alpha ventus

Projektbüro
Fact-Sheet

Ansprechpartner
Lutz Wiese

Funktion
Press Officer

Telefon • Fax
+49 (0)40 63 96 22 63

E-Mail
kontakt@alpha-ventus.de

alpha ventus FACT SHEET

Updated: August 2009

OVERVIEW

The alpha ventus offshore wind farm is a pioneering project undertaken jointly by EWE AG, E.ON Climate & Renewables, and Vattenfall Europe Windkraft. An ambitious project: Situated some 45 kilometres north of the island of Borkum, in water about 30 metres deep, alpha ventus is the first German wind farm to be erected at sea under genuine offshore conditions. The alpha ventus wind farm will gather fundamental experience with a view to future commercial use of offshore wind farms.

With the installation of an offshore transformer at the south-eastern most point of the wind farm, the first construction phase for alpha ventus was completed in 2008. Additionally, a submarine cable connecting the wind farm to the German power grid has already been installed.

DOTI GmbH

The Deutsche Offshore-Testfeld und Infrastruktur GmbH & Co. KG (DOTI) was established in June 2006 with the goal of erecting and operating the alpha ventus wind farm. Shareholders are EWE AG (47.5%), E.ON Climate & Renewables Central Europe GmbH and Vattenfall Europe Windkraft (each 26.25%). DOTI headquarters are located in Oldenburg. Company management and a project team of around 40 people in Hamburg, Munich and Oldenburg were drawn from the staff of the partner companies.

The first milestone for the installation of the wind turbines, which began in mid April 2009, was achieved on June 1 with the anchoring of the six tripod foundations for the AREVA Multibrid wind turbines. Step by step, the tower segments were subsequently erected. For one turbine after the other, the uppermost tower segments, nacelles and rotor blades have been installed since the middle of July. In this manner, Germany's first offshore wind energy turbine was fully completed on **July 15, 2009** – a highpoint for the pioneering alpha ventus project.

Since June 8, the foundation work for the six planned turbines from REpower has been running in parallel. The completion of all twelve turbines is planned for the end of 2009.

Germany's first offshore wind energy turbine…

…was completed in the early morning hours of July 15, 2009. At a distance of 45 kilometres from land in 30-metre deep North Sea water, a true pioneering feat was accomplished: Never before has a wind turbine been erected under such conditions. The construction measures around 178 metres from the sea surface to blade tip and delivers enough energy to meet the needs of over 4,100 households.

Dimensions & superlatives

The wind turbines are placed in a grid-like formation with gaps of approximately 800 metres between each turbine. Four rows, each with three turbines, form a rectangle with a total surface area of four square kilometres – about the size of 500 football pitches.

Even the dimensions of the individual turbines are impressive: Including the rotor blades, the Multibrid turbines from AREVA rise 148 metres above the sea surface, as tall as the Pyramid of Cheops. The REpower turbines, with a height of 155 metres, almost reach the height of the Cologne Cathedral. If the total height of the construction from 30 metres down on the seabed is taken in consideration, the turbines reach a height of 178 and 185 metres respectively.

With a nominal output of five megawatts each and a corresponding total capacity of 60 MW, a yearly energy yield of approx. 220 gigawatt hours is expected. The power needs of around 50,000 three-person households can be met by this energy output.

Due to the distance from the coast and the curvature of the earth, the turbines are not visible from land, even under the best visibility conditions.

Construction work overview:

August 2007:
- Beginning of construction work on the cable route

Summer/Autumn 2008:
- Laying of submarine cable
- Preparation for grid connection

September 2008:
- Installation of offshore transformer platform

Spring-Summer 2009:
- Connection of the submarine cable
- Transformer station is brought online
- Installation of six WEA AREVA Multibrid M5000 turbines
- Installation of six WEA REpower 5M turbines
- Cable work within the wind farm

Late autumn 2009:
- Completion of the installation work

A WIND FARM EMERGES…

Construction phases

The alpha ventus wind farm is a true European. The planning and production of the various components of the wind energy turbines and transformer station were carried out by around 20 companies in Europe.

The work had already begun in August 2007 with the construction work for the laying of the cable route for the submarine cable. From the alluvial deposit point of Hilgenrieder Siel over the island of Norderney to the alpha ventus location, the cable was installed in the summer and autumn of 2008. The connection of the submarine cable to the offshore transformer station took place in spring 2009, with the cabling within the farm being carried out at the completion of the installation of the foundations.

The offshore transformer station was assembled in Wilhemshaven from March until the beginning of September 2008 and erected at the offshore site at the end of September.

The six foundations for the AREVA Multibrid turbines were put into place by June 1, 2009 and the first cables within the farm for connection to the transformer station were installed. Germany's first offshore wind energy turbines were completed on July 15, 2009. By the beginning of August, four turbines were already completed. Since June, the foundation work for the six Repower 5M turbines has been running in parallel, with an expected completion in autumn 2009.

Construction work progress

The individual turbine components were prefabricated at various locations on land. In the end, the entire assembly of nacelle, rotor blade, tower segments and foundation structure to complete one wind energy turbine takes place on site offshore.

During the erection of each turbine, the use of jack-up barges and floating cranes are necessary. The work takes place as follows: A floating crane lifts the heavy loads from the transport ships and places them on the seabed. The jack-up barge serves as the work platform for driving in the piles and for the crane assembly of the turbines. With four support legs, the barges stand firmly on the seabed, with the platform rising around 10 metres above sea level. Along with

alpha ventus timeline:

1999/2001: Application for construction of “Windpark Borkum-West” by PROKON Nord GmbH
2001: Permit granted by the Federal Institute for Navigation and Hydrography (BSH)
2005: Formation of Offshore Wind Energy Foundation, rights of use sold to the Foundation by PROKON Nord GmbH
June 2006: Establishment of DOTI to construct wind farm
December 2006: Lease agreement signed between DOTI and Offshore Wind Energy Foundation
End of 2006: Federal government’s “Infrastructure Planning Acceleration Act”
June 2007: Contract signed with Multibrid Entwicklungsgesellschaft mbH (which has operated under the name Multibrid GmbH since December 2007) as general contractor for construction and erection of six M5000 wind turbines
July 2007: Order placed with AREVA to supply the transformers for the transformer station
October 2007: Contract signed with AREVA for the supply of the transformer station
December 2007: Order placed for the offshore transformer station and cable work within the wind farm with the consortium Bilfinger Berger, Hochtief Construction and WeserWind and Norddeutsche Seekabelwerke
November 2008: Contract signed with REpower Systems AG to deliver six REpower 5M turbines

workers and material, the barges accommodate an underwater pile driver for the securing of the foundation to the seafloor along with a heavy-duty crane for the lifting of individual components. Exact positioning of all turbines is done using the Global Positioning System (GPS)

Work stages are similar in the northern and southern halves of the wind farm. First of all, each of the six foundation structures is erected. Afterwards, the assembly of the wind turbines follows. Each one is assembled with multiple heavy-lifts by the work platform's heavy-duty crane. One on top of the other, the tower segments are put into place. The assembly of each turbine concludes with the placing of the uppermost tower segment, nacelle and rotor blades. In a separate work stage, the cabling within the wind farm is carried out, which means connecting each of the six turbines to the offshore transformer station.

The assembly and base harbour for all offshore work is the Dutch harbour of Eemshaven. This location has a decisive advantage: Since there are no locks in the harbour, the preassembly of the turbines does not have to take into account the size of any locks. Therefore, all wind turbine rotor blades can be preassembled and transported to the offshore site as a complete unit.

Location

alpha ventus lies about 45 km north of the island of Borkum, within the Exclusive Economic Zone (EEZ) of the Federal Republic of Germany. The coordinates of the wind farm corners are:

54° 00.0' N 6°34.4' E
54° 01.6' N 6°34.4' E
54° 01.6' N 6°37.3' E
54° 00.0' N 6°37.4' E

AREVA Multibrid M5000

Preparation

The individual components of the wind turbines are prefabricated as much as possible on land and then transported to the alpha ventus wind farm. Once on site, the complete assembly is carried out. The base harbour for the prefabrication and transport of the turbine components is Eemshaven in the Netherlands.

Equipment & construction

For the construction of the wind turbines, all turbine components are brought together in Eemshaven. ARVA Multibrid is carrying out a key-turn construction of the six wind turbines. During the offshore work, the jack-up barges "Odin" and "JB 114" as well as the floating crane "Taklift 4" are in operation.

The construction of the M5000 has been underway since spring 2009 in multiple stages. First, the foundation

Multibrid M5000 technical data

- Rotor diameter: 116 m
- Hub height: 90 m
- Total height above seabed: 178 m
- Total height above sea surface: 148 m
- Rated output: 5 MW
- Rotation speed: 5.9 - 14.8 rpm
- Cut-in wind speed: 3.5 m/s (force 3 wind)
- Rated wind speed: 12.5 m/s (force 6 wind)
- Cut-out wind speed: 25 m/s (force 10 wind)
- Blade tip speed: 90 m/s (324 km/h)
- Weight of nacelle without rotor and hub: 200 t
- Weight of nacelle with rotor and hub: 309 t
- Weight of steel in tripod, tower, nacelle: 1,000 t
- Tripod - weight of steel: 700 t;
- Height: 45 m; Pile length: 35-45 m

structure, a so-called “tripod”, for the AREVA Multibrid wind turbines was constructed. The 45 metre tall and more than 700 ton “tripods” were securely anchored to the seabed with a hydraulic hammer on the “Odin”. The three legs of the tripods were each “nailed” separately to the seabed using an approximately 45-metre long pile, then subsequently balanced and sealed into their final position by pouring concrete into the pile sleeve (a duct for piles). This work was completed on June 1, 2009. Alongside this work, the cable-laying barge, “Sternat 82” placed the first cable between the tripods and the transformer station.

Next, the towers, comprised of three segments, are installed on the tripods. After their installation, the bottom tower segments of all six turbines are joined with steel flanges to the substructure and the second tower segment is added. Turbine by turbine, the last step is carried out with the installation of the uppermost tower segment, nacelle and rotor blades. At the beginning of August, four turbines were completed in this manner.

The completed wind turbines rise to a height of 90 metres over the surface of the sea to a rotor blade tip of 148 metres. If one were to measure the height from the seabed, the turbines would reach an actual total height of 178 metres. The triangular area of the tripods covers an area of 255 square metres, and the total weight of one turbine is approximately 1,000 tons, or the weight of 200 fully-grown elephants or 22 railway wagons. The rotor catches the wind from an area of about one and a half times the size of a football pitch. When the rotor is turning at maximum speed, the tips of the blades cut through the air at around 320 kilometres per hour.

REpower 5M

Preparation

The wind turbines from REpower were manufactured in the new offshore manufacturing hall of REpower Systems AG in Bremerhaven, Germany. The towers for the 5M turbines were prefabricated – exactly as with the AREVA Multibrid M5000 – by Ambau GmbH in Bremen, Germany.

The foundations (jackets) were manufactured in Methil, Scotland and transported from there to the base harbour of Eemshaven. The piles were produced by EEW in Rostock, Germany, while the templates for the positioning of the piles were supplied by ICH Seasteel of Montrose, Scotland.

REpower 5M technical data

- Rotor diameter: 126 m
- Hub height: 92 m
- Rated output: 5 MW
- Rotation speed: 6.9 - 12.1 rpm; generator: 60-1,170 rpm
- Cut-in wind speed: 3.5 m/s (force 3 wind)
- Rated wind speed: 13.0 m/s (force 6 wind)
- Cut-out wind speed: 30 m/s (force 11 wind)
- Blade tip speed: 80 m/s (ca. 288 km/h) at a rotor speed of 12.1 rpm
- Lifespan: 20 years
- Weight of nacelle without rotor and hub: 290 t
- Weight of nacelle with rotor and hub: 410 t
- Foundation weight: ca. 500 t; tower: ca. 210 t

Equipment & construction

All six Repower 5M turbines used in the northern part of the wind farm were “built” through the cooperation between REpower Systems and DOTI. The general contractor for the engineering, construction and assembly of the foundations was the Norwegian offshore company of Norwind, with headquarters in Bergen.

So-called “jackets” were used as the foundation structure for the 5M turbines. The four-corner constructions are already familiar solutions in offshore oil and gas extraction. The offshore transformer station also rests on a jacket foundation. In order to securely anchor the jackets to the seabed – the same as with the AREVA Multibrid turbines – the foundations were “nailed” to the sea bottom with piles. However, the operation was reversed: First, the piles were driven in and then the “jackets” put into place.

The following is a detailed description of the work involved: In order to position and align the piles exactly, a so-called “template” was positioned on the seabed via GPS or DGPS. The template shows where the piles are to be placed. Before the piles are driven in, a second auxiliary construction, a pile sleeve, is put into place. The 40-metre long piles are lifted by the floating crane of the jack-up barge and vertically “threaded” through the pile sleeve. Due to their own weight, the piles sink about 1 to 2 metres into the seabed before they are driven further into the sea bottom by a hydraulic hammer. For each pile, the sleeve is first put into the new position. After all four piles are driven in, the jack-up barge moves to the next location. Since June 8, 2009, the jack-up barge “Buzzard” has been carrying out these operations.

After the completion of the pile driving work, the 56 metre tall and 480 ton jackets can be installed on the piles. Then, the individual tower segments are added, one on top of the other. Finally, the nacelle and the rotor blades are installed. The 20 by 20 metre wide jackets enclose a total area on the seabed of 400 square metres. From their base to the tips of the rotor blades, the turbine reaches a height of approx. 185 metres, of which about 92 metres is the distance from the sea surface to the hub alone.

Offshore transformer station

Preparation

Leading the construction and assembly of the offshore transformer station was the consortium of Bilfinger Berger AG (Mannheim), Hochtief Construction AG (Essen) and WeserWind GmbH (Bremerhaven).

The jacket construction for the foundation structure and the “topside” superstructure, which includes the helipad, main deck and cable deck, were prefabricated from March to September 2008 at the Braunschweig Quay in Wilhelmshaven.

The transformer station was supplied by AREVA Energietechnik GmbH (Dresden) and installed on the offshore transformer station at the beginning of August 2008. It not only steps up the voltage to 110,000 volts (110 kV), but also connects the wind farm to the German power grid.

Equipment & construction

The offshore transformer station was already installed and in place on the south-eastern corner of the wind farm in September 2008. It secures the wind farm's connection to the grid. At the same time, it takes over the supply of power to the turbines from the power grid, serves as logistical base for the wind farm and ensures the delivery of the generated wind power to the mainland.

The construction work was carried out by the jack-up barge “Odin” of HOCHTIEF AG with the help of "Taklift 4", a floating crane. A jacket construction, similar to that used for the REpower turbines, was used for the foundation structure of the offshore transformer station.

In mid September, the construction began with the transport of the 46 metre tall and 650 ton jacket to the site at alpha ventus and anchored using four piles, each 30 metres long and weighing 100 tons.

A week later, the topside module with the entire E-technology was placed on the 30 by 30 metre wide jacket, fully completing the construction of the transformer station. In total, the offshore transformer station, with its three storeys, now rises around 30 metres above sea level.

The cable deck, with cable junction and rooms for assembly and service technicians, sits at about 21 metres. Above that sits the main deck, at around 25 metres, with its electrical equipment. At the very top is the helicopter deck at 30 metres.

Transformer station technical data

- Constructed in September 2008
- 30 m: elevation of helipad
- 25 m: elevation of main deck with crane, substation control and protection (I&C) / switch-gear plant / neutral earthing transformer, fire extinguishing system, MV and LV systems, emergency generator, MVAr throttle / 110 kV GIS (gas-insulated switchgear) system (AREVA)
- 21 m: cable deck with workshop, equipment room, lounge, diesel tanks, emergency generator, cable bench and oil sump
- Cable deck and main deck: 110/30 kV transformer 75 MVA (AREVA)
- Jacket foundation height: approx. 46 m
- Jacket weight: approx. 650 t
- Foundation piles: 30 m long, 2.7 m diameter, 100 t apiece
- Position: N 54°00', E 6°37.40'

Grid connection

Preparation

E.ON Netz GmbH, since May 2009 Transpower GmbH, is responsible for laying the 110 kV submarine cable, with which alpha ventus is connected to the German power grid. All the necessary preparatory work was carried out in the summer and autumn of 2008. The construction of the required cable routes and a conduit system from the alluvial deposit point of Hilgenrieder Siel over the island of Norderney had already begun in August 2007.

Cable work within the wind farm

Norddeutsche Seekabelwerke GmbH (NSW, Nordenham) not only supplies the cabling for use within the wind farm, but also is responsible for its laying. Around 16 kilometres of cabling will be installed and buried at least 60 centimetres deep in the seabed within the wind farm. The power lines from each of the six wind turbines are connected in a ring and routed to the offshore transformer station via a 30 kV submarine cable. In a difficult task, divers or a Remotely Operated Vehicle (ROV) must "thread" the power lines on the seabed through the cable conduits on the turbine foundations. Specialised vessels working to the nearest centimetre lay the copper connecting cables from the units to the offshore transformer station. The cable layer “Sternat 82” has already placed the first cable between tripod and transformer station.

Submarine cable from transformer station to Hagermarsch

The 30 kV cables of the 12 wind turbines come together at the transformer station's platform. Here, the power is stepped up to 110 kV and fed as three-phase current through a 60-kilometre long submarine cable to the mainland.

In May 2009, the already installed 110 kV submarine cable was connected to the offshore transformer station. From here, the 18-centimetre thick submarine cable runs over the island of Norderney to the transformer located at Hagermarsch on the mainland. Along the route, the cable disappears several metres underground to minimize the danger to the marine environment and shipping.

Laying the cable over Norderney was done under the existing roadways so that all nature conservancy conditions

were met. A conduit system was also put into place, in which, along with the power cable for alpha ventus, cables for future offshore wind farms should be threaded.

Because alpha ventus should not only deliver power but also data to the mainland, the cable comprises not only a 10-centimetre thick power core but is threaded throughout with fine, light wave conducting cable (e.g. fibre optics) as well.

WEATHER, ENVIRONMENT AND SECURITY

Wind conditions – sea conditions

Since 2003 the research platform FINO 1, situated 400 metres from the wind farm, has been supplying detailed weather data about the alpha ventus site. These figures form the basis for the yield forecasts. www.fino1.de

The average wind speed at the site is 10 metres per second (m/s), or a force 5 wind. The planners expect 3,800 full operating hours a year. The figures for good onshore sites are about 5 m/s and 2,200-2,500 full operating hours. The prevailing wind direction is 210-240° (south-west).

The waves can reach a height of up to 10 metres, with an average of at least 6-8 metres, while the main wave direction is 330° (north-west).

Weather conditions for construction and operation

The weather conditions are crucial for offshore work in the North Sea. Work is only possible for a total of about 3-4 months a year. However, this time window is divided up into smaller periods, and to some extent individual days. While work is in progress, the weather conditions are kept under close observation with an eye to the detailed local weather forecast. Construction planners have to take account of the difficult weather conditions by keeping plans in reserve that enable them to abort operations or adopt alternative approaches – and have to be able to respond flexibly at all times.

The installations are designed for an operational lifespan of 20 years. Reliable corrosion protection and thorough encapsulation of the systems are crucial for successful operation of the wind farm. The important electrical systems of each wind turbine are redundant, in other words, provided as multiple systems. This ensures that they can continue to produce power even if individual components fail.

Background: The wind farm will be accessible by ship for only about 70 days a year. Even when seas are moderate, it is not possible to approach the wind turbines accurately enough to permit transfer of personnel. The journey to the site alone takes about 2 hours. Helicopters can only land on the offshore transformer station. Although it is not possible to land on the individual wind turbines, each has a small landing pad onto which service personnel can be winched down from a helicopter. With helipad, workshop, equipment

Shipping safety

The wind farm, which lies outside the Wadden Sea National Park and the 12-mile zone, is in the Exclusive Economic Zone (EEZ), in which the provisions of the UN Law of the Sea permit economic utilisation by the Federal Republic of Germany, and which is thus subject to a special legal regime. The Federal Institute for Navigation and Hydrography investigated the site and gave permission for construction of the project. One of the decisive factors for such a permit is that the project “shall not impair the safety and ease of traffic and shall not endanger the marine environment”.

Maritime Safety Zone

The offshore wind farm alpha ventus lies between the Traffic Separation Schemes of "Terschelling German Bight" and TSS "German Bight Western Approach" within the German Exclusive Economic Zone (EEZ). Around the construction site and the neighbouring research platform FINO 1, a 500-metre wide safety zone has been established and marked with buoys. A traffic safety ship travels around the construction site day and night.

and amenity room, the two-storey platform of the transformer station is the onsite service centre. Accessibility by helicopter is better than by sea and is expected to be possible for more than 200 days a year.

Environmental impact of wind farm

The construction of the wind farm – and especially the work on the foundations and the laying of the submarine cables – represent an encroachment on the marine environment. However, alpha ventus lies outside the Wadden Sea National Park in a marine environment that does not give cause for concern from a nature conservation point of view. In 2008, the submarine cable running through the National Park was laid in compliance with strict environmental requirements. Since 2002, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has been promoting scientific studies of the possible impacts of offshore wind energy systems on marine mammals, seabirds, bird migration, seabed fauna and fish.

The Offshore Wind Energy Foundation conducted all work at alpha ventus with nature conservancy analyses in accordance with the regulations of the standard analysis concept of the Federal Institute for Navigation and Hydrography (BSH 2007),

ASSEMBLY SITES AND SUPPLIERS

AREVA Multibrid M5000

Foundation: assembly site Verdal, Norway

- Sif Group bv, Roermond, Netherlands: tripod duct elements
- Aker Solutions, Verdal: tripod foundations
- Offshore Wind Technologie GmbH (OWT), Leer, Germany: engineering of foundation & tower jackets; offshore logistics
- Menck, Kaltenkirchen, Germany: underwater pile driving

Tower: assembly site Bremen, Germany

- Ambau GmbH, Bremen

Nacelle: assembly site Multibrid GmbH, Bremerhaven, Germany

- ABB Oy, Helsinki Finland: generator
- ABB Schweiz AG, Baden, Switzerland: converters
- Pauwels Trafo Belgium NV, Mechelen, Belgium: transformers
- Siempelkamp Giesserei GmbH, Krefeld, Germany: machine housing & lower deck
- Renk AG, Augsburg, Germany: transmission
- Friedrich Wilhelms Hütte GmbH, Mülheim an der Ruhr, Germany: hub
- Ferry-Capitain, Joinville, France: hollow shaft
- REETEC GmbH, Bremen, Germany: assembly work & mean voltage work
- Bode & Wrede GmbH, Dingen, Germany: engineering of jig manufacturing & lifting accessories
- µ-Sen GmbH, Rudolstadt, Germany: online Condition Monitoring Systems (CMS) for wind turbine monitoring

Blades: assembly site Stade, Germany

- PN Rotor GmbH, Stade: rotor blade & composites engineering

Ship Shuttle:

- AG Chatter Norden-Frisia, Offshore-Catamaran “Wind Force I“

Helicopter Shuttle:

- HTM – Helicopter Travel Munich GmbH

Working ships

AREVA Multibrid M5000

- Push-tow group “Mega Motti“ (towboat “Mega”, barge “Motti”) Briese Shipping
- Jack-up rig “Odin“, Hochtief Construction AG
- Jack-up platform “JB-114“
- Floating crane “Taklift 4”, and towboat “Bankert” and “Barracuda” (for “TL4”, “Odin” and “JB-114”), Smit Heavy Lift, Rotterdam
- “Bugsier 15“ (pile hauler and positioning “Odin“)’ sea crane “Enak“ (Bremerhaven Shipping)
- “EmsTug“ (pile hauler), Ems-Offshore
- “Ailsa“ (construction field Multicat, anchor handler), Maritime Craft Service
- “Petr Kottsov“, Rickmers Shipping
- “Baltic Taucher 2“, Baltic Taucher

REpower 5M

Foundation: assembly site Methell, Scotland

- General contractor for engineering, construction and assembly: NorWind, Bergen, Germany
- Burntisland Fabrication Ltd: jackets
- EEW, Rostock, Germany: piles
- ICH Seasteel, Montrose, Scotland: template
- GeoSea, Zwijndrecht, Belgium: pile driving

Tower: Assembly site Bremen, Germany

- Ambau GmbH, Bremen

Nacelle: Assembly site REpower Bremerhaven, Germany

Working ships

Repower 5M

- GeoSea: Jack-up platform "Buzzard"
- Jack-up platform "JB 115"
- Floating crane "Taklift 4", Smit Heavy Lift, Rotterdam
- Hochtief Construction AG: jack-up rig "Odin"
- Heerema Marine Contractors (HMC): crane vessel "Thialf"

Offshore transformer station

Assembly site for transformer and transformer platform: Braunschweig Quay in Wilhelmshaven, Germany

Transformer station

- AREVA Energietechnik GmbH, Bremen/Dresden, Germany: complete electrical engineering 110/30 kV offshore transformer station including transformer

Transformer platform and offshore construction

- Consortium of: Bilfinger Berger AG (Mannheim, Germany), Hochtief Construction AG (Essen, Germany) and WeserWind GmbH (Bremerhaven, Germany)

Transformer platform suppliers:

- IMS Ingenieurgesellschaft mbH, Hamburg, Germany: engineering of jacket & topside
- Mostostal, Cracow, Poland: topside prefabrication
- BVT Brenn- und Verformtechnik Bremen GmbH, Bremen, Germany: helipad

Submarine cabling within wind farm

- NSW (Norddeutsche Seekabelwerke), Nordenham, Germany: cable manufacture and laying

Control technology for offshore wind farm:

- BTC Business Technology Consulting AG, Oldenburg, Germany: integrated wind farm control and management system

Working ships

Transformer station, September 08:

- Sea crane/floating sheer legs: Smit Heavy Lift, Rotterdam: "Taklift 4"
- Hochtief Construction AG: jack-up rig "Odin"

Grid connection

Grid connection from offshore transformer to land:
Transpower GmbH (formerly E.ON Netz GmbH)

Submarine cable:

- Prysmian Cables and Systems: supply

Oceanteam Power & Umbilical, Wilhelmshaven:

- Cable-laying vessel “Team Oman“
- Cable-laying barge “Oceanteam Installer“

Pipe laying at Norderney/Hilgenriedersiel:

- Ludwig Freytag GmbH & Co. Kommanditgesellschaft, Oldenburg, Germany
- MOLL-prd, planning company for pipe drive technology and culvert construction, Schmallenberg, Germany

Environmental protection and landscape conservation supervision:

- Planungsgruppe Grün, Bremen, Germany (Norderney region)
- Bürogemeinschaft Landschaftsplanung Ecoplan, Leer, Germany (Hilgenriedersiel region)

CONTACT AND FURTHER INFORMATION

kontakt@alpha-ventus.de
www.alpha-ventus.de

EWE AG: www.ewe.de
E.ON Climate & Renewables Central Europe GmbH: www.eon.com
Vattenfall Europe AG: www.vattenfall.de
AREVA Multibrid: www.multibrid.com
REpower Systems AG: www.repower.de
Research at alpha ventus: www.rave-offshore.de
OFFSHORE WIND ENERGY FOUNDATION: www.offshore-stiftung.de
German Wind Energy Association: www.wind-energie.de
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety: www.bmu.de and www.erneuerbare-energien.de
Federal Maritime and Hydrographic Agency: www.bsh.de