C-Power

WIND FARM THORNTON BANK PHASE 1

ANNUAL ENVIRONMENTAL REPORT 2010

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INTRODUCTION

C-Power's wind farm is located on the Thornton Bank, some 27 km to the nearest point of the coast.
The project is realised in three phases.
Phase 1 or the pilot phase, fully operational since June 2009, consists of six 5M Repower wind turbine generators (WTG) on gravity base foundations.
Phase 2 and 3 consist of:
-the installation and operation of 48 units of 6 MW Repower WTG on jacket foundations;
- the construction and installation of the offshore high voltage transformer station (OHVS) and
- the laying of the second 150 kV export cable.
The works for phase 2 and 3 will be realised successively. The preparatory offshore works of phase 2 and 3 have started end of February 2011. All 54 wind turbines constituting an installed capacity of 325 MW are expected to be fully operational by end 2013.

The environmental annual report 2010 contains the following information:

- reporting on the environmental permit conditions
- reporting on the monitoring activities performed by C-Power in 2010
- wind turbines data
- an overview of health, safety and environment issues

ACTIVITIES DURING 2010

In 2010, C-Power prepared phase 2 and 3 of the project: project financing (due diligence,..) , engineering (design basis, detailed design, ..) tendering process, preparatory works (soil investigation campaigns,…).

The main activity in the concession area in 2010 consisted of the operation and maintenance (O&M) of the 6 WTG of phase 1. These O&M activities are carried out by Repower under the supervision of C-Power.

The O&M team of Repower consists of 5 permanent members with support from an extra team for the execution of scheduled maintenance.

The O&M activities consist of:

- preventive maintenance: yearly and half yearly maintenance of all turbines
- interventions: the front bearings in the generator were changed, the convertors were retrofitted and small repairs were done on the blades of D4 and D5
- inspection (steered or performed) by C-Power:
    - 20/01: yearly certification green counters and high voltage
    - 02/03: visual inspection (C-P) of D2,D3,D5,D6
    - 28/04: visual inspection (C-P) D1,D4
    - 14/06: yearly certification of hoist equipment D4,D5,D6
    - 23/06: yearly maintenance (C-P) all turbines
    - 03/09: yearly certification of hoist equipment D1,D2,D3
    - 07/10: visual inspection (C-P) D2,D3
    - 18/11: visual inspection (C-P) D1,D4,D5,D6
- painting: refreshment paintings in the autumn (see 1, permit condition 34)

1 PERMIT CONDITIONS

For the year 2010, during which no construction activities have taken place, the following permit conditions were of application:

Condition 2 Planned project adaptations

The project adaptations for phase 2 and 3 are:

- Extension of the concession area in order to adapt to the modified boundaries of the wind energy development zone (Royal Decree of 17 may 2004). In subarea A the extended zone will measure 10, 68 km², in subarea B 9, 23 km², the total surface of the concession area being 19, 90 km²;
- Adaptation of the layout of the wind farm: in order to minimise the wake effect, the WTG have been spaced out ; (see figure 1)
- Use of 6 MW WTG: the WTG supplier Repower has announced that by 2012 the 5 MW WTG will be replaced by the 6 MW WTG;
- Given the more powerful WTG of 6 M, C-Power decided to reduce the number of WTG: from the initial 60 to 54 WTG;
- Use of jacket foundations for the remaining 48 WTG and for the OHVS;

C-Power's project adaptations in phase 2 and 3, including the extension of the concession area, have been authorised by Ministerial Decree of 3 February 2010.

By its letter of 15 March 2010 to the BMM, C-Power has notified the addendum EIA (March 2010) This addendum EIA describes and analyses all expected effects on the marine environment generated by the project adaptations, as well as the expected cumulative effects of the three authorised wind farms in the Belgian part of the North Sea.

The addendum EIA concludes that the effects on the marine environment that will be caused by the project adaptations are not larger nor of a different nature than those of the initial project. On the contrary, given the reduced number of wind turbines and substructures, the impact on the seabed and on the marine environment of the adapted project is expected to be smaller than the impact of the initial and authorised project of 60 WTG with gravity based foundations.

The BMM subsequently adopted the legal provisions of art. 1, 9° *juncto* art. 3, §2 of the Royal Decree of 7 September 2003 on Permits and Authorisations and stated, by its letter to C-Power of 6 May 2010, that the project adaptations of phase 2 and 3 can be considered as adjustments *("ingrepen").* Therefore the project adaptations remain covered by the building authorisation and environmental permit of 14-04-2004, as modified by MD of 10-05-2006 and MD of 25-04-2008.

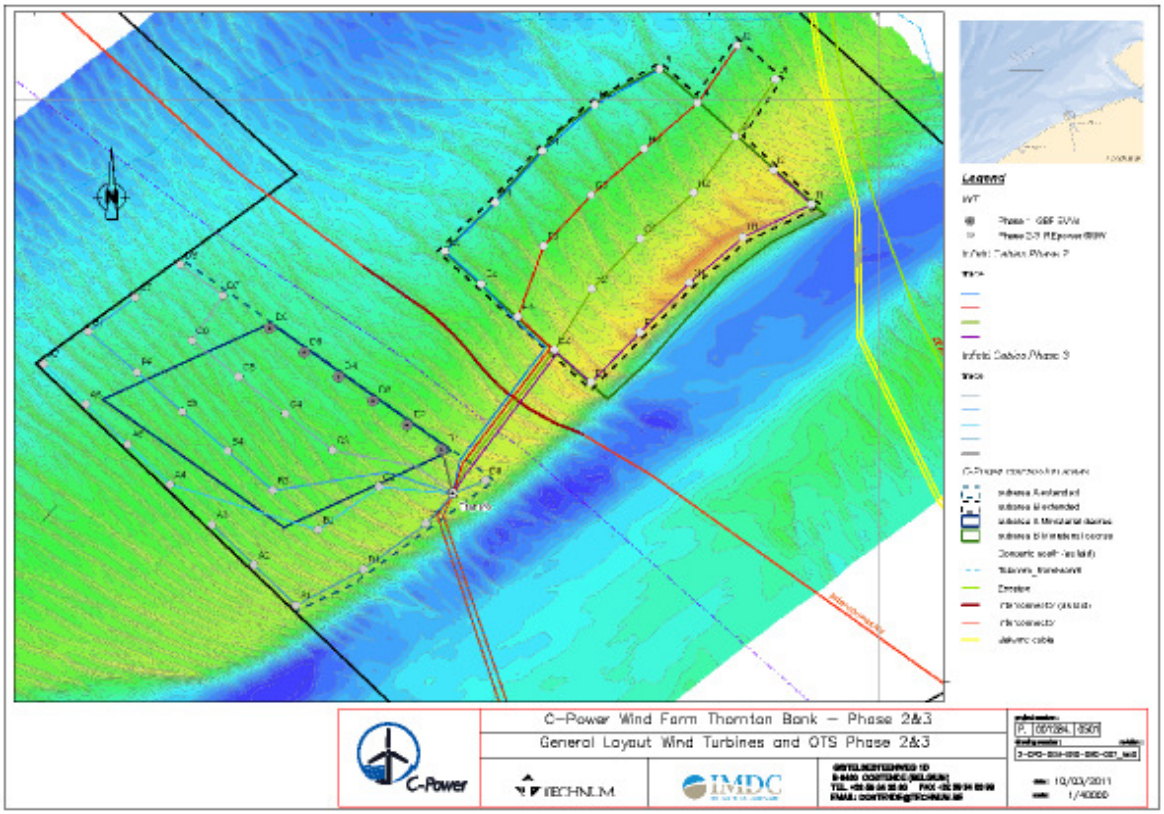

Figure 1: Map of adapted Thornton Bank project

Condition 4 Sunken or driving objects

No objects have sunken or driven in 2010.

Condition 5 & 35 Annual report & survey export cable

This annual report implements condition 5.

C-Power carries out regularly cable survey campaigns in order to monitor the actual situation of the sea cables. In April 2010 and October 2010, a bathymetric survey campaign has been carried out on the infield and export cable routes.

A meeting on the results of the cable survey with the official representatives of the competent authorities (FOD Economie & BMM) has taken place on 15-12-2010 at C-Power's premises in Ostend, during which the results of the survey were discussed and a hard copy of the survey report was given.

The report with the results and the charts has also been put on C-Power's data storage system Buzzsaw, to which the official representatives of the authorities have a password protected access.

The report concludes that the depth of burial of the sea cable is minimum 1 meter, except at a few locations due to moving sand dunes.

The most critical burial depth of the export cable is between D1 and the limit of the concession area. However, this part of the export cable will be completely re-laid when the new connection to the OTS will be installed (2012). The safety of the export cable is not threatened.

Concerning the infield cables, at some points a deeper burial depth was observed in September 2010 than in April 2010.

Condition 7 Scientific research within concession area
Scientific research activities performed by BMM or third parties (University of Gent,…) have been taking place in C-Power's concession area. A communication procedure between C-Power and BMM has been established in order to minimise the risk of conflicts between research and maintenance activities.

Condition 8 Meteorological parameters
The meteorological data from the wind turbines (REguard) are transmitted to the Belgian Marine Data Centre on a monthly basis.

Condition 10 &13 &18 & 22.1 & 22.3 Risks & Safety
C-Power's internal emergency plan (IEP) for phase 1 (exploitation), with the respective internal emergency plans of the contractors, is regularly updated and available on Buzzsaw. The IEP of phase 1 (exploitation) has been officially approved by a letter from BMM.
The IEP contains, in the respective emergency plans of the contractors:

- a list of all vessels of phase 1.
- the risks related to oils and dangerous substances in the WTG
- procedures describing how to react to the incidental release of oil and dangerous substances in case of fire or collision from a vessel
- a list with the features and the quantities of hazardous and noxious substances (HNS)

Condition 15
The buoyage system in the concession area, the colour marking and numbering, the navigation lights, the aviation lights, the sound signalisation, the SCADA system and the Automatic Identification System (AIS) on the WTG are installed according to international norms and standards. Detailed information on the signalisation is outlined in the signalisation plan of phase 1. This document has been sent to the nautical authorities and to BMM.

Condition 16
Each structure has an identification number (in black) on the tower, in order to be identified by boats, and one on the roof of the nacelle, to be identified by helicopters.

Condition 20&21
An agreement for the compensation in environmental advantage has been signed between the Federal public service of Environment, the BMM and C-Power in January 2009.
This agreement stipulates for C-Power the obligation of a yearly financial or material contribution to the readiness of the State for the potential environmental risk of oil pollution by collision incidents within the wind farm.
An oil pollution control exercise, coordinated by the Federal public service of Environment and in collaboration with the nautical authorities, has been successfully organised in April 2010, and has been financed by C-Power, in order to comply with condition 20.

Condition 23
The fouling on the substructures has not been removed in 2010.

Condition 26
A comprehensive soil investigation campaign in subarea A and B has been conducted in October 2009 and in January-February 2010 in order to prepare the foundation installation works of April 2011. The results of the soil investigation campaign are available on Buzzsaw.

Condition 33
The wind turbines have lighting devices according to international IALA and ICAO standards. The corner wind turbines D1 and D6 dispose of fog horns that automatically operate at weather conditions of -2 miles visibility. The lighting and other signalisation for navigation and aviation is put in the Signalisation Plan- phase 1- exploitation of February 2011, which has been transmitted to the nautical authorities and BMM.

Condition 34
The corroded parts of the wind turbines have been removed and painted in October and November 2010. Due to weather conditions, the refreshment painting works were not entirely finished and have been continued in the beginning of 2011.

Condition 41
A table with an overview of all permit conditions and a full copy of all permits has been integrated in the tender documents. All contractors are consequently fully informed on the permit conditions and have integrated the permit requirements in their project planning and budget. C-Power coordinates and supervises the permit conditions' compliance of the respective contractors.

Condition 48
A log book of the marine works contractor and the wind turbine contractor of C-Power is kept and at the disposal of the supervisory authorities at all times. The logbook of 2010 is available on Buzzsaw.

Condition 49
In 2010, a safety zone around the 6 WTG of the pilot phase has been established with cardinal buoys. These buoys are located at more than 500 m from the wind turbines. In accordance with the nautical authorities, it was agreed to leave these cardinal buoys during 2010 until repositioning for the next phase of the construction works, which has been done in February 2011.

2 MONITORING ACTIVITIES C-POWER

A bathymetric survey of infield and export cable routes, of sedimentation and erosion of the foundations and of the sand dumping locations L1, L2 and L3 on the Thornton bank has been executed in April and September 2010 in order to monitor the burial depth of the cables, the evolution of the morphology of the seabed around the foundations and around the disposal areas.
In May 2010, the first survey of electromagnetic fields has been performed.

- Sedimentation and erosion foundations

Two monitoring campaigns, in April 2010 and in September 2010, have measured seabed levels around the wind turbine locations. The results have been presented to BMM during a meeting on 15 December 2010 and are available on C-Power's data management system (Buzzsaw).

- Sedimentation and erosion cable

Two monitoring campaigns, in April 2010 and in September 2010, have measured the burial depth levels of the export cable and the infield cables. The results have been presented to BMM and Ministry of Economy on 15 December 2010 and are available on Buzzsaw.

- Movement of dumped sand

The disposal areas have been monitored in April 2010; the results were presented in December 2010 and stored on Buzzsaw.

- Electromagnetic fields

On 21 may 2010, a survey of electromagnetic fields of the export cable has been performed. The results and a descriptive note have been transmitted to BMM.

3 WIND TURBINES DATA

In table 2, the average rotor speed and pitch angle are compared to the wind direction for the Repower 5M WTG in 2010.

Rotor speed (rpm)f	Pitch angle (°)	Wind direction (°)
NA	NA	North
11	5	
10	5	
10	8	30°
10	10	
9	10	
9	12	60°
9	10	
8	13	
7	14	East
7	17	
7	20	
6	24	120°
7	19	
7	19	
8	18	150°
9	12	
9	14	
9	16	South
9	15	
9	14	
9	14	210°
9	13	
10	13	
9	13	240°
9	13	
9	13	
8	14	West
9	12	
8	14	
7	17	300°
8	14	
8	14	
9	12	330°
10	5	
9	2	

Table 1 Average rotor speed and pitch angle vs. wind direction for a 5M in 2010

In figure 2, a diagram represents the average rotor speed and pitch angle of D1 in 2010

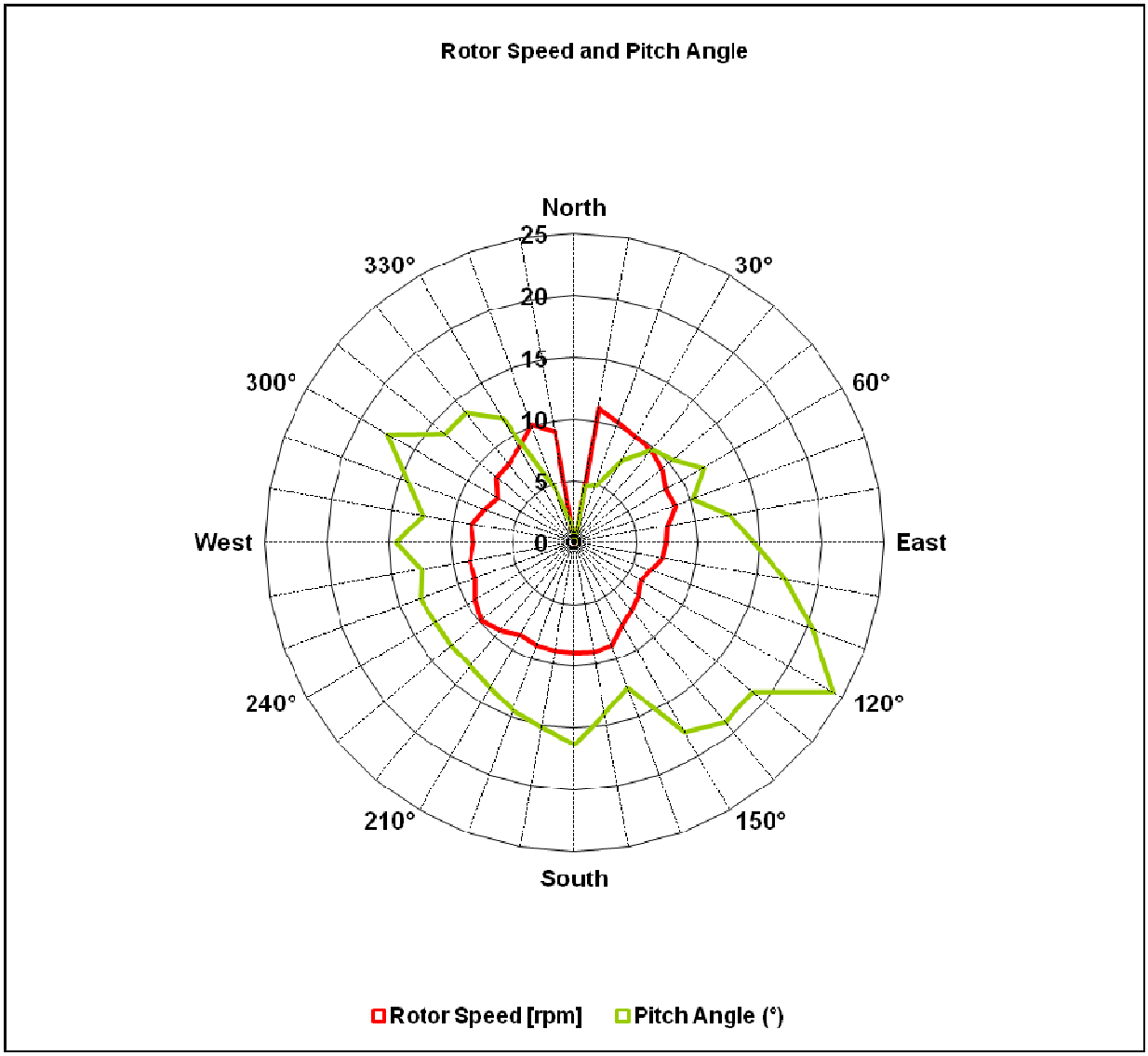

Figure 2 Rotor speed and pitch angle of D1 in 2010

4 HEALTH, SAFETY AND ENVIRONMENT (HSE)

The health, safety and environment standards at the Thornton Bank are considered to be good , which is reflected in the low occurrence of incidents during 2010 and before.
In 2010 no injuries (minor nor heavy) to people working in our around the wind farm occurred, no objects have sunken, no hazardous substances have been introduced in the marine environment.

C-Power's emergency plan for the exploitation of phase 1 has been updated end of 2010 and approved by BMM beginning of February 2011. The emergency plan as well as the logbook are available on Buzzsaw.

A dedicated HSE manager is integrated in the organisation chart of C-Power. The HSE manager is charged with missions such as the coordination of the HSE initiatives, the organisation of internal HSE emergency exercises, training and information sessions, etc...

Specific training sessions (climbing, rescuing and basic rules of accident prevention) are regularly organised by Repower for their employees and for some of C-Power's staff.
As an important safety measure, the visit or access to the WTG without a Repower employee is not authorised: a special instruction sheet with safety regulations for persons who need to visit or ascend the wind turbines, needs to be read and signed off prior to the visit.
On a regular basis, safety exercises with the Sea King helicopters are organised by Repower in order to train safe access procedures in emergency cases. Safety regulations for the use of a NHV helicopter for transport to the Thornton bank turbines have also been established and strictly implemented.

Remote Monitoring system
C-Power has a 24-hour SCADA (Supervisory Control and Data Acquisition) surveillance system in operation, which is located both at the operational centre of C-Power in Ostend and in the Repower offices in Ostend and Hamburg.
The daily monitoring of the SCADA system enables both the operational manager of C-Power and Repower to have a complete overview of all turbines and therefore can take action if any abnormalities occur. C-Power has linked MRCC into this SCADA system.
On each wind turbine, 2 cameras are installed at the height of the boat landings. On WTG D1, an extra third camera is installed. On WTG D6, an extra 180° camera will be installed in 2011.
The camera images are sent through in real time to the operational centre in Ostend and Hamburg and are stored for 24 h. These images are available for the nautical authorities in real time as of 2010.

In consultation with the nautical authorities, C-Power has also installed an AIS (Automatic Identification system) allowing identification of the wind farm for vessels in the navigation zone.

Events with a possible impact on the safety of the installations or on the safety of persons or events which could have had an impact on the marine environment.

During C-Power's visual inspection in November 2010, a minor dysfunction of some of the signalisation lights was observed. C-Power asked Repower to remedy as soon as reasonably possible the dysfunctions. Detailed information on the progress status of the repair actions of Repower has been sent to the follow-up committee at BMM (permit condition 15).
One of the lessons learnt of this incident is that it is necessary to inform not only the follow-up committee but also the nautical authorities.
The other incidents that could have caused an impact on the safety of the installations or on the safety of persons or which could have had an impact on the marine environment are:
- a problem with a hardly visible buoy of monitoring activities
- a helicopter flying closely to the wind turbines

A full record of these events can be found in C-Power's logbook, put at the disposal of the authorities via Buzzsaw.