



## Yearly Environmental Report 2012

### BELWIND phase 1



# Tabel of Contents

<b>Tabel of Contents .....</b>	<b>2</b>
<b>1 Introduction .....</b>	<b>4</b>
<b>2 Project overview .....</b>	<b>5</b>
<b>3 Construction .....</b>	<b>6</b>
3.1 Description of the Belwind Demo project .....	6
3.2 Overview timing of the activity .....	6
3.3 Detailed overview of the activity during 2012 .....	6
3.4 Procurement of plant .....	6
3.5 Onshore works .....	6
3.6 Offshore works .....	6
3.6.1 Foundation .....	6
3.6.2 Wind turbine.....	6
3.6.3 Export cable.....	6
3.6.4 Grid connection.....	7
3.6.5 Commissioning and tests .....	7
3.6.6 Outstanding and remedial works .....	7
<b>4 Wind farm annual operations information .....</b>	<b>8</b>
4.1 Availability .....	8
4.1.1 Technical Availability.....	8
4.1.2 Commercial Availability.....	8
4.2 Availability of the electrical installation .....	8
4.3 Production .....	8
4.3.1 <i>Wind rose &amp; energetic wind rose</i> .....	8
4.4 Maintenance .....	9

4.4.1	<i>Planned Maintenance</i> .....	9
<b>5</b>	<b>Permit conditions</b> .....	<b>10</b>

# 1 Introduction

The Belwind offshore wind farm is located on the Belgian Continental Shelf, within the Belgian Exclusive Economic zone. The distance from the wind farm to the nearest point at the shore (Zeebrugge) is approximately 46 km (Figure 1).

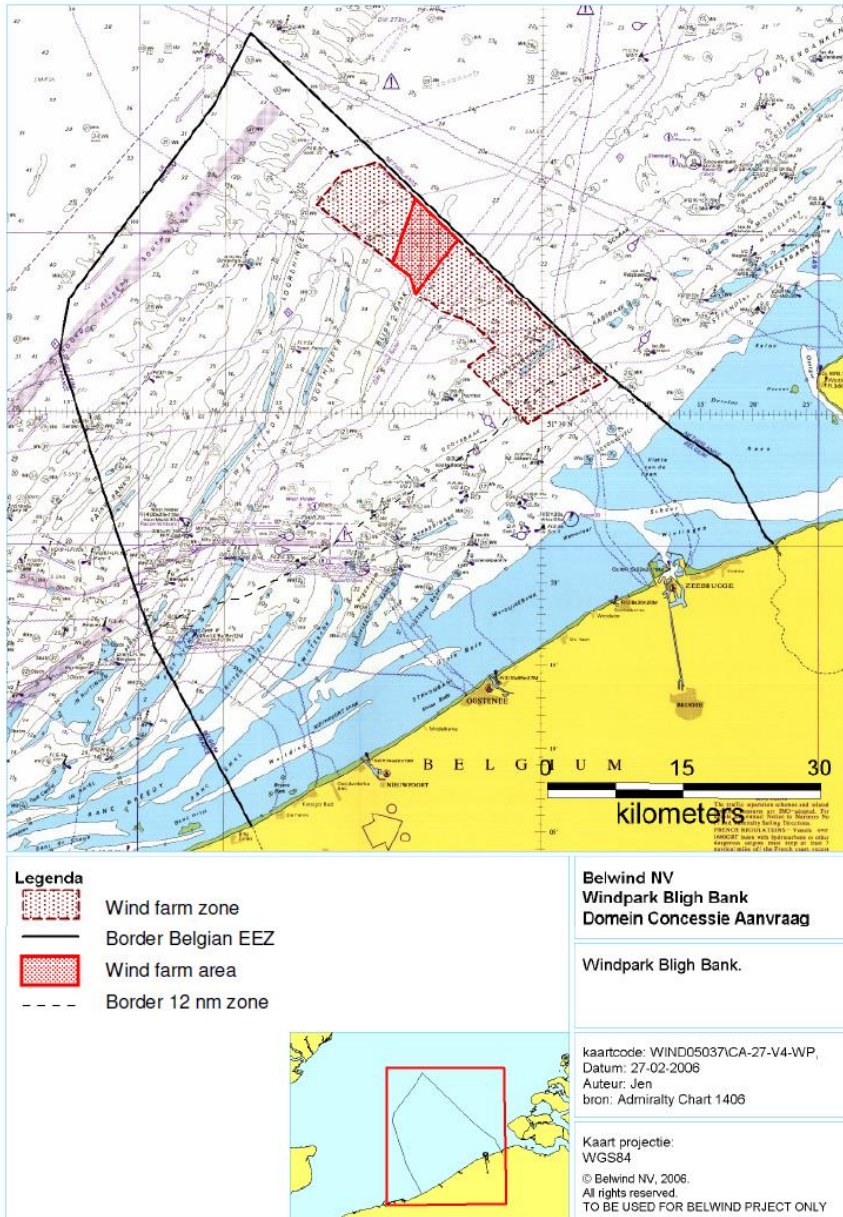
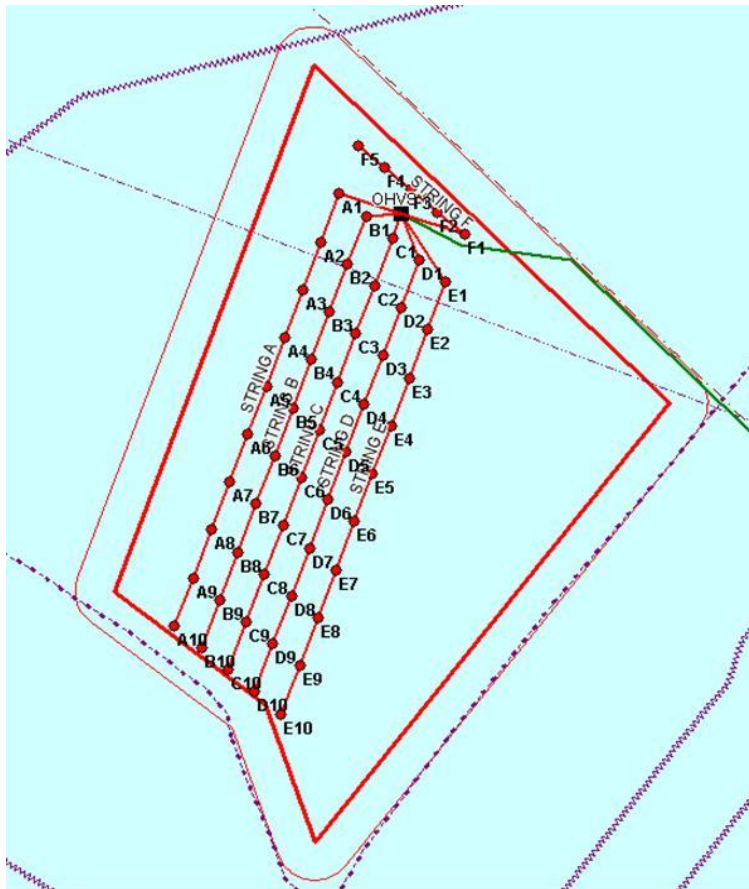


Figure 1: Location offshore wind farm Belwind

## 2 Project overview

According to the authorization for the construction and a license for the operation of an offshore wind power plant on the Bligh Bank in the Belgian sea areas article 5 §1, the offshore wind power plant will be constructed in phases.

The pilot phase, Belwind 1 or Belwind phase 1, consists of 55 wind turbines of 3 MW each (Vestas V90) and an offshore high voltage station (OHVS). Via a local grid (33 kV) the wind turbines are connected to the OHVS. The energy is transported to land by a 150 kV submarine cable. Phase 1 is erected and fully operational since January 2011.



**Figure 2: Locations of the wind turbines and the grid connection phase 1**

Phase 2, Belwind 2 or Belwind phase 2, will consist of minimum 165MW, with its own OHVS and submarine power cable. The detail engineering has been started and the plan is to start of the construction works after 2014. As there is an evolution in the development of the offshore wind turbines, the type of wind turbine isn't defined yet.

A Demo Project has been initialized giving place to the zero testing of the Alstom Haliade150 turbine.

### **3 Construction**

The BW1 construction was finalized already in 2011. The last remaining punch-list items were incorporated in the O&M contracts.

In 2012 the Belwind DEMO project was launched. On the BW concession a Demo turbine of the type Alstom Haliade150 will be erected. Planning was to establish the construction end of 2012 but due to several delay reasons construction has been started beginning of 2013. Erection of the wind turbine is foreseen June 2013.

#### **3.1 Description of the Belwind Demo project**

Belwind sent an application for the installation of one 6 MW wind turbine. On 15<sup>th</sup> of March 2012 Belwind obtained a correction (“ingreep”) of the existing permit from the Minister.

The Haliade150 is a direct drive turbine with 150m blade diameter and rated power of 6 MW.

The Turbine will be installed on a jacket foundation

The turbine will be connected per 33kV infield cable to the BW1 OHVS via where the power will be transferred to 150kV and brought to shore together with the power of all 55 V90 turbines on BW1.

Beginning of 2013 the installation works of the scour filter layer has been started. It is foreseen to install and start up the wind turbine in June 2013.

#### **3.2 Overview timing of the activity**

No planned activity took place in 2012. All actions were a result of the continue monitoring of the exploitation of the offshore wind power plant (see 4.5.1.).

#### **3.3 Detailed overview of the activity during 2012**

On a continue process all monitoring and O&M activities were performed for the 55 wind turbines and the OHVS during 2012.

#### **3.4 Procurement of plant**

All lessons learnt from the exploitation of the offshore wind power plant will take into account for the development of the Belwind phase 2 project. On a regular basis meeting are scheduled to share the information between the O&M team and the develop team of Belwind.

#### **3.5 Onshore works**

Apart from the O&M for BW no specific onshore project works were executed.

#### **3.6 Offshore works**

##### **3.6.1 Foundation**

Surveys for the foundation were done by several survey vessels and the Jack-up-Barge Neptune performed the 60m deep CPT tests.

All preparations are done to allow the first scour layer of scour stones to be installed by the Simon Stevin Fall pipe vessel starting first days of 2013.

##### **3.6.2 Wind turbine**

No construction activities in 2012

##### **3.6.3 Export cable**

No project works in 2012 only O&M activities

#### **3.6.4 Grid connection**

Preparation surveys for the infield cable were performed by the GEO ocean and MPR3 including CPT's and all seabed surveys.

#### **3.6.5 Commissioning and tests**

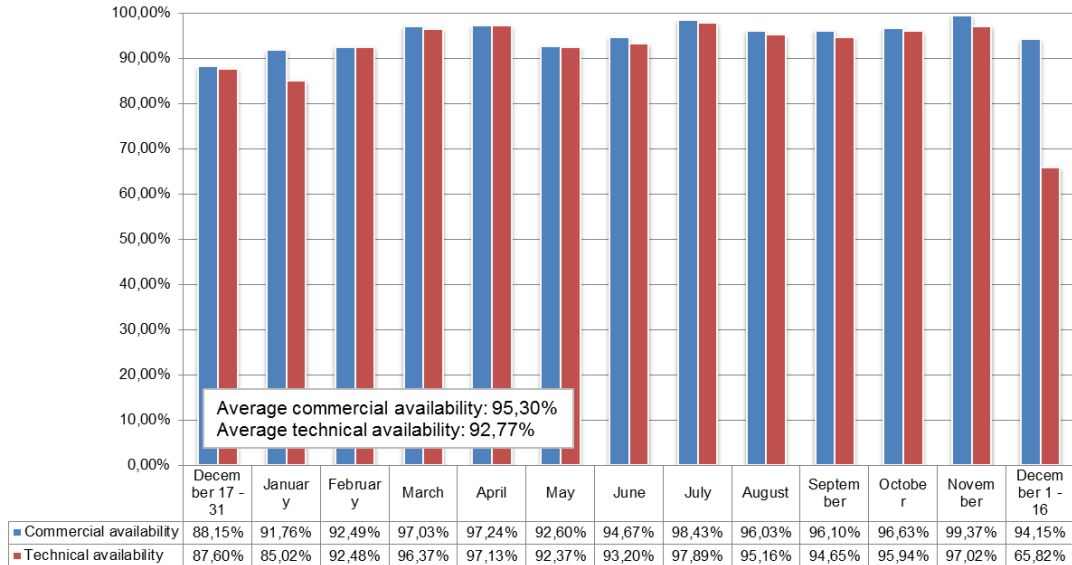
No construction activities in 2012

#### **3.6.6 Outstanding and remedial works**

The installation of the Demo turbine still has to be started as from early 2013 onwards.

## 4 Wind farm annual operations information

### 4.1 Availability



**Table 1: Monthly availability 2012**

#### 4.1.1 Technical Availability

Technical availability is the overall availability of the turbines, with every downtime taken into account.

#### 4.1.2 Commercial Availability

Commercial availability is the availability including only downtime due to the maintenance contractor, Vestas.

### 4.2 Availability of the electrical installation

In 2012, the main electrical infrastructure was 97,75% available

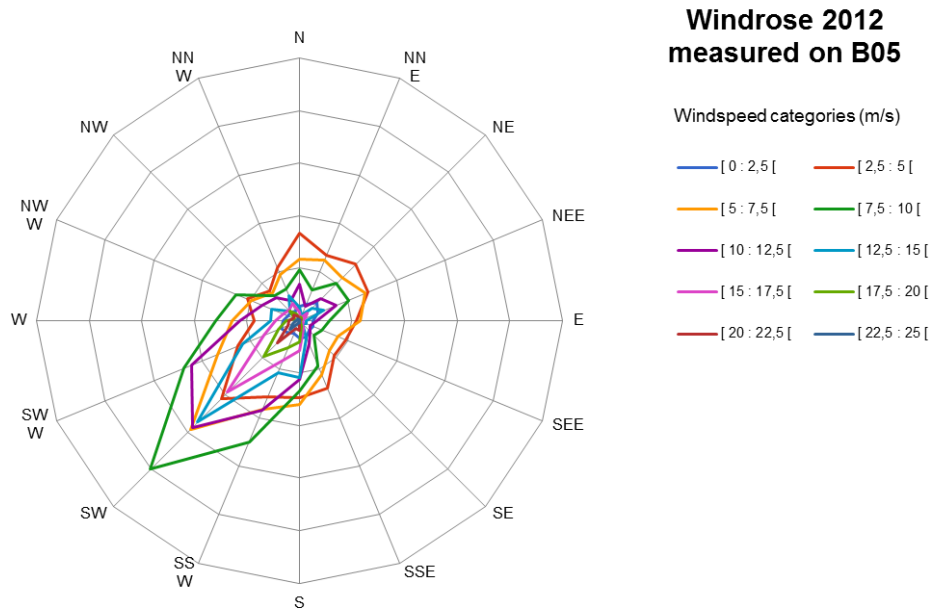
All planned maintenances and inspections on the OHVS and Booster station were carried out without shut down.

### 4.3 Production

The global average wind speed in 2012 was slightly below the expected wind resource. For the second year in a row, the measured value in June and December was significantly higher than the estimated speed by the assessment studies. March was, also as in the first year, significantly lower.

#### 4.3.1 Wind rose & energetic wind rose





**Table 2: Energetic wind-rose B05**

The displayed wind rose is a graphical representation of the wind speed and direction measured on turbine B05. Due to a construction error with the absolute direction indicator, the wind direction SCADA measurement is not correct on most of the turbines. The sensor on B05 was manually adjusted and therefore more reliable. The sum of all turbines gives due to the erroneous absolute wind direction indication a completely distorted view.

For all wind speed categories, the wind directions SSW SW and SWW prevail.

## 4.4 Maintenance

### 4.4.1 Planned Maintenance

Vestas, the service contractor for the BW1 WTG's, performed the following planned maintenance and inspections in 2012:

- Annual service: yearly an annual service is done on all the turbines. The annual service takes three full days per turbine. Every component is carefully inspected and made sure it will operate correctly for the next year.
- Statutory inspections: on regular intervals, the service elevator (3 months), the Acta crane on the transition piece (1 year) and the hook on points (1 year) are inspected and certified by a 3th party [Vincotte].
- Vestas HV inspections: every year, all the HV equipment on the turbines (transformer and switchgears) is inspected by Vestas.
- Vincotte HV inspections: every year, Vestas skilled technicians and a third party [Vincotte] inspect and certifies the HV installation. The switchgear in the turbines is also inspected with ultra-sonic equipment.
- o On the Belwind Booster station in Zeebrugge, Seahopper performed all planned maintenance:
- o On the Belwind Offshore High Voltage Station, Seahopper performed all planned maintenance.

## 5 Permit conditions

In compliance with the authorization for the construction and a license for the operation of a wind farm on the Bligh Bank in the Belgian sea areas article, we give an overview of the environmental permit conditions as mentioned in the appendix 1 of the authorization for the construction and a license for the operation of a wind farm.

Condition Number	Condition Summary	Current Status
2	Each planned modification must be reported to the Board and will be included in the annual work report.	Belwind submitted a correction for the installation of 1 wind turbine Alstom Haliade 6 MW. The minister responsible for the marine environment accorded this correction.
4	The holder undertakes to find and recover all floating or sunken objects used for its activities which, for any reason, have ended up in the sea during the construction, operation or dismantling stages.	No floating of sunken objects have been established.
14	During construction, all foundations and structures already finished must have a temporary warning light (at the highest point) for shipping and aviation traffic.	
15	The holder must set up the necessary safety systems to assure the signalling of the wind farm and structures at all times.	Since 8 February 2011 all navigation and aviation signalisation is fully operational
16	All WTGs must be numbered individually at the base of the mast and at the top of the nacelle.	The foundation and the WTGs have been numbered in accordance with the requirements of this condition.
17	All WTGs and transformers must be provided with collection receptacles to prevent liquids from being released in the environment.	The design of the WTG is such that in case of leakage in the nacelle, all fluids are collected in the central part of the nacelle. From here, collection receptacles are installed under the oil pumps and hydraulic systems as standard.
20	During the operation stage, the availability must be facilitated of a specially equipped intervention vessel (or combination of vessels) for assignments concerning the prevention of shipping traffic accidents and cleaning up sea pollution round and in the wind farm	On 22 January 2011 an agreement was signed with Federal authority responsible for the marine environment
21	Once or twice a year, the holder must take part in simulated nautical accidents, emergency towing exercises and pollution combating exercises.	On a regular base Belwind, Vestas and Seahopper execute emergency exercises.
29.1	The construction materials and rip-rap must be made of natural materials and must not contain any waste materials or a secondary raw material... the use of slag is prohibited.	Certificates of Origin supplied for all scour protection materials have been transmitted to the MUMM.
33.1	The lighting of the turbines for the benefit of shipping and aviation traffic must comply with the conditions set by the competent authorities.	Lights are installed according to the Navigational Aids plan and have been fully operational in the O&M reporting period.
33.2	Foghorns, which come into operation automatically in the event of a meteorological visibility of less than 2 sea miles, must be placed on the corner turbines.	Fog horns are installed according to the Navigational Aids plan and have been fully operational in the O&M reporting period.
34	The holder must maintain the farm on a regular basis.	All installations are maintained on a regular basis.

Condition Number	Condition Summary	Current Status
48	<p>A logbook must be kept in which the following is specified for each turbine:</p> <ul style="list-style-type: none"> <li>➤ Date, time and all relevant data of incidents that occur which have an impact of the environment, stating the measures taken; and</li> <li>➤ The recording of hazardous waste materials, the date of removal of the relevant batch of waste, the quantity and the name of the carrier and the recognised waste processor must also be recorded.</li> </ul>	<p>We confirm that logbooks have been kept for all turbines since start-up of the first WTG and this has continued during operation.</p>

**Table 3: Permit conditions overview**