically largely integrated situation it does not seem very probable that the liberalisation will soon result in a competition between distribution companies. First a clear unbundling would be needed to change the present, purely formally 'unbundled' situation in order to give Danish distribution companies a more independent role in the electricity sector.

Recently, Elsam has taken the initiative to an investigation into such an organisational change. Similar to the Dutch plans for the future the producers in the Jutland/Fyn region would merge, and distributors would get the shares of this production company. However, these plans have not been adopted in Governmental policy. Here energy conservation up to now appears to given priority as compared to a restructuring that is primarily directed at introducing competition. In the Dutch situation, on the other hand, one aims to attain both goals, without giving a clear priority to either.

From the analysis of the Danish case studies some lessons can be drawn for the Dutch situation. The implementation of wind energy is far behind schedule. After previous, more ambitious goals for wind energy which were set in the eighties were adjusted downward, the Dutch target

became the installation of 1000 MW before the year 2000. This goal formally is retained in the Third White Paper on Energy Policy, and it is even claimed that: 'wind energy is on schedule *with respect to cost price development and industrial position*' (EZ, 1995, p.53, italics added).

However, on the other hand Sep expects in its latest detailed capacity plan that this capacity will not be realised before 2004 (Sep, 1996).

At present, in the Netherlands wind energy is mainly realised in large-scale wind parks and by distribution companies. In 1995 more than 70% of the installed capacity was in hand of these companies, partly in co-operation with third-parties. An important impediment in the Netherlands is the local opposition against these parks.

The case study of wind energy in Denmark shows that it is important to provide opportunities to end-users to invest in renewables in their own neighbourhood rather than to utilities. In the Netherlands there is a significant potential for end-user investments in renewable energy, as the successful programmes for 'green electricity' show. Therefore it seems possible to increase local support for wind energy by stimulating end-user involvement in wind energy and limiting investments to people's own environs. In this respect, the recently extended possibilities for tax deduction of 'green' investment appear to be a modest step in the right direction.

In recent years cogeneration of heat and power in the Netherlands has experienced a major boom. In particular the installed industrial capacity has grown rapidly since the end of the eighties. Distribution companies have played a key role here. It appears that in particular the unbundling of large-scale generation and distribution of electricity, which was formally effected in 1989, has been important for this development. By setting up cogeneration projects as joint-ventures with industrial end-users, distribution companies found a smart way to keep a hold on generation capacity and to simultaneously fulfil the CO<sub>2</sub> emission reduction obligations of their environmental action plans (Slingerland, 1997).

However, as a result of an agreement in 1994 between Sep, generation companies and distribution companies the rapid growth of installed generation capacity was tempered. The fears of Sep and the generation companies that an overall surplus of generation capacity would be installed in the Netherlands as a result of the unforeseen boom in cogeneration capacity led them to buy off part of the CHP plants planned.

Compared to wind energy, in the case of CHP it is less straightforward to give recommendations for the Dutch situation based on the Danish experiences, since cogeneration in Denmark is mainly directed at

heat supply to households, whereas in the Netherlands predominantly industrial CHP is installed in recent years.

Nevertheless it is interesting to compare the reaction of Elsam with respect to decentral CHP to that of Sep and the Dutch generation companies. In the Netherlands, Sep and the generation companies brought about a moratorium and a reduced growth of CHP capacity, in Denmark Elsam was forced by a Governmental intervention to accept decentral CHP. The latter seems to be predominantly a result of the strong position policy makers in Denmark take in energy conservation, which gets shape in particular in the influential role of the Danish Energy Agency. This agency has the jurisdiction and the competence to lead the developments into a direction that has been set by Government. Moreover, it is not directly involved in any generation-, transmission- or distribution activities and hence more independent than Sep in the Netherlands, which also has to take into account the interests of its own transmission activities and that of its owners. Also, the integration of environmental and energy issues in one Ministry in Denmark, as opposed to industrial and energy issues in the Netherlands, gives an indication of the priorities in energy matters in both countries.

A strong hold on, and control of electricity supply by policy makers like in Denmark, where much knowledge and competence is concentrated sector-externally at the policy level, does not have to be incompatible with liberalisation. On the contrary, a close control by policy makers can prevent market distortions or other unwanted side-effects of this major organisational change in an early stage.

Integrated resource planning as a new planning method has been examined extensively in the Netherlands. Distribution companies, Sep and Gasunie at present work on an integral environmental plan for the energy sector. So far, however, this has not yet led to an implementation of this planning method. Despite the opportunities IRP offers for energy conservation, it seems that it is of little interest to policy makers in the Netherlands. In the plans for the future organisation of electricity supply the concept is not mentioned (EZ, 1996).

If IRP in the Netherlands would be given more attention in future, the Danish case study could show that the results of this kind of planning are - similar to the present generation capacity plans in the Netherlands - no invariable objective facts. They have to serve as the starting point of a dialogue between all parties concerned. If IRP were to be implemented in the Netherlands, it therefore appears useful to involve end-users in the

procedure in addition to policy makers and utilities. In this way any possibly one-sided outcomes of IRP studies could be precluded.

Finally, the most important general conclusion of the three Danish case studies is that particularly end-users and policy makers as sector-external actors appear to determine the direction of energy conservation developments in Denmark. Primary-energy suppliers seem to play a less important role. In the Netherlands in particular distribution companies as sector-internal actors play a main role in energy conservation.

Of the three sector-internal factors distinguished in particular the market position appears important to Danish utilities. Ownership and vertical structure seem to be of less importance in energy conservation developments: Even a non-profit system that is formally in the hands of end-users does not 'automatically' infer energy conservation as an end-user interest in the policy of utilities. Also, the close co-operation and practical integration of distribution, generation and transmission in Denmark makes that any differences between sector-internal actors are expressed predominantly as differences between Elsam and Elkraft rather than as contrasts between, for instance, generation and distribution companies.

The foregoing suggest that it would be useful in the Dutch situation to pay more attention to the position of end-users and policy makers who could, apart from, or in co-operation with distribution utilities, carry and initiate developments in energy conservation. But it is even more important that Dutch policy makers determine the respective priorities of liberalisation and energy conservation. If, like in Denmark, a clear preference would be set for energy conservation, it might even be possible in future to use competition purposefully as an instrument to attain a sustainable energy supply system at least costs.

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