



In Emden something's moving. Economics and ecology play a role with it. Emden is an industrial base and a job motor in East Frisia. Continuously Emden is the role model for climate protection. This is documented through different awards.

Climate protection activities and the development of regenerative energies help everybody. So many jobs are created in an innovative and aspiring area as well as an environmental and living quality for the people in Emden.

By making use of progressive techniques natural resources like wind, water and sun can be used to benefit economically from them. Environmental aspects are kept in mind by urban planning and favourable conditions for environmental technical settlements are created. Emden has recognized the high potential of the regenerative use of resources and supports their development. Positive climate protection effects are motivation for further innovative developments.

The climate project "Emden – sun, wind and more" wants you to approach the mission statement "climate friendly city Emden" with this cycle guide and give you an overview about the manifold activities of using regenerative energies and climate protection in Emden.

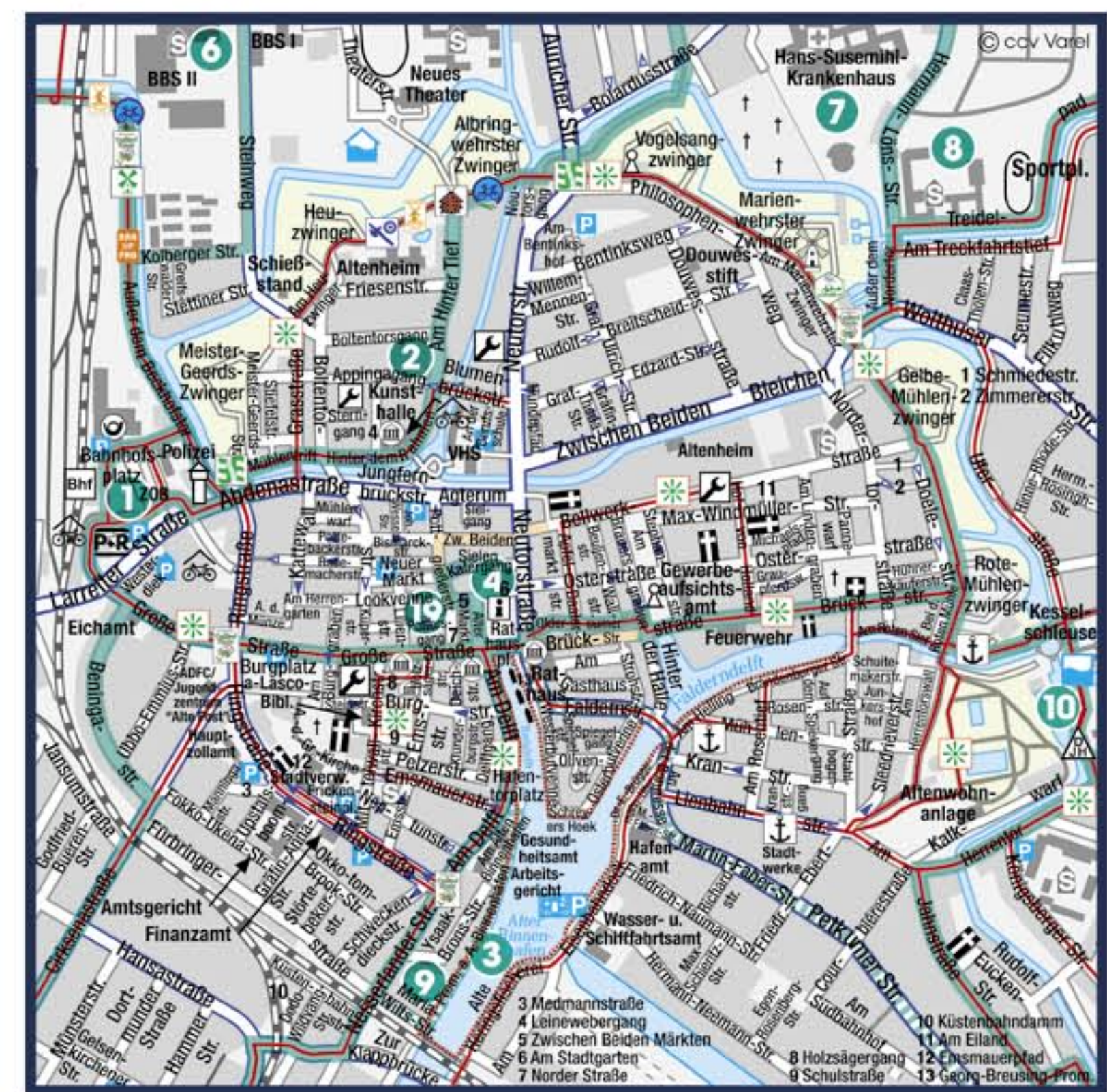
Emden is the "regenerative capital in Europe".

Today Emden has already exceeded the definition of a CO₂ mitigation of 20 % until the year 2020, which was intended in the Kyoto Protocol. The Kyoto Protocol is a solicited declaration according to international laws and respective countries signed to reduce concretely the greenhouse gas emissions.

Both in Germany and in Europe, Emden is the role model of using regenerative energies. The city has already made a point in the area of regenerative energy production. In Emden there is not only a focus on wind energy, but also on photovoltaics, solar heat and biomass (wood chip).

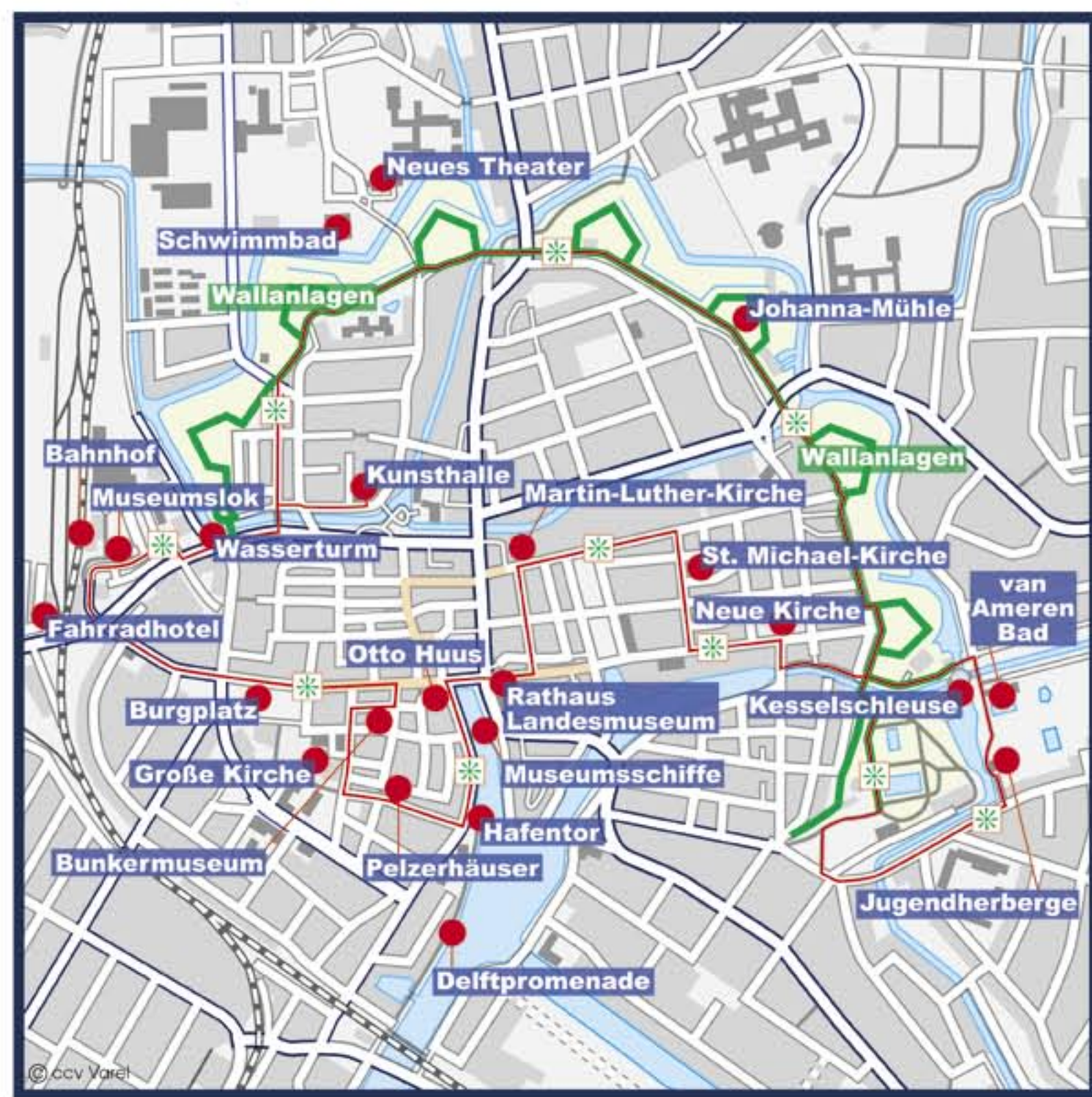
So in 2004 Emden was awarded as the first Lower-Saxon commune with the *European Energy Award*. In 2005 the city received the *German Solar Award*.

City Centre plan



Route of the places of interest

In addition, we offer you a route of the places of interest. The length of this circular course is 6.4 kms



1 Infoterminal – climate protection in Emden



A windmill wing installation type E 30 and an information terminal at the train and bus station square were built in March 2006 within the climate project "Emden – sun, wind and more". The windmill wing has a height of 15 metres. At the information terminal guests and locals can inform themselves about energy projects in Emden.

Emden has been executing this climate project since 2004. The mission statement "climate-friendly city Emden" is to be published to the population through public relations. So, for example, the climate brochure "Der Kurs bestimmt die Richtung. Seehafenstadt Emden, das Meer an Energie" was published or important regenerative highlights were locally labelled.

2 Geothermal energy – art museum uses geothermal energy

The art museum in Emden uses the geothermal energy for heating and cooling



Geothermal energy is an exhaustless and universally available energy resource. In comparison to other regenerative energy resources it is available round the clock 365 days a year. With geothermal energy you can heat as well as cool. It is a regenerative, carbon-free energy resource, which makes the user independent of oil and gas and he can also save 80 % of the energy costs.

With the expansion of the art museum in 2000, a geothermal heating system was built. Therefore 11 thermal ground probes had to be placed more than 200 metres under the ground to hit the layer of earth, where the natural heat of 13 degrees is located.

By including the ground as energy storage and the use of heating pumps for the heat and cold generation, the art museum can save considerable costs. In general, 13,706,255 kilowatt-hours (kWh) environmental energy is generated annually in this way and accordingly 9,000 tons carbon dioxide emission can be avoided.

3 Regenerative energy forms by rebuilding the inner harbour – local heat and geothermal energy



A local heat power supply will be built in the development area "Neuer Delft". An installation with a size of 1,480 kilowatts is planned in the first building section. In the second section is an installation with 525 kilowatts and in third section an installation with 980 kilowatts planned. The construction work for the first section started in 2008.

Local heat has an excellent ecological balance sheet. The association of many heat consumers makes it possible, to produce the needed heat on a central place with the use of the latest technology in an economical and environmental-friendly way, based on a cogeneration of heat and power. The heat, which accrues by the generation of electricity, is used extensively. Compared to other fossil energies, half of the toxic emissions can be avoided. The heat lost by industrial facilities and regenerative energies can be used optimally.

New buildings at the "Ratsdelft" and the shipping office got geothermal installations.

4 Solar-Bunker

Bunker changes itself into the environmental emblem in Emden as the result of electricity generation



The cityscape of Emden is dotted by many bunkers. They rise high over the rooftops of the city and let us still remember the 2nd World War. Meanwhile some of them are used as flats, storerooms and as a museum.

This bunker has a really special possibility for using photovoltaics, because the southern roof and front side has been covered with a photovoltaic installation for solar electricity supply. On an area of about 175 m² up to 13,000 kWh environmental friendly electricity can be generated annually and be connected to the public electricity system, so that a carbon dioxide emission up to 9 tons can be avoided.

Not only the production of clean energy and the saving of carbon dioxide throw a special light on the bunker. Also it enriches the whole cityscape optimally through its big blue photovoltaic module. The project cost 300,000 Euros and was supported and financed by the public energy supplier in Emden, the association Solar East Frisia e.V., bingo-lottery, by the 100 roofs-programme, the agenda 21-project, by the Economic Juniors Hannover and by selling electricity. By buying a solar letter everyone can support the project financially and make a contribution to the climate protection.

5 Noise Control with Solar Power

The first North German thin-film-noise-barrier offers noise control and energy generation at the same time



In summer 2003 this A31 motorway bridge was protected with a 492 m long noise barrier which was subsequently covered with photovoltaic modules for the generation of solar electricity. The photovoltaic installation in Emden is the first thin-film-noise-barrier in Northern Germany.

The modules generate on an area of 953 m² 32,000 kWh clean electricity annually. This quantity meets the annual consumption of about 10 average households. Therefore every year 32 tons carbon dioxide can be avoided. The electricity generated is connected into the public system of the public energy supplier in Emden and is merchandised through the common subsidiary EWE NaturWatt GmbH. There are further installations in the same line at the A 23 (Hamburg), at the A 620 (Saarbrücken) at the A96 (München) and at the A6 (Mannheim). The state Lower Saxony took a share in the investment with 30 %, because the noise barrier was built within the directive "Innovative Model Plans", which was established by the state Lower Saxony.

6 Solar Park at the Vocational Schools II

The sun gives electricity: use for class and environment

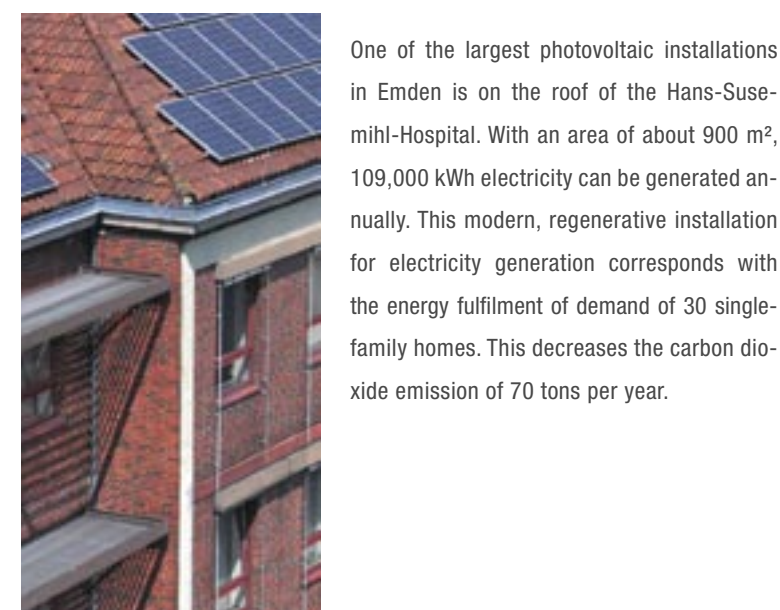


As part of the EXPO 2000 the vocational schools II in Emden created beside, other projects, the solar park. This solar park consists of four houses, which consist of large photovoltaic installations. In one of these houses you can find media capable computers, which can be used by interested "users". By the way, identically constructed photovoltaic-panels in China, Spain and Finland supply their measuring data by internet to Emden where it is compared and the results are posted on the internet. You can find information under: www.bb2-emd.de

In 2004 a further photovoltaic installation with 3 kilowatts was placed on the rooftop. This special installation was built by pupils, who are students of the profession basic year of building techniques from all over East Frisia. With an area of 30 m², the photovoltaic installation is able to generate 2,500 kilowatts annually and therefore enjoy a saving of 1.8 tons carbon dioxide. The photovoltaic installations are also used for classes. The technical school profits in a way that the electricians can research with the help of these installations and are able to develop some own projects.

7 Hans-Susemihl-Hospital

One of the largest photovoltaic installations in Emden

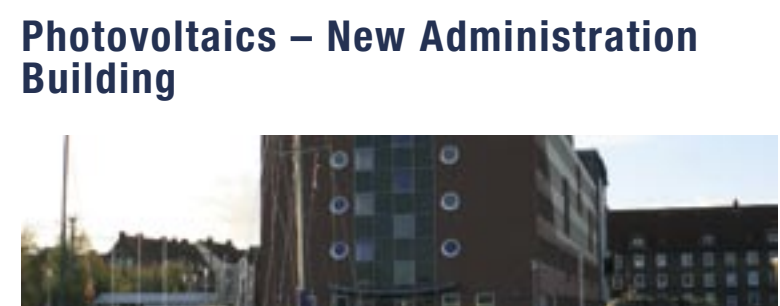


8 Gymnasium am Treckfahrtstief – photovoltaics in school

Since 2004 and as first school in Emden the Gymnasium am Treckfahrtstief has a photovoltaic installation on its southern roof to generate solar energy. With an area of 72.5 m² this installation is able to generate about 5,981 kWh clean solar energy annually. Therefore a carbon dioxide emission of more than 4 tons can be avoided. The photovoltaic installation is used as a sign for a technical and innovative school and is integrated in the different classes. The environmental consciousness is to be passed to the adolescents. Display boards in the break hall of the grammar school show the pupils the effectiveness of this installation.

The project was established and supported by the great commitment of different partners from economy and administration.

9 Photovoltaics – New Administration Building



In October 2006 the photovoltaic installation was commissioned, which is on the roof of the new administration building. The installation has a power of 9.5 kilowatts and an area of about 50 m².

10 Solar Energy uses at the Van Ameren outdoor pool

Warm water from solar energy avoids 55.3 tons carbon dioxide every year

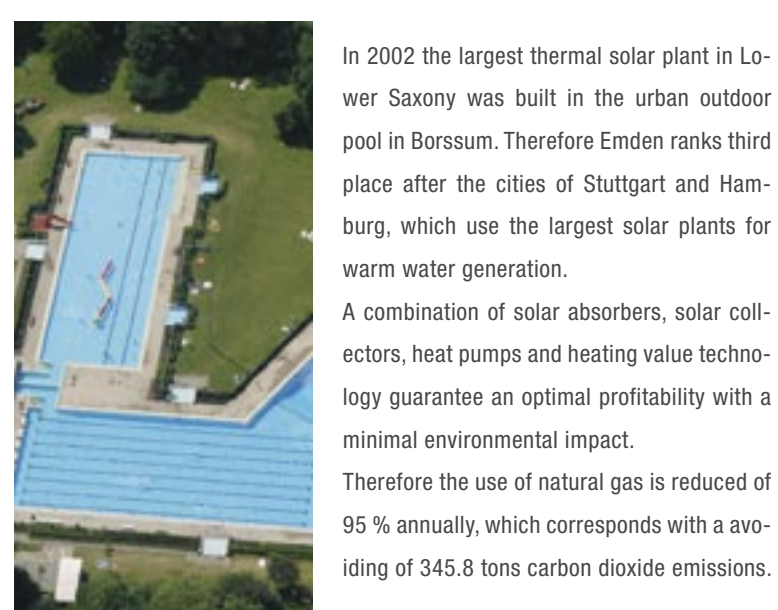


In 2001 a solar installation was built for the outdoor pool by the development association "Van Ameren Bad". Solar absorbers with an area of 430 m² warm the water in the pools. Sun collectors with an area of 12 m² warm the shower water. In this way about 55.3 tons carbon dioxide can be avoided every year. With the aid of this technique the natural gas consumption can be reduced about 50 – 60 %. For the operators this excellent result leads to considerable cost savings.

History of the development association: The development association "Van Ameren Bad" was founded in 1993. Active citizens of Emden got together when the city of Emden wanted to close the pool at the Emder Kesselschleuse because of unavailable funds. In 1994 the association signed a contract with the city Emden, to open the pool. Today the development association consists of over 2,300 members. High investments from own funds and the technical, creative personal contribution made the pool a highlight again.

11 Solar Energy in the outdoor pool Borssum

The largest solar plant in Lower Saxony warms the water of the outdoor pool in Borssum



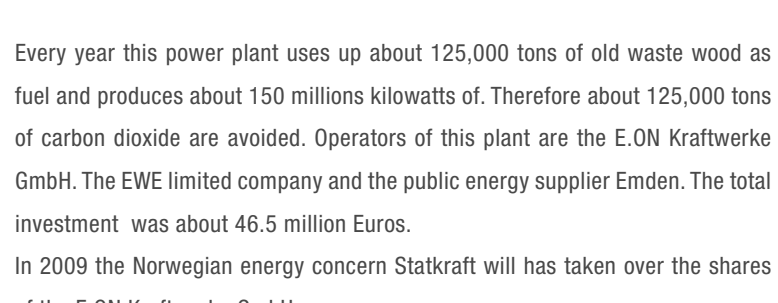
In 2002 the largest thermal solar plant in Lower Saxony was built in the urban outdoor pool in Borssum. Therefore Emden ranks third place after the cities of Stuttgart and Hamburg, which use the largest solar plants for warm water generation. A combination of solar absorbers, solar collectors, heat pumps and heating value technology guarantee an optimal profitability with a minimal environmental impact. Therefore the use of natural gas is reduced of 95 % annually, which corresponds with a avoiding of 345.8 tons carbon dioxide emissions.

The solar absorber plant, which is 1,900 m², warms the pool water. Therefore 500 m³ on the roof of the pool building and 1,400 m² on the roof of the super-market nearby were installed. So the roof of the super-market is cooled and the energy generated is connected to the outdoor pool. The warming of the shower water is resulted from the solar collectors plant, which is 12.5 m².

The pool guests profit from the solar plant, too. Frequently the temperatures of water reach more than 25 degrees. If you look over the season, the first year the middle temperature has already been higher than 24 degrees. So, not only is active environmental protection practised, but also the use of modern solar technology takes part to enhance convenience.

12 Biomass power plant with 20 megawatts

The increased use of biomass makes sure of a sustainable relief to our environment



In July 2003 the building of the biomass power plant in Emden, which is situated on the site of the E.ON gas power plant Emden, began. The installation was commissioned commercially in April 2005.

Every year this power plant uses up about 125,000 tons of old waste wood as fuel and produces about 150 millions kilowatts. Therefore about 125,000 tons of carbon dioxide are avoided. Operators of this plant are the E.ON Kraftwerke GmbH. The EWE limited company and the public energy supplier Emden. The total investment was about 46.5 million Euros. In 2009 the Norwegian energy concern Statkraft will have taken over the shares of the E.ON Kraftwerke GmbH.

Block heating power plant (BHKW) on the main sewage treatment plant in Emden

In 2004 the block heating power plant commissioned its trial run. It consists of two aggregates of the company MWB. Every aggregate generates 150 kilowatts electricity and is able to be run with sewage gas as well as with natural gas. In 2006 1.2 million kWh electricity were generated in general. Up to now the generated heat has been used internally for heating the digestion towers and the factory.

14 Windpark Wybelsumer Polder – one of the largest windparks in Europe

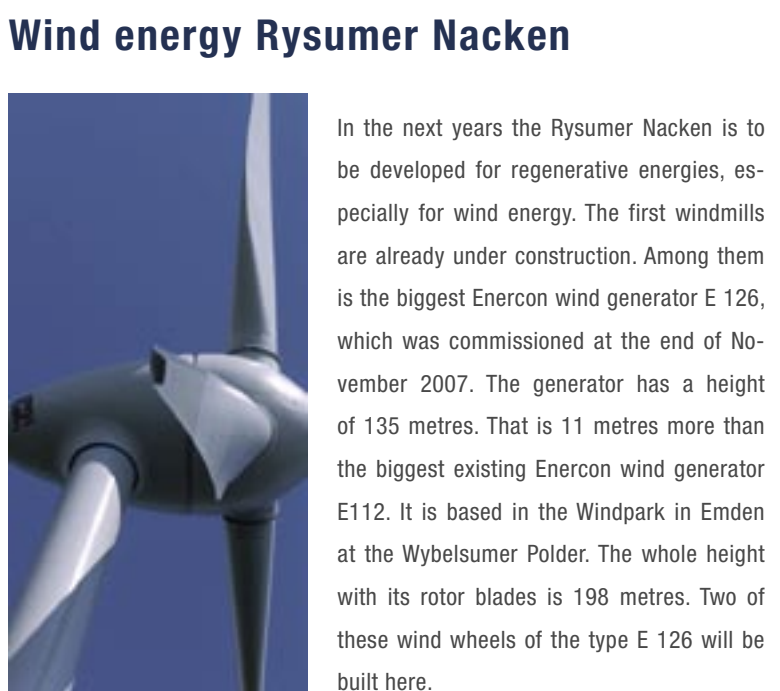
This windpark has a power of 103 megawatts and through its working process 190,000 tons carbon dioxide are avoided



Since 2001 one of the largest windpark installations in Europe is in operation, which is basically located west of Emden at the Larretter and Wybelsumer Polder. Situated here are the biggest wind energy installations of the world, e.g. the Enercon E 112 with a power of 6 megawatts.

Operators of the wind energy installations are the Windpark Wybelsumer Polder GmbH & Co. KG, the EWE Limited Company, the Enercon GmbH as well as the public energy supplier Emden.

15 Wind energy Rysumer Nacken

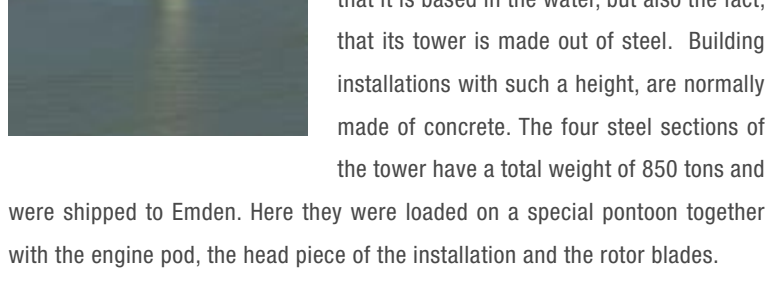


In the next years the Rysumer Nacken is to be developed for regenerative energies, especially for wind energy. The first windmills are already under construction. Among them is the biggest Enercon wind generator E 126, which was commissioned at the end of November 2007. The generator has a height of 135 metres. That is 11 metres more than the biggest existing Enercon wind generator E112. It is based in the Windpark in Emden at the Wybelsumer Polder. The whole height with its rotor blades is 198 metres. Two of these wind wheels of the type E 126 will be built here.

At the Rysumer Nacken the E 126 shall generate about 20 million kilowatts electricity per year; this is enough to supply 5,000 household with electricity. Also the BARD Engineering GmbH has installed two offshore prototypes there. The "BARD 5.0" with a hub height of 90 meter is an own development. It is comparable to the machines which are intended to be installed in the first BARD offshore wind power plants. The target is to test and prove the whole construction intensively under similar conditions as are prevalent on the open sea.

16 Wind Energy Nearsore installation E 112

Wind energy installation is getting wet feet



In October 2004 the Nearsore wind energy installation of the company Enercon was built in front of the bank. Not far away from the harbour Emden, this installation belongs to the biggest installations worldwide at present. It has a power of 6 megawatts. The wind energy installation has a height of 124 metres and its rotor blades are 53 metres long. Without its rotor blades the engine pod of the installation has a weight of about 440 tons. To achieve some experience with offshore-projects, the logistic was controlled from quayside.

The usual feature of this installation is not only that it is based in the water, but also the fact, that its tower is made out of steel. Building installations with such a height, are normally made of concrete. The four steel sections of the tower have a total weight of 850 tons and were shipped to Emden. Here they were loaded on a special pontoon together with the engine pod, the head piece of the installation and the rotor blades.

The "regional environmental education centre" based in the district Borssum in the Kai-erweg, which has an area of 9 hectares, is well known by many people as meeting place with a manifold nature. Just in the domain of the climate protection a lot possibilities are presented locally how to counter the greenhouse effect actively. Thereby the exploitability of regenerative energy sources like sun and wind are focused.

Opening times:
Mo – Tue: 07:00 – 16:00
Fr: 07:00 – 12:30
Sat + Sun: on demand

18 City Forest Emden

The city forest offers both recreation and climate protection



Your city Emden plants a citizen's forest. Since 2000 the forest in Emden has grown on an area of more than 65 hectares. A mixed forest is arising in accordance with the location within spitting distance to the North Sea Coast. Till the end of 2006 over 360,000 trees were planted. English oak, ash tree, alder, sycamore, wych elm, hornbeam, common beech, chestnut and miscellaneous shrubs have found their new habitat.

Besides the active contribution to the protection of climate, water, ground, emission forest visitors can find rebound and calmness. Furthermore the forest supplies a renewable resource and builds accordingly a carbon sink against the greenhouse effect, which is being more recognised worldwide. Although it will last some years till the plantings will be developed to a completed forest with its typical animals and plants, but the structures can be already recognised by an interested visitor.

19 Emden Modell – the public energy supplier Emden

A development programme to save electricity and support the climate protection



The Emden Modell of the public energy supplier Emden, which is a 100 percent subsidiary of the city Emden, offers its customers financial attractions for the renewal of heating systems and electrical machines for saving energy since 1992. It was created as a development programme for saving electricity and energy to decrease the carbon emission. It was created under the direction of Mister R. Edzard.

Among other things this is developed:
- The installation of thermal solar plant at 750 Euros
- The installation of photovoltaics up to 750 Euros
- New acquisition of a natural gas automobile at up to 1,900 Euros

But also less cost-extravagant investments are supported by the City of Emden Public Services, for example the purchase of energy saving lamps - buy two energy saving lamps, get one free!

20 20 Harbour of Emden and wind energy

Growth to future



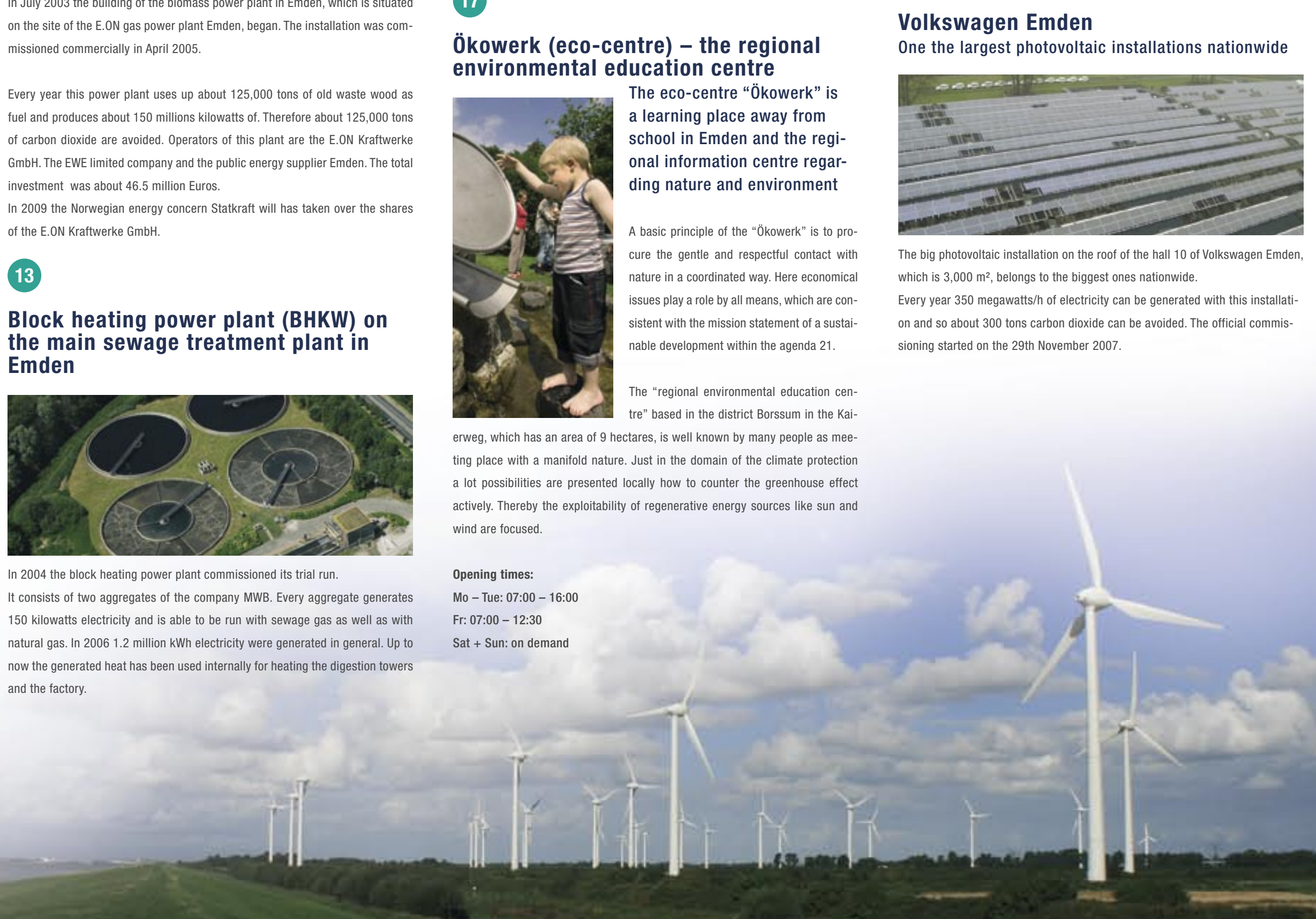
With its activities, the harbour of Emden makes a big contribution to the climate protection and creates jobs in accordance. In 2007 about 627 wind energy installations with a charge volume of 1,141,219 cubicmetres (m³) were shipped. Since 1997 about 2,000 installations were capsized in Emden. The building of Off-Shore installations with an output of 1,200 megawatts are planned until 2011.

21 Volkswagen Emden

One the largest photovoltaic installations nationwide



The big photovoltaic installation on the roof of the hall 10 of Volkswagen Emden, which is 3,000 m², belongs to the biggest ones nationwide. Every year 350 megawatts/h of electricity can be generated with this installation and so about 300 tons carbon dioxide can be avoided. The official commissioning started on the 29th November 2007.



17 Ökowerk (eco-centre) – the regional environmental education centre

The eco-centre "Ökowerk" is a learning place away from school in Emden and the regional information centre regarding nature and environment

A basic principle of the "Ökowerk" is to procure the gentle and respectful contact with nature in a coordinated way. Here economical issues play a role by all means, which are consistent with the mission statement of a sustainable development within the agenda 21.

The "regional environmental education centre" based in the district Borssum in the Kai-erweg, which has an area of 9 hectares, is well known by many people as meeting place with a manifold nature. Just in the domain of the climate protection a lot possibilities are presented locally how to counter the greenhouse effect actively. Thereby the exploitability of regenerative energy sources like sun and wind are focused.