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## The German Wind Energy Lobby: How to successfully promote costly technological change

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# **The German Wind Energy Lobby**

## **How to successfully promote costly technological change**

### **ABSTRACT**

German wind power development is a technological success story but has involved very high subsidies. Germany was a latecomer in wind power but specific political conditions in the late 1980s and early 1990s allowed the implementation of the feed in tariff regime which has characterised Germany ever since. The wind lobby managed to constitute itself at an early stage and to develop stable alliances with farmers and regional policymakers. The concentration of the wind industry in structurally weak regions reinforced these links. With an increased visibility of the subsidies and saturation of onshore sites in the early 2000s, the lobby has been less successful in retaining support. The current attempt to develop offshore projects may suffer from less favourable interest constellations.

**Key words:** Wind power, interest groups, technological change

**JEL classification:** Q420, Q580, Q520

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## 1. Introduction

A very effective but not cost-efficient policy has boosted renewable energies in Germany throughout the last decade. It started with investment subsidies such as the programme “250 MW Wind” and continued with guaranteed feed-in tariffs set out in the “Energy Feed-In Law“ of 1991 to be paid by regional utilities. Especially wind energy grew with double-digit rates that surprised even its hardest proponents. In February 2002, the northern German state of Schleswig-Holstein generated more than 50% of its electricity use from wind (for Germany’s installed capacity and electricity generation see Table 1). The sector quickly became a powerful lobby and managed to retain the law despite forceful opposition from energy companies operating in areas with a high potential for renewable energies. Their pressure led to a hardship clause according to which the feed-in-tariff was not applicable if the sale of regenerative electricity to the grid was more than 5 per cent of total sales of the respective energy company. In the revamped Renewable Energy Law (EEG), all types of renewable energy receive differentiated feed-in-tariffs that make them economically attractive for investors. Here a compensation model was introduced that evenly distributes the burden among the energy companies. These pass on the extra costs to the consumers, since electricity prices are no longer regulated by the Länder authorities.

**Table 1: Renewable energy in Germany 2003**

Type of renewable energy	Feed-in-tariff (ct/kWh)	Installed capacity end 2003 (MW)	Electricity production 2003 (TWh, % of total)
Wind	6.2- 9.1	14700	18.5 (3.1)
Biomass	8.7 – 10.2	1000	5.1 (1.2)
PV	50.6	400	0.3 (0.06)
Small hydro (< 5 MW)	6.7 –7.6	NA	NA
Geothermal	7.1- 8.9	0.25	0

Source: BMU (2004a)

Moreover, after the change of government in 1998 new highly symbolic investment subsidies were set up such as the 100,000 roof programme for PV. The overall amount of subsidies is shown in Table 2.

**Table 2: Subsidies for renewable energy in Germany (million €)**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Feed-in-law/EEG	301	403	551	639	1136	1540	2212	2618	3363	3760
Investment subsidy	9	9	9	102	153	102	200	190	200	215
100,000 roofs PV	-	-	-	92	113	113	113	69	70	70
Biofuels	-	-	-	-	3	5	10	10	512	512
Sum	310	412	560	833	1405	1800	2535	2887	4145	4567

Source: Ministry of Environment (2002, 2004b), VDN (2003), for biofuels from 2004 own calculations from UFOP (2004 a,b). All figures for 2003 onwards are estimates.

## 2. Starting with a failure

Germans in general have a strong environmental attitude and are willing to invest (at least moderately) in a clean environment. Just one example: Germany is today by far the most important donor of funds for GREENPEACE. On the other hand, there is quite some ambivalence in their relationship to technology. We seem to be both technophile and technophobe at the same time. The more transparent, open and understandable technology is, the more it will be appreciated. Hard to understand technologies with unknown consequences are less accepted or even violently refused. Renewable energies, because they are open and transparent, will benefit from that attitude (Welle 1997). Compared to the United States and Denmark, Germany was a latecomer in wind technology. This was due to the utter failure of the technology top-down approach pursued in the late 1970s that culminated in the multi-million Euro 3 MW “GROWIAN” (badly chosen acronym signifying “large wind energy plant” but rhymes with the German word for rowdy) built in 1983. This 100 m giant faced severe technological problems and was operational just about 500 hours. It failed due to an unmanageable leap-frog approach (everything in one step), half-hearted political support, resistance of utilities and the absence of interest by Germany's high tech industry. GROWIAN was unceremoniously dismantled. Nobody spoke of windpower for many years afterwards but without much publicity, small turbines coming from Denmark were adopted by some farmers. In the late 1980s Germany was one of the first countries to seriously discuss climate policy and thus all forms of renewable energy were revived. In 1988, the Ministry of Research and Technology started a large-scale research programme that included investment subsidies programme to install 100 MW of wind power capacity. Already in 1989 it was scaled up to 250 MW. Under the 250 MW program two options existed: either investment subsidies, which were calculated as “hub height [m] x rotor radius [m] x 400” (maximum amount 46.016 Euro<sup>1</sup> and 60% of total building cost), or operation subsidies of 3.1 ct/ kWh. This program was complemented by additional programs in many of the German federal states. The decisive element of this programme was that it gave enough long-term security to enable

<sup>1</sup> All values of the DM era are converted into Euro to facilitate comparison.

banks to lend to small operators. Moreover, without government support and unnoticed by the public environmentally oriented individuals had started to develop small wind turbines.

### **3. The roaring Nineties**

The decisive step for the rapid expansion of wind power to levels that had even not been considered feasible by the wildest wind enthusiasts was the Electricity Feed-In Law (EFL) of 1991, which gave for the first time every private operator a reliable financial basis. By this law utilities are obliged to accept power from independent producers of renewable energy. The feed-in tariff was set at 90% of the average retail electricity rate (about 9 ct/ kWh). The law was supported by all parties. Müller (2000) explains the support of the conservative Christian Democrats that were in power and traditionally not very environmentally-minded by the pressure of small hydro producers from Bavaria.

Thus despite the Danish technological advance, German manufacturers were able to exploit the incentives and dominated the market, followed by Danish manufacturers, which partly produce in Germany. Between 1982 and 1996, German manufacturers had installed 76% of total capacity. Market leaders were Enercon (29.1%) and Tacke (17.3%); the companies Nordex, Nordtank, Lagerwey and Husumer Schiffswerft all had less than 8%. The average capacity per turbine grew from 175 kW in 1991 to 380 kW in 1994 and 510 kW in 1996 (Welle 1997). Most of the German manufacturers initially were small engineering outfits that profited from the availability of highly skilled engineers that were no longer needed in the economically depressed shipbuilding industry. All companies were set up near the coast, Husumer Schiffswerft originally was a shipyard. Later, production plants in East Germany were added where qualified labour was available and infrastructure was cheap. Political support in these locations was extremely strong, as wind energy enabled to diversify the economy.

A decisive element of the wind expansion drive in Germany was the alliance that formed between several interest groups on a very early stage. Wind plants were planned and financed by small associations, initially predominantly by farmers. Farming has long been heavily subsidised in Germany but nevertheless declines consistently. Seeing the possibility of additional revenue from using a tiny portion of their grazing land, dairy farmers near the coast embraced wind eagerly. The farmers dominated the local policymaking and thus were able to get wind projects approved quickly. 95% of wind plants in Germany have utility-independent private ownership (Scheer 2004b). The lack of the involvement of large banks or companies from the cities prevented a NIMBY-type backlash that was prevailing in the UK at the same time. This group was strengthened by parliamentarians that saw renewables as salvation to a



world crisis. Particularly the social democrat Scheer is known for his strong views that equate fossil power with suppression of labour interests (Scheer 2004a). Quickly wind energy got the same planning rights as large fossil power stations.

In the mid 1990s, the explosive growth of the wind capacity made some politicians uneasy about the swelling volume of subsidies. Utilities stepped up their pressure and business reporters criticised the system (e.g. Lampe 1998). The EFL was retained in 1997 only after a big effort by the German Wind Energy Association (Bundesverband Windenergie, BWE) which argued that the abolition of the subsidy would lead to job losses of several thousand located in structurally weak regions. Welle (1997) estimated that at that time the German wind industry employed about 5.000 people directly and that some 5.000 additional indirect jobs had been created. With growth rates of about 80% per year it was one of the fastest growth segments within mechanical engineering. BWE joined forces with trade unions (metalworkers have traditionally been a strongly organised) and the agricultural lobby and managed to get 4000 people to Bonn for a protest march. The success made BWE a strong lobby group with 40 regional groups, in 2003 it had 16,000 members (BWE 2003a).

In the second half of the 1990s the financing structure of wind projects changed. Now the tax-saving funds came into the fore. They collected money from many people that formerly became shareholders in the wind projects. For example, the company Energiekontor collected 120 million Euro and built 57 wind projects within 10 years (Asendorpf and Rauner 2004). As the expenses could be fully deducted from income tax and the EFL allowed to project double-digit rates of return, this vehicle was very powerful. However, the ever larger projects started to mobilise the first NIMBY protests.

Another important fight was waged by the German wind lobby on the EU level. It opposed a directive by the EU of doubling the renewable energy production in member countries by 2010 and was based on a quota system. Christophe Bourillion, executive director of the EWEA criticised the BWE, citing liberalisation of the European energy market as inevitable. The directive would give wind a level playing field while we develop to full maturity and become more competitive. He noted that Germany would have had until 2010 to reform its current fixed-price wind power programme (Asmus 1999). In the end, the German position prevailed and the directive allowed all types of national incentives. A European Court case against the EFL was also dismissed in 2001.

The EFL did not provide an incentive to reduce costs of windpower as the guaranteed price level made it more profitable to churn out a maximum of turbines than to focus on cost-saving innovation. Therefore, the producers concentrated on offering ever bigger turbines without

lowering the costs. Actually, in the second half of the 1990s, costs rose when the MW barrier was breached (see Morthorst and Chandler 2004, p. 130<sup>2</sup>).

#### **4. The Renewable Energy Law**

Due to the liberalisation of the electricity markets, retail prices started to plummet in 1998. Therefore, the wind lobby called for a legal basis that would abolish the link to retail prices. They argued that banks were stopping to lend to wind power projects (Müller 2000). Parliament started to debate a successor, the Renewable Energy Law (REL) that entered into force in 2000. A new element was that utilities could also get the feed-in-tariffs.

In 2001, economics minister Müller launched an outright attack against the REL. BWE hurriedly commissioned a study to prove that the average cost of the REL amounted to just 0.1 ct per kWh and would only rise to 0.2 ct in 2010 (Krzikalla 2001) Müller's successor Clement stepped up that fight and called for a quota system. The Ministry of Environment wanted to decrease the feed-in-rates by 1.5% per year. Clement called for a 15% decrease outright and then an annual rate of 5%.

Utilities joined the fight arguing that they would have to use up to 7% of energy produced as "buffer energy" to cover short-term variability of wind (Asendorpf 2002). The wind lobby fought back by stressing that it had created 35,000 jobs and was adding 3000 more each year, particularly in economically weak regions (BWE 2002). All major turbine manufacturers were indeed using the subsidies provided for industries in East Germany to build up production plants there. Moreover, it was stressed that wind power manufacturers had become the second most important customer in the German steel industry, after automobiles. The renewables lobby organised a large demonstration in Berlin (Bundesverband Erneuerbare Energien et al. 2003). Interestingly, the powerful metalworkers' trade union joined. Utilities counteracted by raising electricity prices using the additional costs from the REL as main argument. BWE (2003b) tried to refute their argument but had to concede that the cost of the REL now amounted to 0.4 ct/kWh, double the level that Krzikalla (2001) had forecast for 2010 on its behalf. BWE tried to circumvent this issue by arguing that "10 years from now, renewable energy will be cheaper than fossil fuels", without corroborating this. Nitschke (2003), still with very favourable assumptions for renewables, arrives at a period 16 years for wind power to become competitive. BEE (2003) now says that the maximum of 0.5 ct/kWh would be reached in 2006. This reminds of the classical position in climate policy: "nowadays we have problems in achieving our targets but ten years from now, everything will be easy".

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<sup>2</sup> The data relate to Denmark but in Germany the average size of plants has even been bigger (Langniß and Neij, 2004, p. 179).

Clement continued to fight against renewables and got a supporting study by the social democrat-leaning Bremen Energy Institute (Bremer Energie-Institut 2004) that argues that wind energy macroeconomically had a negative employment impact. Immediately, BWE launched a counter-offensive now claiming that 50,000 jobs had been created through wind energy and that the externalities of fossil fuels had been underestimated by the Bremen Energy Institute study (BWE 2004).

## **5. The NIMBY backlash**

In the early 2000s, the NIMBY wave has increased even if the general population largely remained in favour of wind power (for a nice overview of their arguments from a wind power advocate see Scheer 2004b). It consists of many local groups with a loose coordination by the Bundesverband Landschaftsschutz; its roots had been set in the late 1990s (Wolfrum 1997). Moreover, the media which had earlier overwhelmingly supported wind power have turned against it. The popular magazine “Spiegel” in early 2004 titled its cover story “The windmill craze” (Spiegel 2004). The story was well timed with the parliamentary discussions about the extension of the REL. Nevertheless, wind power supporters rallied, denounced the editor-in-chief for waging a personal crusade against windmills in his backyard. Even within the Spiegel editorial office emotions ran high. A senior editor quit (Seel 2004); already in October a draft article on the role of the utilities in fighting against renewables had been turned down by the editor-in-chief.

The NIMBY wave led to a change in the REL that reduced support of less attractive locations that so far had received higher subsidies. The REL revision reduces the feed-in-tariff to 5.5 ct/kWh for plants that do not achieve a certain yield. Plants that achieve less than 44% of that yield do not get any subsidy at all (v. Hammerstein 2004).

In 2002 and 2003 changes in the tax law made wind power funds less attractive for investors and therefore the inflow of money was considerably reduced.

## **6. Trading emissions trading against feed-in-tariffs**

In early 2004, the economics and environment ministers engaged in a bitter and publicly visible fight about the allocation of CO<sub>2</sub> emission allowances under the trading system to be introduced in 2005. In the end, the economics minister prevailed and the allocation was set in a very lenient way. Only a few days later, the revised REL was adopted; it contained more generous tariffs than the earlier draft and fixed the annual decrease at 2%. Media reported that

the renewables lobby managed to trade the allocation issue against the tariffs. Anyway, the renewables industry sees emissions trading as a threat to the REL.

## **7. Salvation by offshore?**

Due to the NIMBY movement and the objective exhaustion of attractive onshore sites, for the last three years the wind lobby has tried to promote offshore projects (for a detailed analysis of the discussion see Bartolomäus 2002). It argues mainly that the capacity factor is 50% higher than onshore. The government was convinced very quickly and visions took gigantic proportions. The Ministry of Environment aims at 25 GW offshore capacity by 2030 and the REL provides sizeable subsidies. The hope was to induce the large utilities to invest in such projects but so far they have not been eager to do so (Netzeitung 2004). Initially, the feed-in tariffs of 9.1 ct/kWh were only limited to plants operating by 2006; they are granted for 12 years and then reduced to 6.2 ct. However, only few projects, if any, are likely to be operational by that time. Project opposition by coastal communities has been stiff that fear impacts on their tourist industry. Therefore, the distance to shore has to be very big which increases costs considerably. Likewise, environmental NGOs fear impacts on maritime biodiversity which leads to costly environmental impact assessments. Asendorpf and Rauner (2004) estimate total costs at least as double of those onshore, not least due to the need to get approvals by more than 20 different institutions that takes about five years. Any project has to be very big to exploit scale effects – several hundred million Euro per project are expected. Nevertheless, 14 requests have been lodged with the authorities. Many port cities try to become the base for offshore operations. The race for the first offshore projects has provided an incentive for the turbine manufacturers to offer 5 MW plants. Enercon has already reached 4.5 MW, Repower and Multibrid want to unveil their 5 MW prototypes in 2004. But whether offshore will offer the salvation that the wind lobby hopes for remains to be seen. The first license for an offshore site, Butendiek near the island of Sylt, gives them some hope. But the Butendiek consortium uses Danish 3 MW turbines that have been tested in the first large-scale offshore plant there... Allnoch (2004) sees the first project coming online in 2006. The government reacted and in the REL overhaul shifted the cutoff date to 2010. However, an annual decrease of 2% will apply for projects coming on stream after 2007. As the legal framework is now more conducive to investments, the utility E.ON has invested in two offshore projects, one of which has recently been approved. The utility Vattenfall Europe is discussing similar investments (Gassmann and Gammelín 2004, Anonymous 2004).

## **8. Conclusions**

The German wind lobby has shown that clever utilisation of a window of opportunity can lead to a positive feedback loop to implement a costly renewable energy technology. The window of opportunity was provided by the early German enthusiasm about climate policy coupled with euphoria about reunification. Moreover, renewable energy was seen as a chance to reinvigorate regions that had suffered from industrial decline. Once the wind turbine manufacturers had got hold there, they were able to mobilise a coalition of local politicians, farmers and trade unions that became the stronger, the higher the share of wind in the job market and farmer revenue became. The construction of the subsidy regime was very successful because it distributed the costs to the entire population where they were diluted so strongly that no opposition could be organised. The only threat to wind power is the increasing NIMBY movement that has led to the strategy to develop offshore projects. However, the success factors that were prevalent concerning the onshore projects are absent offshore. These projects need large-scale financing and thus do not generate local benefits. It is no surprise that they have already generated substantial opposition.

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