

# CHAPTER 2

## OFFSHORE RENEWABLE ENERGY DEVELOPMENT IN THE BELGIAN PART OF THE NORTH SEA - 2016

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### ABSTRACT

Offshore wind farms are expected to contribute significantly to the Belgian 2020 targets for renewable energy. Today, 182 turbines are operational in the Belgian part of the North Sea. In the next few years, an additional 234-342 turbines may be installed. With 238 km<sup>2</sup> reserved for offshore wind farms in Belgium and 344 km<sup>2</sup> in the adjacent Dutch Borssele, cumulative ecological impacts

may however be expected. These impacts both positive and negative, triggered an environmental monitoring programme focusing on various aspects of the marine ecosystem components, but also on the human appreciation of offshore wind farms. This report provides an overview of the offshore renewable energy development in the Belgian part of the North Sea.

## 2.1. OFFSHORE RENEWABLE ENERGY IN BELGIUM

The European Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market, imposes a target figure for the contribution of the production of electricity from renewable energy sources upon each Member State. For Belgium, this target figure is 13% of the total energy consumption, which must be achieved by 2020. Offshore wind farms in the Belgian part of the North Sea (BPNS) are expected to make an important contribution to achieve that goal.

With the Royal Decree of 17 May 2004, a 264 km<sup>2</sup> area within the BPNS is reserved for the production of electricity from water, currents or wind. It is located between two major shipping routes: the north and south traffic separation schemes. In 2011, the zone was adjusted on its Northern and Southern side in order to ensure safe shipping traffic in the vicinity of the wind farms. After this adjustment the total surface of the area amounted to 238 km<sup>2</sup>.

Prior to installing a renewable energy project, a developer must obtain (1) a domain concession and (2) an environmental permit. Without an environmental permit, a project developer is not allowed to build and exploit a wind farm, even if a domain concession was granted.

In order to stimulate the development of wave energy in Belgium, the Mermaid project obtained its domain concession license only on condition that a certain amount of energy would be generated from waves as well as from wind.

When a project developer applies for an environmental permit an administrative procedure, mandatory by law, starts. This procedure has several steps, including a public consultation during which the public and other stakeholders can express any comments or objections based on the environmental impact study (EIS) that is set up by the project developer. Later on during the permit procedure, the Management Unit of the North Sea Mathematical Models (MUMM), a Scientific Service of the Operational Directorate Natural Environment (OD Nature) of the Royal Belgian Institute of Natural Sciences, gives advice on the acceptability of expected environmental impacts of the future project to the Minister responsible for the marine environment. MUMM's advice includes an environmental impact assessment, based on the EIS. The Minister then grants or denies the environmental permit in a duly motivated decree.

The environmental permit includes a number of terms and conditions intended to minimise and/or mitigate the impact of the project on the marine ecosystem. Furthermore, as required by law, the permit imposes a monitoring programme to assess the effects of the project on the marine environment.

At present, nine projects were granted a domain concession and an environmental permit (from South to North: Norther, C-Power, Rentel, Northwind, Seastar, Nobelwind, Belwind, Northwester II & Mermaid) (Table 1). When all Belgian wind farms are built, there will be just under 500 wind turbines in the Belgian part of the North Sea. The entire area with its nine parks will

have a capacity of 2200 MW and cover up to 10 % of the total electricity needs of Belgium

or nearly 50 % of the electricity needs of all Belgian households.

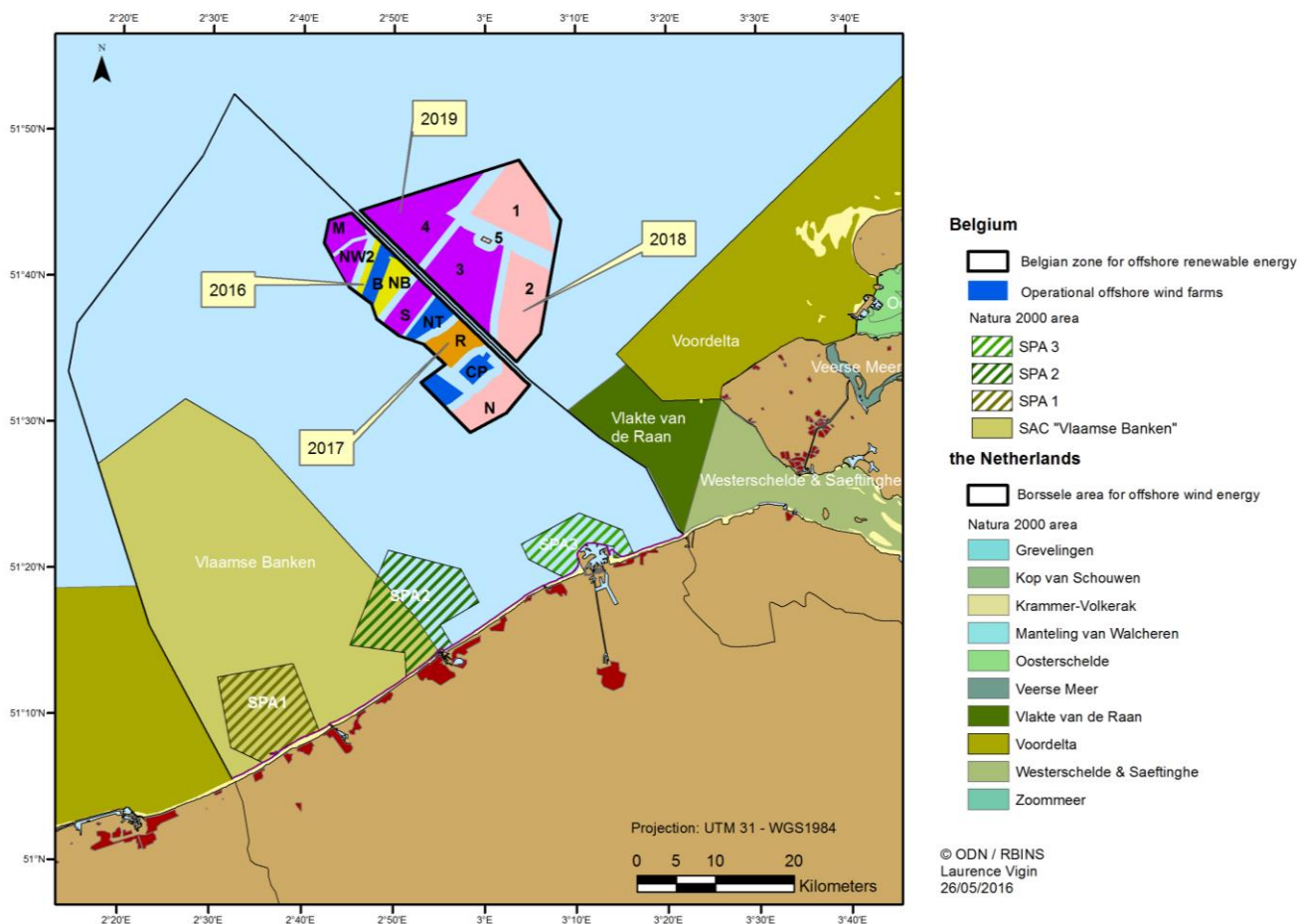


Figure 1. Map of the Belgian zone for offshore renewable energy, the Dutch Borssele offshore wind area and Natura 2000 areas in the vicinity. Already constructed wind farms are indicated in blue (CP: C-Power, NT: Northwind and B: Belwind), wind farms under construction in 2016 in yellow (NB: Nobelwind), 2017 in orange (R: Rentel), 2018 pink (N: Norther, 1 and 2: Borssele 1 and 2) and 2019 in purple (S: Seastar, NW2: Northwester2, M: Mermaid, 3 and 4: Borssele 3 and 4)

Table 1. Overview of wind farms in the Belgian part of the North Sea (situation on March 18<sup>th</sup>, 2016)  
 \*: number of turbines and/or total capacity still to be decided; \*\*: including 5 MW of wave energy.

Project		Number of turbines	Capacity (MW)	Total capacity (MW)	Concession obtained	Environmental permit obtained	Status
<b>C-Power</b>	phase 1	6	5	325	YES	YES	Phase 1 operational since 2009
	phase 2 & 3	48	6.15		YES	YES	Phase 2 and 3 operational since 2013
<b>Belwind</b>	phase 1	55	3	171	YES	YES	Phase 1 operational since 2011
	Alstom Demo project	1	6		YES	YES	Demo turbine operational 2013
<b>Nobelwind</b>		50	3.3	165	YES	YES	Construction ongoing (2016-2017)
<b>Northwind</b>		72	3	216	YES	YES	operational since 2014
<b>Norther</b>		47-100*	3-10	258 – 470*	YES	YES	Constructions foreseen to start in 2018
<b>Rentel</b>		47 – 78*	4-10	289 – 468*	YES	YES	Construction foreseen to start in 2017
<b>Seastar</b>		41	4-10	246*	YES	YES	Construction foreseen to start in 2019
<b>Mermaid</b>		27-41	4-10	232-266 + 5**	YES	YES	Construction foreseen to start in 2019
<b>Northwester 2</b>		22 - 32	3-10	217-224	YES	YES	Construction foreseen to start in 2019

## 2.2. MARINE SPATIAL PLAN AND AQUACULTURE

On 20 March 2014 Belgium approved a new marine spatial plan for the Belgian Part of the North Sea by Royal Decree. The new plan lays out principles, goals, objectives, a long-term vision and spatial policy choices for the management of the Belgian territorial sea and the Exclusive Economic Zone (EEZ). Management actions, indicators and targets addressing marine protected areas and the management of human uses including commercial fishing, offshore aquaculture,

offshore renewable energy, shipping, dredging, sand and gravel extraction, pipelines and cables, military activities, tourism and recreation, and scientific research are included. The current marine spatial plan is valid for a period of six years and thus in 2020 a new plan will be formulated. This will allow the government to take into account new developments in the field of marine renewable energy.

In the current marine spatial plan two zones are dedicated to sustainable aquaculture. These are both situated within the operational Belwind and C-Power windfarms. In December 2015, the Aquavalue project formulated a roadmap for integrated aquaculture for Flanders and defined on a

technical and economical level four possible pilots for integrated aquaculture in Belgium. These included two pilots in the wind farms: one involves bivalve and sea weed aquaculture, and the other the herding of conditioned sea bass.

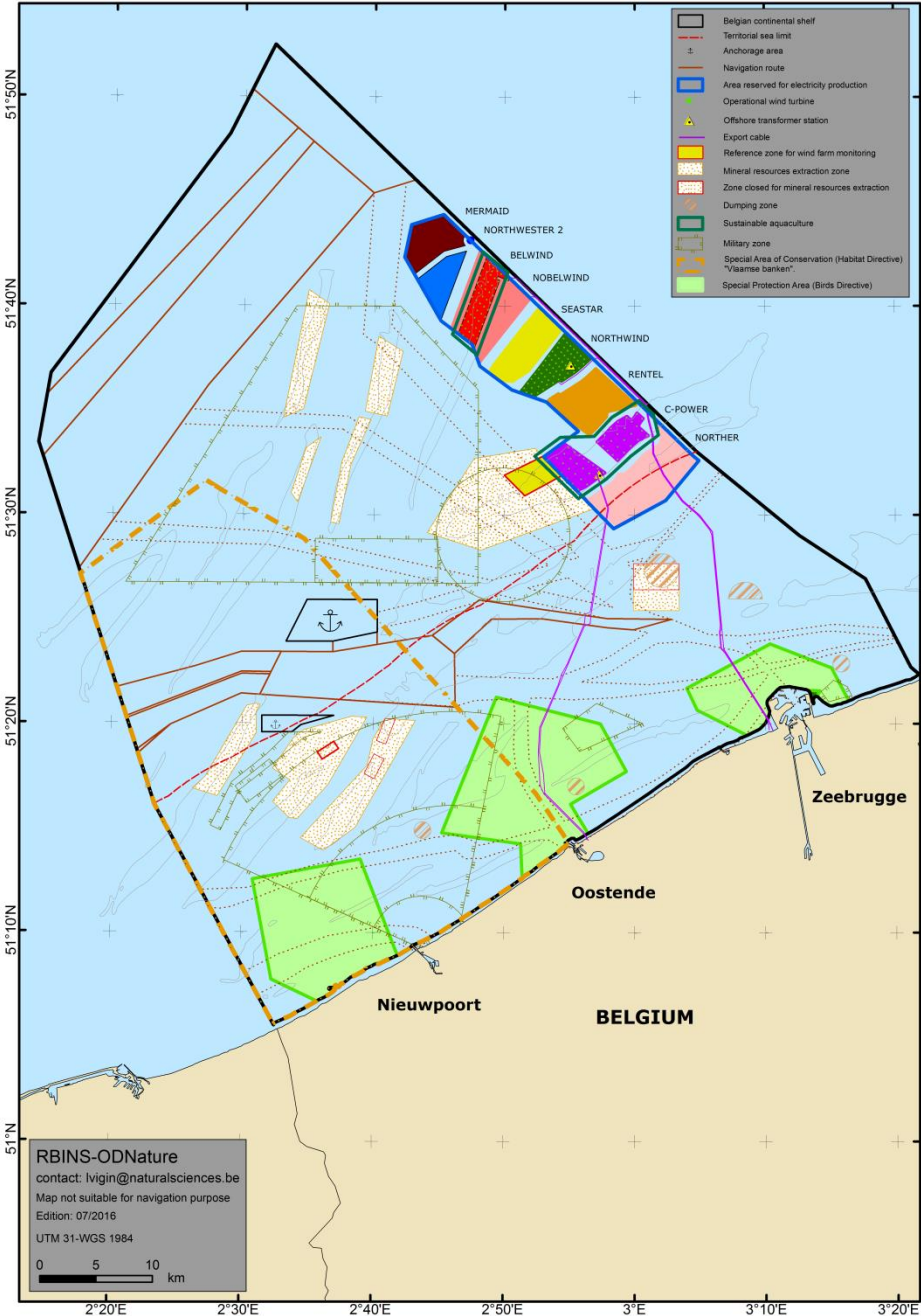


Figure 2. Marine spatial plan of the Belgian Part of the North Sea.

### 2.3. GRID REINFORCEMENT AND A ‘PLUG AT SEA’

The first three offshore wind farms were connected to the electricity grid by a limited strengthening of the existing high-voltage grid. For the next six projects to be built a comprehensive network upgrade is necessary. To meet this necessity, Elia launched the Stevin project which includes a new power station near the port of Zeebrugge and a high voltage network from Zeebrugge to Zomergem. It is expected to be finished in 2018.

The three operational wind farms each ensure the export of their electricity to the onshore grid. Several proposals have been formulated to develop a shared connection, a

so-called ‘plug-at-sea’ which would allow the remaining projects to share an export connection and would allow for integration in an as yet to be developed international offshore grid. The first project of this nature, the Belgian Offshore Grid, included a meshed grid with two offshore high voltage stations, one of which was to be located on an artificial island and six export- and/or interconnection cables (Figure 3). Currently a more reduced setup – a Modular Offshore Grid (MOG) - consisting of a single Offshore switch Yard (OSY) located near the Rentel concession is being considered, which would connect four of the remaining wind farms to the grid.

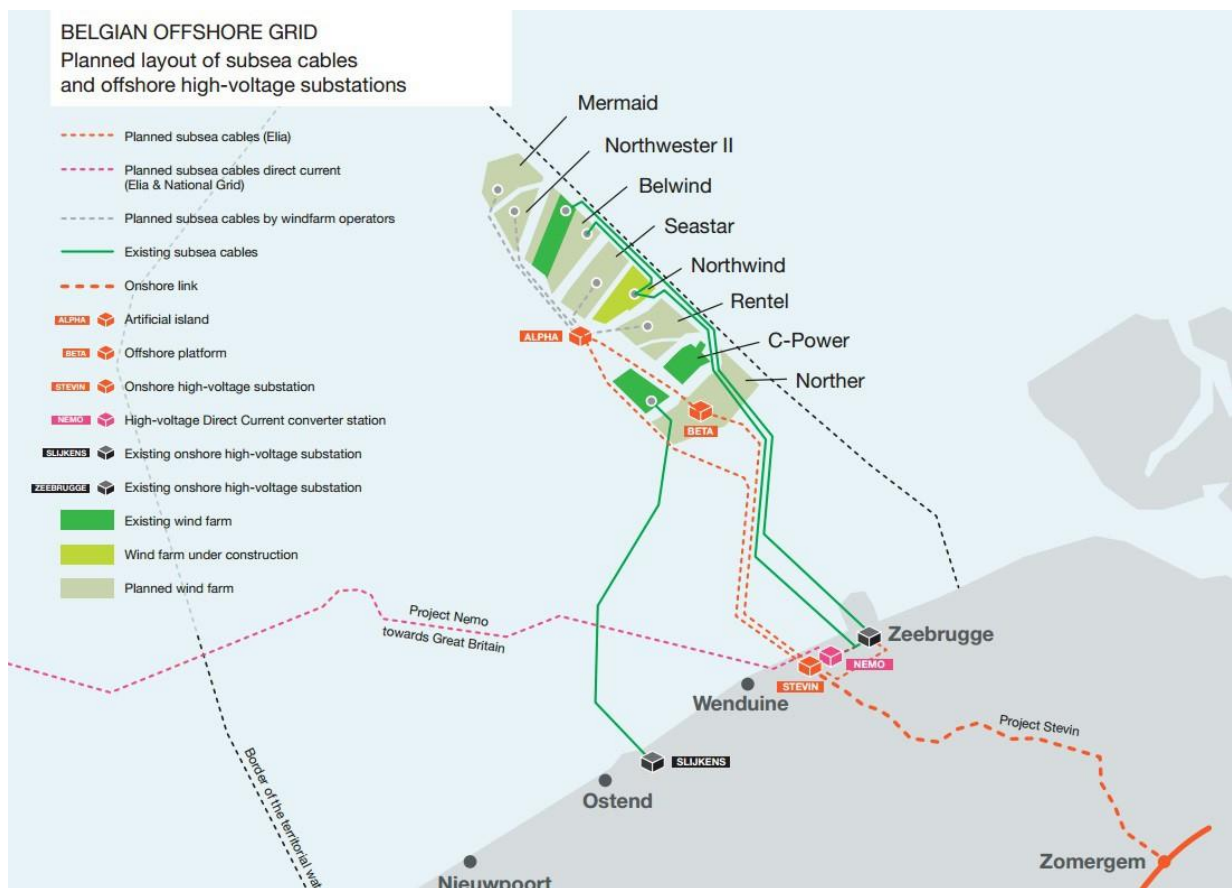


Figure 3. Initial design for the Belgian Offshore Grid (BOG).(Source: [www.G-tec.eu](http://www.G-tec.eu)).