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Dutch wind power policy

Stagnating implementation of renewables

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Since 1985 the official goal for wind power development in the Netherlands is 1000 MW by the year 2000. About 200 MW had been installed in 1995 and in 2000 only about 300 MW appears to be feasible, which is far behind the official goal. Essential government choices that have made policy less effective are relying on large-scale application by utilities, stimulating capacity instead of energy yield, entanglement of energy policy and industrial policy and most of all aloofness in the process of obtaining sites. There was no programme on making sites available and there were no instruments to stimulate crucial actors in the process of decision making of sites. This started a vicious circle: economic feasibility has not been reached, because there is no mass production of turbines, which in turn is a result of the lack of available sites.

Keywords: Wind energy; Implementation rates; Policy beliefs

After the 1973 oil crisis the Netherlands initiated a policy on development and application of wind energy in 1975. Several programmes on the development and implementation of wind power have been carried out. The renewed interest in wind power finds its origin in the first energy crisis. The Minister of Economic Affairs, Mr Lubbers (later prime minister from 1983–94), radically changed the Dutch energy policy. His *Energienota* 1974 (energy policy memorandum) sketched three outlines: more efficient use of energy, more economic exploitation of resources and pushing back external dependence (*Energienota*, 1974). These policy lines are still current principles of the Dutch energy policy. The second and third lines should be supported by diversification of sources. As many different sources as possible were to be exploited, although Dutch sources were to be preferred wherever possible. Wind energy policy was started with a research programme.

Wind energy policy 1975–90

In the first national research programme wind energy (NOW1), 9 million ECU (current rates) was spent on research up to 1981. Throughout the programme the complexity of the technology involved appeared to be underestimated. Wind turned out to be a more complex phenomenon than was anticipated, and the only reliable turbines able to be built were very small. Nevertheless the results of NOW1 were seen as positive. It was estimated that 10% of the domestic electricity demand could be supplied by wind power, without the use of complicated and expensive storage systems. The environmental impact of wind turbines seemed to be relatively small and only a few obstacles were anticipated in the process of physical planning (Hack, 1986). An official policy goal was formulated as a result of the programme: by the year 2000 about 1500 MW of large-scale wind power capacity and 350 MW of small-scale decentralized applications were to be installed.

In 1982 the national development programme Wind Energy (NOW2), started and it was directed at research, development, demonstration projects and commercial application. It contained a clear choice from the start: development was to be directed at large-scale applications. Energy utilities were defined as the key actors, responsible for large-scale, centralized applications. In 1982 the Ministry of Economic Affairs (EA) and the Co-operating Electricity Producers (SEP) allocated funds for the construction of a 5.4 MW demonstration wind farm of eighteen 300 kW machines.

Beside research, funds (18 million ECU) were also used to subsidize the development of large-scale turbines by the industry. The aim was to stimulate the manufacture of Dutch turbines. For example, in 1983 the ministry ordered an engineering consultancy, an aircraft company and an electronics company to build a 3 MW turbine with an 80 m diameter rotor. The engineering consultancy designed a 1 MW prototype that was built in 1985, which is still the largest turbine in the Netherlands.

In the meantime the assessment of wind power potential was adjusted downward after including spatial variables (Table 1). The old policy target was not based on experiences with siting and building wind turbines yet, as the installed capacity was less than 1 MW in 1981. Now it was concluded that physical planning and environmental impact could create constraints for the installation of wind power capacity. A new goal of 1000 MW by the year 2000 was officially formulated in January 1985, a goal which is still maintained today as the official basis for wind energy policy.

After the two research and development programmes, a third programme started, the Integrated Programme Wind Energy (IPW) directed at market stimulation and support for turbine manufacturers. Implementation was stimulated with subsidies for installing wind capacity. The programme included 15 million ECU for industrial development and 33 million ECU for market stimulation. The assessment of the IPW was that as soon as the prices began to fall, the market would be prepared to invest in wind energy (Hack, 1986).

The market stimulation line included two subsidies. The largest one was the IPW subsidy of 35–40% of the investments in newly built turbines, issued by the MEA. The conditions for subsidy were the use of turbines with safety and operational certificates, and realization of the project in the year the subsidy was granted. The subsidy was reduced each year, in line with expected turbine improvements and a better economic performance of new windfarms. This resulted in severe pressure on the process of planning and issuing permits (see below). The second subsidy was issued by the Ministry of VROM (housing, physical planning and environment). This *MilieuPremie* (environmental bonus) contained a subsidy on capital investments in selected suitable areas and a bonus for low noise turbines of 21 ECU/kW. The subsidies on implementation had the effect of increasing competition among turbine manufacturers from Holland and abroad. The largest contribution to the capacity installed within the scope of the IPW was in the Noordoostpolder, at that time Europe's largest wind farm with twenty-five 300 kW turbines built by a Belgian constructor.

Following the IPW a new programme started for the years 1991–95, the Support Programme for Application of Wind Energy in the Netherlands (*Toepassing Windenergie in Nederland*, TWIN). Most of the 20 million ECU was spent on technology and product development (67%), the rest on market stimulation, including transfer of knowledge and research on off-shore (a future perspective). The official goals at the start of the TWIN programme in 1990 remained the same. Figure 1 shows the official perspective in 1991 of the amount of new turbine capacity per year that would be installed according to the official goal of 1000 MW by the year 2000 and the intermediate TWIN goals of 400 MW in 1995.

Table 1 A selection of wind energy potential studies for the Netherlands

Study	Potential capacity (MW)	Type of siting turbines	Type of potential
NOW1, 1978	15 000	Centralized	Meteo/site potential
NOW1, 1981	2 500	Centralized	Economic/ technological potential
Verkuijlen *et al*, 1986	4 000	Decentralized	Site potential and local demand
Arkesteijn *et al*, 1987	I 600	Centralized and decentralized	Current physical planning potential
	II 2 000	Centralized and decentralized	Flexible physical planning potential

New energy policy lines were set out in 1990. The national environmental policy plan aimed at stabilizing CO_2 emissions in 1995 at the level of 1989 and a reduction of 3–5% to be achieved in 2000 (NMP, 1989; NMPplus, 1990). Cooperation in achieving these goals was requested from several sectors and a new task was also formulated for the energy supply sector (*Nota Energiebesparing*, 1990). It was to invest in energy conservation, efficient generating techniques, in particular cogeneration, and renewables such as wind, solar and biomass. In a reaction to this new policy the utilities' introduced their Environmental Action Plans (MAP). The utilities could generate funds for their MAP with a tax on distributed electricity, which they had to invest in energy conservation and carbon dioxide reduction. Part of these funds could be invested in wind power and a number of utilities operating in the wind resource regions drew up a new project, called 'Wind Plan'. They would realize an extra 250 MW by the year 1994, bringing total capacity above 300 MW.

Wind energy potential

The goals and instruments of the wind energy policy were based on numerous assessment studies on wind energy potential. Assessments of capacity shrank in the course of time (Table 1).

Estimations of potential mostly start with a assessment of wind resources: the meteorological potential (Jahraus *et al*, 1991). The next step is an assessment of sites with high wind speed without regard for other restrictive prevailing uses. Many studies of wind energy potential were site potential calculations of this kind. Wind power potential is also determined by technical conditions, such as performance of available turbines, possibilities for grid connection, and economic conditions. A cost–benefit analysis for available sites based on the yield of energy, technical feasibility, energy prices for competing sources and implementation costs, leads to an economic potential for wind energy.

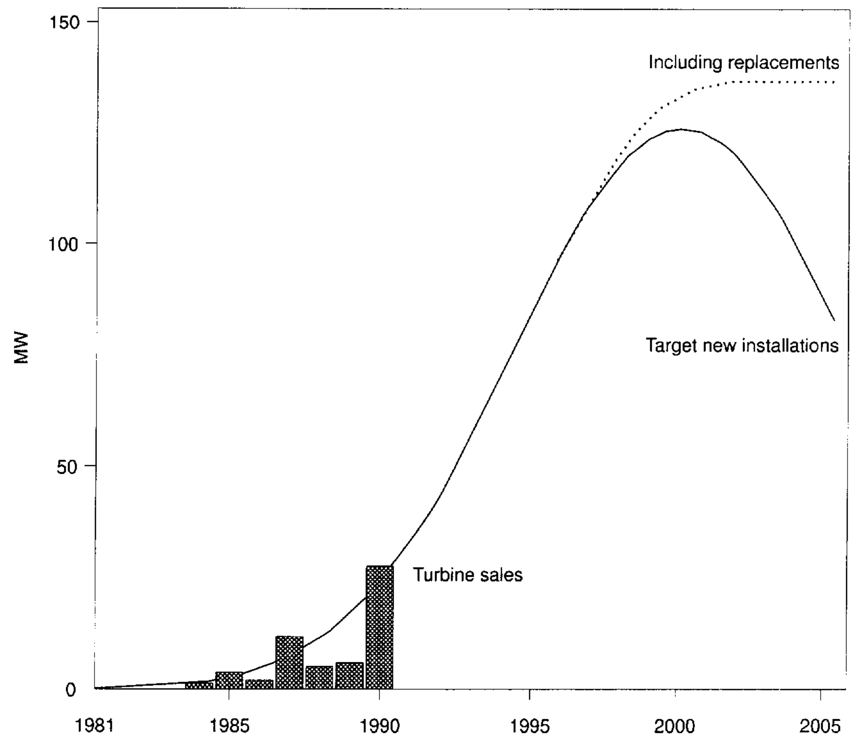

Figure 1 New wind turbines as officially projected in 1991[a]

[a]Annual wind turbine sales (MW) targets: 1995: 400 MW installed; 2000: 1000 MW; 2010: 2000 MW.

Source: Luken and De Bruijne (1991).

Most assessments end with the calculation of this economic potential and policy goals are often based on it. In Table 1 the most sophisticated potential study is shown, carried out by staff members of the Physical Planning Service of the Ministry of VROM (Arkesteijn *et al*, 1987). The lower figure of 600 MW is the assessment of capacity that may be sited without problems from the physical planning point of view. The higher figure of 2000 MW calls for flexible planning conditions. At that moment it would have been reasonable to conclude that the official wind energy policy goal of 1000 MW would not be reached without measures being taken to make many new sites available.

Implementation of economically feasible innovations may not be taken for granted. Technical and economical calculations of potential resources often still tend to overestimate the actual resources. Calculated economic potentials are not by any means a direct indication of the capacity that will be realized in practice. The decisive factor is 'the motivation of the operator to invest in this technology, and the acceptance of the utilization of wind energy by investors, but also by the public' (Jahraus *et al*, 1991, p 527).

At the ministries of EA and VROM it was believed that almost any site that was considered appropriate for wind turbines could actually be used for building them. In 1991 the organization managing the governmental stimulation programme stated that wind energy had a great future. 'The prospects for the application of wind energy are favourable. It has already been established in the past that in the Netherlands, despite its high population density, the potential for wind energy permits a substantial wind capacity in the country' (Luken and De Bruijne, 1991). In 1991 the idea was that the potential for wind energy as calculated from wind resources, economical conditions and physical planning constraints could actually be realized (Figure 1). The official policy beliefs were fortified by a favourable public opinion on the application of wind energy. When people are asked what they think of wind power as such, a large majority (about 90%) react positively, an indication of a general popularity of wind power (Wolsink, 1989).

Most siting studies translate the question whether or not the sites needed for the 600 MW are actually used by investors and made available by society, in terms of physical planning. They concentrate on physical planning aspects and physical planning procedures, in particular formal conditions for building permits, environmental standards (such as noise standards) and the procedures for getting these permits. National government policy was based on the expectation that local authorities, who decide on site selection and building permits, will consistently decide in favour of wind energy installations. The earlier quotation of Jahraus (1991) poses the question of whether or not local politics is allowing wind energy projects. This is the political potential of wind power.

Policies that promote wind power enjoy wide support. Several studies in various countries have shown that wind power is a popular source of energy (Carlman, 1986; Wolsink, 1988; Thayer and Hansen, 1989; Lee *et al*, 1989). In the belief that an overwhelming majority of the public

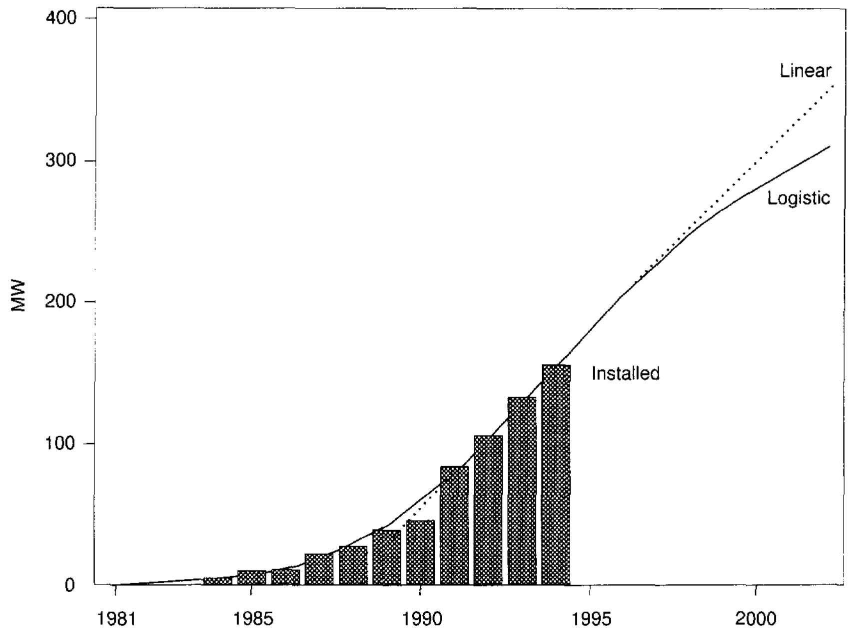

Figure 2 Assessed and existing implementation rates

supports wind energy application, it was expected that the sites necessary for building turbines would become available without trouble. Nevertheless, authorities are warned that the major constraint in the building of wind turbines is the availability of sufficient sites: 'Finding these sites is perhaps the greatest hurdle for wind power developers to overcome' (EWEA, 1991). At present, as Grubb (1995, p 181) in his study on renewable energy strategies states, 'the complex structures of the electricity system and of planning legislation have impeded clear incentives and development, and it is not clear whether the Dutch will meet their target of 1000 MW of wind energy by 2000'.

In the following sections we will analyse the policy results leading to the conclusion that problems at the local level in siting wind turbines have become the major impediment for increasing installed capacity in the Netherlands.

Policy performance

After 1985 the installation of wind power capacity accelerated. The total capacity was 9 MW at the end of 1986, one year later it grew to 22 MW. This growth included the first large 7.5 MW wind farm, which came into operation earlier than the SEP experimental wind farm from the previous programme.

Although installed capacity doubled in 1987 capacity growth in the following years was not sufficient to fulfil the intermediate goal of the programme. At the end of 1991 about 50 MW was operational instead of 100–150. As the number of new turbine installations was small, there was scarcely a home market and as a result prices for new turbines remained high. A market was urgently needed before new machines could be built in serial production, thus bringing prices down. Nevertheless the programme management and the authorities remained optimistic about long-term prospects (Figure 1). At present it is not likely that the official goal of 1000 MW will be reached.

In Figure 2 the development of installed capacity in the Netherlands is shown, accompanied by an assessment for the coming years. In the first years an exponential growth curve could represent the figures of implementation rates. However at present an accelerating curve does not fit to the data. Because there is an upper size limit to the application (the wind energy potential), a logistic curve is the most likely description of the growth in installed capacity of this renewable source (Pearce and Turner, 1990). To make an assessment the crucial issue is whether or not the maximum growth (r) has already been reached.[1] Since 1989 the growth rate remained averagely constant. In Figure 2 a linear extrapolation from 1989 shows that when growth is not slowing down installed capacity may reach the level between 300 and 350 MW by the year 2000. The best fitting logistic curve is also presented in Figure 2, showing a forecast of slightly less than 300 MW. The conclusion must be that an assessment based on existing implementation rates shows that only 30–35% of the target will probably be achieved.

To judge this performance we will compare the results to other cases. In the field of wind power the Netherlands have occupied the third place behind the USA (California) and

[1]The general model of the logistic growth curve:

$$\frac{dI}{dt} = r.X * \frac{(Max - X)}{Max}$$

with I = implementation rate; t = time; r = growth rate; Max = maximum implementation. Max was set at 600 MW, as the best assessement of potential. Best fitting curve however found with Max = 500.

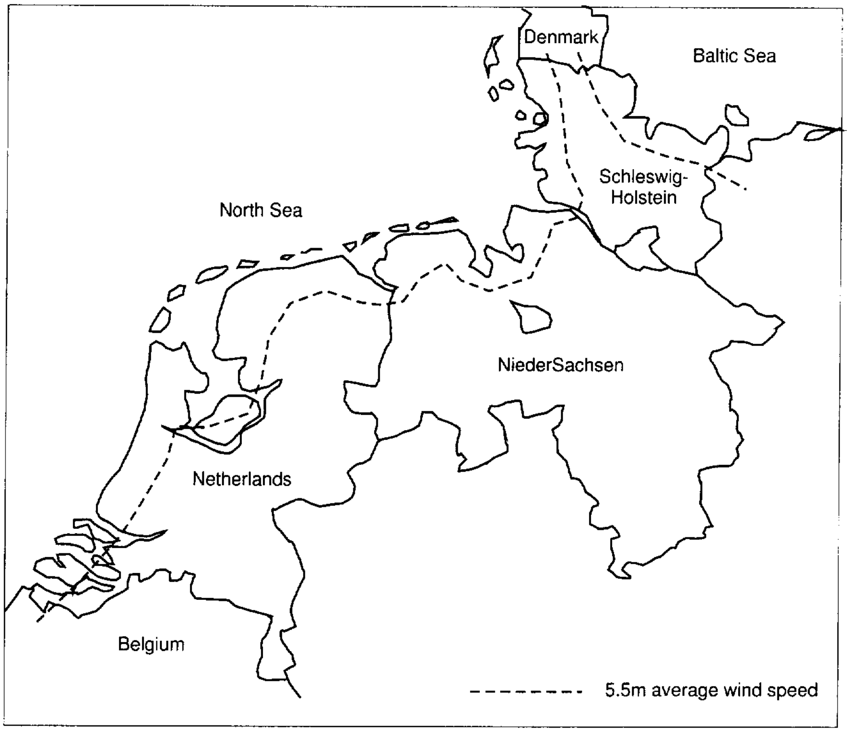

Figure 3 Comparable wind resources of Schleswig-Holstein, NiederSachsen and the Netherlands

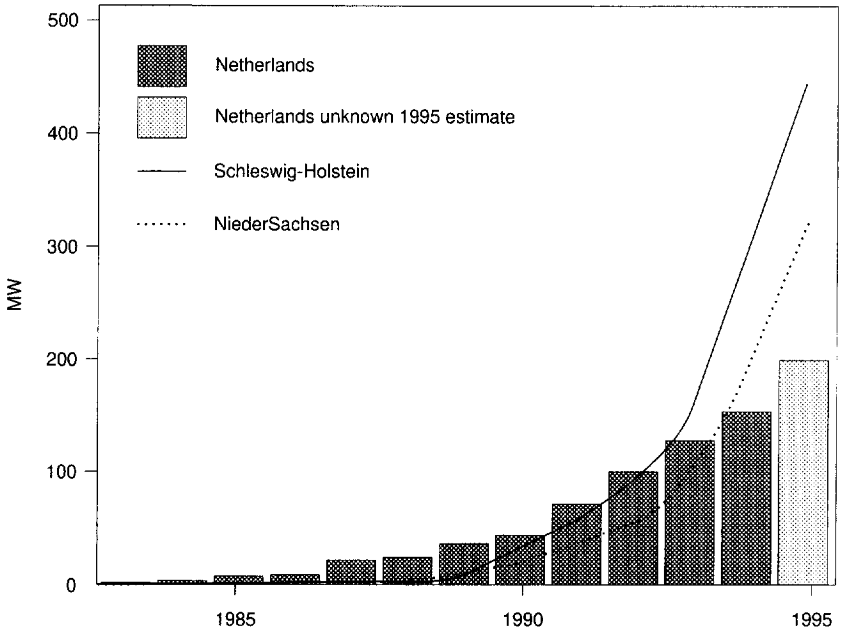

Figure 4 Implementation rates in Schleswig-Holstein, NiederSachsen and the Netherlands

Source: DEWI, Novem.

Denmark for many years. Now the Netherlands have been overtaken by Germany, the UK and India. We will take a closer look at two more or less comparable cases. The coastal German *Bundesländer* Schleswig-Holstein and NiederSachsen (Lower Saxony) have a meteorological and site potential that is comparable with the Netherlands (Figure 3). Looking at actual implementation rates the performance of the Netherlands is rather poor (Figure 4). The target for the whole of Germany was 250 MW in 1995 and this target was achieved before that moment. By the end of

1995 the installed capacity was 1137 MW (Rehfeldt, 1996, p 19). The conclusion is that the German goal was more realistic, even conservative, and their policy successful. Beside their achieved installations so far, the number of yearly installed turbines is still accelerating.

In 1994 the new Dutch government proposed large new cut-backs on all budgets as a part of an overall update of energy policy officially starting in 1996 (*Energienota*, 1995). Within the budget of EA the largest cutback in expenditure occurs in the field of energy policy. All subsidies on energy saving techniques (32 million ECU) and all subsidies on wind energy (17 million ECU) were discarded. Even the mid-term assessment of wind power capacity as presented in Figure 2, is based on continuation of certain forms of market stimulation, needed as long as energy prices stay at the present low level. Now the subsidies disappeared in 1996 and many investors in wind energy, primarily the utilities, become even more hesitant in investing in wind power. Without an alternative policy replacing these subsidies even the 300 MW target may prove illusory. In the official policy the targets remain ambitious. In 2020 renewable energy should take 10% of the total energy demand, which means about 2500 MW installed capacity for wind power (*Energienota*, 1995).

Essential policy choices

Utilities and large-scale application

According to the new Electricity Bill of 1989 the electricity distribution utilities are responsible for electricity generating units below 25 MW. They should become the major investors in wind energy. Although the first investors in wind power were private, one of the basic choices in the Dutch policy has always been that wind power capacity should preferably be built by utilities.

The decision for concentrating on large-scale application and of high responsibility for utilities was made at the start of the NOW2 programme in 1982. At that moment there were no reliable large-scale turbines. The main responsibility was given to SEP, which had hardly any experience with small-scale generation. Their experimental wind farm suffered from many setbacks at the planning and building stage as well as when it was operational.

Within the scope of the utilities' Environmental Action Plan (MAP) a 250 MW Wind Plan was set up, but it completely faltered because of the problems utilities face when they need sites. Utilities do not have experience with small-scale physical planning and local politics. Relying on short-term capital subsidies they started projects from a perspective that is creating many conflicts at the level of local politics (see below). Another problem was that Wind Plan operated as a monopolist toward turbine manufacturers. In Wind Plan technical requirements were dictated that were rather uncommon and manufacturers faced many problems in meeting these requirements (Gipe, 1995). The choice for large-scale application was made too early and it was one-sided. Small-scale application by private investors, which would have created a home market like in Denmark, was not stimulated.

Subsidies on capital investment

The primary goal of the wind energy policy is described in terms of planned capacity. Generator capacity is only an instrument for creating energy yield. From the start subsidies were directed at installation of capacity. Indeed, from 1985 these subsidies did stimulate the construction of wind turbines, but there were also disadvantages to this kind of subsidy. There was only a subsidy on capital investment, no incentive for performance. 'The capital subsidy led Dutch manufacturers to artificially boost the kilowatt rating of their turbines to maximize the subsidy' (Gipe, 1995). This system existed until 1991, when it was changed into a capital subsidy on the rotor swept area. Although this is a better indicator for energy production, the subsidy still leads to non-optimized investments, because the performance of the turbine in terms of energy yield is less important than the investment subsidy.

Subsidies targeted on energy yield, particularly incentives based on kWh production, have proven to be more effective. In the number one country in Europe, Denmark, application has always been ahead as a result of electricity rates. Most small turbines in the seventies and eighties were grid connected private machines. The rates for electricity delivered to the grid (buy back tariff) are very low in the Netherlands compared to all other major wind energy countries. This is crucial as the price paid to the utility at moments of low wind speed is much larger than the money paid by the utility for the same amount of energy supplied to the grid at moments of high wind speed. In 1994 Dutch buy back rates are 55% of consumer prices. This was very low compared to Germany (85%), Denmark (142%) and the UK (189%).[2] These are the countries that perform better on wind energy.

The main reasons for better prices paid for wind generated electricity are to be found in the external costs of the various kinds of electricity generation. The comparatively high rates in Germany for example, are based on the recognition of high external costs for non-renewable, mostly fossil fuel generated electricity. These external costs mainly concern the environmental impact of coal, oil, natural gas and nuclear power (Hohmeyer, 1992). Whereas in most countries some kind of external costs are included in the buy back tariffs, the Netherlands has no tariff regulations for renewables, not even based on the more conservative avoided costs approach (van Wijk, 1990). So negotiations about buy back tariffs have lasted more than ten years. In 1982 these discussions concentrated on the capacity credit of wind power, as theoretical statistical studies indicated wind power capacity might be taken into

[2]*Wind Power Monthly*, Vol 10, October 1994, 'Little consensus on pricing', p 39.

account in planning generating capacity (Hasslet and Diesendorf, 1981). The electricity producers held the view that the capacity of wind turbines could not be counted as the production is zero during calm. In later years simulation studies based on time series analysis of energy demand, supply and wind data proved that the capacity credit of wind power in the Netherlands is about 18.4% (van Wijk *et al*, 1990). The discussions did not lead to a significant rise in the buy back tariffs, because decisions were left to the electricity supply sector itself. The fundamental policy choice was that the utilities were made responsible for the development of wind energy. Electricity generated by private owners is competitive for the utilities' own wind power activities appears to be significant. Some utilities paid one or two cents (guilders) per kWh more for wind, but most of them did not.

Industrial policy

From the start one of the goals of the wind energy policy was the stimulation of a Dutch turbine industry. Large amounts of money were given to the industry in the R&D programmes, meant for the development of reliable wind turbines that could compete with the ones from manufacturers abroad. From 1981, when no reliable turbines from Dutch manufacturers larger than 10 kW existed, and no windfarm had yet been built in Europe, the MEA decided to promote large-scale application. The price of wind turbines remained high as long as serial production was not possible. This meant the local market had to be stimulated to buy Dutch turbines. The Wind Plan consortium of utilities also gave preferential treatment to Dutch turbines, which provoked a protest from abroad. Danish manufacturers protested against unfair competition, not in compliance with rules of competition in the European Community. In the end Wind Plan collapsed, almost killing the Dutch industry, 'leaving manufacturers with designs ill-suited for the international market place' (Gipe, 1995). All effort directed at the turbine industry was no help for wind power. Application however could have been achieved also with reliable machines already available on the international market.

Failing siting policy

For wind energy application, sites with a good wind regime have to be developed as well as reliable turbines. Available sites have to be found within the country. Nevertheless almost all effort was directed at developing technology and industry. For example, the budget for the 1986–90 programme (IPW) included only 8% for environmental problems and public planning (Hack, 1986). At the moment the Dutch wind turbine industry is still caught up in the vicious circle resulting from the lack of a good home market. Because of siting trouble the number of new wind energy projects is too small to create a market that is sufficient for serial production. So a failure in assessing the political potential of wind power also damaged the assessed economic potential. Therefore we will take a closer look at backgrounds of the siting policy.

Policy beliefs

Planning hierarchy

Because public acceptance for wind energy was high, siting policy was never considered a major problem. The following analysis of the reasons for that crucial miscalculation is based on the concept of *policy belief systems* (Sabatier and Jenkins-Smith, 1993). The basic idea in Dutch physical planning is prescriptive zoning in municipal zoning schemes with a legally binding effect. Construction and building permits have to be granted, when a project proposal fits in with an approved zoning scheme. Existing schemes seldom contain zoning for wind turbines, so they must be altered. New zoning schemes have to be designed and politically accepted before building permits can be issued. This is a time consuming process that is absolutely necessary, as building permits may not be issued otherwise.

The way of thinking at the central policy level is different from the way local policy is made. Application of wind energy is governmental policy and changing a zoning scheme is a local political decision. The policy belief at the central level is the top down hierarchy of the formal Dutch planning system (Figure 5). This idea is mainly a myth. Although central authorities have legal competence for instructing local authorities about specific parts of their zoning schemes, these powers are hardly ever used in practice. For large-scale developments, such as railway lines, roads and waste incinerators, the competence of the central authorities in the hierarchy was strengthened recently (Wolsink, 1994). This 'NIMBY policy', referring to the 'not in my backyard' syndrome, has been severely criticized. It is doubtful whether or not it will help to provoke municipalities to change their zoning schemes, in particular for wind farms, as these are relatively small facilities compared to railroads. Large-scale wind power developments would require numerous top-down instructions and these kind of interventions contradict with the principles of physical planning and legal protection of civilians (Faludi and Van der Valk, 1994).

The Ministry of VROM operated in the framework of the planning hierarchy. It had made an agreement with seven provinces with appropriate wind resources, in which a goal was formulated for all of them.[3] Provinces have the legal authority to design regional plans (Figure 5) but these only give rough indications. In a region plan the spatial use, for example areas suitable for wind energy may be indicated. Actual zoning, however, requires details which can only be determined in municipal zoning schemes and a building permit can only be issued based on appropriate zoning. Stakeholders in the decision making process of wind turbine siting are the municipalities. Although there would be a large number of relevant municipalities involved (about 200), an agreement with them would have

[3]Administrative agreement of government and provinces on the issue of siting wind energy facilities, Ministry of VROM, the Hague, July 1991.

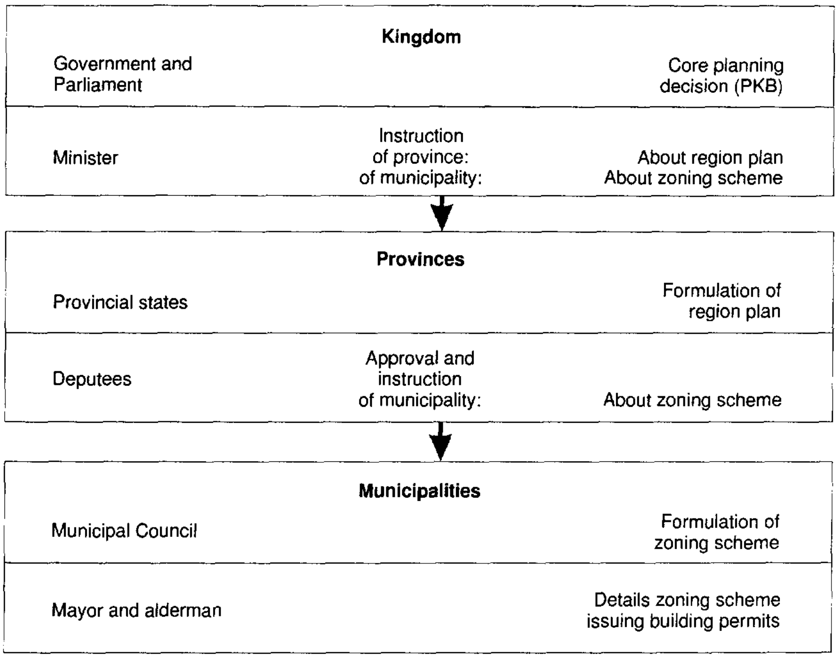

Figure 5 The formal planning hierarchy in the Dutch physical planning system

been more effective than with provinces without effective power in siting issues.

In many cases proposals for new turbines or wind farms cause intensive local public discussions. In spite of the overall positive public attitude towards wind energy, when turbines have to be sited there arise local problems of acceptance. Opposition to facility siting is usually referred to as the familiar NIMBY syndrome. This phenomenon has been analysed before in cases such as hazardous waste facilities, nuclear facilities, power plants, oil drilling etc. The content of the NIMBY concept is rather confusing, however (Freudenberg and Pastor, 1994). The popular view is 'people are in favour of wind power, but are opposed to wind turbines in their own living environs'. Since wind turbine siting appears to be problematic, the NIMBY syndrome is called the root of acceptance problems and policies are often based on this common view. It is also the policy belief of the Dutch government. The minister of Economic Affairs pointed out: 'It will be a hard job to find sites of which everybody will say: indeed the right site; of course it should not be the neighbours backyard'.[4] In parliament he stated that the new anti-NIMBY policy offered an instrument (instruction of municipalities) appropriate for siting turbines.

General attitudes and specific behaviour

A second problem is that there is an entanglement of different concepts of 'opposition'. Opposition can be defined in terms of negative attitudes, or alternatively described as behaviour: acts of resistance against new developments. Empirical research in multiple case studies has shown that the authorities as well as the initiators of projects have misconceptions about the backgrounds of local opposition (Wolsink, 1989, 1990). They assume that when attitudes towards wind energy are positive, there will be no opposition towards wind power projects. However, widespread negative feelings towards a technology, as in the case of nuclear power, are not a necessary condition for local conflicts. Legal procedures against permits may be initiated by one single opponent. Therefore public conflict over local developments has become the rule rather than the exception and this is also true for wind power (O'Hare *et al*, 1983).

Attitudes generally are positive in the case of wind energy and there is no dominant negative trend in the public debate. If the press coverage is taken as an indicator for the latter, the image of wind power projects appears to be favourable. The average picture from newspaper content is positive, without prejudice. In all cases critical notes appear in press reports as well, but positive views outnumber the negative (Wolsink, 1991). Nevertheless, newspaper content indicated also that every proposal for a wind farm has led to a public debate and these discussions always reach the agenda of the municipal counsel. The political decisions taken by these counsels are the major impediment for the acceptance of the utilization of wind energy, which is the last barrier in the assessment of wind energy potential (Jahraus *et al*, 1991). The argument of a clean energy source is only one consideration, among many others, in the trade-off for decisions at the local level.

Another point is that a positive attitude towards wind energy does not automatically imply a positive attitude to all wind energy projects. Looking at opposition as behaviour,

[4]The minister of Economic Affairs, Mr Andriessen at the opening of the EWEC '91, European Wind Energy Conference 1991, in Amsterdam.

arguments that do not concern the local situation do not have direct impact. The environmental arguments for wind power may influence wind energy attitudes, but have no direct impact on intentions of resistance or acceptance of a local wind farm. Siting wind turbines has many more aspects than generating renewable energy. The major factor in the formation of attitudes is the evaluative judgement of the visual impact of wind turbines on the landscape. The belief of wind power as a clean renewable energy source is only of secondary importance when people form their attitude towards wind energy, and it appears to be almost irrelevant when they are considering their behaviour concerning a proposed wind project in their region (Wolsink, 1990). The main factors in any specific case concern local variables, such as the type of landscape in which the turbines will be built, the scenic value, beliefs about interference such as noise, shadow flicker, and impact on birds and nature. It should be noted that this does not mean that people are suffering from NIMBYism. In the research special attention was given to the existence of NIMBY attitudes. It was found that the NIMBY syndrome actually exists for some individuals, but that it is a minor factor in the motives of most opponents. The classical phrase 'wind power is perfect, but not in my backyard' is a poor explanation for the opposition against wind power developments.

Conclusion

Concerns about building wind turbines are not of a global nature, they are always dependent on local variables: they are very site specific. Obviously the concerns about interference (mainly noise) are also dependent on the location and distance to buildings. Thus, any intentions to resist are determined by the characteristics of the selected location. They are not primarily induced by doubts about wind power as a clean energy source, nor by NIMBY attitudes. Oppositional behaviour is based on concerns about the consequences of a wind power plant: impact on landscape in the first place and hindrance as a secondary concern. These concerns become salient at the moment that a project is introduced to the public. Public and political discussions are triggered by the announcement of a concrete project. In these discussions even opinions about the use of wind power in general grow more critical in the planning phase of a project.

The combination of two policy beliefs with limited validity is the start of the vicious circle in which a lack of sites is a barrier for the development of a wind turbine market in the Netherlands. The assumption that existing generally positive attitudes will lead to support for almost any wind energy project, combined with the idea that local opposition is caused by NIMBY feelings that can easily be overruled by a hierarchical planning system, is constantly leading to stalemate in the decision making processes of many wind projects. The way a plan for a wind farm is introduced tends to be crucial. A decide–announce–defend approach (DAD) (Ducsik, 1987) as often used by utilities and sometimes by the municipality or the province, provokes opposition. Any procedure that does not offer all involved parties real opportunities for influence on projects will make people more opposed than necessary. The DAD strategy brings about an escalating conflict. For example, once confronted with public opposition, authorities and industries that have taken the initiative for a facility think that the discussion is dominated by a small group of opponents and that the discussion does not reflect actual public opinion. Thinking they have taken every aspect of the case into account in making their decision, they believe that people who remain silent are accepting the project. This is selective perception and may be called the 'planners fallacy' (O'Hare *et al*, 1983). As they act according to this belief, opponents are not taken seriously, and this has the effect of strengthening resistance.

The key question in the issue of the poor policy performance is why do government, authorities and utilities operate the way they do? Why are they planning wind farms using strategies like the DAD strategy? The first explanation may be that the delay in the implementation rates is nothing new for new technologies. Even when economic feasibility has been achieved application of new techniques or implementation of new policies may require changed social conditions. Economists have explanations for the phenomenon of a delay in reaching a new economical equilibrium that is closer to an optimum, and sometimes even why an obvious optimum outcome will not be reached at all (David, 1985). However the implementation rates of German Länder with about the same economic potential do not show such a delay.

Even large-scale wind farms are generally smaller than 10 MW, so wind energy is basically a small-scale decentralized way of generating electricity. The process of siting many small facilities is quite different from planning a few large ones. One has to deal with different actors, many more actors on various locations with different characteristics. It requires expertise in 'social engineering' and utilities do not have that expertise. Nor do central authorities have the ability to plan many small-scale units. Often they are already facing tremendous problems with planning large projects. They tend to work top down automatically, as illustrated by the agreement with the provinces. The actors that actually execute the power over siting decisions do not participate in the agreement with the central government. These processes are triggered by wrong policy incentives following from existing policy beliefs. The most essential factor that is missing in the Dutch wind energy policy is that there is no effective policy perspective for developing wind turbine sites. The result is a policy that is failing to achieve its goals. An improvement of the wind energy policy should include:

(1) a programme for making sites available in the long term;
(2) taking away the main responsibility for wind power development and the gatekeeper role from the utilities;
(3) the creation of incentives targeted at energy yield instead of capital investments, based on avoided social costs;

(4) creating an interest in wind power development for actors on the local level, including municipalities;
(5) a strict separation of wind power policy and the industrial policy towards manufacturers.

Although the ambitions for implementing renewable energy remained high, the recent reformulation of Dutch energy policy does not include the improvements mentioned (*Energienota*, 1995). Existing financial incentives are even discarded, without introducing better incentives. Because the essential site planning is based on two core policy beliefs that are not easily changed (Sabatier and Jenkins-Smith, 1993) the performance of the Dutch wind energy policy will probably not improve in the near future.

Another important lesson for policy development is that in setting goals for successful implementation, assessments of economic potential are inadequate as an indication of actually possible implementation rates. This is probably true for all efficient energy technologies, not only wind power. For example a supply side innovation like photovoltaics: a recent study on the economic potential of PV cells on rooftops calculated 40 TWh, which would be 60% of the total Dutch electricity demand (Corten and Bergsma, 1995). This cannot be a reliable assessment of the physical planning potential, nor the political potential. An example of a simple demand side innovation like fluorescent lighting offers a general picture in which implementation rates are staying far behind what could be expected using economic figures of real payback time, discount rates and product lifetime (Krause and Eto, 1988). The economic potential of fluorescent lighting in the residential sector is an overestimation of real investments by consumers, due to several barriers like transaction costs, lack of information, and psychological factors. Generally government policy on diffusion of energy efficient technologies should take institutional and psychological factors more seriously for becoming more effective.

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