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

Slingerland, S.

Publication date
1999

3. The Netherlands

First Published as: Slingerland, S. (1997) 'Energy Conservation and Organisation of Electricity Supply in the Netherlands' Energy Policy 25 (2), 193-203

In light of the present debate about the future organisation of electricity supply, the relationship between energy conservation and organisation of electricity supply in the Netherlands is examined. Three case studies of energy conservation are analysed: the development of industrial cogeneration of heat and power, the development of wind energy and the use of a so-called 'MAP levy' as an instrument used by utilities to stimulate demand reduction of end-users.

The implications of these case studies for the future organisation of Dutch electricity supply are discussed. Some measures aimed at reconciling energy conservation and liberalisation are suggested.

The future organisation of electricity supply is currently subject of lively debate. One question that stands out for the future is how energy conservation can be realised in increasingly liberalised markets. For this purpose, new organisational solutions have to be found that draw on past and present experiences in several countries. In this paper, I will describe the Dutch situation and examine the relationship between energy conservation and organisation of electricity supply in the Netherlands.

'Energy conservation' and 'organisation of electricity supply' are two terms that are familiar to most people, but when looked after more closely, their exact meaning is hazy. Therefore I will define what I mean by both terms.

As energy conservation I regard all measures that lead to a reduction in the use of fossil fuels and nuclear energy as primary-energy sources for electricity supply. With this definition, three fundamentally different forms of energy conservation can be identified, of which the

application is influenced by the way electricity supply is organised. These are:

1. reduction of end-user demand for electricity;
2. use of renewable primary-energy sources for electricity generation;
3. more efficient generation of electricity with fossil fuels.

Each of these three broad fields of energy conservation consists of a whole range of more specific individual options. However, I will examine only one case study per field of energy conservation.

Central to the organisation of electricity supply are the utilities which I will define as all organisations with as principal target generation, transmission, distribution or supply of electricity to end-users. In order to provide a basis for the description and analysis I will discern internal and external dynamics that influence the position of utilities towards energy conservation. The discussion will be restrained to three groups of external actors that exert influence on utilities and three internal factors that determine the position of utilities towards each other.

Regarding the external dynamics, I will focus on those actors that are at the beginning and the end of the electricity supply chain and those that can bring their influence to bear on utilities by way of policy. I will refer to these actors respectively as the primary-energy suppliers, the end-users and the policy makers (see Figure 3.1). In the internal dynamics, I will differentiate between the factors market position, ownership and unbundling/integration as key variables that influence the position of utilities towards energy conservation (see Figure 3.2). By the factor unbundling/integration I mean the choice to let either generation, transmission, distribution and supply of electricity be carried out by separate organisations, or to have one company carry out two or more of these tasks.

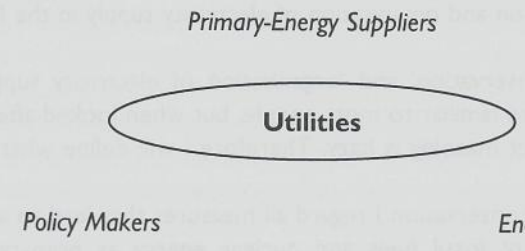

Figure 3.1 External Dynamics of the Electricity Sector

The topic of this article now can be formulated as:

1. What is the role of the external and internal dynamics of electricity supply in three cases of energy conservation in the Netherlands?
2. What lessons can be learned from these case studies for the future organisation of Dutch electricity supply?

The cases I want to examine are the recent development of industrial cogeneration of heat and power (CHP), the development of wind power, and the use of the so-called 'MAP levy' as an instrument to stimulate end-user demand reduction. After a general introduction to the organisation of Dutch electricity supply, these cases will be examined in subsequent sections. The analysis of the cases is based on literature study, documents and interviews with persons involved in Dutch electricity supply. Finally, recommendations that follow from the case studies will be discussed in the context of recently announced plans for the future of energy conservation and organisation of electricity supply in the Netherlands.

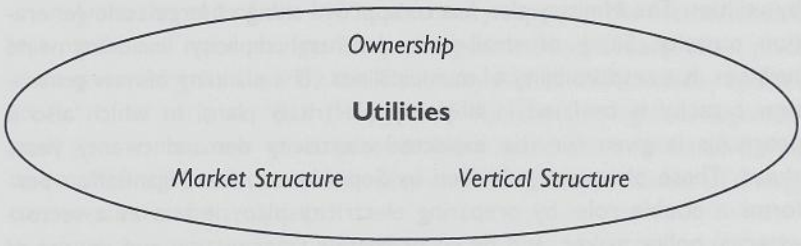

Figure 3.2 Internal Dynamics of the Electricity Sector

Dutch Electricity Supply

In the 1996 organisational model, generation, transmission and distribution of electricity are unbundled. Distribution in the Netherlands includes supply to end-users. At the moment there are thirty-one distribution utilities and four large-scale electricity generators. Apart from central generation capacity, there is also a quite high percentage of total electricity demand produced by decentral power plants. The latter are mainly industry-owned combined heat and power plants. In 1995, 25% of all electricity produced originated from decentral power plants (Sep, 1995). High voltage transmission is co-ordinated and operated by an organisation named 'Sep'.

Although electric utilities legally are separated, ties remain via ownership. Municipalities or provinces own the distribution companies in their area. In two out of four areas, the distributors jointly own the generators they are supplied by. In the other two areas, the generator is owned directly by the municipal and provincial authorities. The four generators, in turn, jointly own Sep.

Policy Makers

The Ministry of Economic Affairs is the primary policy maker in Dutch electricity and energy supply. It sets out the way electricity supply is organised by means of general policy papers and reports on specific topics, including energy conservation. Until present, three general policy papers have been published, in 1974, 1979 and at the end of 1995. Papers on specific topics are generally prepared in co-operation with other ministries concerned. The Ministry of Environment is involved in all environmental policy concerning electricity supply.

Main legal instruments of the Ministry of Economic Affairs are the obligation to approve new generation capacity and maximum tariffs set by utilities. The Ministry also has to approve siting of large-scale generation capacity. Siting of small-scale decentral capacity, including wind turbines, is a responsibility of municipalities. The planning of new generation capacity is outlined in bi-yearly electricity plans, in which also a prognosis is given for the expected electricity demand twenty years ahead. These plans are published by Sep. Hence, this organisation performs a double role: by preparing electricity plans it acts as a sector-external policy maker, and by co-ordinating transmission and import of electricity it also takes the role of an actor which is directly involved with electricity flows, thus an internal actor. Sep is also an intermediate actor in the tariff system. Costs of generators are pooled by an arrangement in which they first sell electricity to Sep and re-buy it at a national tariff that includes costs of Sep before selling it to distributors.

Primary-Energy Suppliers

Since the discovery of large domestic reserves in the 1960s, natural gas is the dominant primary-energy source in the Netherlands. In 1993, it had a share of 49% in total primary-energy consumption - which is higher than in any other IEA country. Oil, solid fuels and nuclear accounted for 36%, 12% and 2% respectively. The remaining 1% were net electricity imports (IEA, 1994). The way the inland gas reserves can best be used is an important topic in energy policy. Gasunie, a venture which is partly state owned and partly by the oil companies Esso and Shell,

is responsible for the distribution of natural gas to electricity generation companies, distributors, some large industrial end-users and foreign buyers. As such, Gasunie is an actor which also has influence on electricity supply.

End-users

Compared to other countries, Dutch industry is relatively energy-intensive, having a share of 37% in total electricity consumption. Residential and non-residential end-users account for 25 and 35% respectively (Sep, 1995). Industrial end-users exert influence on the organisation of electricity supply mainly by way of their representative bodies, who negotiate for them with the utilities. However, they also have substantial influence as decentral power producers, in particular by combined heat and power production.

Trends in Dutch Electricity Supply

Since the end of the 1980s, electricity supply in the Netherlands is in a process of rapid change. Many changes that had already taken place were given a formal basis by the Electricity Act of 1989, which replaced an Act of as early as 1938 (Huygen, 1994). But the legal arrangement itself gave rise to new developments. Here some sector-internal trends up to 1996 will be discussed that play a role in the case studies of energy conservation to be analysed.

Vertical Structure

Electricity supply in the Netherlands developed as a system in which a great variety of unbundled and integrated utilities of very different scales were active (Tellegen et al., 1996). In the 1980s, it was felt that the functioning of this system was not optimal, and changes in order to reduce the costs of supply were considered necessary. It was argued that integration of generation and distribution did not provide enough incentives to the utilities to minimise costs. Furthermore, it was stated that the objectives of power producers required another internal organisation than those of distribution companies (VEEN, 1987). It was concluded that costs of electricity supply could best be reduced by unbundling power producers from distribution companies.

This unbundling became a fact in 1988. Five power producers were formed, which in 1990 merged into the present four public electricity generators.

Ownership

Previous to the unbundling, utilities were owned and controlled directly by provincial and municipal authorities. With the separation, however, utilities were given the legal position of public limited companies, of which the shares were given in hands of the former owners. This gave in particular distribution companies a more independent position to formulate their own policy. One result was that the process of strategic mergers, which had started in the 1980s, rapidly gained momentum. The mergers reduced the number of distribution utilities from more than seventy in 1981 to only thirty-one in 1995 (Sep, 1995).

Another result was that distributors more and more started to extend their activities to areas beyond their traditional domain. Supply of in particular gas to end-users previously had become a business of many distributors due to mergers. Now some became active in waste management, telecommunications and cable TV activities as well.

Competition

One aim of the 1989 Electricity Act was to stimulate competition in power production, while a monopoly in distribution and supply to end-users was retained.

Competition between the four central power producers was stimulated by allowing distribution utilities and large end-users to buy electricity at any of the four generators. Large industrial end-users were even allowed to import electricity for their own demand from abroad. Distributors were not given this opportunity, despite protests from their side. They still had to refer to Sep for imported electricity.

Another option for competition in generation introduced, was to allow distributors to set up their own generation capacity up to 25 MW per plant. End-users were also allowed to construct capacity of any size considered necessary for their own demand of heat and electricity, and deliver the surplus to the grid. Distributors were legally obliged to buy this electricity.

In the years after 1989 it showed that the competition between central power producers did not work out as it was meant to be, mainly as a result of the tariff system. Cost pooling of electricity via Sep resulted in marginal price differences between the four generators, thus effectively eliminating incentives to 'shop around'. Due to low electricity prices in the Netherlands, neither imports were attractive (EZ, 1995).

However, the other arrangements turned out to be more successful, as the analysis of the CHP case will show. One peculiarity of the tariff system played a role there as well, which is the fact that prices charged

to distributors by the central power producers were partially determined by the share a particular distribution company had in total demand during four national demand-peaks. Therefore 'peak-shaving behaviour', reducing demand for central capacity at times the four accounting peaks were anticipated, became attractive to distributors.

Energy Conservation

Energy conservation became a policy issue in the Netherlands after the first energy crisis in 1974. In recent years, energy conservation is one of the topics outlined in the National Environmental Policy Plans (NEPPs), prepared by the Ministry of Environment. The first NEPP, published in 1989, did not yet contain a quantitative goal on CO_2 emission reduction. After a change of Government, however, only one year later an updated version named NEPP-plus appeared. In this environmental policy plan a goal of 3 to 5% CO_2 emission reduction by the year 2000 compared to the 1990 level of 174 Mt was set (VROM, 1990). The actual percentage was held to be dependent on the development of economic conditions. Simultaneously, the Ministry of Economic Affairs published a memorandum on energy conservation describing in detail the measures to be taken (EZ, 1990).

In 1994, NEPP-2 was approved by parliament. It was considered that due to economic conditions additional measures were necessary even to attain the lower, -3% goal. These were specified in a second memorandum on energy conservation (EZ, 1994).

The general policy approach to energy conservation includes voluntary agreements, - 'covenants' - with relevant groups in society as an important instrument. Groups that signed covenants with the Ministry of Economic Affairs aiming at CO_2 emission reduction include several branches of industrial end-users and the distribution utilities.

In 1990, the distributors issued an Environmental Action Plan (milieu-actieplan, MAP) as a result of a covenant signed with the ministry. It contained measures to be taken by the distribution companies which would have to result in 9 Mt of CO_2 emission reduction by the year 2000 (EnergieNed, 1990). In 1994, parallel to NEPP-2 and the second memorandum on energy conservation, distributors also produced a second environmental action plan. In this MAP-2, the CO_2 target set was almost doubled to 17 million tonnes (EnergieNed, 1994). The introduction of combined heat and power plants had to contribute for the major part to the CO_2 reduction aimed at, but also a whole range of

demand-side management measures was identified in order to stimulate energy conservation by end-users. In addition, distributors agreed to aim at supplying 3% of total electricity demand in 2000 from renewable sources.

In the covenant, it was agreed that distributors could charge a so-called 'MAP levy' of up to 2.5% on the kWh price to end-users in order to finance these energy conservation measures. Since 1996, an additional 'eco-tax' is charged to end-users. Contrary to the MAP levy, this is a regulatory levy which is not meant to generate funds for energy conservation activities. The amount charged is returned indirectly to end-users via compensatory tax measures.

Case 1: Cogeneration of Heat and Power - Industrial CHP

From the end of the 1980s on, decentral CHP in the Netherlands experienced a major boom. After having been almost constant for many years at a level of around 1500 MW, the total installed capacity increased sharply to over 4500 MW in 1995 (see Figure 3.3). By far the largest part of this capacity (around 75% in 1995) consists of industrial CHP. Goal is to install 8000 MW CHP capacity by the year 2000, which is assumed to be 40% of total generation capacity at that time (EZ, 1995).

However, in 1994 a 'moratorium' was agreed between distributors, generators and Sep. During an eight month period, no new CHP capacity was contracted by the distributors. After negotiations, the parties agreed to an arrangement as a result of which 460 MW of already planned industrial CHP capacity was postponed or cancelled (Boonekamp and Van Hilten, 1995). In this deal, Sep had to pay 85 million Dutch guilders (ecu 37 million) to industries to get the planned CHP capacity annulled (Huygen, 1994). In addition, the remuneration for end-user deliveries to the grid was reduced. Long-term contracts with fixed deliveries from central electricity producers to distributors were agreed upon and it was decided that distributors should become more involved in the central power planning of Sep (Sep, EnergieNed, OPS, 1994).

Although in 1995 installed CHP capacity was still increasing, the effects on the longer-term planning for the installation of industrial CHP are expected to be dramatic. The anticipated effects are illustrated by a quote from the annual report of 'PW/K', an organisation that acts as an independent broker between industries and utilities in CHP contracts: 'Since the moratorium, the interest of utilities for CHP has decreased. On paper, the space for CHP in contracts between generators and

distributors has been reduced. The conditions for CHP are slowly deteriorating. (...) Because the appreciation of electricity delivered to the grid is decreasing, it is obvious to construct new capacity based on electricity demand. Compared with what has been achieved in the past years, that means an enormous step back' (PW/K, 1995, p.4).

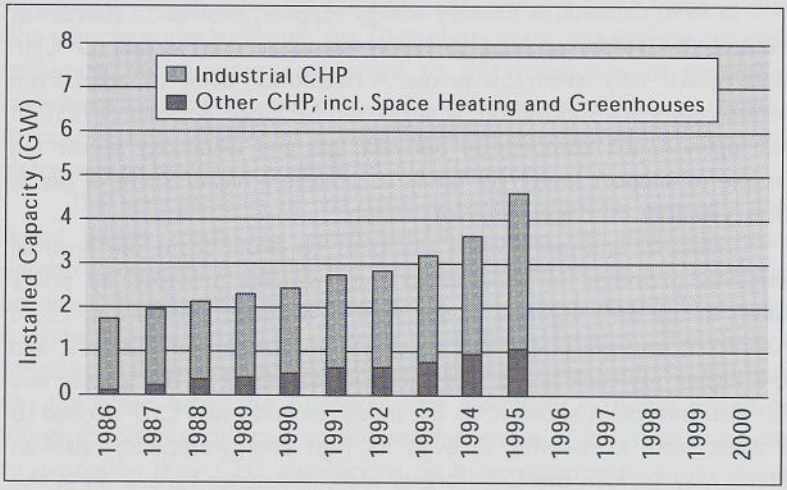

Figure 3.3 Installed Decentral CHP Capacity (Source: PW/K, 1995)

The analysis of this case falls apart in two separate questions: why did industrial CHP experience such a boom in recent years, and why did the moratorium come about? To answer these questions, I will discuss the role of the sector-external actors in this case, as well as the sector-internal factors that influenced the position of the utilities.

Previous to the unbundling, utilities were hardly involved in stimulating industrial end-users to set up decentral CHP capacity. Neither were primary-energy suppliers (Blok, 1990). Policy makers as sector-external actors were the main party to promote CHP. The developments were stimulated in particular by investment grants, tax-deductions and subsidies (Blok & Farla, 1996).

Reasons for this engagement of policy makers can be found in the fact that CHP fits very well into two policy strategies of national authorities. Firstly, due to its high energy-efficiency it greatly contributes to meeting energy conservation- and CO_2 reduction goals set in the late eighties, when climate change became an item on the political agenda.

Secondly, CHP is based mainly on natural gas, which makes it an interesting technology to provide a home-market for the large domestic gas reserves.

Despite the financial incentives provided by policy makers, however, initially the installation of CHP remained below expectations: a policy goal to install 100 MW pa, which was formulated in 1980, could not be met in the early eighties. (Boonekamp and Van Hilten, 1995).

In 1990 Gasunie, as primary-energy supplier, provided a substantial incentive to CHP by agreeing to supply gas to be used as fuel for CHP plants against very favourable prices. A reason for doing so, apart from the environmental motivation, is suggested by Moor & Boels (1995). In their opinion, the competition between gas and electricity sector led Gasunie to support lower gas tariffs to achieve a higher share of gas as primary-energy source in electricity supply.

Industrial end-users were the ones to profit from the financial incentives provided. In addition to the subsidies provided by policy makers in the early eighties, at the start of the next decade they could profit from low gas prices due to the arrangement with Gasunie, and from higher pay-back prices for electricity delivered to the grid agreed with distributors. In addition, to the industrial end-users CHP proved to be apart from cost-saving through its high energy-efficiency, also an optimal way to fulfil the CO_2 targets many industries agreed on in the 1990s in their energy conservation covenants with the Ministry of Economic Affairs. The result was that new CHP installations were increasingly based on heat-, rather than on electricity demand, which led to much larger plants to be installed than previously.

Turning to sector-internal actors, the newly formed distribution utilities had many reasons to become more active in stimulating CHP than the former utilities were.

On one hand the introduction of CHP could be motivated for environmental reasons. It was listed as an important category in the environmental action plans of distributors; more than one third of the CO_2 reduction target of the second MAP had to be achieved by installing combined heat and power plants (EnergieNed, 1994).

On the other hand, distributors could stimulate CHP for economic reasons. Here their competitive situation, ownership and the unbundling played a role. After having been formally separated from the generators and not able anymore to operate large-scale generation of electricity, distributors had to redefine their position. A major cultural change from production orientation to end-user orientation was necessary.

This process did not come about without problems. As one respondent noted: 'The separation caused quite a trauma, which the distributors up to now carry with them'.

Increased involvement in CHP proved to be an ideal way to overcome this 'trauma': it bridged the gap between control over production capacity and focusing on end-users. Since distributors were legally bound to generation capacity smaller than 25 MW, they set up CHP projects as joint ventures with industrial end-users (Boonekamp & van Hilten, 1995). The joint ventures legally left the CHP plants in the hand of the industrial end-users, which were not bound to this restriction of generation capacity as long as they used part of the electricity for their own demand. By contractually agreeing to buy the surpluses distributors had a strategic alternative to buying centrally produced electricity.

The arrangements of the national tariff system for centrally produced power made this particularly important. By maximally using decentral capacity at times the four accounting peaks for electricity produced by the four generators were anticipated, distributors could considerably save costs of centrally produced electricity. Therefore, if possible, peak-shaving use of CHP was agreed in joint venture contracts. On the other hand, the guarantee that electricity surpluses would be bought by distributors gave an additional incentive to industrial end-users to dimension their CHP installations on heat, rather than on electricity demand.

Due to the cost-based tariff system the installation of CHP led to what can be called a vicious circle in favour of decentral capacity: the installed CHP reduced demand for centrally produced electricity. Hence, costs to produce this electricity had to be divided over fewer kWh sold. As a result, tariffs for centrally produced electricity would increase, making decentral capacity even more attractive to distributors.

Perhaps the best illustration of the appeal of CHP to distributors that developed in the early nineties is given by comparing the goals they set in the first and second environmental action plan. In the first plan a CHP goal of 3300 MW in the year 2000 was set (EnergieNed, 1990). Hardly four years later, this target had been changed into 5900 MW, excluding an additional capacity for district heating of 1600 MW (EnergieNed, 1994).

Nevertheless, in 1994 the distributors agreed to the moratorium mentioned previously. An important incentive to distributors to support the agreement was that in this way they became involved in central power planning, which substantially increased their influence. The pact

between the three parties replaced a situation of fast, although less controlled growth of decentral CHP by one in which the developments were slowed down and larger CHP units were included in central planning.

Sep and the central power producers took the initiative for this agreement, which was justified by stating that otherwise an overcapacity in future electricity supply would result (Sep, OPS, EnergieNed, 1994). Sector-external parties were not directly involved: policy makers did support the settlement, but left the initiative to the sector-internal parties. Primary-energy suppliers neither were drawn into the negotiations, nor were industrial end-users. The latter were very much opposed. In their opinion, the anticipated overcapacity was a result of the 'misplanning' by Sep (SIGE, 1995). Only by compensating the industries involved by a large financial transfer from Sep their approval could be obtained. Obviously central power producers as sector-internal party were in favour of the agreement, which left their existing and planned capacity, as well as electricity imports largely untouched. It is quite remarkable in this respect, that at about the same time the CHP agreement was concluded, it was decided to extend the operation period of the nuclear power plant Borssele, which has a capacity nearly equal to that of the CHP capacity postponed or cancelled.

It is likely that alternative solutions to the 'overcapacity problem' would have been possible which would have been more in favour of the energy conservation option CHP. The position that Sep took in this respect has been crucial. It seems likely that the multiple responsibilities of Sep, being a transmission, planning and tariff setting organisation owned by the central power producers determined its stand-point in favour of central capacity. The answer of a respondent from Sep, when asked what the relationship between Sep and the central power producers is, points in this direction: 'In fact, we are operating as an umbrella of the generation companies'.

My conclusion from this case is that policy makers, industrial end-users as well as primary-energy suppliers at the beginning of the nineties had incentives to support CHP. The awareness of climate change as an environmental problem, which arose at that time, and the CO_2 targets that were set played an important role, as well as the economic targets of primary-energy suppliers and industrial end-users. Crucial, however, appears to have been the role of distribution companies who found many motivating factors to support CHP. Their changed market position in particular, determined that CHP became an instrument in the compe-

tition between central and decentral generation capacity which arose after the unbundling. Ownership of distributors seems to have played a less important role here, although their more independent position towards their former owners after the unbundling might have contributed to the increasingly market-oriented approach followed.

The competition between decentral and central capacity was finally decided in favour of the latter, since Sep and the central power producers managed to bring about a settlement despite the remaining appeal of CHP to distributors and industrial end-users. Important in this respect appears to have been the position of Sep in favour of central capacity, which might not in the least case been influenced by its ownership by central power producers.

Case 2: Renewables - Wind Energy

Wind power forms the major part of Dutch renewable energy generation capacity. Of the 1225 TJ electricity produced by renewables in 1994, 70% was produced by wind turbines (CBS, 1994). However, the development of wind power stays far behind planning.

Dutch Governmental policy on wind power started in 1975, when a first national research programme was initiated. As a result of the experience gained, in 1981 a policy goal was formulated to install 1500 MW of large-scale, and 350 MW small-scale wind power capacity by the year 2000 (Beurskens, 1984). A second research programme started in 1982. Due to the perceived economic and siting constraints, however, in 1985 the potential for wind energy to be installed by the year 2000 was adjusted downward to 1000 MW (EZ, 1985).

This goal was maintained in the 1991-95 third research programme, in which the newly formed distribution companies played a dominant role. As part of their environmental action plans, distributors agreed to a 'Wind Plan', which contained the goal to build 250 MW of wind turbines by the year 1995. Also, it was agreed to have renewable energy, including wind, supply 3% of total electricity demand in the year 2000 (EZ, 1994). Activities were to be financed predominantly by way of the MAP levy.

A recent incentive to wind power, and renewable energy in general, are the so-called 'green electricity schemes' of distribution companies. These give end-users the choice to pay a higher tariff for their electricity which is used by the distributors to stimulate renewables, including wind energy. The schemes are marketed as the sale of

renewable, 'green' electricity to customers and are controlled by environmental organisations. So far, the green electricity schemes seem to develop successfully. Many more households than anticipated have shown interest and the number of distribution companies that offer this possibility is likely to increase in future.

Nevertheless, in 1995 in total only 255 MW of wind generation capacity had been installed, of which 100 MW were installed in 1995 (see Figure 3.4). The growth in installation rate over 1995 is largely a result of the installation of one large, utility operated park. Despite this increased installation rate over 1995, however, it is acknowledged in the newest generation capacity plan that the realisation of the 1000 MW target will be delayed by at least four years (Sep, 1996).

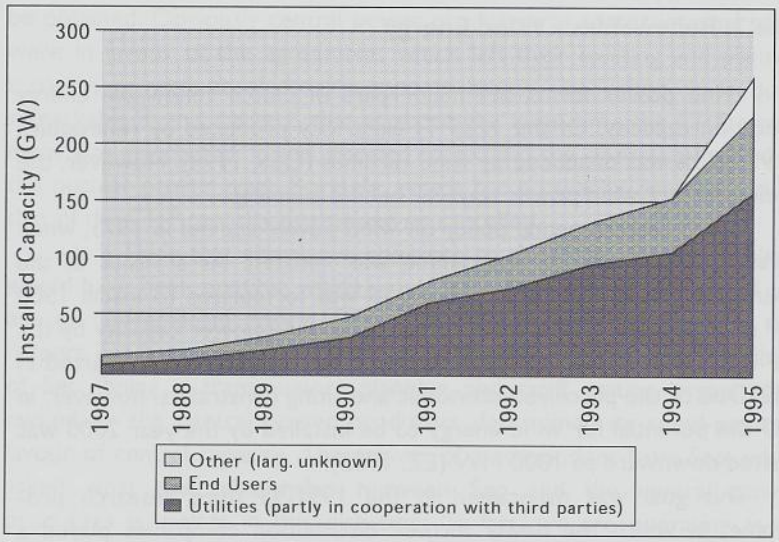

Figure 3.4 Installed Wind Power Capacity (Source: CEA, 1995)

Asked what the reasons for the rather disappointing performance of wind power in the Netherlands were, most of the respondents interviewed stated that the high costs and the difficulties in finding suitable locations were the main constraints to wind power. It appears however, that the organisation of electricity supply in the Netherlands substantially contributes to these limiting factors.

Policy makers, as external actors, initiated the wind energy research programmes and to a large extent provided the financial

resources needed by way of subsidies. Utilities were seen as the key actors who had to carry out the installation of wind power. Contrary to policy choices in other countries, end-user involvement in wind turbine investments was hardly stimulated. Recently end-user involvement is growing, but still relatively small. Of the known operators of installed capacity in 1995, at least 70% were utilities, partly in co-operation with third parties (CEA, 1995).

Utilities who wanted to build wind parks had to face lacking co-operation of municipalities, who are the policy makers responsible for siting of turbines. Most projects were rather heavily opposed by citizens of the municipalities where wind turbines were to be located (Wolsink, 1995). These municipalities generally were not identical to the ones owning the distribution companies; most turbines had to be sited in rural communities, whereas the owners of distribution companies since the fusion process mostly are larger urban municipalities. Although the exact motivations differed from case to case, the confrontation of end-users with the drawbacks of the turbines, such as noise and adverse effects to the landscape, without compensating benefits seems to have played a role in the opposition. The 'decide-announce-defend' approach that was applied in some cases by utilities has been another factor that evoked protests at the municipal level (Wolsink, 1995).

As wind is a freely available primary-energy source, obviously no primary-energy suppliers were involved in this case. However, the manufacturers of wind-turbines, as the suppliers of the 'hardware' to make use of this primary-energy source, did play a role. Research subsidies of policy makers were directed at stimulating domestic manufacturers. It appears that the concentration on the specific conditions of the Dutch market, combined with the disappointing development of both technology and market, has left the Dutch manufacturers with machines less fit for international competition (Gipe, 1995).

Initially Sep was the main sector-internal party responsible for the development of wind energy. In 1982, an experimental wind park of eighteen 300 kW machines was set up which was owned by Sep (EZ, 1985).

However, after the unbundling of generation and distribution distributors became the key party responsible for small-scale capacity. The 3% target the distributors set in their environmental action plans created an interest for distributors to construct wind capacity. Unlike CHP, though, wind capacity could not play a strategic role in the competition between distributors and generators for generation capacity, which resulted from the unbundling. Generation costs of wind power were still

considered too high and due to its uncertain character it neither could provide an alternative to centrally produced electricity. An interviewee from a distribution company noted: 'Unlike CHP, wind cannot be manipulated. Since it cannot be used for base or mid load it cannot be fit easily into electricity supply. Neither has wind been in any case cheaper than central electricity supply. CHP has.'

The lacking economic attractiveness of wind power to utilities was in particular reflected in the long discussions between utilities and end-users as private wind turbine investors about pay-back tariffs for electricity delivered to the grid. Since the tariff system in the Netherlands is cost-based, these tariffs are based on avoided costs for central electricity production as a result of the electricity supplied to the grid by wind turbines.

Sep, as the initial party involved in the negotiations with the wind energy producers, held that as a result of the uncertain character the capacity replacement component, or 'capacity credit' of wind power had to be very low. Avoided costs were to be based on saved fuel mainly. Later, based on measurements of average wind force in several areas, this capacity replacement component of wind power was increased. Distributors then had become the party involved in the negotiations (Wijk, 1990). Nevertheless, compared to other countries pay-back tariffs in the Netherlands are still very low. In 1994, in the Netherlands the buy-back rates were 55% of consumer prices, in Germany 85%, Denmark 142% and the United Kingdom 189% (WPM, 1994).

As a conclusion, of the external actors policy makers in particular did determine the direction of the developments. They assigned utilities as the key party responsible for wind power and gave domestic manufacturers the responsibility to provide the turbines needed for this primary-energy source. End-user involvement was hardly promoted. Apart from the technology, which developed more slowly than expected, an important external fail factor was the role of municipalities as local policy makers took regarding siting, influenced by citizen protests.

Other reasons for the lacking success of wind power can be found in sector-internal factors. Neither before, nor after the unbundling wind power could contribute to the market position of utilities due to its high costs and uncertain character. The municipal ownership of distribution companies could not contribute to alleviate protests against utility wind power projects either, as municipalities owning distributors and municipalities where wind turbines were to be sited generally were not the same.

Case 3: Demand Management - The MAP Levy

Most activities that are directed at reducing the overall energy demand of end-users are not commercially attractive to the distribution companies. In order to have distributors carry out such activities, these have to be financed externally. In the Netherlands, this is done predominantly by way of the 'MAP levy' charged to end-users. Rather than to discuss one of the various rather specific demand reduction options which are carried out by distributors, I want to examine the use of the MAP levy as an instrument to stimulate demand management.

When the environmental action plans of the distributors were introduced in 1991, they were allowed, as a result of the covenant with the Ministry of Economic Affairs, to finance these programmes by a levy. The range of this levy presently can vary between 0.5 % and 2.5 % of the total bill. The average percentage charged is 1.8%, but there is substantial variation between the distribution companies (EnergieNed, 1994).

The MAP levy generates funds which are collected, administered and spent by the individual distribution companies themselves. The total sum collected in 1995 amounted to 293 million Dutch guilders, or ecu 127 million, of which 142.5 million guilders (ecu 62 million) was collected by the levy on electricity (see Table 3.1). The distributors can freely decide on what CO_2 emission reduction activities they want to spend the levy on. These activities include supply-side options, such as renewable energy, and demand-side options, for instance subsidies on efficient lighting, heating and insulation, as well as information and education.

Table 3.1 MAP Levy. Receipts and Expenditure by Distribution Companies in 1995 (Source: EnergieNed, 1995)

(Million Dutch Guilders)	**In**		**Out**
MAP levy on Electricity	132	Residential	117.2
MAP levy on Gas	142.5	Non-Residential	94.7
Distributors' Funds	0.8	Renewable Energy	45.1
Other[1]	17.7	Mutation Reserves	36
Total	293		293

[1] Including interest, corrections of other years and other receipts

The way the MAP levy has been spent has been subject of much debate in recent years. It has also been used in the past for instance to finance CHP activities, to clear polluted soils of utility owned property and even to sponsor a football club to promote energy conservation.

End-users in the small-scale commercial sector, represented by their umbrella MKB (*'Midden en Kleinbedrijf'*), have argued that they had to pay much more than what was actually returned to them by way of energy conservation activities for their sector. Also, the height of the reserves built up has been criticised. In 1994, total reserves acquired since introduction of the levy amounted to 200 million guilders, ecu 87 million (Kuys *et al.*, 1996).

Recently one distribution utility has announced to stop charging the MAP levy to their customers (NRC, 1996). It was announced that the eco-tax and green electricity schemes would provide sufficient basis for energy conservation activities. The reserves built up, in addition, would help meeting the announced MAP-targets for the year 2000. Other distributors now are considering abolition of the levy as well.

The MAP levy was, together with the environmental action plan of distributors, established by way of covenant between the distribution companies and the Ministry of Economic Affairs as policy maker. Neither end-users nor primary-energy suppliers were engaged in this process.

The covenant was in accordance with the general intention of policy makers to give responsibility to individual 'target groups' for achieving environmental targets. To the distributors, on the other hand, the covenant gave them the possibility to keep control of environmental activities in their sector. An additional factor that might have been of importance to motivate distributors in this respect is that the Ministry of Environment at that time was investigating if independent energy conservation organisations could be set up (Dinkelman, 1995).

As a result of the covenant, distributors gained great liberty to initiate CO_2 reduction activities with the funds acquired. Integration of electricity and gas distribution, as well as the increased activity in fields beyond the traditional core business of distribution companies played a role to match environmental with commercial activities. Only in this way it was possible for them to initiate activities concerning electric lighting and equipment, as well as gas heating. Their increasing involvement in waste management made it possible to list the use of landfill gas as one of the CO_2 reduction activities in the environmental action plans. It seems likely that the more independent position of distributors from their public owners after the unbundling, and the increasing concern about their competitive situation as a result of the anticipated liberalised market have been supportive here. 'The environment becomes a market' was the topic of a recent conference held by distributors in which the relationship between environmental and commercial activities was discussed. It was concluded that environmental activities had become an

integral part of the business of distribution companies (EnergieNed, 1996).

On the other hand, the lack of involvement of end-users and control by policy makers on the way the MAP levy funds are spent in some cases appears to have tempted distributors to pay more attention to their competitive situation than to the energy conservation targets of the action plans. This resulted in some activities of which it is rather questionable if these should be financed from the MAP levy. It also made the building up of large reserves possible, and led in particular MKB as representative of small-scale business to complain about MAP levy spending.

The large degree of freedom of distribution companies to decide about energy conservation now has even brought one of them to the point to announce to stop charging the levy. Since this company can meet its conservation targets without the levy, it is considered no longer useful. Apparently, any energy conservation that exceeds the announced goals is regarded as redundant and is given up to improve the competitive position of the distribution company by charging lower tariffs to customers. The signal to other distributors is clear: if one company can improve its competitive position and reduce its tariffs by abolishing the MAP levy, why shouldn't they do the same? One respondent from a distributor illustrated this by saying that for the MAP levy to succeed 'more discipline' between distributors would be needed.

It is difficult to conclude whether the MAP levy is a success as an instrument to stimulate demand management. Distributors claim that their environmental action plans - and hence the levy - are successful, while others (e.g. Gilijamse and Tellegen, 1995) argue that the energy conservation activities mainly a continuation of actions that were carried out already before the plans and the levy were established.

In any case, end-users nor policy makers have had much influence on the way MAP levy funds are used by distributors. Primary-energy suppliers were not involved in this case. The apparent increasing importance of market position to distributors after the unbundling in determining how MAP levy funds are spent has positive as well as negative sides: The large flexibility in collection and spending of the MAP levy allows distribution companies to gear energy conservation to their other business activities and select the most cost-effective measures. Ownership has played a supportive role here, since the process of mergers and the broader range of commercial activities has increased the range of CO_2 reduction possibilities individual distributors could chose

from. On the other hand, there is a danger that the market position becomes dominant in the consideration what demand reduction and energy conservation activities should be carried out.

The Future - Discussion and Conclusions

Despite all energy conservation measures taken, up to present it is quite uncertain whether the CO_2 reduction target for 2000 will be met. New measures to stay 'on track' had to be announced in 1995 (VROM, 1996). Goals for the period after 2000 were set in a recent policy document. The 'Third White Paper on Energy Policy 1996' aims at a stabilisation of CO_2 emissions over the years 2000 to 2020 (EZ, 1995). In that period, energy efficiency has to improve by 33%.

Regarding CHP, it is noted that a capacity of 14,000 MW in 2020 'seems feasible', of which industrial cogeneration has to contribute the major part. Also, for 2020 a target of 10% renewables in total primary-energy supply has been set in this paper. Onshore wind power capacity is expected to rise to 1500 MW, which possibly will be supplemented by an 'exceptionally large potential of off-shore wind energy'. The future of the MAP levy is laid down in the new Energy Distribution Act, which at the moment of writing this article still has to be passed by the First Chamber of Parliament.

These energy conservation targets are accompanied by suggested organisational changes which are intended to liberalise the market. Goal is the stepwise introduction of free choice of supplier to all end-users. Power production will be further opened up to competition by providing a free access to the grid to all parties interested. Simultaneously, however, the four existing central power producers will merge together with Sep to one organisation.

The first question posed at the outset of this article, concerning the internal and external dynamics of electricity supply has been outlined in the individual case studies. To give an answer to the second question, which lessons can be learned from these case studies for the future organisation of electricity supply in the Netherlands, I will return to the examined case studies.

In the CHP case it has been argued that, of the sector-internal factors discerned in particular the competition between distributors and generators has been a crucial factor to the success of CHP. This competition was made possible in the first place by the unbundling of distri-

bution and central power generation and was stimulated by several factors, including incentives provided by the tariff system. It has also been indicated that an important impediment to the development of industrial CHP has been the link between planning and central power production. It seems that this integration, by way of ownership, of Sep and central power producers has influenced the decision in favour of central capacity at the moratorium.

Since industrial CHP has to be the major contributor to the 14 000 MW in 2020 anticipated, it is crucial that the development of this energy conservation option is not impeded by organisational arrangements. However, contrary to what appears recommendable from the CHP case study, the links between distributors and central power generation are tightened again as distributors will become the sole shareholders of the one generation company that is to be formed. It is likely that this will not contribute to stimulate competition between decentral and central power production. Even more remarkably, Sep will become part of this generation company. As Sep will retain its grid operation function, in order to prevent even the semblance of one-sidedness it would be advisable not to establish this factual integration of central power production and transmission.

The wind energy case study revealed that distributors, who were designated to carry the wind power development, did - apart from the environmental motivation - not get additional support by the organisational changes concerning the sector-internal factors unbundling, competition and ownership in recent years. Furthermore, it was demonstrated that municipalities as sector-external actors involved in physical planning did counteract the development of wind power.

Judged by the present installation rate of wind power, the measures taken to promote wind energy clearly fall short to meet the targets set. Despite the new goals set, however, no drastic change of current policy is announced in the new White Paper on Energy. With respect to the drawbacks outlined here it is only noted that 'special emphasis lies on effective administrative co-operation between the various levels of government concerned' (EZ, 1995, p. 51). The current disappointing installation rates would suggest, however, that a more drastic organisational intervention would be needed to provide incentives in particular to municipalities for wind energy.

One possibility to do so is indicated by the way electricity supply in Denmark, and in particular the promotion of wind energy, is organised. In Denmark much more emphasis is put on the stimulation of end-users

as sector-external investors in wind turbines (Slingerland, 1997). The success of wind power in Denmark leads one to believe that this is a far more promising way to stimulate wind power than the organisational choices made in the Netherlands. If end-user involvement would be stimulated in the Netherlands as well, local pressure groups of wind turbine investors would be created that possibly could change the present hesitant position of municipalities. The success of green electricity in the Netherlands gives an indication that there is at least a significant potential of Dutch end-users willing to invest in renewable energies in general, even if no personal profits are involved.

An important instrument to promote end-user involvement in wind energy are the pay-back tariffs. In the case study, it has been shown that sector-internal parties are not keen on high tariffs. Hence, it appears recommendable to let an external party, for instance the Ministry, determine the level of pay-back tariffs taking account of the external environmental costs of all primary-energy sources. Experience in Germany, the United Kingdom and Denmark shows that this could give justification for much higher tariffs than presently applied.

An additional motive to stimulate end-user ownership of wind turbines is that in this way a competition could be created between end-user turbines and those of distributors. If the latter conclude that it is cheaper for them to set up own wind turbine capacity than to have to pay high pay-back tariffs to end-users this might give an additional boost to wind turbine installation.

The principal conclusion from the MAP levy case is that distribution utilities as sector-internal actors use MAP levy funds to gear environmental activities to their market position. This can be interpreted in two ways. The positive side of the approach chosen is that the large flexibility it allows is likely to result in a relatively cost-effective allocation of funds. On the other hand, a negative aspect arises if the competitive position of distributors becomes dominant in determining the allocation of the funds. This is particularly relevant if the collection of the levy itself becomes subject of competition. Control by an external party, preferably representatives of the end-users who have to pay the levy, seems therefore advisable.

To a certain extent, this point has been acknowledged by policy makers in preparing the new Energy Distribution Act. Distribution companies in this Act get the legal responsibility to foster an efficient use of energy by the company itself, as well as by end-users as their customers. The levy in the Act is given a legal basis and an advisory

council consisting of end-users has to be established by the distributors. Part of the tasks of this council will be to give advice about the levy charged (EK, 1996).

However, the Act only denotes a maximum percentage for the levy to be charged (2.5% of the total bill). It neither obliges distribution companies to charge a levy, nor denounces an exact percentage that has to be charged. As the case study has shown, distributors are quite likely to use this opportunity in competition with other distributors to reduce their tariffs by stop charging the levy. To prevent a domino-effect if one company is going to take such a step, it hence appears recommendable to prescribe one percentage that has to be charged by all companies supplying electricity to end-users in the Netherlands alike. In this way, a level playing field for competition can be created without giving up the environmental benefits of the MAP levy.

Finally, the three case studies have shown a picture of the organisation of Dutch electricity supply in which, apart from a varying role of sector-external actors, in particular distribution utilities play a key role in energy conservation. Although this is partly due to the selection of the case studies and other sector-internal parties put in substantial efforts as well, this important role of distribution companies in energy conservation in comparison with other countries appears to be a specific characteristic of Dutch electricity supply.

If this role of distributors is to be maintained in a future more competitive market, it is the responsibility of policy makers to see to that energy conservation and competition in this case will not conflict. However, the case studies indicate that so far the possibilities of competition as an instrument to stimulate energy conservation have not yet been recognised by Dutch policy makers. After all, it is one thing to see energy conservation and cost-reduction by introduction of competition as two separate goals of electricity supply. It is another to use competition deliberately as an instrument to find the most cost-effective way to stimulate energy conservation on way towards a sustainable electricity supply.

Acknowledgements

This article is partly based on information gained from interviews with persons working at the Dutch Ministry of Economic Affairs, the Ministry of Environment, the University of Amsterdam, the University of Utrecht, the Energy Research Centre ECN, the distribution companies EDON, ENECO, ENW, NUON and PNEM, the representing body of distributors EnergieNed and the transmission/planning organisation Sep.

References

Beurskens, H.J.M. (1984) 'The Netherlands Wind Energy R&D Programme; State of the Art' in Palz, W. (ed.) European Wind Energy Conference 1984 Hamburg *Stephens and Ass. Bedford*

Blok, K. (1993) 'The Development of Industrial CHP in the Netherlands' Energy Policy *23 (2) 158-175*

Blok, K. and Farla, J. (1996) 'The Continuing Story of CHP in the Netherlands' International Journal of Global Energy Issues, *8 (4), 349-361*

Boonekamp, P.G.M. en Hilten, O. van (1995) 'Lessons from the Development of Cogeneration' Energie en Milieuspectrum 12-95, *20-23 (Dutch)*

CEA Consultancy for Energy and Environment (1995) National Data Collection on Wind Energy; Annual Report *Rotterdam (Dutch)*

Dinkelman, G.H. (1995) The Relationship between Problems and Solutions in Dutch Air Pollution Policy 1970-1994 *Thesis, Amsterdam University (Dutch)*

EnergieNed (1990) Environmental Action Plan of the Energy Distribution Sector *Arnhem (Dutch)*

EnergieNed (1994) Second Environmental Action Plan of the Energy Distribution Sector *Arnhem (Dutch)*

EnergieNed (1994b) Results of the Environmental Action Plan of the Energy Distribution Sector *Arnhem (Dutch)*

EnergieNed (1995) Results of the Environmental Action Plan of the Energy Distribution Sector *Arnhem (Dutch)*

EnergieNed (1996) 'The Environment becomes a Market' EnergieNed Nieuws *5 (1), Jan. 1996 (Dutch)*

First Chamber of Parliament EK (1996) Energy Distribution Act *Eerste Kamer 1995-96, 22 160, nr 209 (Dutch)*

Gilijamse, W. and Tellegen, E. (1995) 'Energy Consumption in Households' Economisch Statistische Berichten *7-6-1995, 528-33 (Dutch)*

Gipe, P. (1995) Wind Energy Comes of Age *John Wiley & Sons, New-York*

Huygen, A.E.H. (1995) Electricity Regulation in the Netherlands, New Guide to Dutch Electricity Law *DSWO Press Leiden University*

International Energy Agency (1994) Energy Policies of IEA countries; 1994 review *Paris*

Kuys, M., Mierlo, B. van, Westra, Ch. (1996) Receipts and Expenditure of MAP levy *IVAM Environmental Research (Dutch)*

Ministry of Economic Affairs (EZ) (1974) White Paper on Energy *Tweede Kamer 13 122, nrs 1-2, The Hague (Dutch)*

Ministry of Economic Affairs (EZ) (1979) White Paper on Energy Policy *Tweede Kamer 15 802, nrs 1-2, The Hague (Dutch)*

Ministry of Economic Affairs (EZ) (1985) Electricity Supply in the Nineties *Tweede Kamer 18 830, nrs 1-4, The Hague (Dutch)*

Ministry of Economic Affairs (EZ) (1990) Memorandum on Energy Conservation *Tweede Kamer 21 570, nrs 1-2, The Hague (Dutch)*

Ministry of Economic Affairs (EZ) (1994) Second Memorandum on Energy Conservation *Tweede Kamer 23 561, nrs 1-2, The Hague (Dutch)*

Ministry of Economic Affairs (EZ) (1995) Third White Paper on Energy Policy *Tweede Kamer 24 525, nrs 1-2, The Hague*

Ministry of Housing, Town and Country Planning and Environment (VROM) (1989) National Environmental Policy Plan *Tweede Kamer, 21 137, nrs 1-2, The Hague (Dutch)*

Ministry of Housing, Town and Country Planning and Environment (VROM) (1990) National Environmental Policy Plan Plus *Tweede Kamer, 21 137, nrs 20-21, The Hague (Dutch)*

Ministry of Housing, Town and Country Planning and Environment (VROM) (1994) Second National Environmental Policy Plan *Tweede Kamer, 560, nrs 1-2, The Hague (Dutch)*

Ministry of Housing, Town and Country Planning and Environment (VROM) (1996) Second Memorandum on Climate Change *Tweede Kamer, 24 785, nr 1, The Hague (Dutch)*

Moor, R. and Boels, L.B.M.M. (eds.) (1995) Towards a sustainable energy supply system in a liberalised energy market; The view of the Energy Policy Reflection Group *Delft (Dutch)*

NRC Handelsblad (1996) Energy Company PNEM abolishes MAP levy *Press Release, 17/4/96 (Dutch)*

PWIK (1995) Annual Report 1995 and Plan of Work 1996 *Driebergen-Rijsenburg (Dutch)*

Sep (1995) Electricity in the Netherlands 1995 *Arnhem*

Sep (1996) Electricity Plan 1997-2006 *Arnhem*

Sep, EnergieNed and OPS (1994) Joint Vision on the Development of Electricity Supply in the Netherlands *Arnhem (Dutch)*

SIGE (1995) 'Misplanning by Sep' Energiebulletin *14 (5), Nov. 1995 (Dutch)*

Slingerland, S. (1997) 'Energy Conservation and Organisation of Electricity Supply in Denmark' Milieu *12 (1), 15-24 (Dutch)*

Tellegen, E. and Gilijamse, W. (1995) 'Energy Conservation and the Dutch energy sector' Tijdschrift voor Economische en Sociale Geografie *86 (4), 390-5*

Tellegen, E., Jong, P. de, Slingerland, S., Wijmer, S. & Wolsink, M. (1996) 'Public Utilities and Household Demand Reduction' pp 218-241 in Heerikhuizen, B. van, Kruithof, B., Schmidt, K. and Tellegen, E. (eds.) Amsterdams Sociologisch Tijdschrift *23 (1), June 1996 (Dutch)*

Veen, Vegin, Vestin (1987) Report of the Steering Committee on Reorganisation of the Distribution Sector *Arnhem (Dutch)*

Wijk, A. van (1990) Wind Energy and Electricity Production *University of Utrecht*

Wind Power Monthly (1994) Little Consensus on Pricing *10 (10), 39, Oct. 94*

Wolsink, M. (1995) 'Policy Failure in the Introduction of Renewable Energy; Wind Power in the Netherlands' in Persson, A. (ed.) ECEEE Summer Study: Sustainability and the Reinvention of Government, A Challenge for Energy Efficiency *Stockholm*