

# Report on a „Wind Park“ in Norden, Germany

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Based on site visit and conversation with Helmut Cramer, Stadtwerke Norden



During a recent visit to north Germany (town of Norden), I had the opportunity to visit a “wind park” with approximately 40 wind turbines. The wind turbines there have been built in stages, starting in 1987. The most recent models of wind turbine currently being installed in the park are of the type “E-66” by the company Enercon (Aurich) with an 1.8 MW capacity. The closest turbine visible in the above picture is such a model. The entire wind park produces enough power to supply approximately 20,000 homes – most of the population of the nearby town of Norden.

Please note, the following is based on conversations I had with an energy engineer in Norden, and may not be completely accurate, as it is based on my understanding of what he said.

## German Federal Law Subsidizing Renewable Energy

Starting in the early 1990s, the Federal Republic of Germany began to subsidize wind energy installations by guaranteeing the investors in renewable energy facilities a certain price per Kilowatt (“Renewable Energy Law”, or “Erneuerbare-Energien-Gesetz” (EEG))<sup>1</sup>. The idea was to provide an incentive so that enough investors would be willing

<sup>1</sup> <http://de.wikipedia.org/wiki/Erneuerbare-Energien-Gesetz>

to put up the large sums of capital necessary for wind turbines, solar arrays, biomass facilities, etc., despite the (former) lower cost of fossil fuels. The way the law works is as follows:

- A base price is mandated by the federal government for each specific type of renewable energy production (According to Mr. Cramer, the baseline price for wind = 9 cent / kWh, solar = 54 cent / kWh. However, this is only in the case of facilities which operate in areas that are specially zoned as “wind-rich” or “solar-rich” (in other words, the government is trying to make the investors put wind turbines where there is actually a lot of wind).
- All utilities in Germany are required to purchase a certain percentage of their overall energy needs from renewable sources. The minimum requirement for wind is currently 5% throughout Germany.
- Costs for purchasing the renewable energy are passed on from the utility to the consumers. Thus, all consumers in Germany – both residential and commercial – in effect are subsidizing renewable energy.
- Some utilities, like the town of Norden (which operates the windpark I looked at), have lots of wind available in their grid. They do not bother to take more than the 5% minimum wind requirement (because it’s more expensive). Instead, they take their 5%, and then sell the rest off. The proceeds from the sales go back to the investors in the wind park.

## Why Investment in Wind Power Makes Financial Sense

Why is investing in wind still profitable in Germany? Because the total capacity of wind generation in Germany is still less than 5% of total electricity demand, and because the EEG law mandates that more wind power be purchased, there are always utilities somewhere in Germany willing to pay the guaranteed “premium” price for wind energy, to reach their 5% mandated wind energy baseline. (note, with increasing prices for natural gas and coal, it appears that wind power and other forms of renewable energy could compete on price alone).

## Reform of the EEG Law in Regards to Designate Wind Park Locations

After implementation in the 90s, the government EEG law began to spawn large-scale investment in wind and other forms of renewable energy. A problem caused by the law, however, was that investors all over the Republic began building wind turbines on their land, leading to a chaotic distribution of turbines, low economy of scale, and a bad visual effect.

After some years, the process of planning for renewable energy facilities was reformed. Wind turbines were concentrated into “wind parks” – in other words, certain designated areas, where many turbines could be placed together. Now, each Federal State (there are 13 States) decides, in cooperation with the “Landkreis” (the County), where such wind parks could be situated. Such factors as transportation access, proximity of energy

customers, and visual / wildlife impacts can then be considered on a case-by-case basis. These discussions and negotiations often take years.

## **Dealing with Land and Property Issues**

I asked Mr. Cramer about the ever controversial issue of land and property rights and citizens' objections to the visual and sometimes acoustic effects of wind turbines. He agreed that this is a problem already experienced in Germany. His opinion was that the State / Federal government needs to intervene, to tell the property owners that they will be helping the environment and the state and region achieve larger environmental goals. He did not mention any specific law that guarantees some sort of "eminent domain" type of property right, though that may be something already included in the EEG law.

It should be mentioned, that the people who own the land where wind parks are located (in this case farmers) are usually willing to put with a certain amount of noise and grief. They are motivated by the guarantee of annual income over a 10 to 25 year period during which the turbine operates.

## **Comparison to California Law**

The German law requiring utilities to purchase a minimum percentage of power from renewable sources could be compared to the California Renewable Portfolio Standard (RPS) law. In fact, California's law, which in the most recent form requires that 20% of purchased electricity be from renewable sources, is more ambitious than Germany's.

*\*Question: has California considered legislating what percentage of the RPS needs to be sourced from wind, solar and geo-thermal? Should it?*

## **Facts about the E-66 Turbines**

This is information about the turbines that I got from Mr. Cramer that may or may not be of interest to the reader. He is enthusiastic about the locally-developed technology.

The new generation of turbines installed since November 2003 (see pictures) are the "E-66" model from Enercon AG (Aurich, Germany) with a capacity of 1.8 MW (newest models have a 2.0 MW capacity). The E-66 turbines have blades with a diameter of 66 meters (thus the model number, "E-66"). The towers stand between 65 and 98 meters above ground. The town of Norden, which is located near these turbines (only 3 KM / 2 miles away from the nearest ones), manages the Wind Park for the investors who own them. The "Stadtwerke" (the "Public Works", i.e. the public utility) have the turbines maintained twice a year by Enercon AG, the company which builds them. I asked Mr. Cramer does this work need to be outsourced, or could the local population do this job. Mr. Cramer said unfortunately, not. He compared it to when you have a new car, and the dealer has to maintain it for the duration of the manufacturer guarantee.

I asked Mr. Cramer about how the turbines can deal with the occasional violent North Sea storm that occurs in this area. He said the turbines are made to withstand wind gusts of up to 200 Km/Hr. Their blades will also automatically adjust (rotate) to either

increased or decreased wind resistance (similar to when you stick your hand out the car window,) so that a more or less constant blade velocity can be maintained.

Another aspect of the Enercon turbines that Mr. Cramer talked about is the gearless design (“Getriebefrei”). That is, the turbines basically consist of the blades, which are connected to a rotating shaft inside a closed housing. When the shaft rotates, it produces a charge as it passes 2 series of concentric magnets inside the housing (I think). At least, this is what I understood.

## Pictures

1. Picture of some of the E-66 turbines from road level. Note, height of these turbines are approx. 100 meters (300 feet), with a single blade about 30 meters (90 feet)



2. Picture of tower pieces being transported to final assembly site on long haul trucks.



3. Picture of towers being assembled by special crane



4. Information sign outside the wind park. Title says “Since November 2003 – 14 Wind energy facilities (turbines), with 1.8 MW capacity. Of these, 5 are owned by Stadtwerke Norden (the local utility), 7 are owned by the “Windpark Norderland GmbH”, and 2 are owned by “Marschenwind GmbH.” The expected annual electricity production is 60,000 MW, which equals the annual demand for 17,000 households.

**Windpark Marschweg**

Seit November 2003

**14 Windenergieanlagen**

mit je **1.800 kW**

davon sind - 5 Windmühlen im Besitz der Stadtwerke Norden  
- 7 Windmühlen im Besitz der Windpark Norderland  
Verwaltungs- und Beteiligungs- GmbH (inkl.  
Bürgerbeteiligung)  
- 2 Windmühlen im Besitz der Marschenwind GmbH

zu erwartende jährliche Stromerzeugung ca. **60.000.000 kWh**  
(das entspricht dem jährlichen Stromverbrauch von  
ca. **17.000 Einfamilienhäusern**)



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Strom. Gas. Wärme. Wasser.

(end of report)