

# WIND ENERGY

# AACHEN / HEERLEN (Germany / The Netherlands)

*In Germany, wind energy has experienced over recent years a degree of success that had hardly been thought conceivable. Despite this success, it remains remarkable when a major city such as Aachen, which generally has little space within its area to erect larger wind farms, implements one of the largest inland wind farms at a distance of about 5 km to the historic city centre. The wind farm is in the immediate vicinity of the Dutch border town of Heerlen – this fitted excellently within a German-Dutch joint venture: The two border cities of Aachen and Heerlen have decided to build a joint commercial estate which will count wind energy among its sources of supply.*

## THE CITIES

**Aachen**, with 250,000 inhabitants, lies five kilometres from the German-Dutch-Belgian border. Many of its historic monuments have been preserved; but it is also a spa, an industrial city, and the seat of research establishments.

**Heerlen** is on the Dutch side of the border. A former coal-mining centre with 95,000 inhabitants, today it has become a regional shopping and government centre.

Mean wind speed: approx. 6 m/s



## CONTEXT

Aachen is considered throughout Germany as a leader in promoting electricity from renewable sources. The 'Aachen Model', with its approach of providing cost-covering payment for solar-generated electricity fed into the grid, provided the model for the German Renewable Energy Act (Erneuerbare-Energien-Gesetz – EEG). This Act regulates in Germany the procedures for feeding in and providing payment for electricity from renewable sources which is fed into the public grid. Since its entry into force on 01.04.2000, it has made an important contribution to increasing the proportion of renewables in power and heat generation in Germany. The objective of the Act is to promote climate and environmental protection by means of facilitating a sustainable development of the energy supply sector, and to significantly increase the contribution of renewable energy sources. The share of such sources in power generation, which currently stands at 8%, is at least to double by the year 2010.

Thanks to the support provided by the Renewable Energy Act, wind energy in Germany, with an overall installed capacity of 8,800 MW, has now reached a share of 3.5% in nation-wide power generation. The owners of wind power facilities receive a guaranteed payment per kWh over a period of at least 20 years; the payment tapers from 2002 onwards and depends upon the location and the year of grid interconnection.

# EXPERIENCE IN AACHEN / HEERLEN

The cross-border Aachen/Heerlen industrial park named AVANTIS is located directly on the E314 motorway between Aachen and Antwerp. Planning was delayed due to an assessment procedure needed to comply with the EU Habitats Directive, but construction work then commenced in 2001. Between 7,000 and 12,000 jobs are expected to be created there. It is the first industrial park in Europe that extends over two countries: 60% of its area of 100 hectares lies in the territory of the City of Aachen, and 40% in that of Heerlen. Due to this transboundary and innovative character, it has been subsidized by the European Commission.

Both cities hope to meet high standards with this industrial park.

- They want companies with an international orientation, or with high technological or innovative aims to locate here, as well as research institutes, banks and other service enterprises.
- Excellent transport links are to be established, with metro rail connections to the two town centres and the near-by Maastricht airport.
- The power supply to the entire industrial park is to be CO<sub>2</sub>-neutral, and the manufacturing facilities there are also intended to be low-energy and low-emission.

Four items contribute to achieving the goal of a CO<sub>2</sub>-neutral industrial park:

- In the development plan itself, the buildings were already configured with a view to energy savings. In addition, high standards exceeding statutory requirements have been set for the construction of the buildings.
- A local piped-heating system has been set up to heat the buildings. Its provision and use, as well as the strict thermal-insulation levels, are ensured by covenants in the deeds of sale for the properties. Gas is only to be supplied if it is needed for manufacturing.
- Close to the industrial estate, a small-scale cogeneration (CHP) unit or a biomass-fired power plant (based on wood gasification technology) are to be built, supplying both heat and power to the estate.
- The CO<sub>2</sub> neutrality of energy supply is to be guaranteed mainly by generating as much electricity from renewable sources of energy in or near the industrial park as is consumed by the companies locating there. This involves the planned biomass-fired power plant, as well as the wind farm next to the industrial park. This is now almost completed, and will have 9 large wind turbines (8 are already in operation) with a capacity of 1.5 or 1.8 MW each, and a planned annual electricity output totalling 27 GWh (27,000 MWh). This corresponds to ca. 2% of the overall electricity requirement of the city of Aachen.



## The EuroWindPark Aachen

The conception and setting up of this wind farm is described in more detail in the following.

The site was selected upon completion of a wind-energy feasibility study for the City of Aachen in 1994. This study showed that many of the available general wind-speed maps were not suited for assessing the economic viability of individual inland locations. Indeed, at certain exposed locations, wind speeds of 6 m/s were demonstrated at a height of 50 m.



The areas shown to be of above-average quality in the study were then evaluated by experts with respect to potential conflicts in the areas of bird conservation, landscape protection, and recreational amenity. The 50-hectare Vetschauer Berg area was found to be especially suitable for setting up a wind farm. It was declared a “Wind Farm Special Area” for regional planning purposes, and since December 1996 a “Special Area Zone for Wind-Energy Exploitation”. The area of the wind farm is located directly on the Dutch-German frontier, and is bounded by the A4 (E314) motorway. Subsequently, further studies on noise, microclimate, and shadows cast were undertaken. With the necessary revisions to the regional development plan in the autumn of 1997 and 1998, the EuroWindPark Aachen achieved legal approval. At the same time, the locations of the individual wind turbines and a maximum height of 100 metres were specified, in order to prevent uncontrolled development of individual units.

### Participants

The participants in the planning include, besides the City of Aachen, which was and is the main party responsible for the planning, and the “representatives of public interests” who have a right to be heard in the planning process (such as environmental groups, the government environmental agency, and the aviation safety authority), in particular the municipal power utilities STAWAG and ASEAG (e.g. concerning connection to the grid) and private investors. Much credit is due to the role of the environmental groups, whose commitment has been very laudable. The investors in the wind farm include, besides the power utilities STAWAG and ASEAG, private companies of various types (private limited companies, non-profit companies, and co-operatives). In addition, provisions have been made to allow the citizens of Aachen to participate financially, as local politicians had desired, via the Genossenschaft Energie 2030 co-operative and the STAWAG utility. Shares of about EUR 2500 or more were available for purchase via STAWAG, and of about EUR 250 or more via the Energie 2030 cross-border co-operative, which has offices in Eupen/Belgium and Aachen.

### Status of the project as of June 2002

In the EuroWindPark Aachen, 8 out of the total 9 turbines in the 1.5–1.8 MW class with a total capacity of 13.65 MW are now connected to the grid. The first of these was already put into operation in 1997 (even before the planning procedure for the wind farm was completed) by the municipal power utility ASEAG, with financial support from the European Union. In 1999, two further turbines were installed by the municipal undertaking STAWAG and the non-profit company Neue Energie Aachen. These were followed in 2000 by a further 1.8 MW turbine erected by a private operator. Four further turbines were erected in 2001 and 2002; of these,

the Genossenschaft Energie 2030 co-operative built three turbines with citizen participation, and the STAWAG utility one. The ninth turbine is expected to be built in autumn 2002 by Genossenschaft Energie 2030.

The anticipated average annual output of the eight turbines already in operation figures approx. 24,000 MWh. By way of comparison, this would provide ca. 8,000 households in the city of Aachen with an almost CO<sub>2</sub>-free electricity supply.

## EVALUATION AND OUTLOOK

Aachen's experience to date shows that wind energy inland is indeed an economic and cost-efficient climate-protection measure. However, in view of the limited areas available in the greater Aachen area, there are spatial limits to the expansion of wind power here. So a share of the total domestic, commercial, and industrial electricity consumption in Aachen from wind power of only 2%–4% is probably a realistic maximum in the near future, rather than the technically feasible proportion of 10%–15%. A key factor determining the successful further expansion of inland wind energy has been and continues to be the German Renewable Energy Act (Erneuerbare-Energien-Gesetz – EEG), which entered into force in April 2000. The year 2001 was a record year for the German wind energy industry, with 2080 newly installed turbines with a capacity of 2,700 MW, bringing total installed capacity in Germany up to almost 8,800 MW.



## FURTHER INFORMATION

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