THORNTON BANK
OFFSHORE WIND FARM

ANNUAL ACTIVITY REPORT
2011

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INTRODUCTION

In accordance with article 8 of the Ministerial Decree of 14 April 2004, as modified, and in conformity with the stipulation in article 21 of the Royal Decree on the Environmental Impact Assessment, C-Power herewith submits the yearly report on how the authorised and permitted activity in the North Sea has been carried out.

In conformity with the dispositions of Annex III of the Ministerial Decree (MD), the environmental annual report 2011 contains the following information:

- environmental permit conditions
- monitoring activities performed by C-Power in 2011
- wind turbines data
- wind analysis
- synthesised production data
- health, safety and environment plan

GENERAL PROJECT INFORMATION

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 (2007-2009), the pilot phase, consists of the construction of six 5M REpower wind turbine generators (WTG) on gravity base foundations.
The 30 MW installed capacity is fully operational since June 2009.

Phase 2 (2011-2012) consists of works in sub area A and B:

- Installation of 24 WTG units (jacket foundations (JF) and 6,15 MW wind turbine (WTG)) in sub area B and 6 WTG units in sub area A, mutually connected with 33kV-cables;
- Laying and connection of infield cables, including crossing with Interconnector 33/36kv gas pipeline and Concerto South telecom cable;
- Construction of an offshore transformer station (OTS) + its jacket foundation in subarea A;
- De-connection works of 150/170 kV cable A from D1 and connection to transformer station;
- Laying of 33kV infield cable between OTS and D1;
- Installation of 2 subsoil 150 kV-onshore connections between the 150 kV-offshore cables and the high voltage station "Sas Slijkens";
- Installation of the second 150 kV offshore export cable.

Phase 3 (2012-2013) consists of works in sub area A:

- Construction of 18 WTG (6,15 MW) and the necessary connections with the offshore transformer station;

Figure 1 illustrates the different phases of C-Power's project.

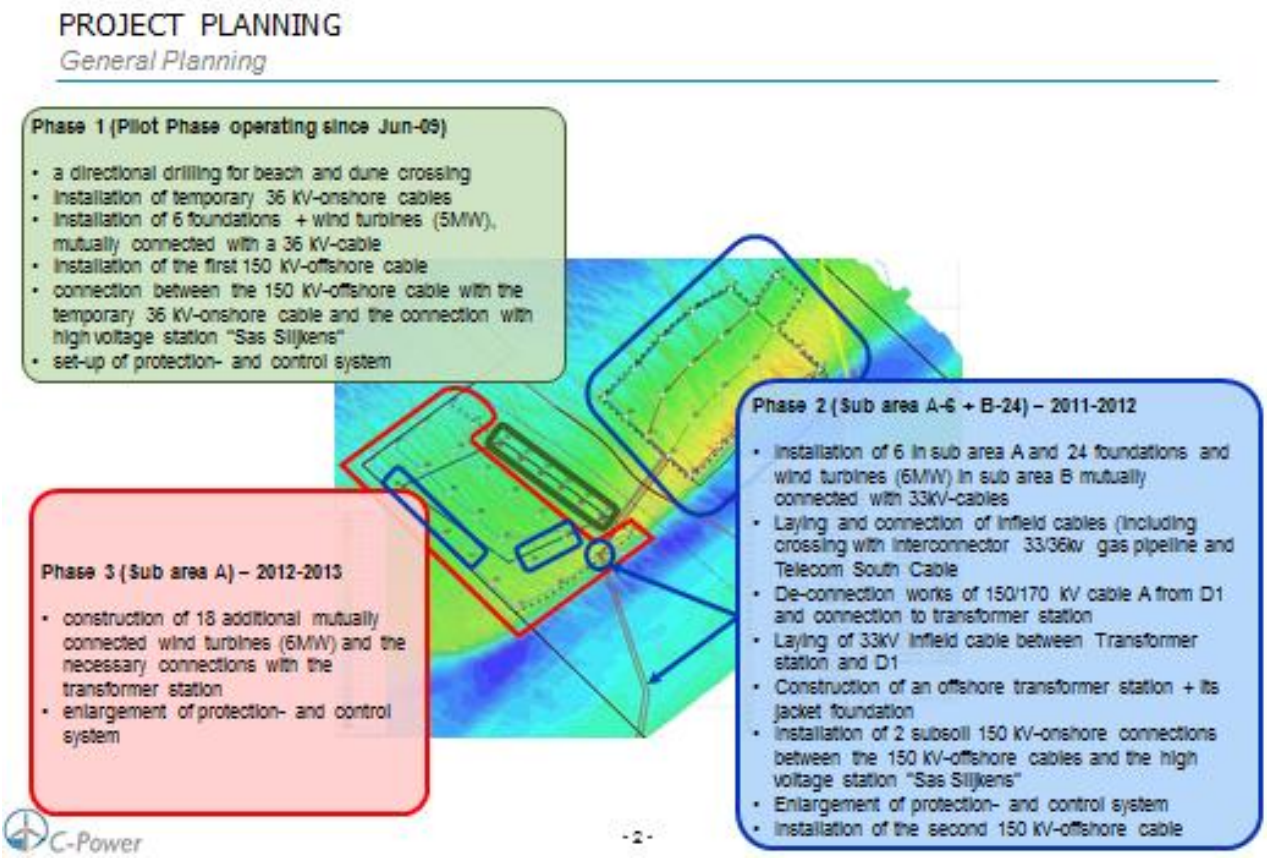

Figure 1: detailed planning project C-Power

All 54 wind turbines will constitute a total installed capacity of 325 MW, which is expected to be fully operational by end 2013. The fully operational wind farm of C-Power will then generate around 1 TWh/year, or the equivalent of the electricity consumption of 600.000 inhabitants.

The total investment cost of C-Power's offshore wind farm amounts to 1.289 M EUR.

ACTIVITIES DURING 2011

In 2011, C-Power realised the driving of the foundation pin-piles in sub area A and B and installed the all 24 jacket foundations of phase 2 of the project.

All 196 foundation pin-piles for phase 2 and 3 were successfully driven by the end of August 2011, which is eight months ahead of schedule. Normally, the pile driving works of phase 3 were planned for the spring in 2012, but given the excellent progress, C-Power decided to go ahead with the foundation pin-piles installation of phase 3. The installation of the jackets of phase 3 has been launched immediately after the winter stop of 2012, as from 1st of March, which is two months ahead of schedule.

Next to the intensive construction works in 2011, normal operating and maintaining (O&M) activities continued in sub area A. The O&M activities are carried out by the wind turbine manufacturer (Repower), under the supervision of C-Power.

Repower's O&M team, based in the Ostend port, consists of 5 permanent maintenance workers with support from an extra team for the execution of scheduled maintenance.

The O&M activities performed in 2011 consisted of:

- preventive maintenance: yearly and half yearly maintenance of all turbines
- Interventions: the cable plugs (high voltage connectors) were exchanged on all the infield cables. 3 gearboxes (D2, D3 and D6) were exchanged and 3 gearboxes (D1, D4 and D5) were retrofitted. Small repairs were done on the blades of all turbines.
- inspection (steered or performed) by C-Power:
    - 18/01: yearly certification green counters and high voltage
    - 19/04: visual inspection (C-P) all turbines
    - 28/07: yearly certification of hoist equipment all turbines
    - 25/08: yearly maintenance (C-P) all turbines
    - 15/09: visual inspection (C-P) D1,D3,D6
    - 22/09: visual inspection (C-P) D2,D4,D5

1 ENVIRONMENTAL PERMIT CONDITIONS

General

All permit conditions are integrated in the daily management of the construction and operation activities offshore and implemented by C-Power and its contractors. C-Power maintains a regular and constructive contact with the federal and nautical authorities in order to assure to observe all permit conditions in the best possible way.

Permit condition 2 Planned project adaptations

All 196 foundation pin-piles for phase 2 and 3 were successfully driven by the end of August 2011, which is eight months ahead of schedule. Normally, the pile driving works of phase 3 were planned for the spring in 2012, but given the good progress, C-Power decided to go ahead with the foundation pin-piles installation of phase 3.

C-Power informed the authorities of this minor change in the planning of the project during the meeting of the follow up committee in June 2011.

Permit condition 4 Driving or sunken objects

An overview of driving and sunken objects is outlined in Table 1.

Object	Date	Description	Action-Follow up
East cardinal buoy (CP East)	04-01-2011	Loss of buoy due to severe storm	Reported to MRCC. New CP-E placed. Lost CP-E found in 2012 in the Dutch North sea.
Marker buoys wave rider	30-05-2011	Disappeared	Recovery of 2 other marker buoys, 3rd drifted far away and could not be recovered.
Anchor marking buoy	20-06-2011	Loss	Could not be recovered
Cable marker buoy	15-09-2011	Loss	Could not be recovered
ROV (remotely operated vehicle)	16-08-2011	Umbilical cut (Location I1)	ROV recovered the same day.
ROV	19-11-2011	Loss	Reported found on the shores of Sweden; recovered and re-used.
Buoys A1,A7 and D8	7->20-12-2011	Loss	Due to very bad weather, the wires connecting the radar reflector buoys to the pre-piles broke and the buoys were lost and could not be recovered

Table 1: overview of lost and recovered objects in 2011

Permit condition 5 & 35 Annual report & survey export cable
C-Power carries out cable survey campaigns in order to monitor regularly the depth of burial and other characteristics of the sea cables.
In 2011, a bathymetric survey campaign of the infield and export cables has been carried out in May and November.
The results of the survey campaign of May 2011 have been presented by C-Power to the members of the Follow up committee on 13-10-2011 and a hard copy of the survey report was submitted.
The report with the results and the charts are on C-Power's data storage system Buzzsaw, to which the representatives of the authorities have a password protected access.

The cable survey report concludes that the required minimum depth of burial (DOB) of 1 meter is for the largest part of the 40 km route of the export cable, complied with. At a few locations however, the survey results show that the minimum DOB is not observed, which is most likely due to the temporary effect of moving sand dunes.

A critical burial depth of the export cable is for instance recorded between windmill D1 and the southern limit of C-Power's concession area. This part of the export cable will be completely re-laid when the new connection to the OTS will be installed (2012) and will be re-buried at the required depth.

Further to the findings of the survey campaign of May, a new export cable survey campaign was ordered by C-Power and executed in November 2011. The detailed results of this survey and a comparative graph of the DOB of the export cable in May and November 2011 showed that the number of critical DOB's of the export cable A had significantly decreased. This report was submitted to the authorities on 9 December 2011.

Monitoring

Permit condition 6 Retribution monitoring activities BMM
Upon receipt in April 2011 of the invoice related to the mandatory monitoring activities performed by BMM or by BMM contracted third parties in the year, C-Power has paid the retribution of 290.097,33 EUR for the BMM monitoring activities in C-Power's concession area.

Permit condition 7 Scientific research within concession area
Even with the intensive construction activities that have taken place in C-Power's concession area as of March 2011, scientific research activities performed by BMM or third parties have continued to take place. In order to minimise and control the risk of conflicts between research and construction and maintenance activities, a safety protocol between C-Power and BMM has been concluded and complied with to the satisfaction of all parties involved.

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

Sediment & hydrodynamics
Permit condition 9

9.1 Dredging activities
From end of February till beginning of June 2011, all jacket foundation locations in area A & B have been dredged (pre-sweeping). The dredged material has been dumped to the disposal areas L1, L2 and L3 within the concession area.

9.2 Erosion protection
An overview of the erosion protection activities in 2011 is outlined in Table 2.

Type	Date	Dimension	Location
Rock dump	June 2011	30x30 m	Jacket foundation OTS
Rock dump	June 2011	70x20 m	Interconnector gas pipeline
Rock dump	June 2011	Remedial works on top of existing rock dump	PEC telecom table crossing with export cable A
2 mattresses	Mid June 2011	2 x (10x30x0,35m)	Concerto 1 South telecom cable
1 mattress	October 2011	10x35x0,35m	PEC telecom cable
Rock dump	November 2011	approx. 90x50m	C-Power infield cables between area A & B, crossing Concerto 1 South cables
Rock dump	November 2011	approx. 80x60m	C-Power infield cables area A&B, crossing interconnector pipeline
Rock dump	November 2011	approx. 50x15m +40x25 m	C-Power infield cable D1 – OTS at D1 foundation

Table 2: overview of the erosion protection installed in 2011

Figure 2: mattresses installation at the Concerto telecom cable crossing (infield cables between area A and B)

Risks & Safety

Permit conditions 10 &13 &18 & 21 & 22.1 & 22.3
C-Power's internal emergency plan (IEP) for phase 1 (exploitation) and phase 2 & 3 (construction), consisting of a general emergency plan and the respective internal emergency plans of the contractors, is regularly updated and available on Buzzsaw.
The IEP contains, in the respective emergency plans of the contractors:

- a list of all vessels of phase 1 and phase 2 and 3;
- the risks related to oils and hazardous substances in the WTG;
- procedures describing how to react to the incidental release of oil and hazardous substances in case of fire or collision from a vessel;
- a list with the features and the quantities of hazardous and noxious substances (HNS)

In January 2012, C-Power organised an internal emergency training for members of the crisis team and for the safety managers of the contractors. A specialised company in offshore safety training was hired to organise a full day program, including simulations of emergency situations. Further to the training, an update of the IEP has been implemented.

Permit condition 11
A specific signalisation plan for the concession area has been drafted and submitted to the relevant authorities in order to give supplementary visibility to the inaccessibility of the concession area for vessels that are not related to the project.
In spite of this, around 80 non-authorised vessels entered into the concession zone without authorisation. C-Power has discussed this issue with nautical and federal authorities. Extra information was sent out from MRCC to yachting and fish shipping companies in order to remind the ban to enter the concession area without authorisation.

Permit condition 12
During the construction activities, a guard vessel assures the coordination of the incoming and outgoing nautical traffic and has also the function of guarding the concession area, i.e. preventing non-project related vessels to enter into C-Power's concession area. This was not at all times successful (see Permit condition 11). Recreational vessels (yachts, watermoto's, etc.) and some fish trawlers entered into the zone without respecting the signals of the guard vessels.

At two occasions the guard vessel left C-Power's zone without prior information to C-Power. The reasons for leaving the concession area were
- technical problems that could have led to the unnavigability of the guard vessel
- heavy weather conditions that made it impossible for the guard vessel and its crew to act properly and moreover, put the lives of the crew at risk.

Issues about the duties and the limitations of a guard vessel, for instance the fact that a guard vessel has no police authority, that staying in the work area in stormy weather puts the lives of the crew at risk, etc. have been discussed with the relevant and nautical authorities during the follow-up committee and ad hoc meetings .

Permit condition 14
During the construction, all foundation structures of phase 2 have temporary navigation warning lights (solar lamps).

Permit condition 15
The buoyage in the concession area, the colour marking, the numbering, the navigation lights, the aviation lights, the sound signalisation, the SCADA system and the Automatic Identification System (AIS) on the WTGs are installed according to international norms and standards.

A detailed buoyage and marine and aviation signalisation plan for phase 2 and 3 has been submitted to and approved by the nautical and other relevant authorities in June 2011.

Permit condition 16
Each wind turbine 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.

Permit condition 17
Each wind turbine and the offshore transformer platform has leakage bins inside which are capable to receive and store temporarily unintended spills or other leakages in order to prevent the release of the substances into the marine environment.

Permit condition 20
An agreement related 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.

Harmful substances

Permit condition 23

The paint used for the maintenance of the WTG structures does not contain TBT.
The fouling on the substructures has not been removed.

Permit condition 24

See also description PC 9.
The protection mattresses used for the crossing of the cables and pipelines do not contain risks for leaching out substances in the marine environment.

Permit condition 25

Prior to the installation of the foundation piles and the laying of the cables a side scan sonar, magnetometer and multibeam surveys have been performed in the concession area and along the cable routing of export cable B.
All objects identified on the seabed have been plotted and, where necessary, were removed. No ship wrecks have been observed. In addition, inspection/removal diving campaigns were performed in order to decrease the possibility to find obstacles and anomalies along routes during the cable laying.

Permit 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.

Permit condition 28

Prior to the start of the construction activities, all required documents (design basis, method statements, building plans, ..) have been submitted to the BMM.

Permit condition 29

The building materials and rock dumps are natural materials and do not contain waste products. No slags have been used.
During grouting activities (3,5 months in 2011), small amounts of mortar (grout) have been released into the marine environment.

Sea mammals

Permit condition 31 prevention hearing damage of sea mammals while driving of foundation piles

The pile driving activities have started in sub area B at the beginning of April 2011 and continued in subarea A till the end of August.

A C-Power's representative was present at the foundation piles location to monitor the pile driving works, including the control of the preventive measures for sea mammals during the pile driving works.

A 'seal scarer' acoustic device has been submitted and approved to the BMM and was systematically deployed a few hours before the start of the pile driving activities.
A watchman was appointed to be on the watch-out for sea mammals in the vicinity of the pile driving sites. No sea mammals have been observed near the pile driving sites during construction activities.
The ramp-up procedure or 'soft start' was applied for each of the 4 foundation piles per location.
No mortality of birds, sea mammals, fishes or cephalopoda has been reported during the pile driving activities.

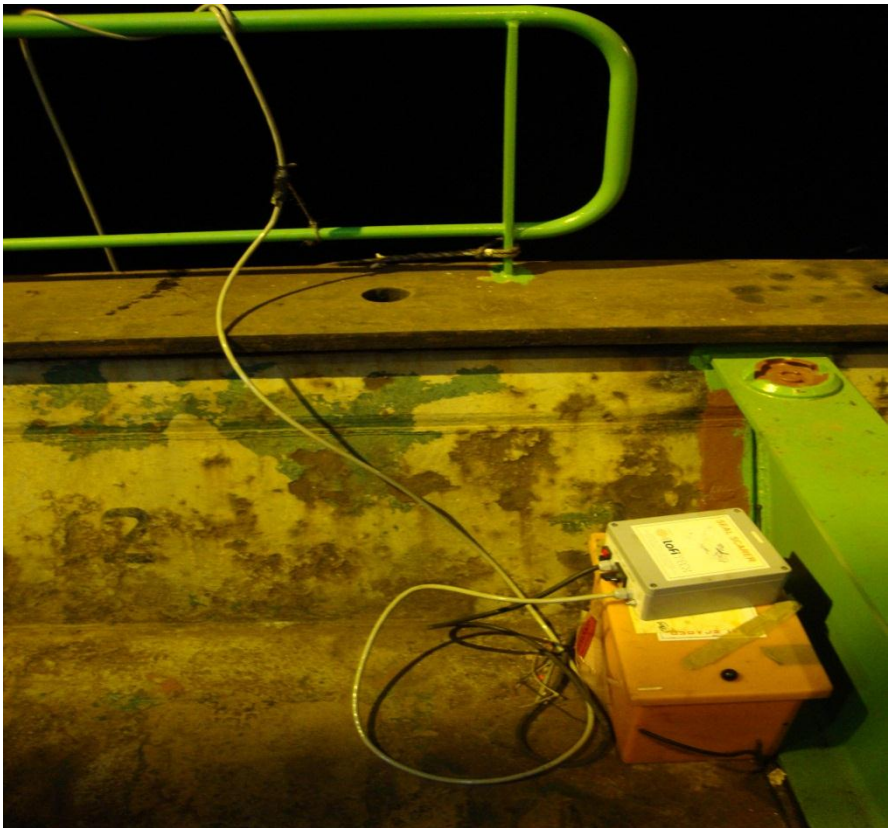

Figure 3: seal scarer used during the pile driving activities in C-Power's concession area

Scenery

Permit 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 to BMM.

Permit condition 34
Some parts of the boat landings and the ladders have had a refreshment painting in 2011.

Cables

Permit condition 35
35.1
All installed cables in area B (including D1-OTS) have not been energized during 2011. One infield cable has been removed and replaced during installation. The replaced (old) cable has been recovered)

35.2 & 35.3
The depth of burial of the cables is regularly surveyed by C-Power. The results of these surveys are submitted to the members of the follow-up committee.

A hard copy of the detailed report of the monitoring survey of the wind turbine locations, the disposal areas, the 150 kV export cable and the 33 kV infield cables executed in May 2011 was submitted to the BMM and DG Energy in October 2011.

A follow up survey for the cable depth of burial was performed in November 2011, and the results submitted to the authorities on 9 December 2011.

As outlined above (General), the results showed that at most locations of the 40 km export cable route, the depth of burial (DOB) was ≥ 1 m. At some places where the DOB of ≥ 1 m was not reached, an evolution towards the required DOB was observed between May and November 2011.

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

Permit condition 46
The planning of all construction related activities offshore are communicated via a weekly e-mail to the representatives of the relevant authorities. This includes the contact details of C-Power's point of contact for the authorities and changes in the schedule of the project planning.

Permit condition 48
A log book, in which all incident reports of the marine works contractor and the wind turbine contractor are registered, is kept on Buzzsaw.

Permit condition 49
In February 2011, a safety zone of ≥ 500 m around the larger work zone has been established with cardinal buoys, of which the locations were put on drawings in the signalisation plan.
This safety zone has to prevent the passage through C-Power's concession area of vessels that are not related to the project.
In spite of the installation of this enlarged safety zone around the work zone, many infringements by vessels related to the Bligh Bank wind farm, cargo vessels, dredging vessels, fish trawlers and yachts have been recorded.

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 May and November 2011 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.

- Sedimentation and erosion foundations

A monitoring campaign in May 2011 has measured seabed levels around the wind turbine locations. The results have been presented to the follow up committee on 13-10-2011.

- Sedimentation and erosion cable

Two monitoring campaigns, in May 2011 and November 2011 have measured the burial depth levels of the export cable and the infield cables. The results have been presented to the follow up committee on 13-10-2011 and results of the second campaign were sent through on 9-10-2011.

- Movement of dumped sand

The disposal areas have been monitored in May 2011; the results were presented to the follow up committee on 13-10-2011.

3 WIND TURBINES DATA

In table 3, the average rotor speed and pitch angle are compared to the wind direction for the Repower 5M WTG in 2011.

Rotor Speed [rpm]	Rotor Speed [rpm]	Pitch Angle (°)	Wind Dir (°)
0	NA	NA	North
1019	11	4	
928	10	6	
901	9	8	30°
890	9	8	
875	9	10	
892	9	10	60°
818	8	14	
767	8	15	
728	8	17	East
697	7	18	
619	6	23	
607	6	25	120°
682	7	19	
735	8	18	
756	8	19	150°
791	8	17	
836	9	17	
914	9	15	South
887	9	16	
899	9	15	
890	9	16	210°
972	10	15	
992	10	15	
927	10	15	240°
879	9	14	
867	9	15	
897	9	15	West
809	8	16	
757	8	19	
775	8	15	300°
808	8	10	
726	7	12	
790	8	9	330°
885	9	6	
1013	10	-1	

Table 3 Average rotor speed and pitch angle vs. wind direction for a 5M in 2011

In figure 4, a diagram represents the average rotor speed and pitch angle of D1 in 2011

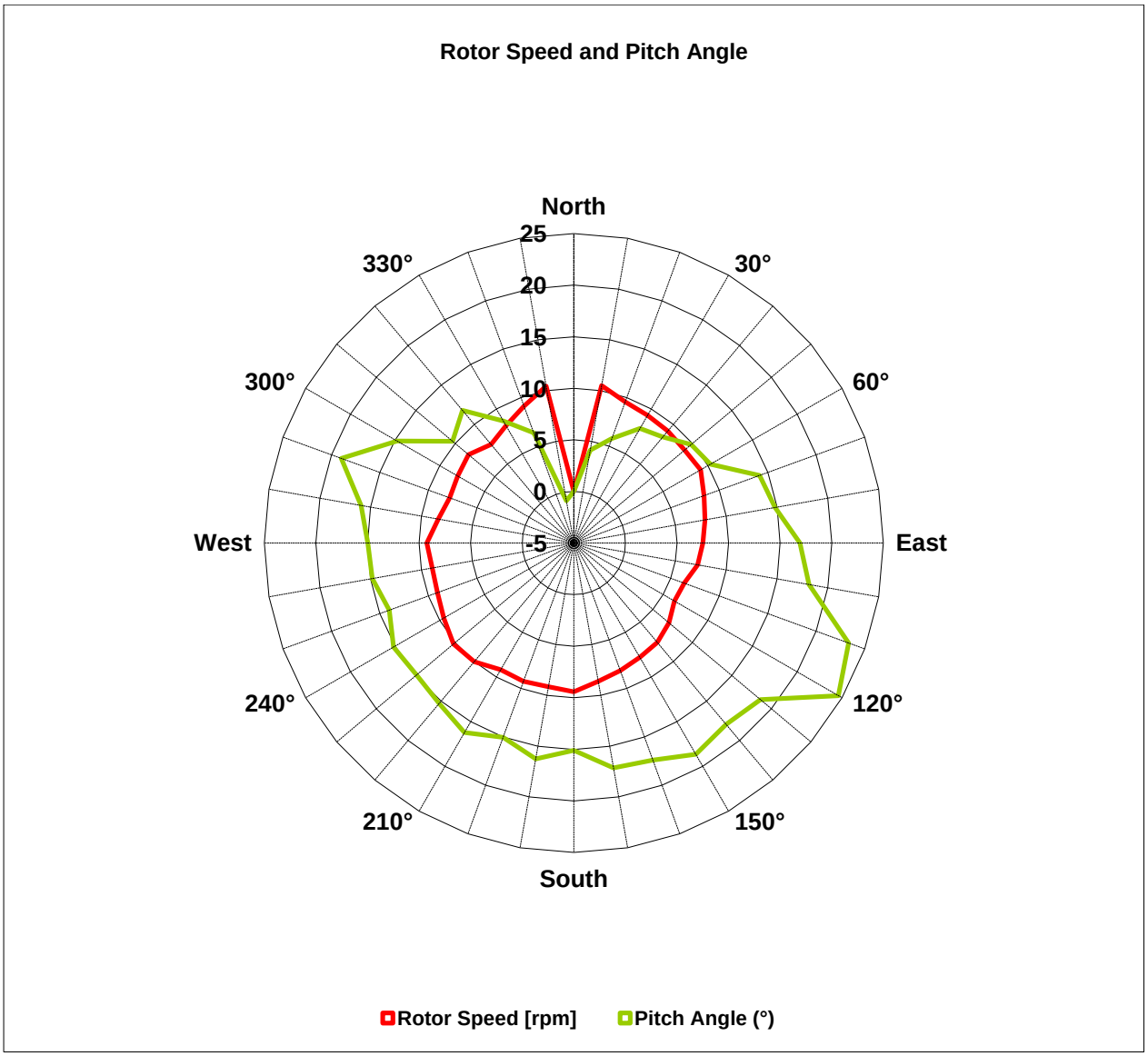

Figure 4 Rotor speed and pitch angle of D1 in 2011

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 2011.

The following elements constitute the corner stones of C-Power's HSE policy:

- Dedicated HSE manager for C-Power;
- Extensive HSE plan for construction works of phase 2 and 3;
- Emergency plan construction phase 2 and 3;
- C-Power's safety charter;
- Introduction of HSE key performance indicator (KPI);
- Report of HSE observations by C-Power's offshore representatives;
- Regular safety walks by C-Power's management;
- HSE and emergency plan training and exercises.

In 2011, no major HSE incidents occurred in or around the wind farm zone. No intervention of MRCC was requested.

A detailed record of all HSE incidents is kept in C-Power's logbook. An external certifying body performs an assessment of the incidents in its evaluation report of 2011, which will be submitted to the BMM.

C-Power's emergency plan has been approved by BMM beginning of February 2011. The regular updates of the emergency plan are systematically sent to the nautical and other federal and Flemish authorities in charge of maritime safety.

A dedicated HSE manager for the construction phases has been engaged on a full time basis in order to coordinate and to supervise the respective HSSE policies and practices of the different contractors. 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 C-Power's O&M 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. If any abnormalities occur, purposive actions and interventions can be undertaken.

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 has been 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.