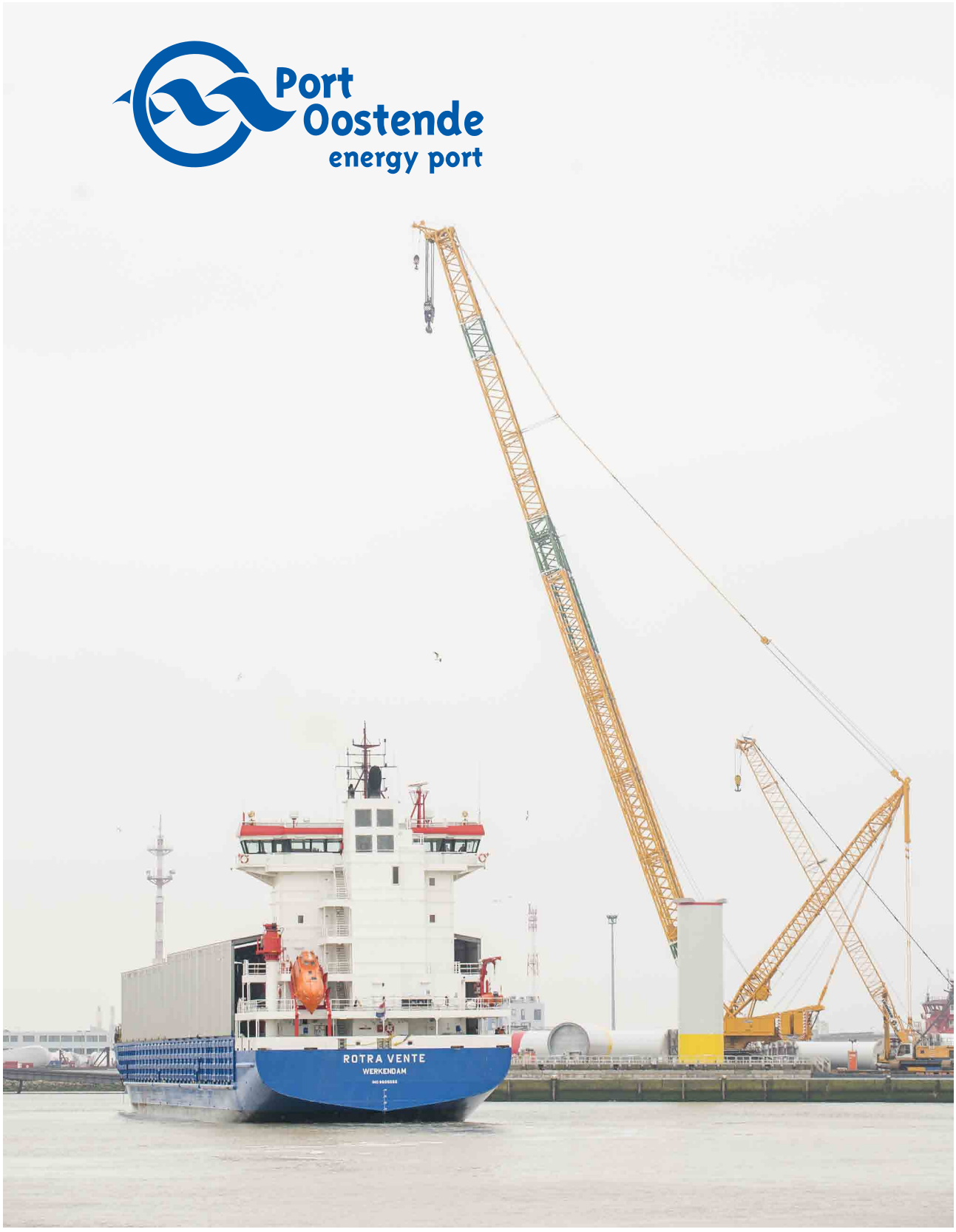
Port Oostende
energy port



VISION

APRIL 2018

picture cover: Bluefort offshore accomodation vessel

V - 18/04/2018

CONTENT

INTRODUCTION

The port of Oostende is a small port with no possibility for spatial expansion. Nautical access is limited to vessels with a maximum length of 200 m and a draught of 8 m.

The traditional idea that growth and prosperity in ports rely on attracting more and more transhipment with ever-larger ships could cause serious doubts concerning the (future) viability of the port of Oostende.

But the sea has more assets than just transport of cargo. In a note to the European Parliament of 2012, the European Commission set the tone: Blue Growth, opportunities for marine and maritime sustainable growth. Briefly, **the potential for economic growth can be found at sea.**

This was already obvious in 2007-2008: the start of the construction of the first phase of the C-Power wind farm from Oostende. This new activity required very specific infrastructure and space and the port was in urgent need to adapt, especially in view of the construction of the currently planned wind farms. A clear choice had to be made and was indeed made. The port of Oostende is developing as **the service port** to support everything happening at sea, the Blue Growth economy.

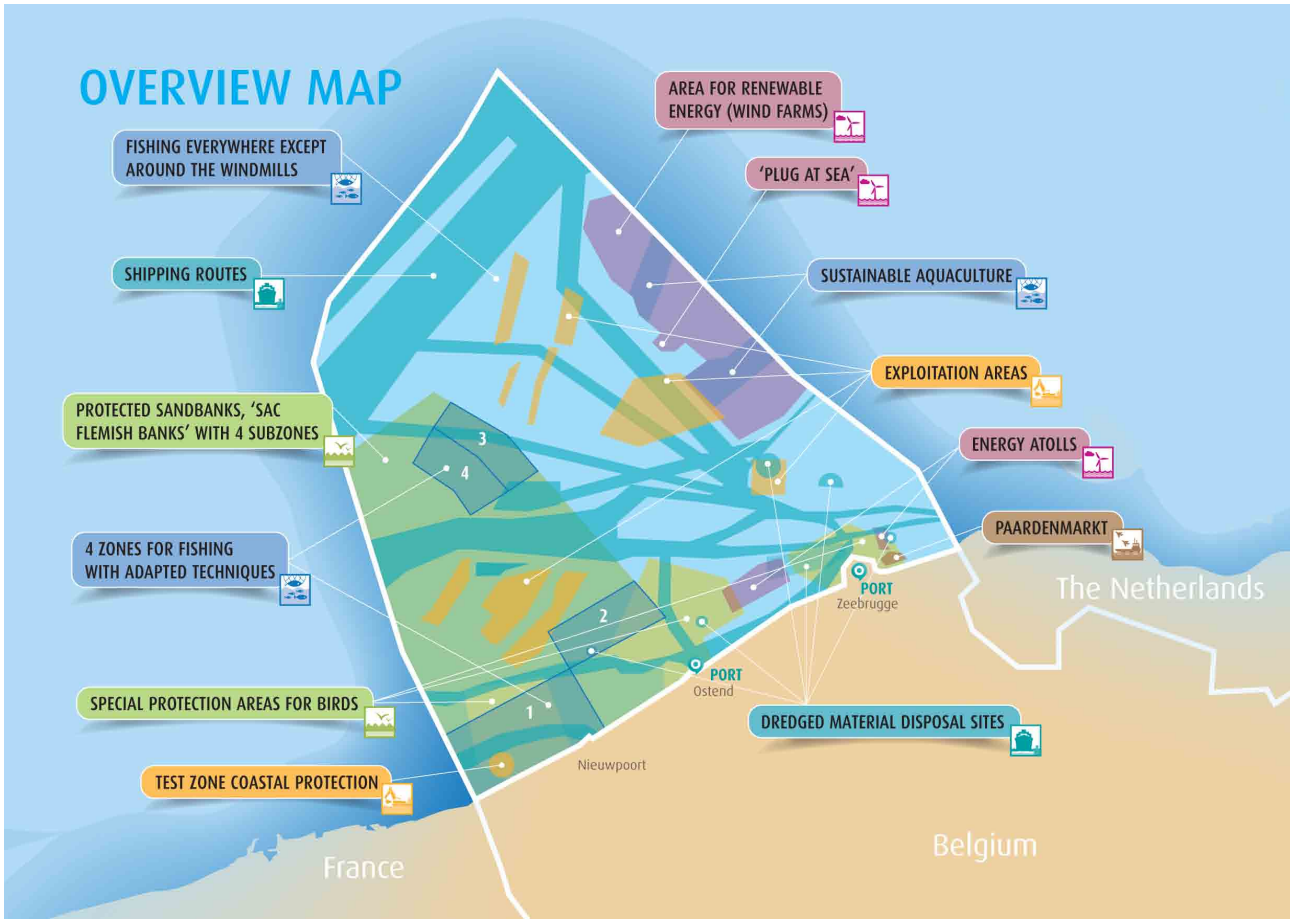
The Port of Oostende immediately invested in the **required infrastructure** (e.g. heavy load quay, together with Rebo nv) and in the first buildings of what has developed into a Blue Energy Cluster.

The development of wind farms remains the most important aspect of Blue Growth. Meanwhile, **232 turbines** produce energy on the Belgian North Sea for more than **750 000 households**. The goal is to develop around 450 turbines, 2.2 GW, nearly 10 % of Belgium's total need of energy.

Facilities to **generate electrical energy from waves, currents, tides or other physical processes** at sea (e.g. thermic processes, osmosis) including full-scale testing are in experimental development. So a Blue Energy sector is developing as the main pillar of **Blue Growth**. Although most projects are still in the experimental stage, some successful full-scale prototypes are operational, such as the projects FlanSea, Laminaria and Nemos.

However, there are many more opportunities than merely generating energy at sea. Think of the problems of **climate change** and *rise of the sea level*. Protective measures are translated into engineering works on the coast and at sea, e.g. **The Coastal Vision Project launched by the Flemish Government.**

Marine Spacial Plan



Belwind - © Alstom

Northwind - © Northwind

C-Power - © C-Power, Tom Dhaenens

The existence of wind farms also offers opportunities for **integrated aquaculture**. Projects concerning cultivation of algae have progressed far enough to engage in industrial production. There are still opportunities for the exploitation of the seabed, the development of **marine biotechnology** and much more. Needless to emphasize that all these developments are anchored in an honest concern for the environment, especially for the fragile ecosystem at sea.

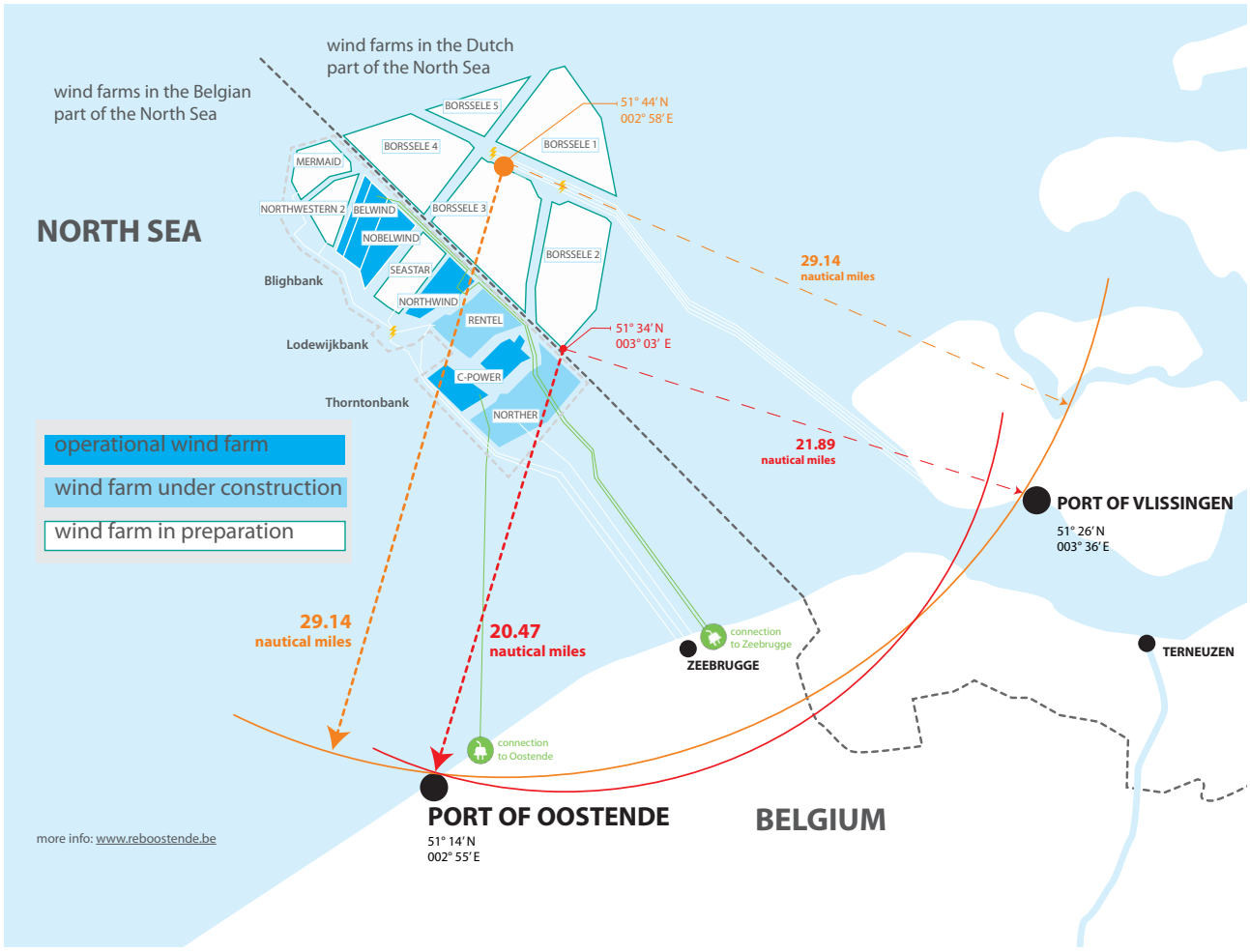
The introduction of the **Marine Spatial Plan** by the federal government creates a legal framework for the development of these activities, a unique asset for Belgium so far.

But shipping requires vital services as well: marking of shipping lanes with buoys, accompanying ships by pilots and at a distance, mapping of current and wave patterns (Hydrography), weather forecasts, dredging fairways and so much more. This is an important task for **Flemish public services** such as MDK, Vloot, Scheepvaartbegeleiding, aMT and others, which all have a home base in Oostende.

The growing activities at sea require a **specialized service port** with this specific core mission. It is necessary to anticipate new developments and innovations in Blue Growth in an alert and flexible way: infrastructure and quality of service, but also the availability and accessibility of support agencies for research and development and for appropriate training of the necessary staff at all levels.

Flanders has tremendous assets to be a top region in Blue Growth with world companies in marine engineering but also with a whole range of innovative SMEs that acquire their position in this domain. The **port of Oostende** will hereby present itself as an excellent **link between onshore and offshore**.

Does this mean that all the other **traditional activities** are banned? Of course not. The transhipment of bulk cargo has been and remains an important activity; the possibility of a limited ferry connection with the UK remains open. Along with the industrial development at Plassendale these activities present also a pillar for the development of the port of Oostende.



windfarms in the Belgian and Dutch part of the Nort Sea

COUNTRY	WIND FARM	CAPACITY	INSTALLED	# TURBINES	CONNECTION
BE	Norther	352 MW	ongoing	44 x 8 MW MHI Vestas	Zeebrugge
BE	C-Power	325 MW	325 MW	6 x 5 MW Senvion 48 x 6.15 MW Senvion	Oostende
BE	Rentel	294 MW	ongoing	42 x 7 MW Siemens	Zeebrugge
BE	Northwind	216 MW	216 MW	72 x 3 MW MHI Vestas	Zeebrugge
BE	Seastar	246 MW	in preparation	7 MW Siemens	
BE	Belwind I	171 MW	171 MW	55 x 3 MW MHI Vestas 1 x 6 MW GE	Zeebrugge
BE	Nobelwind	165 MW	165 MW	50 x 3.3 MW MHI Vestas	Zeebrugge
BE	Northwestern 2	224 MW	in preparation	8 MW MHI Vestas	
BE	Mermaid	266 MW	in preparation	7 MW Siemens	
TOTAL		**2 259 MW**	**877 MW**	**on July 2017: 232 turbines operational**	
NL	Borssele 1 & 2	752 MW	in preparation	94 x 8 MW Siemens	Vlissingen
NL	Borssele 3	330 MW	in preparation	MHI Vestas	Vlissingen
NL	Borssele 4	350 MW	in preparation	MHI Vestas	Vlissingen
TOTAL		**1 432 MW**			

I. PORT ACTIVITIES

1. SERVICE PORT

1.1. OFFSHORE

Oostende wants to be a safe homeport for the **various aspects of offshore operations** as we know them now and as they will occur tomorrow. The final ambition is to localize as many activities as possible concerning management, maintenance and service.

First, the Port of Oostende had to know whether there is a market, how it develops and who the players are. The answer to these questions is positive: Belgium has granted concessions to nine wind farms. Yet, the support mechanism has to be negotiated park by park, which turns out to be very time consuming. However, the wind farms at sea are essential to achieve the Belgian energy goals.

During the last 10 years the **relative importance of renewable energy sources** in the total energy mix has continually increased, from 2% in 2005 to 8% in 2014. The goal is for **13% in 2020** which *still looks achievable*, mainly thanks to offshore wind energy.

The offshore wind energy sector is still young: the first 6 windmills were placed in Belgian waters in 2009. Up until March 2018, 877 MW offshore wind energy is operational, by 2020 an additional 1 235 MW will come on stream.

With **2 292 MW wind energy** installed in the Belgian Waters, around **8,5 TWh of electricity** will be produced, which represents about 10% of the total electricity requirement, and about half of the renewable energy target for 2020.

Additional offshore wind capacity of **1,5 to 2 GW** will be needed to reach the **European renewable energy target of 2030.**

The **construction** of an average offshore wind park (300 MW) creates about **1 400 direct jobs** and a similar number of indirect jobs during the development and construction phase. The *exploitation phase* creates at least **100 new jobs** per wind farm. This means that the realization of the total offshore wind potential in Belgium creates **20 000 jobs** during the development and construction phase (figures BOP) and minimum 800 direct new permanent jobs in the operational phase.

The construction and maintenance of the Belgian wind farms is a **unique economic and environmental opportunity**. Adjacent Dutch and French farms are being developed for which the port of Oostende can position itself as a valuable player, based on its acquired know-how and experience.

Parkwind building

C-Power building -
© Architectuurstudio

building Otary

building Elicio & Norther

1.1.1. CONCESSIONARIES-OPERATORS OF WIND FARMS

The monitoring and control of technical and economic parameters for the **operation of wind farms** is a versatile activity and vital for the productivity of the park. First of all the management assures that the electricity production is monitored and that balances in the net are maintained. It is a **complex system** that can have a major impact on pricing and consequently on the profitability of the operation. In the technical field there is day-to-day interaction with the subcontractors of which the the maintenance department of the turbine supplier is of key importance.

Parkwind (owner of Belwind, Northwind and Nobelwind) and C-Power have established their centres in Oostende. Parkwind is located along quay 602, besides the maintenance centre of MHI Vestas, their turbine supplier.

C-Power is located on the site Halve Maan at the port entrance where the concrete foundations for the first six windmills were built. The site was considerably expanded for the establishment of **Otary** (Rentel, Seastar and Mermaid). Otary occupied their new headquarters as from April 2017.

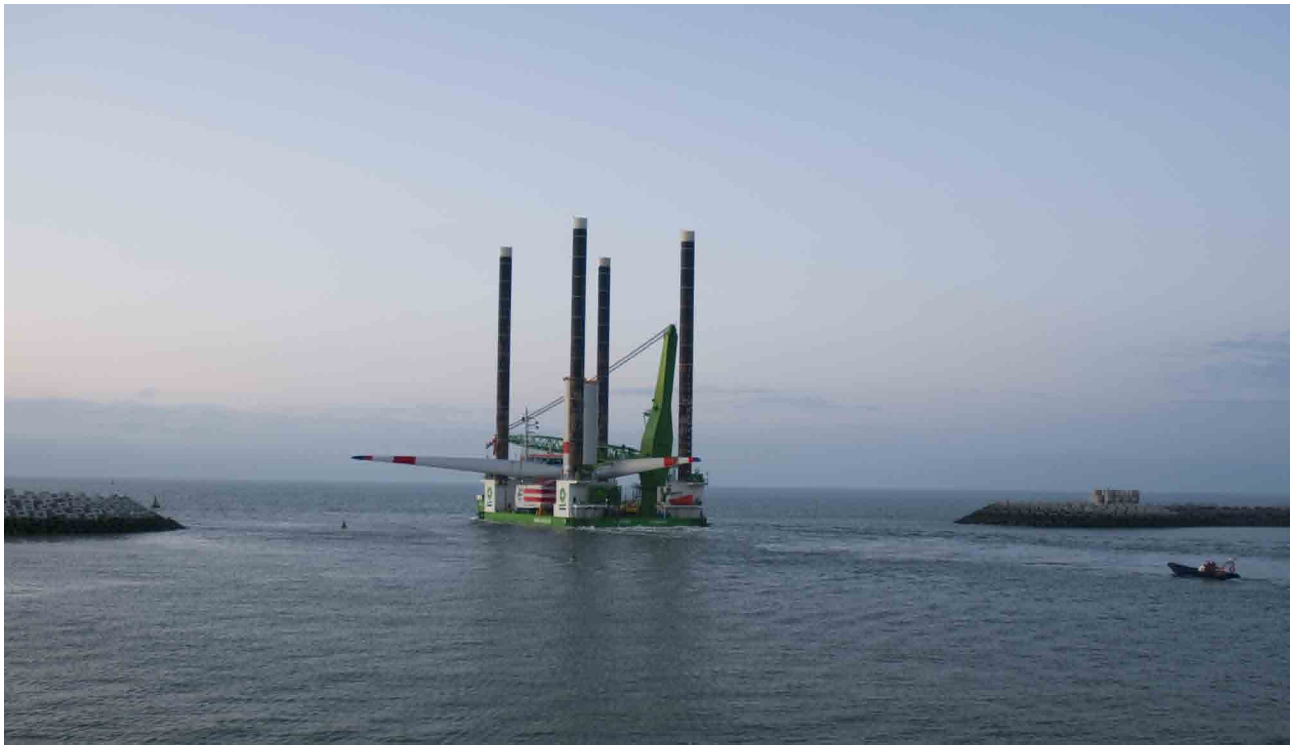
Rentel is the next park, now under construction (2017 - 2018) that will be managed from these buildings. On 21st April 2016, in the presence of the press, RENTEL officially signed the agreement with Siemens for the supply of towers, turbines and blades. The night before the Port of Oostende and Rebo signed the contract with Siemens for the use of the port of Oostende as marshalling port as well as O&M centre.

The park is due to be operational by the end of October 2018.

The subsequent project is the concession of **Norther**, now located in the buildings of shareholder Elicio along the A10 in Oostende. The financial close of this project was in November 2016. In the meantime the decision was taken to move the management seat to a location in the offshore cluster in the port. This new purpose build office and warehouse complex was delivered April 17th 2018.

concrete foundations (GBF) for the first 6 wind mills in the C-Power park

installation vessel Neptune between the new breakwaters



1.1.2. OSTEND AS MARSHALLING PORT FOR INSTALLATION

Adjustments infrastructure

The construction of a wind farm is a comprehensive activity in which handling of very heavy parts plays a major role.

Who does not remember the **first concrete foundations**, weighing 2 700 tonnes each, built on the Halve Maan, probably the heaviest pieces ever handled in Oostende.

To enable **efficient handling** of heavy components, the **infrastructure of the port** needed to be adapted.

On the nautical side, access should be feasible for the installation vessels or jack-up vessels, which are becoming bigger and bigger. The construction of the new harbour walls and hence the widening of the access to the port was and is a crucial step. Without these adjustments any installation activity would have been out of the question.

access to the port

widening Halve Maandijk

unloading of the Siemens nacelle via roro

The **widening of the access** is now to be further completed by removing the slope of the Halve Maandijk in order to add approximately 50 m. Thus the unsafe constriction for shipping will be corrected and the incoming vessels will be able to follow the indicated light line safely. These works are planned to start late 2018.

The terminal itself has been completely rebuilt to a **bearing capacity of 20 T/m²**, for quay 503 even onto the very edge of the quay. The terminal has a max. surface of 140 000 m².

Berths are available at quays 601 to 604 (min. depth 5,5 m), 503 (minimum depth 8,5 m), 502, 501 and 404 (all min. depth 8,5 m). Quays 502, 501 and 404 are equipped for roro handling with floating pontoon and link (65 m) to the quay, to compensate for the tidal difference (4,5 m). **The bearing capacity of the roro bridge 502 is no less than 650 T (!)**, of 501 it is 240 T, while 404 carries 200 T. Loading/unloading of WTG's or other components in roro mode is thereby made easy.

Ostend is the only tidal port (tidal difference 4,5 m) equiped with this kind of an installation, a unique asset allowing turbine handling on the terminal huge savings in time and money.

On an installation terminal a great number of (temporary) labour is employed. At the far end of the terminal (landside) along the access road (adjacent to Senvion building, see photo p. 22) **a sanitary complex is available for their comfort, capacity 90 persons**. It is equipped with toilets, showers and changing rooms with lockers, men and women separated.

loading of the rotor on the Neptune

unloading Alstom Haliade 6MW

Use of new infrastructure

The new structures have been operational since **January 2012** for the **2nd phase of the C-Power** project concerning the treatment of 30 Senvion (then referred to as Re-power) 6 MW turbines, with the corresponding tower sections (60 pieces) and blades (90 pieces).

Barges, towed from Cuxhaven, delivered turbines and towers; blades came from North- Denmark by road. The company Sarens managed the terminal and installed a giant crane with a lifting capacity of 1 250 tonnes and a boom length of 102 m. The installation at sea was carried out with the jack-up platforms Neptune and Goliath from GeoSea (Deme). This phase ended in September 2012.

Between **March and September 2013** the **3rd phase** was executed: handling and installation of 18 identical turbines in the same way as in phase two.

In **2013**, the biggest existing turbine at the time, the Alstom Haliade 6MW was assembled on the Rebo terminal. The installation at sea was executed with the then largest heavy lift vessel Bold Tern. This test turbine was installed on the Belwind windfarm.

In **2014-2015** the terminal was used for a number of major maintenance, repair and replacement activities.

Bold Tern


Jan De Nul
GROUP
VOLE AU VENT

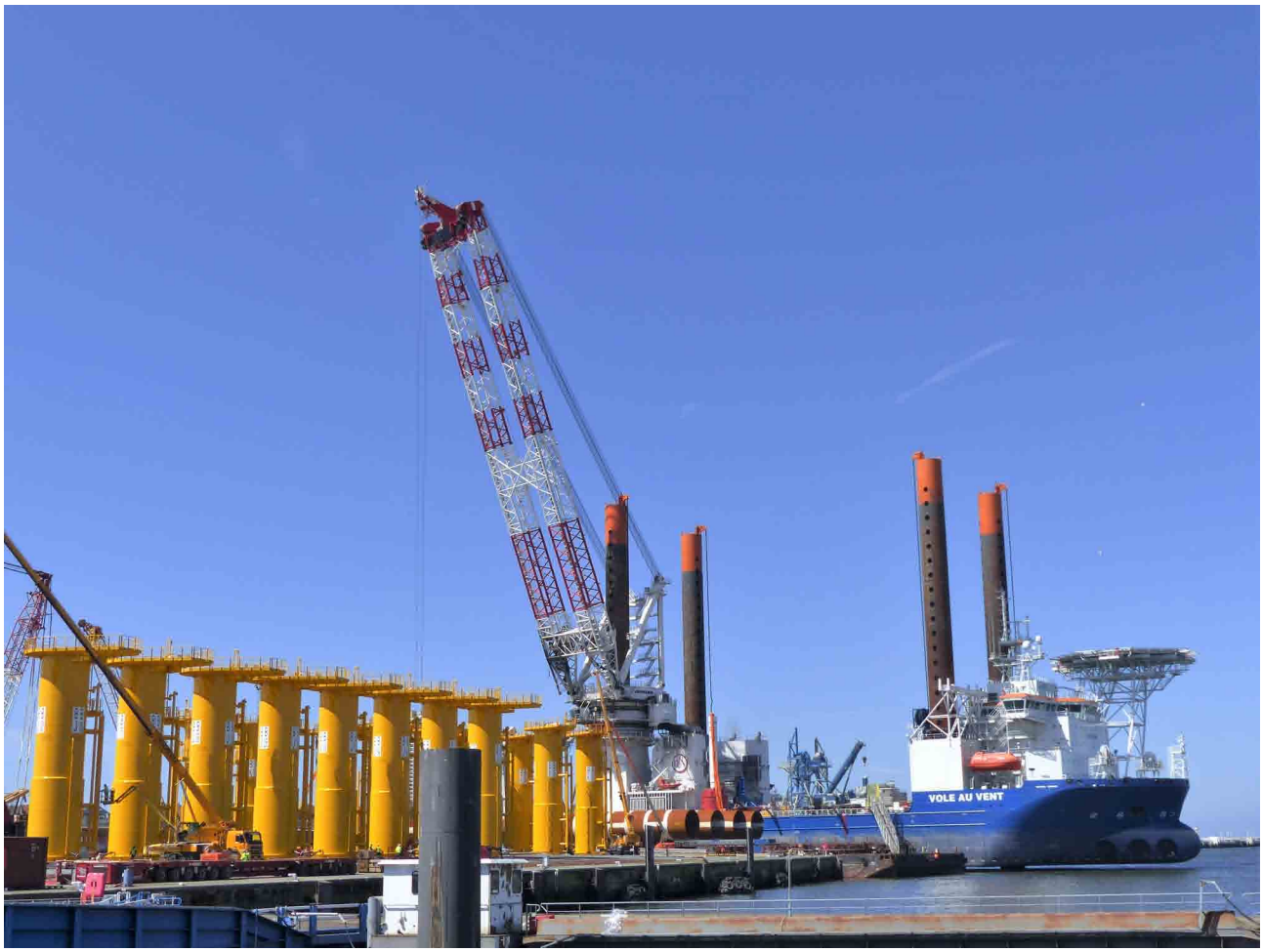
In **March 2016** the installation of the foundations for the wind farm **Nobelwind** started: 50 Vestas turbines of 3.3 MW each and a power station. The foundations consist of monopiles of about 60 to 80 m long, 8 m diameter, weighing 600 to 850 tonnes. On top of them "transition pieces" were installed on the water surface, where the access ("boat landing") is located and in which a lot of electrical installations are set up. Afterwards the tower, turbine and blades are installed on top.

The General Contractor was **Jan de Nul.** For that purpose the company decided to use the heavy lift vessel "Vole au Vent" that was christened by Queen Mathilde in Oostende on 28th April 2016. Handling on the terminal is managed by the Danish company Martin Bencher and executed by the Dutch heavy-lift handling company Mammoet.

With the supply of these very heavy foundation elements the Port of Oostende proves for the first time that it is also a very suitable port for his purpose.

arrival monopiles

Industrial Revolution transports the first 10 transition pieces (TPs) for Nobelwind



20 transtion pieces (TPs) for Nobelwind on the Rebo terminal

Port of Oostende should continue creating a distinct profile as a **marshalling port** for all the components of wind turbines or other offshore structures, whether they are foundations or turbines. During 2018 Siemens uses the whole terminal for handling and assembling nacelles, towers and blades for the Rentel project (42 x 7 MW). Geosea is the contractor for erecting the Rental park at sea.

The next park is Norther (44 x 8 MW) of which the building coincides with the building period for Rentel. Hence the installation and handling will have to be organised from other ports, whilst the project teams will be located in Oostende.

Furthermore there are plans for the parks Seastar, Northwester 2 and Mermaid, while the Netherlands start with the development of the Borssele wind farms, which forms a mirror image to the Belgian ones on the other side of the Belgian-Dutch border at sea. The Port of Oostende is ready, both for installation and maintenance of all these parks.

7MW turbine of Siemens for Rentel wind farm

refurbished building for Alstom & new building for MHI Vestas alongside the quay

renovated building for Senvion with direct access to the quay with sanitary complex (blue building)

building for among others Falck Safety Services, Jan De Nul, Engie & Tractebel

1.1.3. OPERATIONS & MAINTENANCE COMPANIES

Operations & Maintenance is the collective term for keeping wind turbines operational with the guarantee of maximum efficiency. For the wind farms currently in operation, the O & M departments of turbine suppliers Senvion, MHI Vestas and GE-Alstom are involved. Obviously they need accommodation for workshops, storage, social areas and offices with direct access to the quays.

In order to achieve maximum return from the wind turbines, daily maintenance is required by specifically trained technicians.

For the benefit of Senvion, the port authority fully refurbished a former building of the Navy. For MHI Vestas a completely new building has been constructed by REBO at quay 605. For GE-Alstom as well, space has been created in an existing building. These two buildings were put into use in 2014 and are subject to a long-standing occupation agreement.

With Siemens plans have been completed for facilities to be used during the installation and subsequently for the O & M of the turbines for the Rentel wind farm.

Depending on the construction of additional wind farms, adequate accommodation will be provided. Please refer to the master plan for the site, which is presented in chapter III Infrastructure.

companies active in the BLUE ENERGY BUSINESS established in the port

1.1.4. SUPPORTING COMPANIES

Due to the influx of subcontractors the **offshore cluster t**akes shape and forms a solid entity that is still developing.

The first pillar is the availability of personnel with **appropriate training**. In the offshore sector there is extra attention for safety, with certification of trained technicians. Organizing this training on-site is a huge asset.

This first pillar has been realized by the establishment of the world-renowned **Falck Safety Services**, so far the largest and most modern training centre for offshore and other safety training. The port thoroughly converted an old military building in which Falck provided equipment infrastructure. It was put into use in the autumn of 2015 and has been growing steadily.

The second pillar involves the **technical and technological companies** that O&M companies necessarily have to appeal to. To that end the port provides the necessary accommodation. In 2015 an extension of the Falck building meant that Jan de Nul, Engie-Fabricom and Technum-Tractebel could settle there. In the neighbouring buildings accommodation was created for CMI, CG, G4S, e-BO Offshore, e-Coast, GeoSea Maintenance, GeoSea, Van Oord and other companies.

The Port of Oostende is also active in the supply to wind farms and various maritime companies. The services are bundled in Multitech nv, subsidiary of The Port of Oostende. **Multitech** is specializing in **metal construction works and mechanical surface treatment** (blasting, spraying) of mainly maritime structures.

There is also an extensive range of services for all kinds of technical demands from local companies and companies active on the Rebo terminal during the installation phase of the wind farms. The business unit workshop is certified to the ISO 9001 and VCA * standard (safety, health and environment).

The Port of Oostende will continue to provide adequate accommodation for companies wishing to join the Blue Energy Cluster, as this implies steadily increasing employment.

Port of Oostende	overview arrival offshore service vessels													
2017	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	total	**2017**
Advancer	9	0	0	9	19	15	6	0	0	0	0	0		58
Adventure	0	0	0	1	1	0	1	1	1	1	0	0		6
Alcedo	0	0	0	0	0	1	0	0	0	0	0	0		1
Aquaflight	0	0	7	0	17	21	17	22	11	19	1	0		115
Aqualink	21	12	14	11	21	14	15	17	19	10	10	3		167
Aquasurveyor	0	0	0	0	0	2	0	0	1	0	1	0		4
Aquata	0	0	0	0	10	21	21	25	22	7	13	8		127
Aquaway	0	0	2	14	20	21	17	47	32	12	19	19		203
Arista	2	16	3	11	19	23	18	24	20	7	10	6		159
Assister	0	0	0	2	17	14	7	6	0	0	3	8		57
Attender	10	17	17	20	26	24	22	22	21	10	12	11		212
Bayard 2	0	0	0	0	0	0	1	0	0	0	0	0		1
Bayard 5	0	0	0	1	12	13	16	19	23	0	0	0		84
Bayard 6	0	0	0	3	22	16	17	18	21	14	15	4		130
Blue Thistle	8	12	16	20	24	23	20	22	20	10	0	0		175
Cardinal P	0	0	0	0	0	0	0	21	17	10	2	0		50
Cwind Challenger	0	0	9	17	25	21	16	21	16	9	2	0		136
Cwind Phantom	0	0	0	0	0	0	0	13	0	0	0	0		13
Cwind Resolution	0	0	0	0	0	0	0	0	17	13	0	0		30
Dalby Swale	0	0	0	0	0	0	0	0	3	0	0	0		3
Discoverer	0	0	0	0	0	0	0	0	0	0	0	1		1
Esvagt Supporter	5	8	6	6	10	8	7	7	3	4	4	0		68
Esvagt Wind 4	0	0	0	0	0	0	0	0	0	0	1	4		5
Geo Focus	0	0	0	5	0	0	0	0	1	1	0	5		12
Geo Ocean I	0	0	0	0	0	0	0	1	0	0	0	0		1
Geo Ocean II	0	0	3	6	3	1	3	0	0	1	1	0		18
Geosurveyor 17	0	0	0	0	0	9	13	15	12	5	6	2		62
Geosurveyor III	0	0	0	1	0	1	0	0	0	0	0	0		2
Geosurveyor IV	4	1	9	11	4	3	1	0	11	9	3	4		60
Geosurveyor VI	9	4	6	10	13	6	1	0	3	1	1	3		57
Geosurveyor X	12	10	17	13	11	3	8	9	0	0	3	2		88
Geosurveyor XI	5	3	0	5	1	3	4	4	6	2	2	2		37
Geosurveyor XIV	0	0	0	0	13	13	19	25	13	9	9	5		106
Guardian	1	0	0	0	0	0	0	0	0	0	0	0		1
M. P. R. 3	0	0	0	0	2	0	0	0	0	0	0	2		4
Marineco Dignity	0	0	0	0	0	0	0	20	22	12	15	12		81
Marineco Stingray	19	4	8	0	0	0	0	0	10	15	17	12		85
Marineco Thunderbird	0	0	0	0	0	0	8	15	10	0	0	0		33
MCS Blue Norther	21	2	0	0	0	0	0	0	0	0	0	0		23
MCS Boreas	21	18	21	21	2	0	0	0	0	9	31	26		149
MCS Coromell	6	0	0	0	0	0	0	0	0	0	0	1		7
MCS Pampero	2	0	0	0	0	0	0	0	0	0	0	0		2
MCS Sirocco	19	14	0	0	0	0	0	0	0	0	0	0		33
MCS Taku CPP	1	1	0	0	0	0	0	0	0	0	0	0		2
MPI Don Quixote	0	0	0	0	0	0	0	0	7	4	0	0		11
MPI Trifaldi	0	0	0	0	0	0	0	14	20	0	0	0		34
Njord Alpha	0	1	0	0	0	0	0	0	0	0	0	0		1
Njord Curlew	16	14	15	21	0	0	0	0	0	0	0	0		66
Njord Puffin	16	17	23	20	13	0	0	0	0	0	0	0		89
Ocean Wind 6	0	0	0	2	0	0	0	0	0	0	0	0		2
Offshore Waddenzee	0	0	0	0	0	0	0	1	15	10	3	0		29
Patriot	0	0	0	0	0	0	0	0	1	0	0	0		1
Pelican	0	0	0	0	1	0	0	0	0	0	0	0		1
Resolute	0	0	0	0	1	0	0	0	0	0	0	0		1
SC Agate	0	0	2	5	27	24	24	25	12	0	0	0		119
SC Amber	0	0	0	0	0	3	6	10	0	0	0	0		19
Seazip 2	0	0	0	11	10	0	0	0	0	0	0	0		21
Seazip 4	0	0	8	21	16	0	0	0	0	0	0	0		45
Supporter	0	0	0	0	0	0	0	0	0	0	0	1		1
Sure Partner	0	0	0	0	0	0	0	1	16	8	11	3		39
Sure Progress	0	0	0	0	0	0	0	0	9	12	10	4		35
Umoe Rapid	0	0	0	0	0	1	0	0	0	0	0	0		1
Victor Hensen	0	0	0	0	0	0	0	3	0	0	0	0		3
Windcat 23	12	15	21	0	0	0	0	0	0	0	0	0		48
	219	**169**	**207**	**267**	**360**	**304**	**288**	**428**	**415**	**224**	**205**	**148**		**3234**

Port of Oostende	overview arrival offshore installations vessels with components													
2017	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	total	**2017**
Atlantic Carrier	0	0	0	0	0	0	2	4	1	0	0	0		7
Bluefort	0	0	0	1	0	1	1	2	1	2	1	0		9
Boabarge 37	0	0	0	0	1	0	0	0	0	0	0	0		1
CS 1	0	0	0	0	0	0	0	0	0	0	1	0		1
Esvagt Mercator	0	0	0	0	0	0	0	0	0	0	1	1		2
Flintstone	0	0	0	0	0	0	0	0	0	1	0	0		1
Fortuna	0	0	0	0	0	0	0	0	0	0	1	0		1
Glomar Baltic	2	0	1	1	0	0	0	0	0	0	0	0		4
Glomar Vantage	0	1	0	0	0	0	0	0	0	0	0	0		1
Glomar Wave	0	0	0	0	0	0	0	0	1	3	0	0		4
Goliath	0	0	0	0	1	0	0	0	0	0	0	0		1
Island Crown	0	0	0	0	0	0	0	0	0	1	1	0		2
Kommandor Stuart	0	0	0	0	0	0	1	0	0	0	0	0		1
Olympic Intervention IV	0	0	0	0	2	2	3	0	0	0	0	0		7
Siem Aimery	0	0	0	0	0	0	0	0	0	0	1	0		1
Siem Moxie	0	0	0	0	0	0	0	0	0	0	2	3		5
Stril Server	0	0	0	0	0	0	0	0	0	0	0	2		2
Tess	0	0	0	0	1	0	0	0	0	0	0	0		1
Thor	0	0	0	0	1	0	0	0	0	0	0	0		1
Wind	0	0	0	0	0	0	0	0	0	1	0	1		2
Wind Pioneer	0	0	0	0	0	0	0	0	0	0	0	1		1
Wind Server	0	0	0	0	0	0	0	0	0	0	0	1		1
Vole au vent	0	0	0	0	0	0	0	0	0	0	0	0		0
Wind Pioneer	0	0	0	0	0	0	0	0	0	0	0	1		1
	2	**1**	**1**	**2**	**6**	**3**	**7**	**6**	**3**	**8**	**8**	**10**		**57**

1.2. MARITIME SERVICE COMPANIES

It is not obvious that ship-owners choose to settle in a homeport depending on the shipping they realize there. Yet some of them specifically chose Oostende. **Geosea**, owner of the large installation vessels (DEME group) has an office in the REBO building, together with their colleagues of **Geosea Maintenance**.

Furthermore many shipping companies organize the transport of technicians to wind farms with service vessels (Crew Transfer Vessels - CTVs). These companies depend on contracts with offshore operators. That's why the presence of various shipping companies constantly changes but we can take pride in the fact that all companies that are active in this sector have already come to Oostende: **Windcat, Nordfjord, Sima Charters, Sea Contractors, MPI, MCS, Stemat, Turbine Transfers,** ... These are mainly companies from the UK, Norway or Denmark.

As the next windfarms are being build further from the coast there is a trend to use SOV's (**Service Operation Vessels**) to serve these farms. Some 25 technicians stay on board for average 2 weeks and are transferred to the windmills with smaller vessels available on the ship. An example is the Esvagt Mercator, baptized in Ostend on December 1st 2017 under contract with MHI Vestas for the maintenance of the Belwind - Nobelwind windfarms.

Worth mentioning is certainly the fact that these shipping companies provide a lot of **ship movements** in the port. In 2013 and 2014, years in which installation activities took place, there were respectively 3 600 and 3 300 "calls". In 2015 there were only O&M activities; still, the port authority recorded 2 130 calls (4 260 movements) of CTVs. In 2016 the construction of Nobelwind caused the number of ship movements to increase again to 2 652 calls.

Since there are still five parks to be built and then maintained, we can expect the number of ship movements to triple in this segment. Once all active wind farms have become operational, the port will count more than **12 000 movements per year** in this segment.

Yet there is also a Belgian company active in this sector, namely **GEOxyz**. This company is among other things specialised in surveys at sea (now global) and settled on the former Beliardsite for the management and maintenance of the fleet of 18 vessels by now.

In any event, expectations are that the fleet of installation vessels and especially of offshore service vessels will continue to increase considerably.

service vessels on the way to the wind farms

The West Flemiish company GEOxyz has a fleet of 17 ships to manage

NHV helicopter winches technicians on board a CTV

For **mooring and safe loading and unloading** of the service vessels, the port authority has built fully equipped pontoons, one (24 m long) per wind farm. Currently 4 pontoons are operational; the others will be built as and when the wind farms become operational.

The next wind farms to be built are **Rentel** and **Norther,** starting in 2018. Pontoons are provided along the quays 606-607. The area is still occupied by VLOOT but will move to quays 101 - 102.

With the further development of wind farms, the port will continue investing in the **necessary infrastructure for mooring** and in high performance IT-systems for follow-up and assistance. Mooring places are currently created in front of the Ryco Yachtclub at the far and of the tidal outer port. Those 14 new mooring facilities will be available summer 2018.

For the maintenance of these ships, only one site is available in Oostende at the moment: **IDP**. More ships will undoubtedly give a new boost to these repair and maintenance activities. To this end, the Port will keep the former Beliardsite (+/- 3 ha) available.

Within IDP the group of shareholders has recently been reorganized and strengthened. The Group DC (De Cloedt) has **engaged in investments** to make the installations at the Visserijdok and in the inner port more performing, and is modernising the existing infrastructure.

Another innovation from which the CTV fleet can benefit is the installation of a **floating bunker station** at quay 201. The Danish firm **Monjasa** that has won its spurs in offshore for quite some time, operates this bunker station.

Of a very different nature is the **maritime service by helicopters**. Ostend is home to the worldwide operations of the helicopter service company NHV. One or several helicopters are standby in Ostend at the disposal of the windfarms.

Maritime services involve **a variety of hoist operations and deck landings** at sea including:

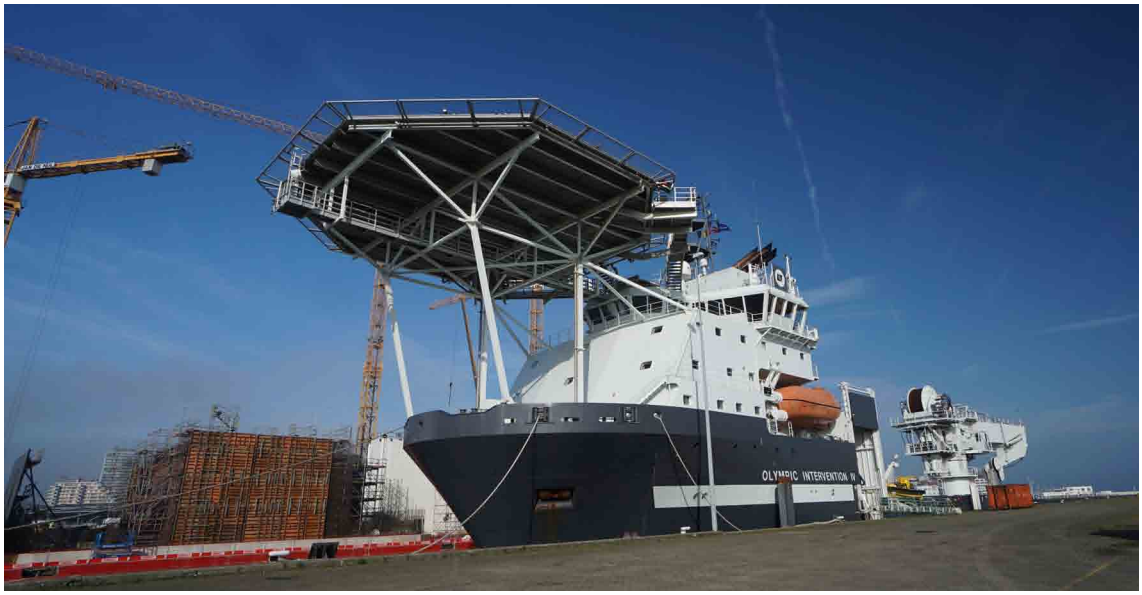
- Transport of ship pilots from large vessels maneuvering around harbors
- Wind turbines transport of crew and supplies for construction and maintenance
- Flare tip replacement by Vertech Offshore

Since maintenance on wind turbine can be required at any given time, HHV is the helicopter operator of choice because of its flexible and quick response times in a safe and cost-effective manner.

The helicopter used for these operations is the Airbus Helicopters AS365N3 "Dauphin".

Kommandor Stuart

Olympic Intervention IV



Esvagt Farady - walk to work

The port has to realize that the story doesn't end with the CTV's as currently in use. Other and bigger ships for a variety of functions are in use and developed as the windfarms are growing in size and at much larger distances from the shore.

The port of Oostende is already regularly host to some of these ships, as there are survey ships (such as **Kommandor Stuart**), Multifunctional Subsea vessels (such as the **Olympic Intervention IV**, with accommodation for 100 crew), Siem Moxi, Siem N-Sea, or ferries converted to hotel-ships (such as the Bluefort, with 264 single cabins).

New fast crew supplier ships, both monohulls and catamarans are already in operation (25 to 55 m length), as there are offshore accommodation barges and the newest trend **"walk to work"** offshore service ships. The latter being equipped with an ingenious hydraulic system that despite the movement of the ship, keeps a walkway from ship to windmill platform perfectly steady.

The aforementioned ships have dimensions typically from 50 to 150 m in length and 20 m and more in width, with a draft of approx. 6 m.

Mooring accommodation for those types of ships can only be found in **the tidal outer port** as the locks are not wide enough, unless an infrastructure conversion of the **fisheries dock** and locks is envisaged (see II infrastructure, p 75).

Blue Fort

DAB Vloot moves to quay 101

Port of Oostende	overview arrival vessels DAB Vloot												
2016	**2016 1**	**2016 2**	**2016 3**	**2016 4**	**2016 5**	**2016 6**	**2016 7**	**2016 8**	**2016 9**	**2016 10**	**2016 11**	**2016 12**	**totaal 2016**
LOODSBOOT 1	5	8	4	8	6	6	0	4	9	10	9	3	72
LOODSBOOT 7	4	6	6	10	13	6	9	7	8	10	5	9	93
SIMON STEVIN	7	14	19	18	16	12	5	7	20	17	15	12	162
TER STREEP	2	1	0	0	1	1	0	1	0	0	8	12	26
WANDELAAR	2	3	2	2	1	2	0	1	2	1	4	2	22
WESTDIEP	74	53	60	79	81	72	37	0	85	100	64	68	773
WESTERSCHELDE	55	76	83	51	72	82	40	64	5	0	69	70	667
WIELINGEN	62	47	39	68	32	0	0	49	92	102	58	59	608
ZEEHOND	3	9	6	10	4	4	2	2	9	11	20	23	103
ZEETIJGER	9	13	16	17	17	8	2	4	9	11	13	18	137
Totaal	**223**	**230**	**235**	**263**	**243**	**193**	**95**	**139**	**239**	**262**	**265**	**276**	**2663**

2017	**2017 1**	**2017 2**	**2017 3**	**2017 4**	**2017 5**	**2017 6**	**2017 7**	**2017 8**	**2017 9**	**2017 10**	**2017 11**	**2017 12**	**totaal 2017**
LOODSBOOT 1	6	8	12	10	6	10	8	8	9	12	4	7	100
LOODSBOOT 7	10	2	6	8	10	7	7	4	1	1	8	6	70
SIMON STEVIN	0	8	17	17	18	18	16	18	16	16	11	10	165
SIRIUS	5	13	16	10	10	13	11	12	17	11	13	9	140
TER STREEP	12	14	13	9	17	16	14	12	10	11	9	8	145
WANDELAAR	2	2	2	1	1	2	1	2	1	3	2	3	22
WESTDIEP	85	43	63	64	18	77	74	64	60	77	65	70	760
WESTERSCHELDE	58	75	63	76	90	56	50	59	53	56	51	94	781
WIELINGEN	48	59	73	44	93	61	73	77	83	65	87	24	787
ZEEHOND	25	19	15	11	14	10	15	11	7	4	9	12	152
ZEETIJGER	11	17	27	22	20	19	17	18	21	18	15	16	221
Totaal	**262**	**260**	**307**	**272**	**297**	**289**	**286**	**285**	**278**	**274**	**274**	**259**	**3343**

Port of Oostende	overview arrivals training and military vessels												
2015	**2015 1**	**2015 2**	**2015 3**	**2015 4**	**2015 5**	**2015 6**	**2015 7**	**2015 8**	**2015 9**	**2015 10**	**2015 11**	**2015 12**	**totaal 2015**
	0	0	0	0	0	6	1	0	1	1	1	4	**14**
2016	**2016 1**	**2016 2**	**2016 3**	**2016 4**	**2016 5**	**2016 6**	**2016 7**	**2016 8**	**2016 9**	**2016 10**	**2016 11**	**2016 12**	**totaal 2016**
	0	1	1	1	3	1	7	1	1	1	0	0	**17**
2017	**2017 1**	**2017 2**	**2017 3**	**2017 4**	**2017 5**	**2017 6**	**2017 7**	**2017 8**	**2017 9**	**2017 10**	**2017 11**	**2017 12**	**totaal 2017**
	2	1	4	8	4	1	0	0	1	2	1	1	**25**

1.3. FLEMISH GOVERNMENT

1.3.1. VLOOT

The **VLOOT** department, shipowner of the Flemish Government has its headquarters in Oostende (Winston Churchillkaai). With more than 300 employees, VLOOT is the largest employer in the outer port.

In addition to its headquarters, VLOOT has a site at its disposal at quays 606-607, where workshops, warehouses, technical services and the buoy storage area are located.

In 2016, the **tender** was accepted for the **renovation** of quay 101 near the current VLOOT main building. This creates an area of about 7 000 m^2: newly available land at the new quays, formerly used as fastferry terminal. Works are underway and foreseen for completion before summer 2019.

The purpose is to transfer the installations currently located at quay 606 to quays101-102. This implies a **concentration of all activities** enabling efficient management and control.

The Port of Oostende does not charge port fees or concessions to VLOOT. VLOOT's ship movements are therefore not included in the statistics of the number of incoming vessels in the port. Only commercial (paying port fees) shipping is included. The number of incoming VLOOT vessels exceeds **3 000 (6 000 movements)**, see the attached table. These ships are also accompanied by port control, organized by the port authority.

MRCC

1.3.2. MRCC

Oostende is also the seat of the MRCC - Maritime Rescue & Coordination Centre, which is located in the former management building of the fish market, rebuilt by the port authority, later sold to the Flemish Government.

The MRCC is the **central contact point for accidents at sea**. Coordination of North Sea tasks must ensure that staff, assignments and resources are aligned across the boundaries of the various administrations.

The area of activity is the full **Belgian Exclusive Economic Zone**. Although it is small, it's one of the world's busiest shipping areas at sea. It includes the access channels to the Flemish and Zeeland seaports.

1.3.3. OTHER ADMINISTRATIONS

In addition to the MRCC, in the same renovated management building of the fish market, the administrations include the **Coast Guard**, the **Shipping Guidance Department** and the **Flemish Hydrography**.

The *Coast Guard* deals with cooperation between the partners responsible for the North Sea, consisting of no less than seventeen government departments (at Flemish and federal level). **Shipping guidance** ensures safe shipping guidance at sea. The Flemish Hydrography produces among others the high quality **Coastal Weather Forecast**.

The administrative centre (located near the city) also accommodates the services of **MDK Coast and the Maritime Access Department (aMT)**. Both services are responsible for all the hydraulic infrastructure works to be carried out at the Belgian coast. MDK Coast concentrates on the coastline and marinas while aMT has the two coastal seaports under its jurisdiction, as well as the access fairways.

Business Unit

Benchmark Port Community Systems
Voorstelling aan de Raad van Bestuur CCS vzw

pwc

Resultaten operatorenbevraging

Vlaamse PCS' kennen beperkt aanbod aan de douanezijde in tegenstelling tot buitenlandse PCS' die via hun PCS een toegangsportaal aanbieden naar de douane. ENIGMA is de enige die een koppeling aanbiedt naar de douane.

Na DAKOSY scoort APCS goed op vlak van hun aanbod aan de terminalzijde

Vlaamse PCS' kennen beperkt aanb aan de landzijde in tegenstelling tot de Duitse systemen die op dit vlak d meest complete systemen zijn.

Uitgebreid aanbod aan functionaliteiten aan de nautische zijde in de Vlaamse PCS'en, waarbij ENSOR het meest complete systeem is

Haven		Nautische Zijde	Terminalzijde	Douane Zijde	Landzijde
Antwerpen	APCS	70%	71%	29%	33%
Gent	ENIGMA	78%	10%	65%	24%
Oostende	ENSOR	96%	33%	0%	5%
Zeebrugge	ZEDIS	74%	10%	0%	0%
Bremen	BHT	74%	57%	94%	43%
Hamburg	DAKOSY	41%	91%	100%	57%
Amsterdam, Rotterdam	PORTBASE	76%	52%	82%	48%

Scoringspercentage op de gevraagde functionaliteiten

1.4. PORT COMMUNITY SYSTEM

All shipping companies entering the port of Oostende must use the port information system **Ensor** (Electronic Network System Oostende Region) that was launched in 1999. The reason for this was the international obligation to forward HAZMAT data (Hazardous Materials / dangerous goods) digitally to the international agency HAZMAT. A completely new port system was developed together with the port of Gent (Enigma) by the same system developer.

Later, all port systems were linked to each other via the Central Broker System at Flemish level, allowing for the exchange of ship data between the various Flemish ports. Later this was also linked to Safeseabel and the European Safeseanet, which also connects **all other European ports** and agencies.

Safeseanet is a European platform that enables all ship data to be consulted in case of maritime disasters and to which all relevant agencies within Europe are affiliated. This allows reacting quickly in case of rescue operations or accidents at sea.

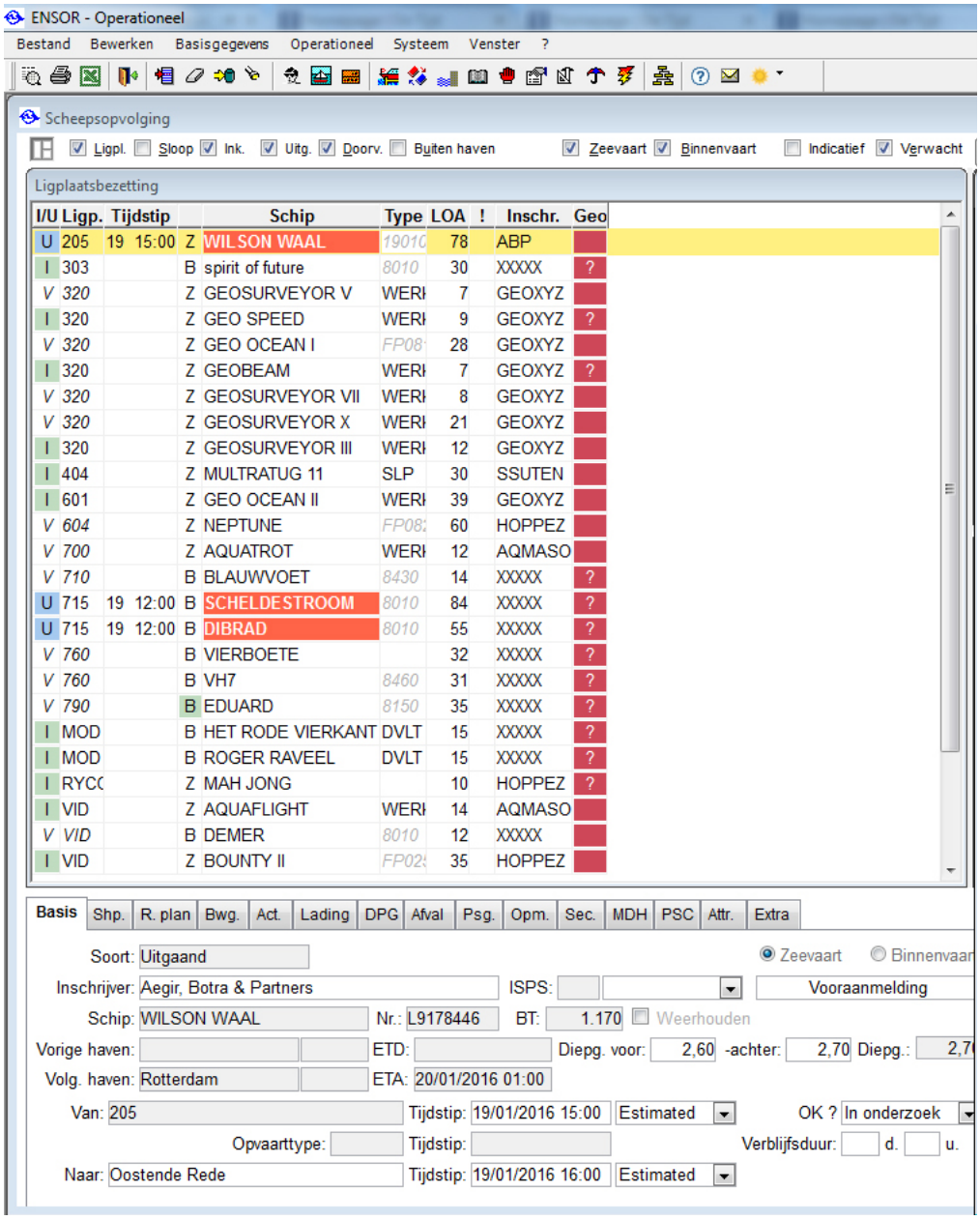
Since then, several more modules have been added to ENSOR; they are specific for the port traffic of Oostende, such as ferry modules and reservation modules for the crew transfer vessels of the offshore industry. Unique to the port system of the port of Oostende is that it operates with an AIS hub (Automatic Identification System) which is connected by satellite to the AIS system aboard ships.

This makes it possible for the ENSOR system to function fully automatically. By satellite connection, ship voyages are automatically created in the ENSOR system.

For the high-frequency workboats a "GeoPro" tool is used to detect whether a ship "stops" or "leaves". On the basis of that detection, a workboat is automatically registered as an **ATA Entry/Exit (ATA = Actual Time of Arrival)**. GeoPro is a useful tool to follow the movements of ships within the port on a port map and to see where ships are moored.

This system is used for the vessels of the offshore industry, the vessels of Vloot and the fishing vessels. This **reduces the work of an agent** to a minimum and is thus very user-friendly. The crew transfer vessels can book a berth for a certain time and the ship is picked up through AIS by the system. In this way berths are automatically taken and released.

screenshot Ensor



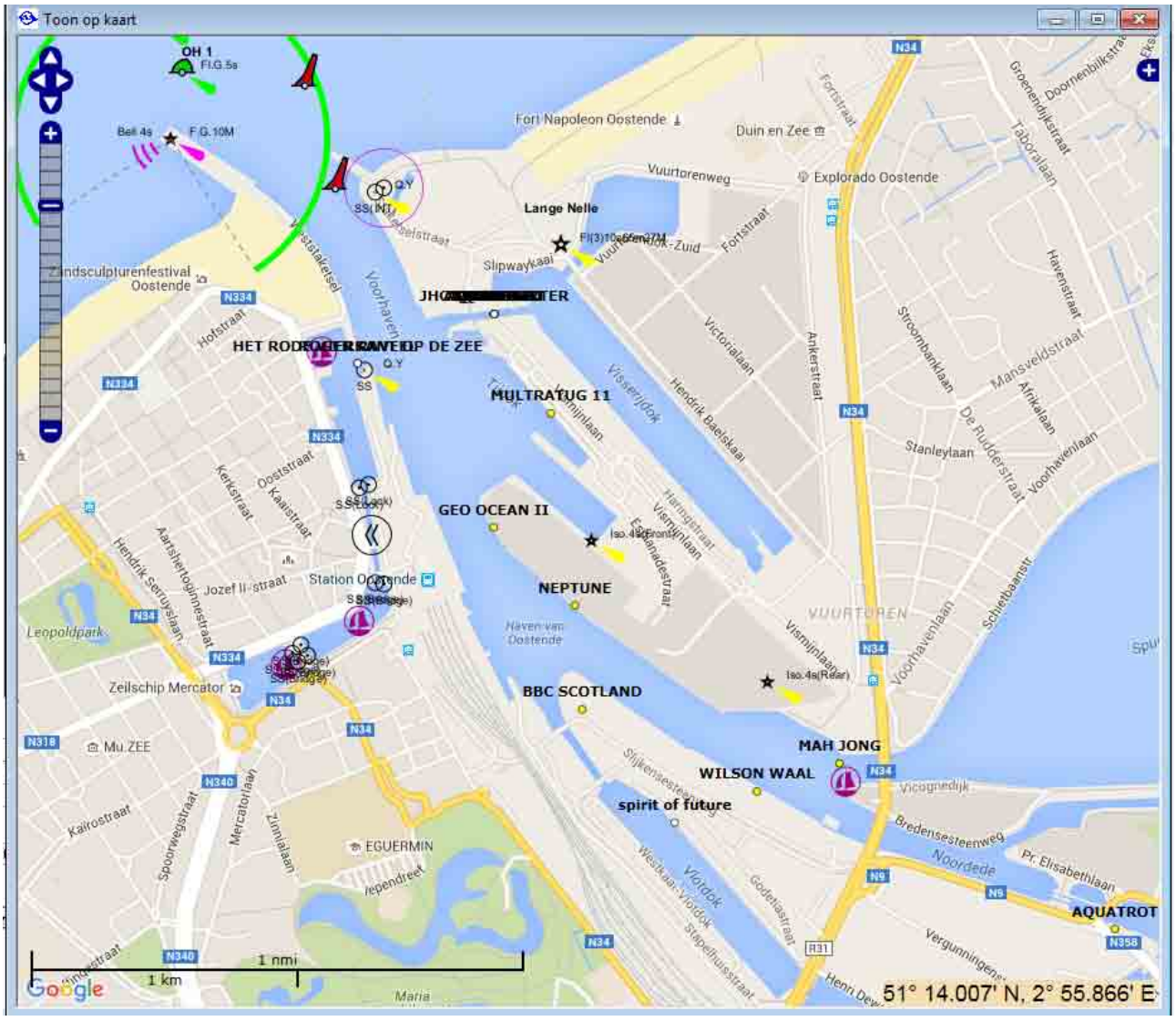
For conventional cargo ships, the agents should provide additional information as required under the **Maritime Single Window**. All European port systems must, in the context of the new FAL Directive (Directive on reporting formalities for ships in European ports), transmit all documents for ships digitally.

Hence, in the course of the period 2012-2015, ENSOR was amended to link with government agencies such as Internal Affairs (ISPS, International Ship and Port Facility Security)), customs, shipping police, saniport and OVAM. All documents of a ship are digitally transmitted and cleared.

The Ensor system registered **20 203 ship movements** in the port in **2015, 32 719 movements in 2016** and **31 444 movements in 2017.** The pleasure craft sector is not registered.

In this way Ensor has developed into an extremely efficient port information system.

screenshot Ensor



Ostend Spirit

2. FERRY PORT

Oostende has a history of more than 160 years as a ferry port; the connection to the United Kingdom has always been the spearhead of the port activity.

When the government owned ferry company RMT stopped in 1997 it seemed to be the end of the connection with the UK. Attemps were made to revive passenger traffic with fast ferries but first Holyman, later Hoverspeed had to abandon the service.

The arrival of Ferryways in 2000 and the dynamics of **Transeuropa Ferries** were the start of a successful period. Ferry traffic consisted almost exclusively of roroships for truck-trailer combinations or separate trailers. Traffic increased to about 300 000 freight units a year.

All of this suddenly came to an end after the acquisition of Ferryways by Cobelfret and the **cessation of all Cobelfret activities** in 2009. The family enterprise Transeuropa had been struggling with a succession issue since 2010 and finally went bankrupt in April 2013.

Oostende was more than ever faced with the major disadvantage of a small port: depending on one or two major customers and no physical opportunity to offer space to others. The risk was high and unfortunately was confirmed.

Port access has now been improved (a plan from 2000, implemented in 2013) to allow ships with a length of maximum **200 m** to enter. However, evolution goes on and now many roroships are longer than 200 m.

Are there no opportunities left for a ferry connection? We believe there are.

Oostende has proved that it did not struggle with a lack of traffic. Especially on the short route (Oostende-Ramsgate), until the last day, there were more than enough **transport companies** and their truckers who had a great liking for Transeuropa and the advantages the port and the line could offer.

With specially adapted vessels (Ramsgate as well has its limits) and ingenious management, a profitable line might be feasible. However, the **threshold** for starting a new line is **very high**: minimum 2 vessels with sufficient capacity, setting up a new organization and going through a start-up period needs a lot of capital input.

Given the choice for activities on the offshore terminal and cluster, **the space for roro traffic is limited**, yet sufficient for up to 2 destinations. Accompanied traffic on the short route (e.g. Ramsgate) requires relatively little space for large volumes of trucks.

September 2008 - RORO Port

A new British ferry operator Seaborne and shipowner Clearwater have announced their intention to start a **new ferryline between Ostend and Ramsgate**. Preparations are underway including measures taken to ensure safety and security in view of expected transmirgants. It is planned for **3 ships, 12 crossings a day, catering for accompanied traffic only** (trucker - trailor- driver).

The problem of illegal migration with thousands of refugees trying to reach the UK causes considerable costs, an organizational nightmare and an almost irresponsible risk. The camps at Calais and Duinkerke are sufficient proof.

available roro bridges

The World

Princess Danea - turn around cruise

brochure cruises Oostende - Zeebrugge

3. PASSENGER TRAFFIC AND CRUISES

Pure **passenger traffic** with jetfoils, catamarans or other forms of high-speed ferries on the Channel have disappeared completely because they were unprofitable. The Eurostar and the low-cost airline companies have given the final blow to this kind of passenger transport. There are still some regular lines that take passengers by car or coach in addition to freight traffic.

Foot passengers can only board in Calais between 06.40 and 21.45. In Dunkirk foot passengers cannot board.

The **cruises** on the other hand are a completely different market with a very different public. For a number of years already, the ports of Oostende and Zeebrugge have collaborated to work out campaigns to promote the Flemish hinterland to the various cruise companies.

This approach is quite successful and has resulted in an increased number of cruise ships calling at both ports over the last 10 years. In practice we see that a cruise company, when it is possible, chooses **Oostende as port of call** because ships moor in the city itself.

However, less than **10 % of the active fleet** in Northern-Europe has the appropriate dimensions to enter the Port of Oostende, which means that Oostende has an annual average of about ten cruises.

The presence of a large installation vessel in the port makes it difficult for cruises to enter. Although nautical simulations suggest that is possible to combine the two, lots of captains and/or pilots prefer to avoid difficulties and choose Zeebrugge as their port of call.

About half of the cruises create extra **added value for our city** because they are turnaround cruises. They usually stay an extra day in the city before or after the cruise and enjoy sightseeing and shopping in Ostend.

A turnaround cruise requires a lot of **organization and logistic support** from the port. For example, there are ships with 500 passengers aboard that moor at noon and leave port again with a new group of passengers at 4 pm. In 4 hours the ship must be fully discharged, supplied and loaded.

For a pre-eminently tourist city as Oostende, cruise ships create added value, not only thanks to the guests and their purchasing power, but also because they **offer a nice view for tourists** on the port breakwaters.

ruimte voor zandopslag met directe toegang tot open zee

tanks GFS

4. BULK & GENERAL CARGO

Traffic of bulk and general cargo remains important and due attention is paid to it. In 2014 **some companies invested** in additional storage capacity (Verhelst Logistics, Logghe) resulting in further development of a number of niche activities such as sepeolite (cat litter), ferro silicon, pellets, bricks, etc.
Further evolution is feasible.

The largest tonnage is in particular **sand and gravel**; three terminals deal with the traffic of these cargoes. It is a major advantage that these terminals are located in the outerport with direct short access to the sea, which causes the cycle of dredging-discharging to be very efficient. The traded quantities strongly depend on the business cycle of construction, specifically in public works.

Unfortunately, the development of bulk and general cargo traffic by sea is limited by the restrictions of the Demey lock that gives access to the inner port. The lock was renovated by aMT but the dimensions (124 x 18 x 4,5 m) are still the same as in 1905 when the lock was built. This means that only small coasters (up to 3 000 tons) can reach the inner port. On the canal, access is even more restricted by the curve behind the lock; **a ships length of 110 m is the maximum.**

All in all, the annual volume of **bulk and general cargo traffic** is between 1.2 and 1.5 million tons.

However, the inner port and the canal are suitable for **inland navigation** up to 1 350 tons. A number of companies often use it. Filling up the tanks of GFS, mainly in 2013, resulted in a peak of 322 000 tons in 2013. In 2016, 199 260 ton of inland navigation were realized, and in 2017, 224 304 tons.

TopMix, a company from the Verhelst group that recycles contaminated soils, is a new frequent user of inland navigation. Since early 2016, AIM Recycling (American Iron &Metals) has become operational. It specializes in sorting and recycling non-ferrous metals. They organize incoming and outgoing traffic more and more by inland waterways.

Furthermore, the **chemical site** (Proviron Functional Chemicals, Proviron Basic Chemicals, Huber) is a user of inland navigation (and a limited amount of sea-going navigation). Proviron also produces biodiesel that is transported by inland navigation.

Plassendale 1

The temporary reduction of bulk traffic is largely due to the **gentle winters of 2016 and 2017,** which made the supply of coal, pellets and salt superfluous.

At **Plassendale 2** there are also two biofuel plants that produce electricity from oils and fats.

All these activities are very suitable for supplying, and partly also for exporting by **inland navigation.** Bottleneck is the lack of equipped jetties along the canal, except for quay 740 at the turning basin at Plassendale 1. There a lot of products are discharged in trucks and then transported to the other side where the companies are located. This is not an efficient method. In collaboration with W&Z a solution is in the making.

biomass & biofuel installation

Plassendale

AIM Recycling

5. INDUSTRIAL AREA (INNER PORT)

Plassendale 1 belongs to the port area. In addition to the chemical site, there are many possibilities for developing chemistry-related companies with space available, especially on the grounds of Proviron and GFS.

Currently there is a **large spatial spread** of SMEs in chemistry across Flanders. A lot of these companies are experiencing difficulties to expand or just to renew or modify licences. On the two sites mentioned, such establishments are possible; Proviron has Seveso status. Thanks to the well-equipped areas with easy access and the stimulating influence of the established companies, there is a possibility for developing a cluster of smaller companies that are active in chemistry or related production.

Luc Seminck (GFS, concessionaire of 7 ha at Plassendale 1) took the initiative to launch the project "Dockland" in the port of Ghent to facilitate the establishment of chemical companies by means of prior licences. The Ministers Schauvlieghe and Muyters support this initiative. The plan is perfectly applicable to the Plassendale 1 site.

The availability of land at Plassendale 1 is a rare asset. Establishments are possible in synergy with existing activities, as described above.

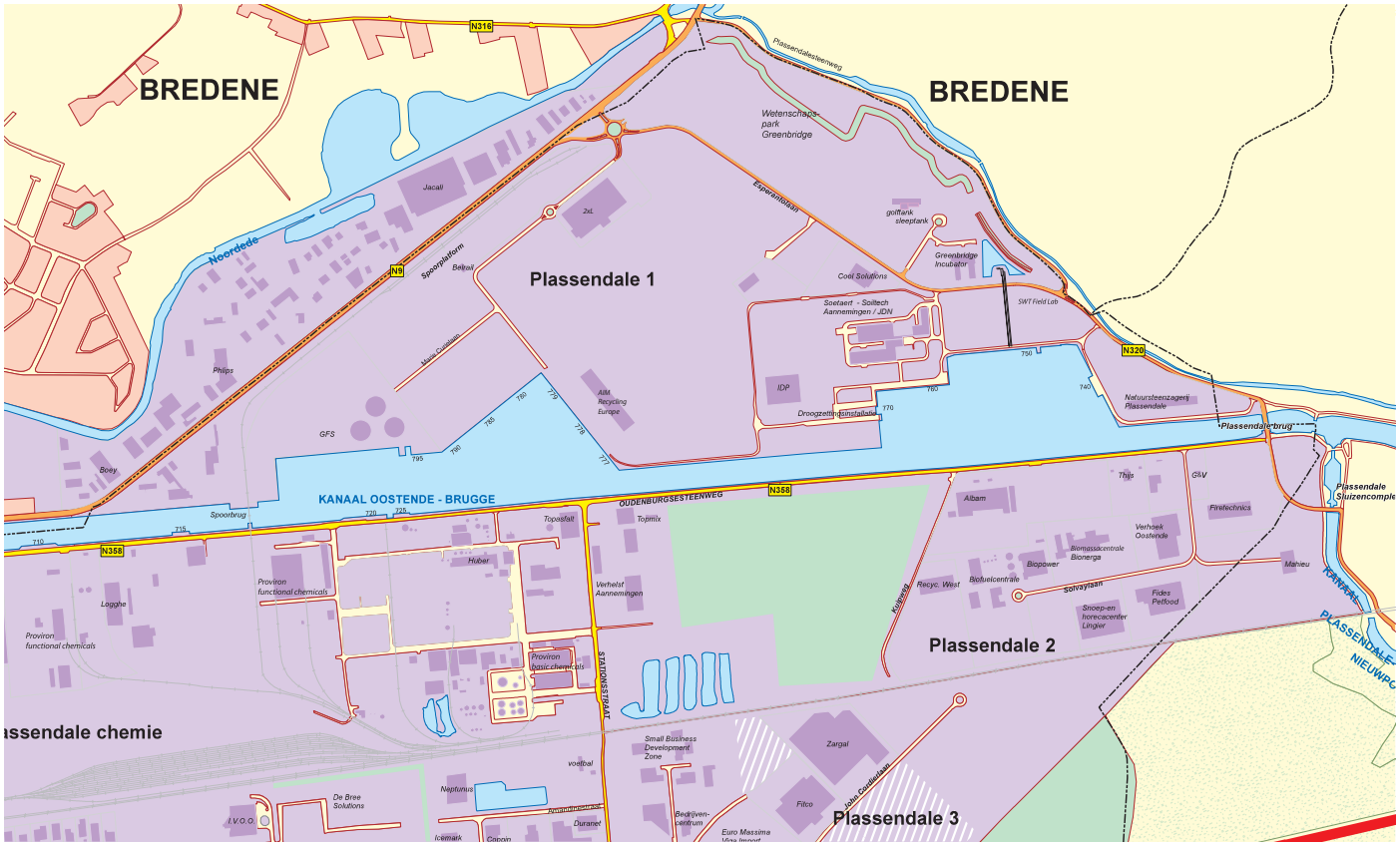
Moreover chemistry chooses resolutely for sustainability. Proviron for instance is the only biodiesel producer who also invests in the industrial production of micro algae. Algae are widely regarded as an energy source and a chemical raw material of the future.

That brings us to **'circular economy':** reusing raw materials, thorough recycling. Proviron e.g. recycles brake fluid from vehicles. Top Mix cleans and recycles contaminated soils. At Plassendale 1 the **Canadian recycling group AIM** (American Iron & Metal) was established, specializing in the recovery and recycling of non-ferrous metals from metal waste. from metal waste. The Belgian Railways plan a large recycling plant for various materials.


Biostoom

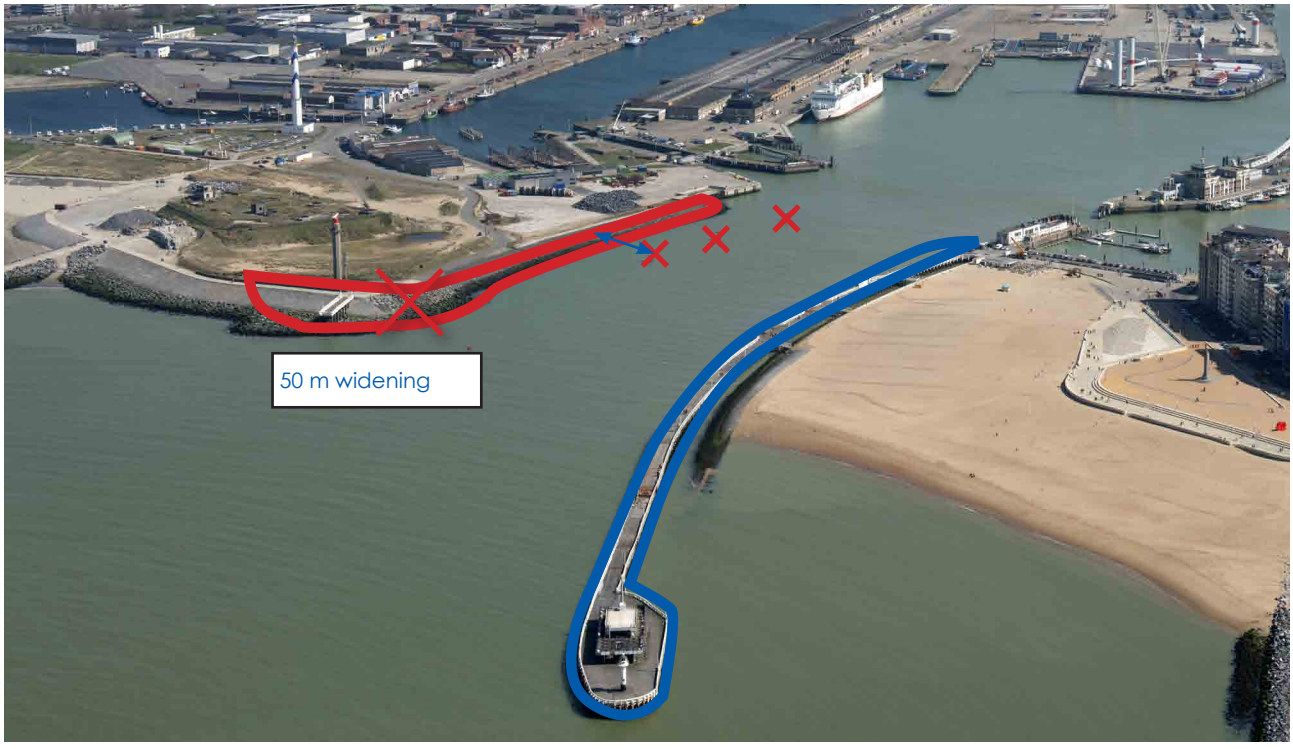
Since there is also demolition, sorting and recycling of airplanes at Oostende Airport, perfect synergy is possible. The intention is to realize a 'circular economy cluster' at Plassendale 1 with the establishment of more companies.

At **Plassendale 2**, Bionerga's biosteam installation is still very active, producing electricity from various waste streams including household waste.



DAB fleet moving to quay 101

widening Halve Maandijk



II. INFRASTRUCTURE

The evolution and further development as described above, has a number of consequences that colour the vision on the future. The implementation requires **investments from various actors:** the Flemish Region, the port authority, REBO and industry.

Maritime accessibility must be ensured so that the evolution in offshore installation and other vessels can be maintained. Accommodation should be made available for the influx of contractors and subcontractors.

1. INVESTMENT PROGRAM FLEMISH REGION

- Renovation Quay 101 - estimate 9.6 million €
- Widening at Halve Maandijk - estimate 12 million €
- Construction of towing tank and wave basin - estimate 25 million € (supporting investment)

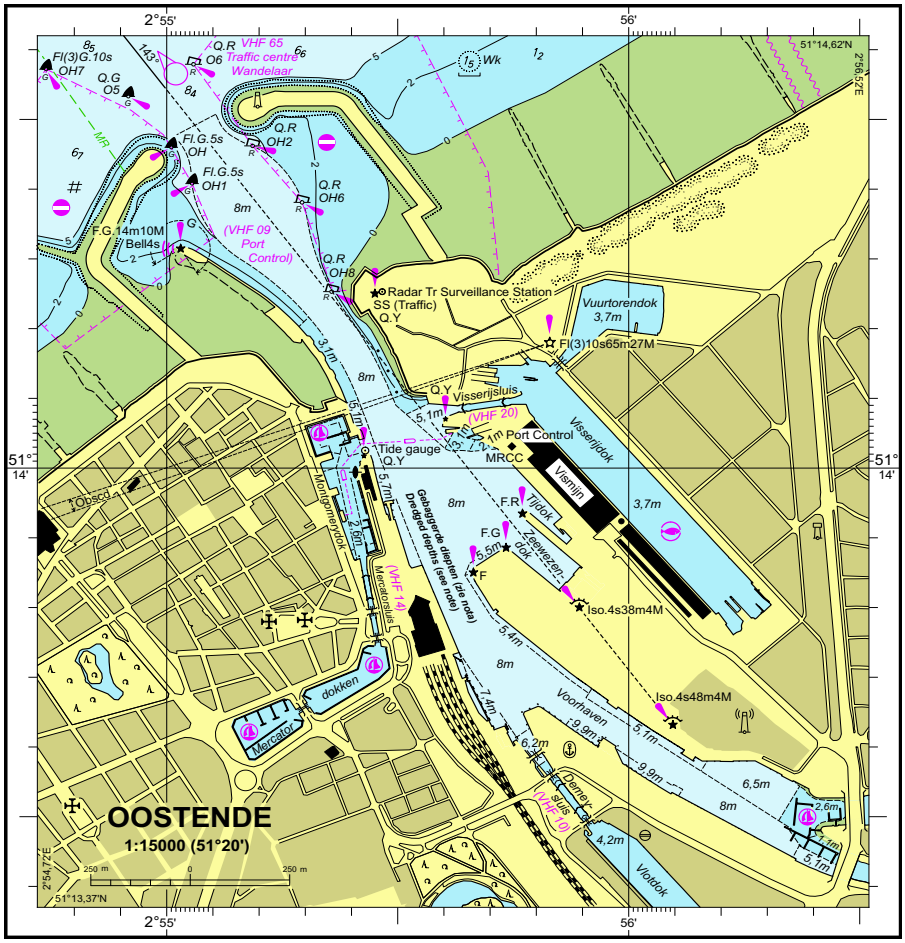
The **rebuilding of quay 101** for the department Vloot of the Flemish Region was an urgent requirement that was met by the tender and allocation in December 2015. However the actual work has not yet started. First of all, it is absolutely vital that the Vloot department can group its activities on one site near the headquarters. This will certainly contribute to efficiency. The renovation of quay 101 should be completed by summer 2019.

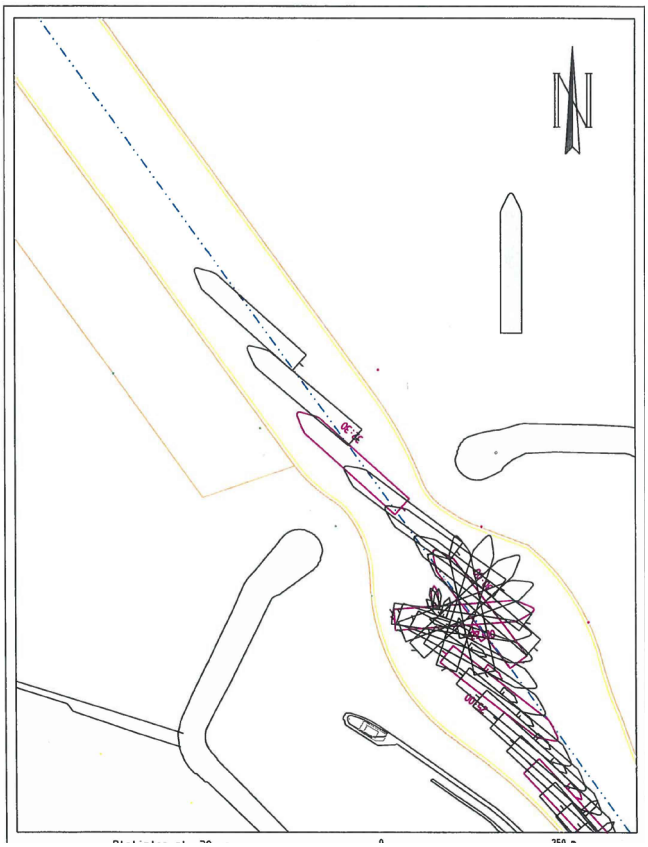
The now vacant area on the site along quays 606 and 607 can be used for the offshore activities that the port authority wishes to develop. With Rentel, Siemens and Norther there are agreements that these quays are necessary for their activities.

In the beginning of 2017, the next wind farm operators in front of the Belgian coast effectively started constructions. Additional offices and storage facilities must therefore be built in the vacant space.

We should bear in mind that the vacant space, formerly belonging to the Navy, has to be decontaminated. The necessary agreements between all parties have already been signed but the actual decontamination can only take place after the Vloot department has moved. The necessary budget must be provided.

simulation swinging of a ship between the breakwaters

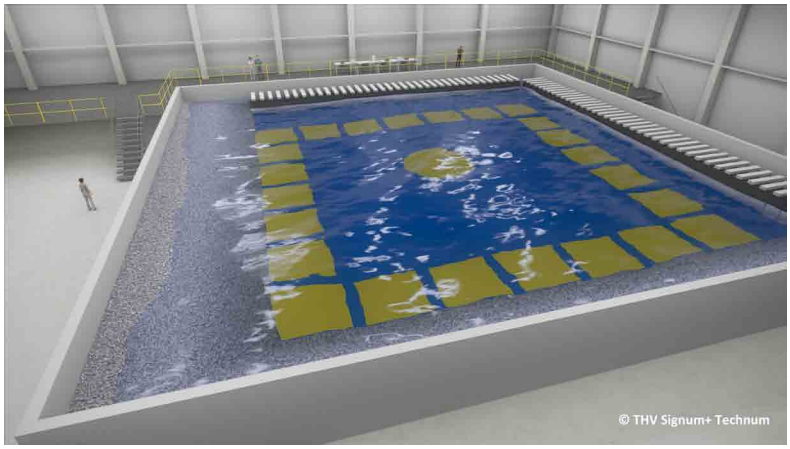




Another consideration is to use the **basin between the breakwaters** for **swinging ships**. This will be necessary if a large installation vessel occupies most of the current swinging circle in front of the Zeewezendok for loading operations of foundations or turbines. For larger vessels the presence of the disused Westerstaketsel may be problematic.

A study of this obstacle is being carried out in the Hydraulic Laboratory in Borgerhout where pilots are carrying out simulation voyages with various kinds of ships. The results show that the turning basin between the breakwaters perfectly enables access for ships <150 metres provided that the depth in the turning basin is sufficient.

basin between the port breakwaters



ocean basin

towing tank

The construction of a **towing tank and wave basin** on the site of Greenbridge is a huge asset to study all sorts of constructions that still have to be planned on the North Sea. On Monday 19th May 2014, the Board of Directors of the Hercules Foundation decided to approve the request of UGent and KU Leuven to support heavy research infrastructure linked to Gen4Wave for an amount of 2.3 million euros.

The resources are used for the realization and start-up of a large basin with wave, tidal and wind generation. However, the Flemish Region through aMT provides the funds for the structural work to build the towing tank and the wave basin.

The Flemish government officially approved the dossier on 30th September 2016. The tender was published shortly thereafter. Construction started at the end of 2016 and will become **operational in the beginning of 2019**. All in all in concerns an investment of some 25 million euro.

We are convinced that a lot of **scientific and research companies** will be **established** around this site on the adjacent GreenBridge science park, in analogy with similar installations abroad (cf. Nantes - St. Nazaire / NTNU - Trondheim). It must be ensured that the investment is available in a timely manner to prove useful for the short-term projects.

Rotra Vente - Siemens

2. INVESTMENT PROGRAM PORT OF OOSTENDE

- Modifications of roro infrastructure in Zeewezendok at Rebo terminal
- Development according to the master plan and development of the wind energy cluster eastern shore (docks, accommodation, roads, energy supply, etc.)
- Mooring pontoons for crew transfer vessels
- Safety and security facilities

2.1. RORO INFRASTRUCTURE

Roll-on/roll-off transport of the parts of wind turbines is a new challenge. These are very heavy loads: 400 T for a turbine (nacelle), 230 T for a tower section and considerably more for foundation piles.

Siemens, turbine supplier for the Rentel project (2018) takes the lead. Two previous container ships have been converted into a roro vessels, specially equipped for the transport of Siemens turbines, tower sections and blades. They have been named Rotra Vente and Rotra Mare.

In a port with little or no tide (e.g. Esjberg, Rotterdam, IJmuiden) ships can be discharged directly to the quay (= driven) (as shown in the picture). A **tidal port** like Oostende must be equipped with a floating pontoon and a bridge link to the landside.

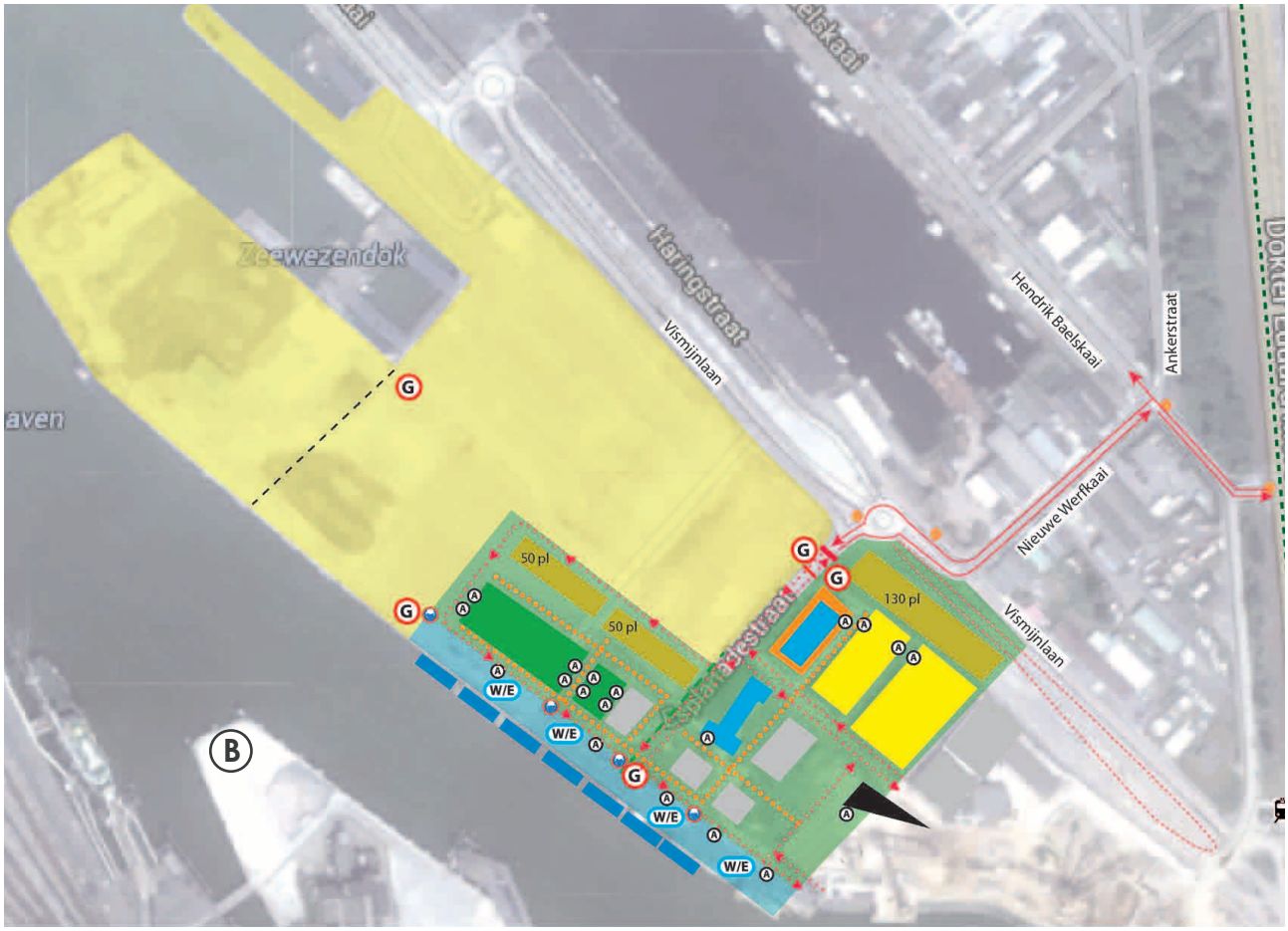
In the **Zeewezendok and Tijdok** these structures are present, designed for ferry freight traffic, with a very high loading capacity of 240 T. This is now insufficient for the Siemens parts. It is therefore necessary to strengthen pontoons, bridges and abutments. This is initially done for Siemens but will prove to be a major asset for wind turbines in the future. The investment is estimated at more than € 1 million.

This roro installation is currently operational. Bearing capacity was tested and certified with a ballast of 1000 Tons of sand on the bridge. The Siemens turbines (with frame and spmt some 400 T) are unloaded regardless of the tidal difference in roro mode thanks to spmt's fitting under the preconstructed frame.

To put things in prespective, 400 Tons over a floating roro bridge equals 12 to the maximum loaded 40' containers to be rolled of in 1 stack ...

master plan


otary
C-Power
503
501
502
504
rebo
INSTALLATION
401
405
406
O&M
407
Port Oostende
energy port



LEGENDE

New driving directions	
Possible control points	**(G)**
Waste points	**(A)**
Water and electricity	**(W & E)**
Bunkering	**(B)**
Pontoons	
Safety zones	

2.2. BUILDINGS (OFFICES, STORAGE, ETC ...)

The **master plan** for the expansion of the offshore wind energy cluster (which is also part of the European Sustainable Ports project) describes the vision on the site with a time horizon 2020 to 2025, the time when all wind farms in the Belgian area should be operational.

The buildings on the **first line**, behind a free safety quay zone of approximately 30 meters, are reserved for the companies that need daily access to the sea. These are the main contractors of O&M, who are responsible for ensuring maximum availability of the wind turbines. In the current constellation these companies are the turbine suppliers (Senvion, MHI Vestas, Alstom and later Siemens) but they may also be third companies or branches of utility companies themselves.

For several companies there have already been investments in accommodation. Geosea, Geosea maintenance, GE-Alstom, MHI Vestas, Parkwind, Senvion, Multitech and CMI and a few smaller companies are located there.

With Siemens and Norther an agreement for accommodation on the first line was signed on 31st March 2017. To this end a new building was designed that also leaves space to be managed by the port itself for warehouses, co-working space, meeting rooms and individual offices. The investment is estimated at € 3 500 000.

SHORT TERM INVESTMENTS BY PORT OOSTENDE FOR DEVELOPMENT OF WIND ENERGY CLUSTER

Modification roro infrastructure Zeewezendock	€ 1.000.000
2017-2022 Buildings for accommodation O&M companies	€ 8.000.000
2017-2018 Renovation Hangar 17	€ 1.000.000
2019 Refurbishment areas at quays 605-607	€ 1.000.000
2017-2022 Pontoons/boatlandings for CTVs	€ 3.950.000
For 5 years ongoing improvement for safety and efficiency of installations +/- € 100 000 per year	€ 500.000
	€ 15.450.000

On the **second line,** behind the buildings with direct access to the docks, there is accommodation for **suppliers, subcontractors** as well as **central warehouses** for materials and spare parts. In addition, there is also space for the park owners, engineering offices, IT companies and the like.

And of course, we must take into consideration the needs of the (growing) staff: restaurants and relaxation rooms, possibilities for training and further education. Currently Falck Safety Services is a "school example" of this. These further buildings will need an investment estimated at € 5 million.

The port authority as well invests to meet the **increasing demand for storage space**, also for large parts. To this end, the rebuilding of a former warehouse of the Navy ("Warehouse 17"), 4 000 m^2, has started. The investment is estimated at € 1 000 000.

service vessels C-Wind en Aqualink

2.3. MOORING INFRASTRUCTURE FOR SERVICE VESSELS

The question arises as to the efficient organization of **the berths for service vessels**, especially crew transfer vessels (CTVs). Before the establishment of maintenance companies at quays 604/605/606 AGHO made available fully equipped pontoons for fast berthing and unberthing, safe loading and unloading of goods and staff on service vessels, one (24 m long) per wind farm. Today 4 pontoons are in use; the others will be built when the wind farms become operational.

The next wind farms are those of **Rentel** and **Norther**, have started in 2017. For this purpose, pontoons or boat landings are built alongside quays 606-607, which is now still used by department VLOOT as storage area for buoys. This will move to quays 101-102. The investment is estimated at € 350 000.

The problem remains of **safe overnight stays** or berthing of these ships. The necessary accommodation for this is also provided and will follow the growth of the number of CTV's step by step.

New berths will have been built at the **Ryco yacht club** by the end of 2017, early 2018 (see plan 1). Up to 9 berths for smaller CTVs and 5 berths for larger CTVs are created. This investment is estimated at € 600.000.

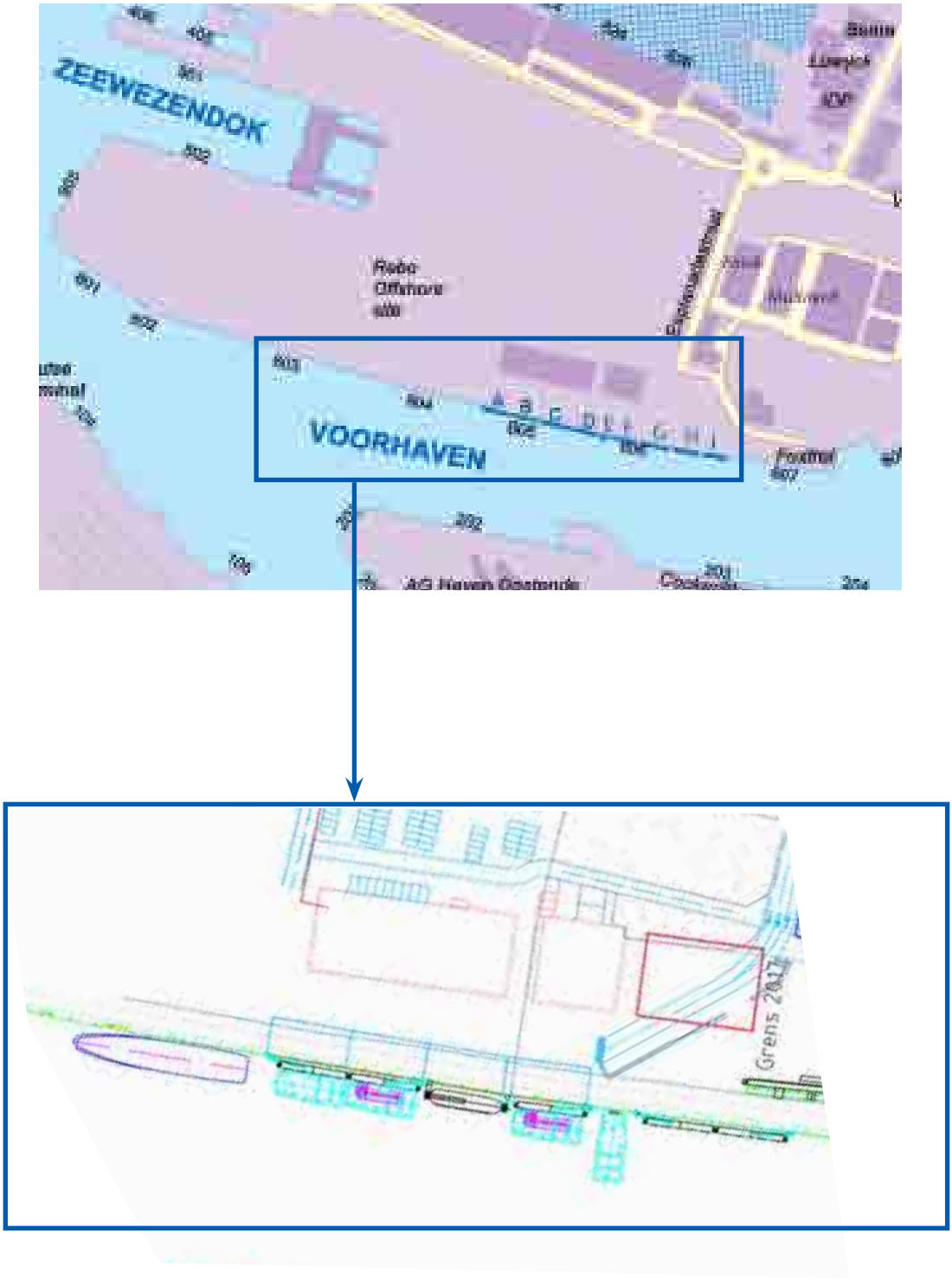
In a **second phase** from the end of 2017, early 2018, berths will be built at pontoons moored at **quay 202** (see plan 2). No less than 12 berths for large CTVs will thus be available. Of course, the available space can be flexibly filled in with a mix of large and small CTVs, although it is expected that the majority will have a length of about 24 - 27m. This investment is estimated at € 1.5 million.

For safe mooring of unmanned ships for longer periods the berths behind the lock in the **Visserijdok** are of course still available.

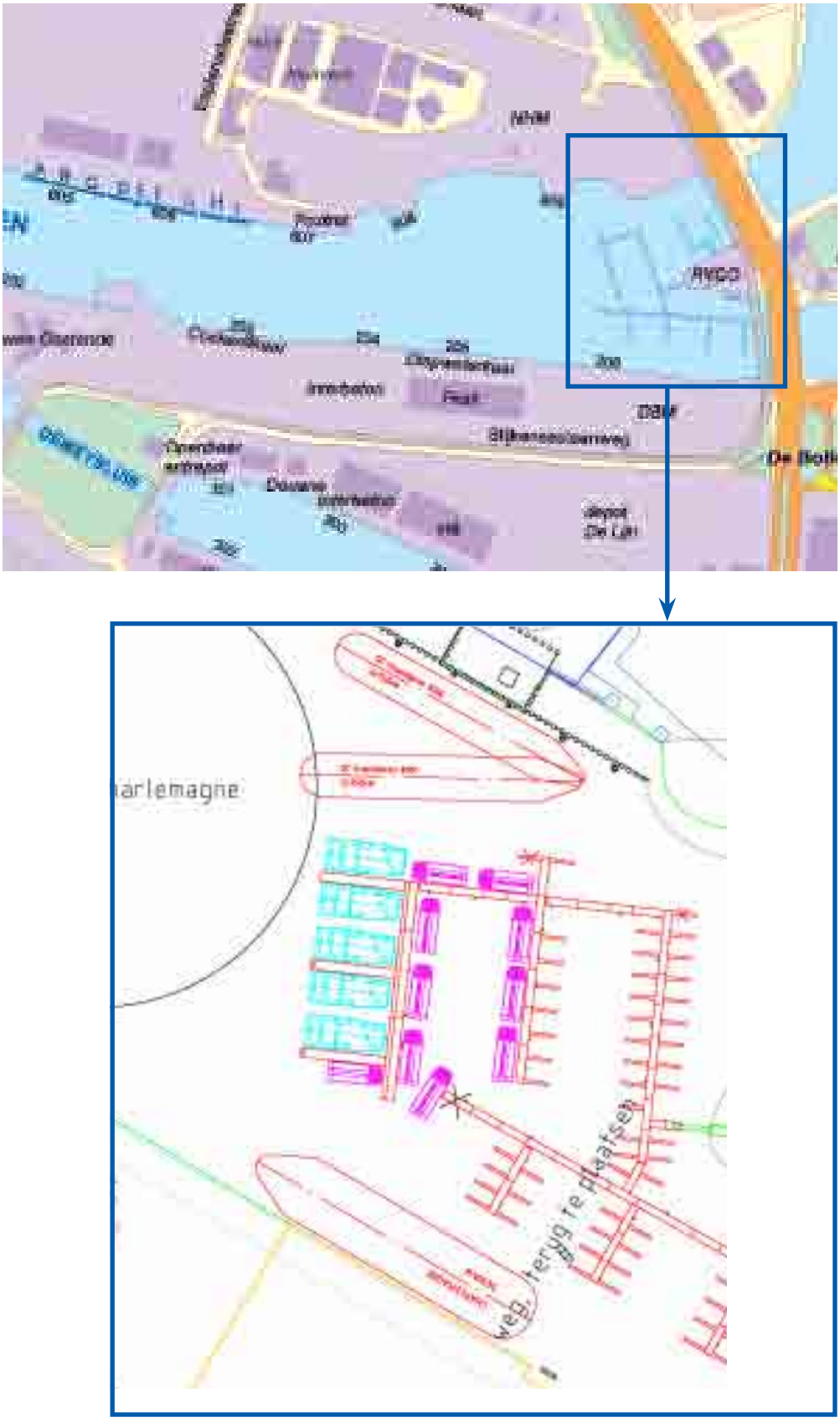
All this is accompanied by a highly effective IT-system so that everything can be organized in an orderly, controlled and efficient way.

pontoons for Senvion and MHI Vestas

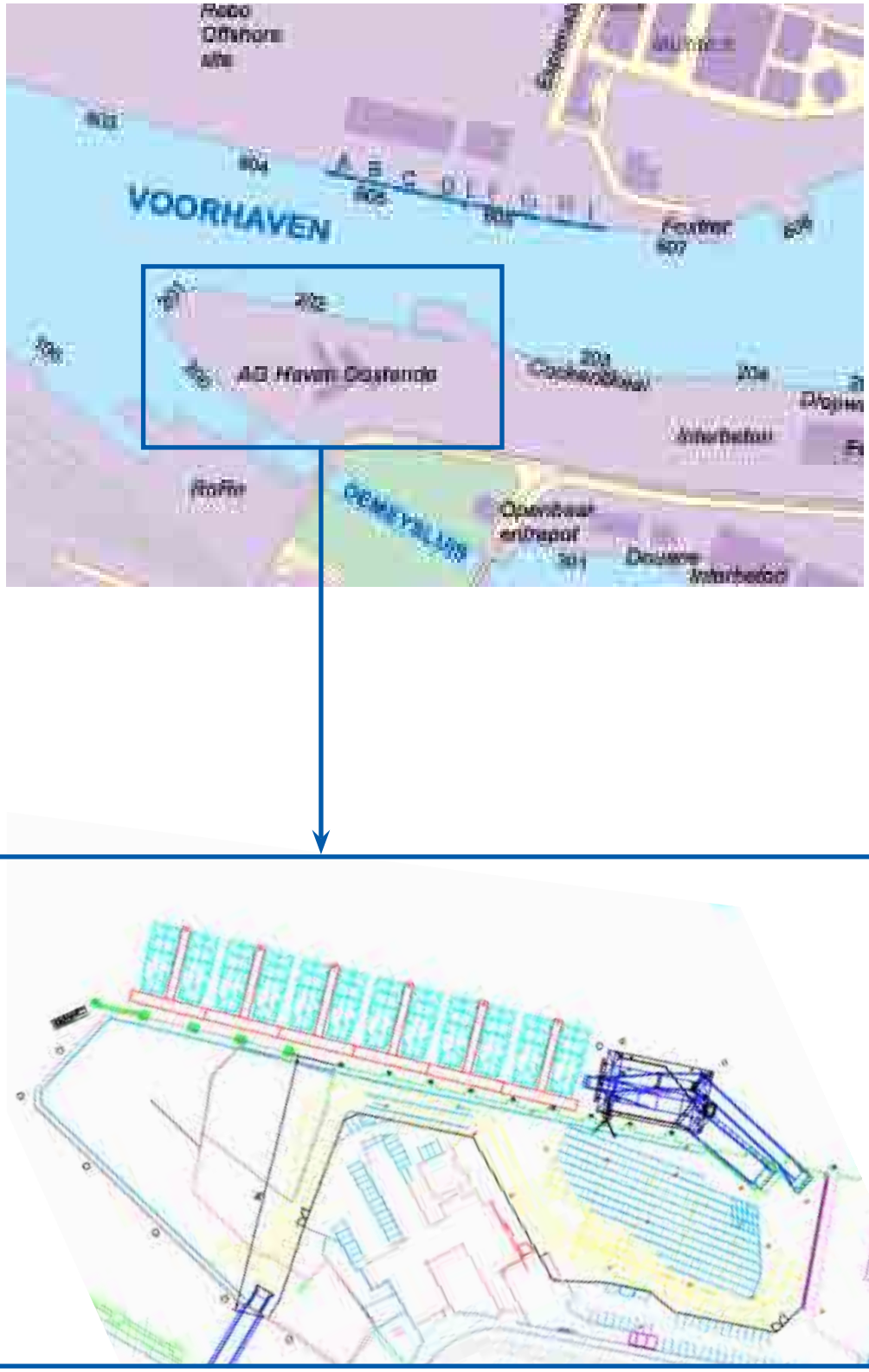
new pontoons for Rentel and Norther



plan 1: new berths at the Ryco



plan 2: new pontons at Quay 202



Fisheries dock

2.4. REFURBISHMENT FISHERIES DOCK

The Fisheries Dock is a rather large dock, about 700 m long, about 125 m wide. It is accessible through a lock with a length of 91 m, width 15.30 m, depth 5.50 m and a total of 1 425 m quay length.

As the fisheries have steadily declined over recent years, the dock is underused and has a lot of free space. It is currently used by CTVs for overnight stay.

This is the **subject of a controversy**: ship owners and crew love to lay behind the lock as they can leave their ship in all safety and stay themselves in an apartment or hotel in town. Windfarm O&M companies however focus on the time lost for passing the lock (minimum 30' per pass unless waiting ships) which is time lost for working within the 12 hours per day maximum allowance.

The solution then is to turn the Fisheries dock into *a tidal dock*. The lock simply stays open but the waters are still quite secluded avoiding swell and waves coming in. There is only the tidal difference (4.5 m average) to be taken care of.

However, this cannot be done without important *infrastructure works*.

Dock and lock date back to 1937. Since then about 1,5 m of silt has collected in the dock, meaning dredging works are necessary to remove the amassed silt to the extent of about 130 000 m^3. That silt is contaminated and needs to be treated before discharge. All in all, bringing the dock back to a depth of 6 m under low water needs dredging and decontamination works estimated to cost around € 13 million.

Next, the existing quay walls must be protected by rock deposits. Floating pontoons must then be moored above those deposits so that ships coming alongside are not hindered by those deposits. On the West quay, an area is reserved for fishing boats unloading their catch at the fish auction, and this will have to be a vertical quay. All these works are estimated to cost around € 7 million for the eastern quay and around € 16 million for the western quay. The protection of the existing slipways should cost an extra € 2 million.

Finally, pontoons and mooring spaces for CTVs and other service vessels must be equipped, a cost estimated at € 2 million.

All in all turning the fisheries dock into a (very useful) tidal dock is bound to cost some € 40 million.

REFURBISHMENT FISHERIES DOCK

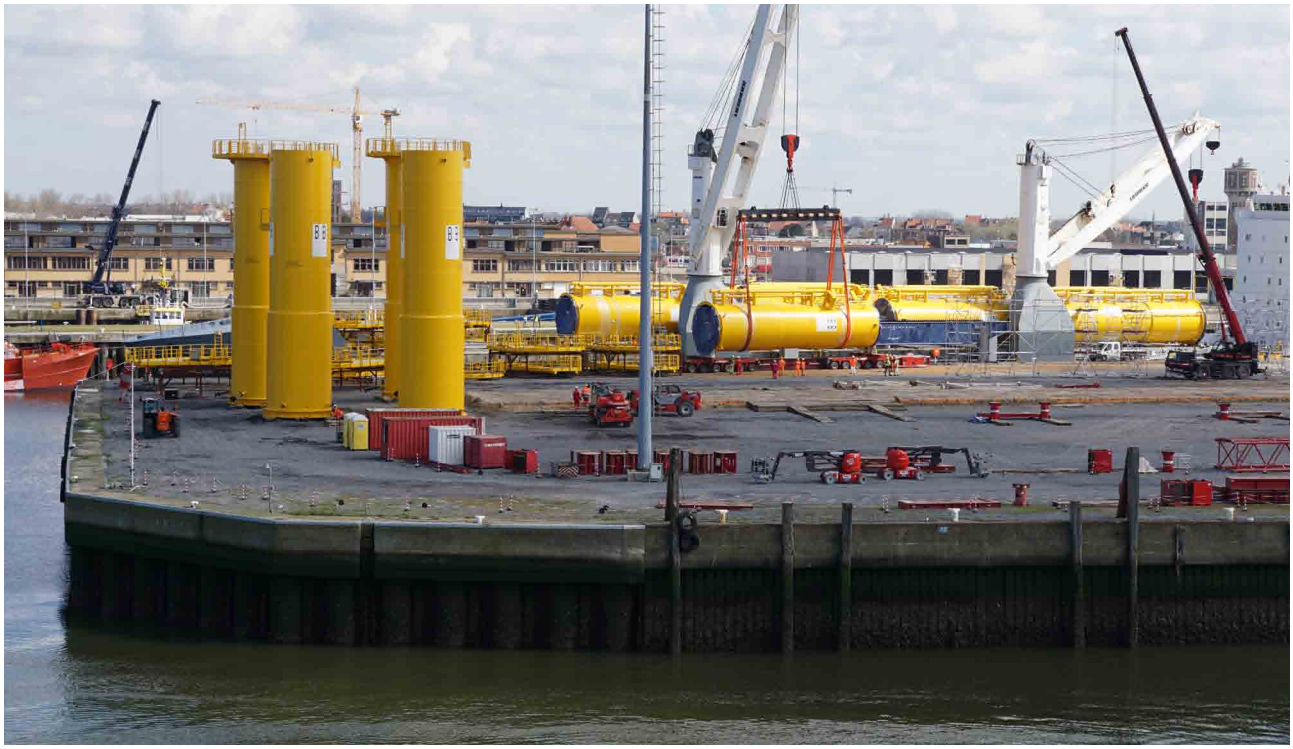
	mio €
Dredging and treatment of silt	13
East Quay	7
West Quay	16
Protection slipways	2
Pontoons	2
Enlargement access	15
	55

With all that the lock doors are open and the dock is fully accessible. In case of bad weather, the doors can be closed which comes in quite handy to offer safe mooring even in very bad weather conditions.

However, the existing width is 15.30 m which is insufficient for the **larger service vessels,** currently around 20 m in width. Widening the entrance is technically possible but is a major infrastructure work for which an extra € 15 million must be found.

All of this is a considerable investment which **on the long term** may prove to be worth it, creating the ultimate solution for the proliferation of service vessels in the port of Oostende, living in synergy with the remaining fishing vessels.

investments executed by REBO nv



reinforced quay up to 20 T/m²

3. INVESTMENT PROGRAM REBO

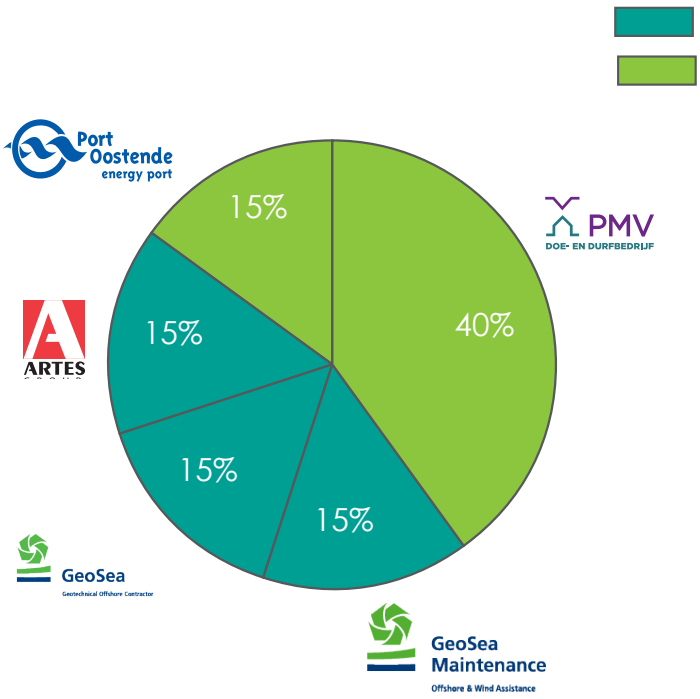
Heavy loads require heavy load quays. These have been realised at the Zeewezendok with a load capacity of 20 T/m². In front of the quay at the head of the Zeewezendok the seabed has been reinforced by gravel piles to limit the penetration of the spuds of the jack-up vessels.

These investments are non-subsidized. To finance these quays, the nv Renewable Energy Base Oostende (Rebo) has been created. By contributions of their partners (PMV, Deme, Artes, Port Authority of Oostende) and bank financing the necessary funds are being raised.

The investment program of Rebo nv amounts to 15 mio euros of which 7 mio euros have been used. As soon as the further development of wind farms requires further investments, they will be carried out. For this purpose Rebo nv has the concession for the land areas at the Zeewezendok and offers underconcessions to the users.

In addition, it is possible that there will be additional investments for accommodation on the premises, at the request of (sub) contractors. For example, REBO has invested in buildings for Parkwind, Alstom and Vestas (2.5 million €).

shareholders REBO nv



GEOxyz established in the swing dock (Zwaaidok)

new office building GEOxyz

Survitec group established in the swing dock (Zwaaidok)

4. INDUSTRY / PRIVATE INVESTMENTS

Once the strategic investments by the governments and semi-governments have been completed, private companies will be following. Usually, the amount of money invested by private companies is much higher than government investments. This is no different here.

C-Power, one of the wind farm developers, has recently built completely new buildings on its site, including a sophisticated data system for the maintenance and monitoring of her park on the Thorton bank. These buildings have now been extensively expanded to accommodate Otary and Rentel. The IT company **e-Bo Enterprises** is also planning new constructions on this site.

AGHO and Falck jointly invested in the construction of the Falck Safety Services training centre, so far the largest and most modern of the group.

The Belgian company **GEOxyz** is growing so fast in Oostende that its recently opened workshop (inauguration on 2/12/2014) on the former Beliard site in the inner port is already too small. They are now finishing the drawings for a new office building.

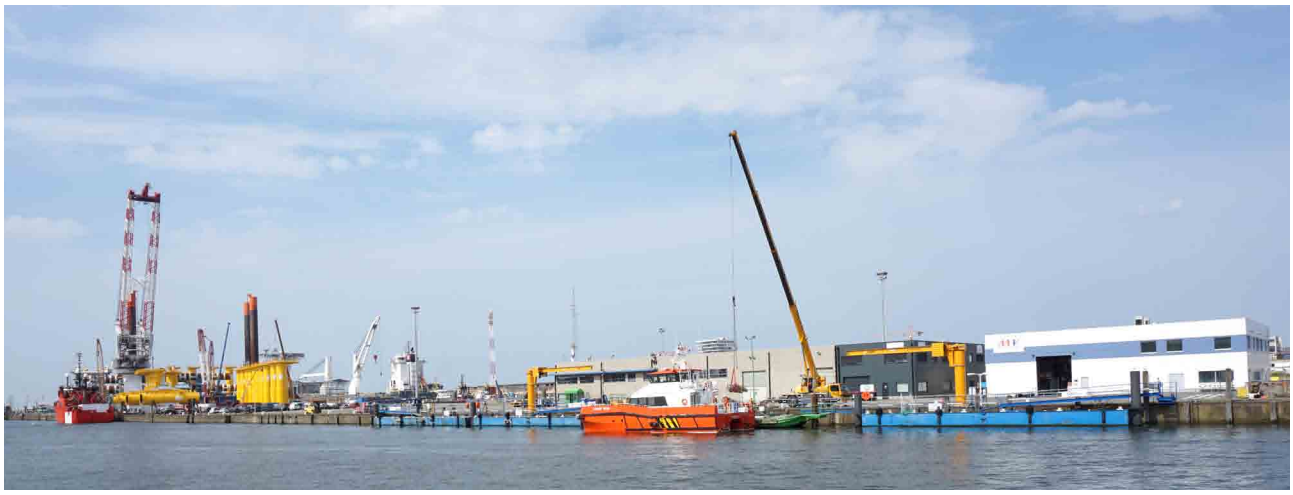
The Belgian company SKB life saving equipment has found its second breath due to the offshore industry under the name **Survitec**. Previously, their customers mainly consisted of shipping companies in the fishing industry. They occupy a new location in Oostende, also on the ex-Beliard site and thus became neighbours of GEOxyz.

In the inner port the recycling company **AIM Recycling Europe** has invested in a completely new 3 ha site for a metal processing unit (an investment of 12 million €).

Investments from other companies are in the pipeline.

Building and accomodation is normaly leased from the Port Authority, but companies invest large sums in the development of their activities. Some also invest in fixed assets.

at 7.45 am - technicians are loading service vessels by crane



III. ECONOMIC IMPACT

1. RETURN ON INVESTMENT

The **return on investments** made by REBO nv and AGHO to optimize business conditions are low in economic terms and do not achieve the return that real estate brokers would expect.

Some investments, e.g. in buildings have the direct return of concessions, usually for a period of 15 years or more. Again, **the return is modest** - at present < 10 %. A great deal of investments, e.g. in quay structures, pontoons, mooring facilities, roads, security facilities etc. do not have a direct return and are paid back in the longer term by increased port traffic and the fees paid for it, terrain concessions and fees for services that are offered.

The return must therefore be seen in the **social added value**: the number and quality of jobs created, the impact on the economic activity in the region, an attractive innovative image stimulating other activities.

That is why the investments of the Flemish Region, REBO and AGHO are the **trigger** for companies to establish themselves and invest in their own activities.

2. EMPLOYMENT

The Port must do every effort to provide the companies that are active in the **Blue Economy** with the most suitable accommodation and the most suitable business climate. The aim is to **anchor the employment** that accompanies it in the port.

The industry standard is *direct employment of 2 to 2.5 FTE per wind turbine*. Employment is very diverse: from offshore wind technicians to technicians ashore, ship crews, warehouse managers and internal transport, staff in the administration and support services, research departments and training centres, etc. These are mostly high-quality jobs that require continuous and further training.

Of course, all employment resulting from wind farms is not limited to the Oostende site. Current figures show that this is true for more than half of the employment. Moreover, there are future projects such as the 'energy atoll' and the 'power socket' at sea. It is therefore not unrealistic that the site will eventually offer around **800 permanent, high-quality jobs** that will be filled in locally.

During the execution of a project, hundreds of other jobs will be created that are specifically related to **installation** and everything that comes with it: a mix of local employment and foreign specialists. Those foreign technicians stay in Oostende for the duration of the project and hotel and catering services in Ostend benefit from it.

By the end of 2017 more than 400 jobs had been created in the offshore cluster, while the outer port offered jobs for over 1 350 people. For the total amount of employment in the port area, we refer to the figures below from the National Bank of Belgium.

3. ADDED VALUE

The direct added value is calculated as the sum of personnel costs, deprecation and other costs, operating results (and eventually operating subsidies) for public as well as private companies operating in the harbour area.

It is an important indicator because these are the measurable effects that flow back into the economy. The latest figures are from 2015, according to the study of the **NBB n° 321 of june 2017**.

	x 1000 tonnage	added value x 1000€	employment units	incomming vessels*
Antwerpen	208 425	10 946	60 656	14 417
Gent	26 362	3 795	27 809	2 847
Zeebrugge	38 318	975	9 268	7 888
Oostende	1 295	508	4 993	2 687

* This only refers to commercial seagoing vessels that pay port fees. The ships of the department Vloot, the dredgers, the fishing vessels and the pleasure boats are not counted here.

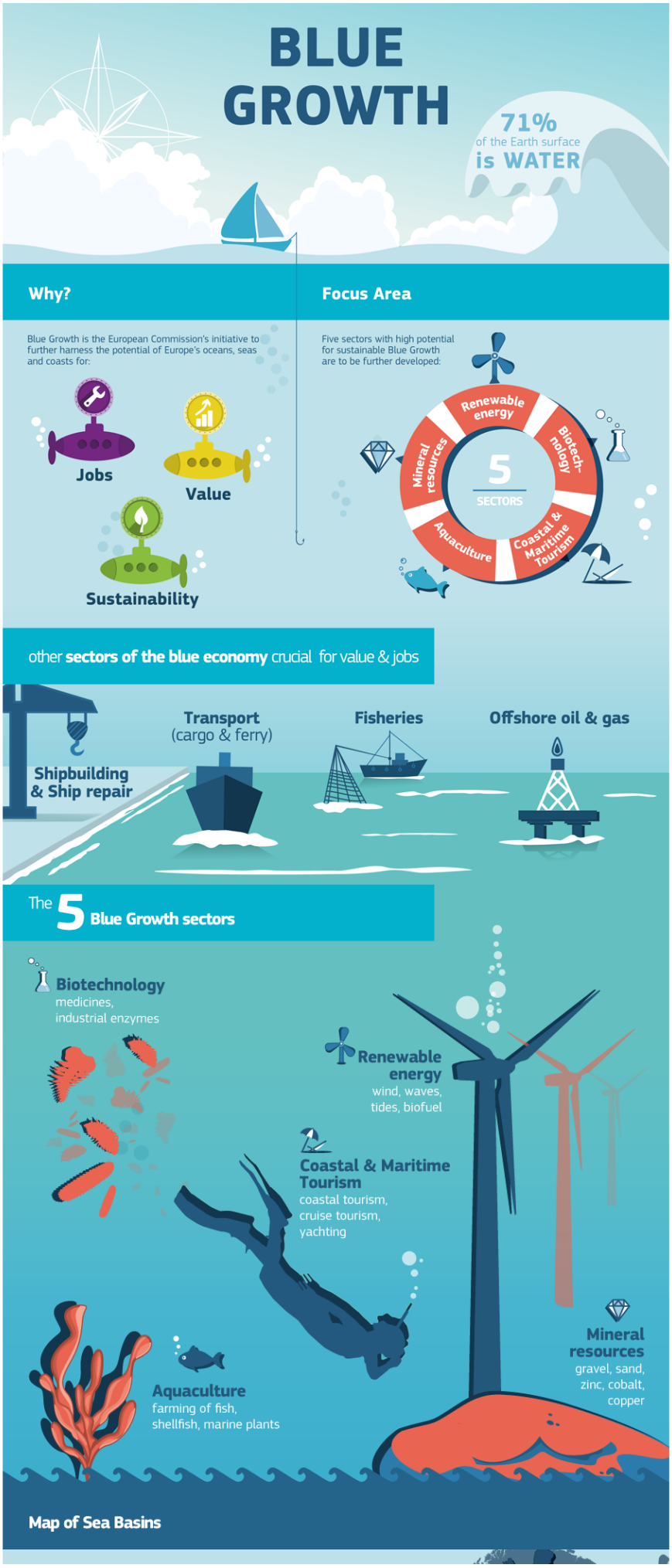
Compared to Oostende:
Antwerp realizes 160 x more tonnage, 21 x more added value, 12 x more employment.
Gent realizes 20 x more tonnage, 7 x more added value, 5,5 x more employment.
Zeebrugge realizes 29 x more tonnage, 2 x more added value, 2 x more employment.

This demonstrates **how relative the influence and ranking according to tonnage or volume** can be and how attention should be paid to added value and employment. Jobs are mainly created in non-transhipment activities in the maritime and non-maritime clusters of the different ports.

All in all, Oostende scores very well in the relative comparison.

The port is **invaluable for the local economy**. The Port of Oostende is an existing lever that should be **further developed** as *the* **driving force for economic growth** in the region.

The planned construction of the following wind farms and the employment it entails, suggest that the Port of Oostende will become **more important for the local economy** in comparison with the performance of the other Flemish ports. Therefore, the Port of Oostende must continue to devote itself to the development of the Blue Growth Cluster and remain attractive for all companies that see an economic potential at sea.


BLUE GROWTH
71%
of the Earth surface
is WATER
Why?
Blue Growth is the European Commission's initiative to further harness the potential of Europe's oceans, seas and coasts for:
Jobs
Value
Sustainability
Focus Area
Five sectors with high potential for sustainable Blue Growth are to be further developed:
Renewable energy
Biotech-nology
Coastal & Maritime Tourism
Aquaculture
Mineral resources
5
SECTORS
other sectors of the blue economy crucial for value & jobs
Shipbuilding & Ship repair
Transport (cargo & ferry)
Fisheries
Offshore oil & gas
The 5 Blue Growth sectors
Biotechnology
medicines, industrial enzymes
Renewable energy
wind, waves, tides, biofuel
Coastal & Maritime Tourism
coastal tourism, cruise tourism, yachting
Aquaculture
farming of fish, shellfish, marine plants
Mineral resources
gravel, sand, zinc, cobalt, copper
Map of Sea Basins

IV. BLUE GROWTH
THE INNOVATIVE CLUSTER

1. BLUE GROWTH

"Even in a slowing or shrinking economy there are sectors with growth potential."

At many levels of policy and especially in the media extra attention is paid to sectors that are a great opportunity. "Blue Growth" is one of them.

"The potential for economic growth is at sea."

In a 2012 memorandum to the European Parliament, the Council and the Committee of the Regions, the European Commission set the tone: **"Blue Growth, opportunities for marine and maritime sustainable growth. "**

Since then, the attention for Blue Growth has increased considerably in Europe and many research and development programs for technological innovations are being set up and realized.

According to the European Commission the "focus area" for sustainable Blue Growth consists of 5 high-potential sectors that need to be further developed.

The 5 sectors are:
- renewable energy
- biotechnology
- mineral resources
- aquaculture
- coastal and maritime tourism

The other sectors of Blue Growth are crucial and create jobs: shipbuilding, transport, fishery, offshore oil and gas.

The Port of Oostende focuses on these high potential sectors, especially renewable energy. Future growth sectors such as aquaculture and mineral resources also receive the required attention. In a further stage biotechnology will be considered, a sector where VLIZ and related research groups will play an important role. Tourism is not the core task of the Port of Oostende.

In the note of the **European Commission,** Oostende is named as one of the (in 2012 rare) examples: "Oostende has made land and quays available for renewable energy companies close to research institutes."

Indeed, at that time the Port of Oostende had already invested in the necessary infrastructure and buildings to allow development at sea, such as the heavy load quays and terminal, and the first buildings of what has now become a **Blue Energy Cluster.** The proximity of the GreenBridge Incubation Centre and VLIZ plays an important role.

The development of wind farms remains the most important aspect of **Blue Growth.** Meanwhile, 182 turbines on the Belgian North Sea produce energy for more than 600 000 families. The goal is to develop around 450 turbines: 2.2 Gw, about 10 % of Belgium's total energy needs.

Installations to **generate electrical energy from waves, currents, tides or other physical processes** at sea (e.g. thermal processes, osmosis) are in experimental development, including full-scale testing. As a result, a Blue Energy sector is the main leg of Blue Growth. Although most of the projects are still in the experimental phase, some successful full-scale prototypes are operational.

However, there are many more opportunities than power generation at sea. Just think of the issues of **climate change and the rise of the sea level**. Protective measures are translated into hydraulic works on the coastline and at sea, e.g. The Coastal Defence project of Flemish Bays.

For example, protective islands off the coast of Zeebrugge up to the Scheldt estuary can provide the vital inland waterway connection from the Port of Zeebrugge.

The existence of wind farms offers opportunities for **integrated aquaculture.** Projects on algae cultivation have progressed far enough to start industrial production. There are still opportunities in the exploitation of the seabed, in the development of marine biotechnology and so much more. Needless to emphasize that in all these developments the focus lies on the environment and on the fragile marine ecosystem.

2. TIME FOR ACTION

It is quite obvious that worldwide developments in the blue technology sector are accelerating rapidly. In a memorandum of the EU Committee of the Regions of June 2015, the EU was even deeply concerned about its position "**The EU at the forefront ... for how long?"**

It is the basis and motivation that encourages the EU to support **Blue Growth** projects and to allow 'state aid'. The EU acknowledges that "without sufficient action the EU risks losing its global leadership".

The same memorandum mentions 8 Member States that have included Ocean Energy in their National Renewable Energy Plan: the UK, Ireland, France, Portugal, Spain, Finland, Italy, the Netherlands. Belgium is missing ... The note mentions that the EU "recognizes that in many cases the drive towards developing ocean and marine energy is coming from sub-Member State level, for example Cornwall, Brittany, Aquitaine, Pays de Loire, Lower Normandy, Basque Country, Cantabria, Galicia, Scotland, Wales". Flanders is not mentioned ...

And yet - at the end of the note a list is attached: "**Some examples of Ocean Energy projects".**

Penultimate bullet > Belgium: "Mermaid concession zone for offshore, wave and tidal energy, aims to install 20 MW wave energy (currently has a permit to 5 MW); national test facility at Oostende".

The **"national test facility"** is the towing tank and wave basin for which funding was decided in 2014, reason why known to the EU in 2015. Realisation is now underway.

If the EU is losing its position because of a lack of "sufficient action", this is certainly true for Flanders. Flanders has a huge potential to gain a **top position** in **Blue Growth**. Not only does Flanders have global players in hydraulic engineering and offshore installations, in high-voltage grids and transport, in transformers, reduction gear, steel construction for offshore foundations, etc., it also has a large number of innovative SMEs that can develop considerable activity as suppliers. Strong orientation on export is always the starting point.

It is essential to provide all companies with appropriate support, for example by making test infrastructure available, creating consultation and innovation platforms, offering the necessary accommodation, preferably in bundled form (cluster!). It is equally vital to provide access to fundamental and applied research at universities and research institutions.

"In short:
bundle forces, it's five to twelve."

bedrijven actief in de offshore wind business met vestiging in Oostende

3. OPERATING IN CLUSTER

3.1 START CLUSTER OPERATION

Forces are currently being united. In the research project "Knowledge Clusters West Flanders" (2012), conducted by Econopolis, Blue Energy was identified as a potential cluster. As the next step, "Blue Growth West" was identified as one of the four future core projects in the Future Vision of West Flanders 2030.

POM (Provincial Development Company) West Flanders launched the **"Blue Energy Factory of the Future"** with partners such as Flanders' Maritime Cluster, Port of Oostende, Technical University Alliance, GreenBridge Incubation Centre, Belgian Offshore Cluster (BOC), Voka, Unizo, OWI lab (Sirris) ... With this initiative, POM West Flanders is the driving force for concrete realizations.

3.2 CLUSTERING: CONCRETE REALIZATIONS

The construction and mainly the maintenance of the wind farms caused many companies to settle in the **cradle of wind energy** - and by extension the whole offshore branch - in Flanders: the **Port of Oostende**.

The Port of Oostende appropriately anticipated the new developments and already made the **strategic choice** for **offshore industry** in **2010**. To this end, the Port of Oostende and its partner REBO nv invested in the necessary infrastructure, heavy-load quays and terrains, and in accommodation rented by the different companies.

In 2016 there were **more than 30 companies**, from wind park operators and turbine suppliers to smaller suppliers, which are still providing around **350 jobs** in the eastern side of the port (Zeewezendok and the areas behind it). This was originated from the construction of the C-power wind farm in 2012.

In 2016 the foundations of the **Nobelwind** wind farm were installed from the port of Oostende with general contractor Jan de Nul nv. That activity created about 120 jobs on the site, afterwards about 30 permanent jobs.

After the installation of Nobelwind, **232 wind turbines** of the planned 450 will be active. So half of the project will then have been realized.

The cluster that de facto originated in situ gave rise to great interest by many companies that are already active in (certain aspects of) the offshore business.

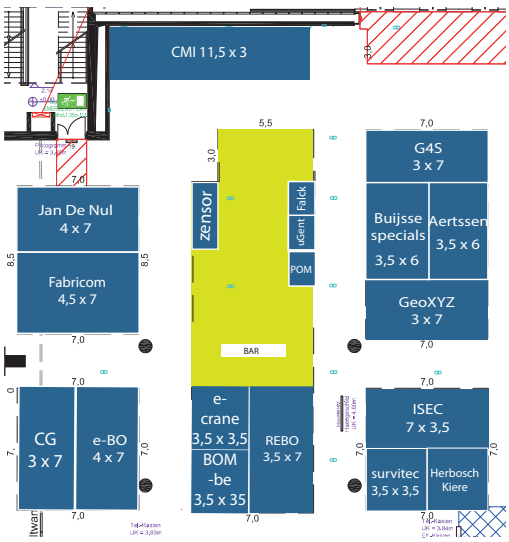
On the initiative of Deme, Jan de Nul, Port of Oostende, Port of Antwerp, POM West Flanders, RESOC Oostende and VLIZ (Flemish Institute of the Sea), **Flanders' Maritime Cluster** was established (FMC). Recently, the companies Sioen Industries and dotOcean joined the Board.

The main tasks of Flanders' Maritime Cluster are promoting, valorising and developing **marine and maritime activities in Flanders.** To make this happen, FMC offers an annual program of activities in addition to its services.

In the meantime FMC already has **130 members** and the cluster is fully operational with the publication of an annual compendium, the organization of seminars, contact sessions and participation in European projects, including the culture of algae on textile mats at sea (Sioen). All this is achieved with very limited resources gathered by the founders and by members.

business catalogue FMC

The companies in the Oostende cluster decided to participate in the main exhibition for the offshore industry, namely Wind Energy in Hamburg (from 27th to 30th September 2016) with a group stand of 400 m². To this end, the **Belgian Offshore Cluster** (BOC) was established in Oostende. This initiative emphasizes the export orientation of the companies active in offshore. In **september 2018** (25 - 28) BOC will organize a **group stand in Hamburg** for the second time.



Awaiting the major trade fair in Hamburg, the **'Belgian Offshore Days'** were set up by Port Oostende and BOC on 21st April 2016. This small fair with a unique visitors' concept aimed at presenting suppliers and innovative start-ups to wind farm owners and large O&M companies. With more than 20 stands and 350 visitors, only from the narrow circle of Flemish offshore, this was a huge success that has been repeated.

The second edition of Belgian Offshore Days took place on 29th and 30th March 2017 in Oostende Sea P'lace. The number of stands was doubled to 40 and there were more than **600 visitors**, all of them people who are directly concerned by the business. There is special appreciation for the formula of very direct contact between SMEs and managers of wind farms and big investors.

The next edition of Belgian Offhsore Day will take place on **March 22nd 2018 in Oostende Sea P'lace** again.

From the 6th to 8th of June 2017 London hosted the **Offshore Wind Energy Exhibition**. It is an initiative by the Wind Europe organisation and is organized each time in a different location. Port of Oostende en REBO took the initiative to organise a small group-stand together with five other local companies.

Federal minister for Energy, Mrs M.C. Marghem was a guest speaker at the openig session and consequently visited the various Belgian representations. Next edition is from 26 to 28 November 2019 in Copenhagen.

4. SUPPORT IN R & D

The young innovative group of companies that want to acquire a solid profile in offshore or have this ambition cannot exist or develop without the necessary support in the form of available infrastructure and information platforms. Below you can find a summary of what is available. However, there is still a long way to go: making contacts between research institutes and industry more intensive and usable. Overarching cluster action can be the answer to this.

> OWI lab *(Offshore Wind Infrastructure Application Lab) is a R&D initiative under the wings of Sirris (Agoria) that initiates and supports innovative projects related to wind energy at sea. The OWI lab user group consists of about 30 members, mainly companies. A widely used realization is the climate room (- 60 to + 60 ° C) for testing in extreme conditions.*

> Gen4Wave was realized thanks to the consortium UGent, KU Leuven and the Hydraulic Engineering Laboratory. UGent is the leading party.

The main ambition of Gen4Wave is the realization of the **Coastal and Ocean Basin**, a so-called wave basin with the ability to impose waves, current and wind on scale models. The infrastructure is designed to be widely used in different areas: wave and tidal energy, offshore wind, offshore engineering, coastal water engineering, wave/current interaction etc.

The *industry is literally waiting* for it; test projects are currently running in Nantes, Copenhagen, Trondheim and Edinburgh. In May 2014 the Flemish Government decided to invest 5 million in the Gen4Wave project. The Hercules Foundation approved the demand of UGent and KULeuven to support heavy research infrastructure for an amount of 2.3 million euros. On 30th September 2016, the Flemish government finally approved the construction of the towing tank and the wave basin for an amount of 25 million euro. Construction started end 2016.

From the start, the initiative has highlighted the business opportunities, specifically in the field of **wave and tidal energy.**

The Hydraulic Engineering Laboratory needs a new larger towing tank. It is obvious to use the **synergies between the towing tank and the wave basin efficiently** and to accommodate the two projects in one building. The Flemish Government agreed to realize both projects together in its decision of 30th September 2016.

Companies that engage in Gen4Wave:

Wave basin in Nantes

> GTI, Integrated Territorial Investment is an integrated implementation tool proposed by the European Commission. Within GTI West Flanders, funds can be released for investments in Blue Growth. This package is promoted under the name **Blue Accelator**.

Consultation with the companies shows that the industry concerned needs testing facilities both on, near and offshore to develop innovative products for both the local and international market.

The high quality standards that are customary in the sector do not allow rushing into product development or preparation of installations at sea. Test facilities are therefore a must. A good example is the Laminaria project, see below.

Within the GTI program, € 1 714 000 ERDF (European Regional Development Fund) resources are provided for a 40 % subsidization; hence, the total budget amounts to € 4 285 000. Of this, € 2 571 000 is to be gathered by interested organizations. It will be clear further in the text that the interest is great. The most requested test infrastructure includes: a multifunctional platform (max. 60 to 80 m2) at sea with demarcated test zone, a floating platform in port (e.g. testing of corrosion, antifouling, etc.). There is also great interest in the wave basin as test infrastructure outside the context of GTI resources.

The installation of the multifunctional platform has been approved by the Flemish Government on July 26th 2017, who also provides €2.2 mio towards the funding. Construction can now start for the location some 500 m to 1 000 m outside the Ostend eastern harbor wall.

EFRO
Europa investeert,
Vlaanderen groeit.

> The Flanders Marine Institute (Dutch: Vlaaams Instituut voor de Zee, VLIZ) is the coordination and information platform for marine scientific research in Flanders. It is also an international centre for marine and maritime research.

VLIZ manages research infrastructure (research vessel RV Simon Stevin and Marine Station Oostende). Their Data Centre has gained global reputation. On location in Oostende (renovated fishery warehouses), VLIZ hosts international world-class organizations.

A non-exhaustive summary:
- Unesco / IOC project office for IODE (International Oceanographic Data & Information Exchange), worldwide the most important training centre of the IODE program;
- The Secretariat of the European Marine Board;
- The Secretariat of the European Marine Observation and Data Network.

VLIZ is also the Flemish representative in international projects and organizations such as:
-LifeWatch
-ICOS (Integrated Carbon Observation System),
-EMBRC (European Marine Biological Resource Centre)
-JPI Oceans (Joint Program Initiative for Healthy and Productive Oceans).

Because of its impressive bundling of knowledge VLIZ also has a function in supporting the Blue Growth strategies of the **Flemish Government.**

Research vessel Simon Stevin

> Greenbridge (Plassendale Oostende), the incubation and innovation centre in which UGent takes the lead, provides young start-ups focusing on Blue Growth or Blue Energy with space and support for management and research. Young and/or small companies with the ambition to play a role in the big Blue Growth Cluster will immediately find the necessary accommodation here.

The port of Oostende was one of the initiators for the creation of GreenBridge and still has a minority share.

In her **strategic plan**, GreenBridge emphasizes the development of Blue Growth initiatives, focusing on research and development, training and support for start-ups.

GreenBridge has access to the information channels of UGent. Its initative Marine @ UGent brings together **30 marine and maritime research groups** from 6 faculties.

GreenBridge takes numerous initiatives for workshops, conferences and network events, but also for training courses including a **Blue Growth Summer School** (2016 & 2017).

invitation Summer School 2017

> The projects **Flansea and Laminaria** are worth mentioning in this context. They are experimental pilot projects to convert wave energy into electrical energy.

> **Flansea** is a consortium of the companies Deme, Cloostermans, Electrawinds, Spiromatic, Port of Oostende and Contec, with support from IWT.

> **Laminaria** is an initiative of Steven Nauwelaerts who received support from Clean Energy Invest in Rebeca and nv MultiTech (subsidiary of Port of Oostende). Thanks to IWT (Flemish Institute for Science and Technology) he was able to realize a project: after scale testing in a small self-manufactured wave basin and testing outside the eastern breakwaters of Oostende, the project is now being tested in the roughest waves of Europe: on the Orkney Islands.

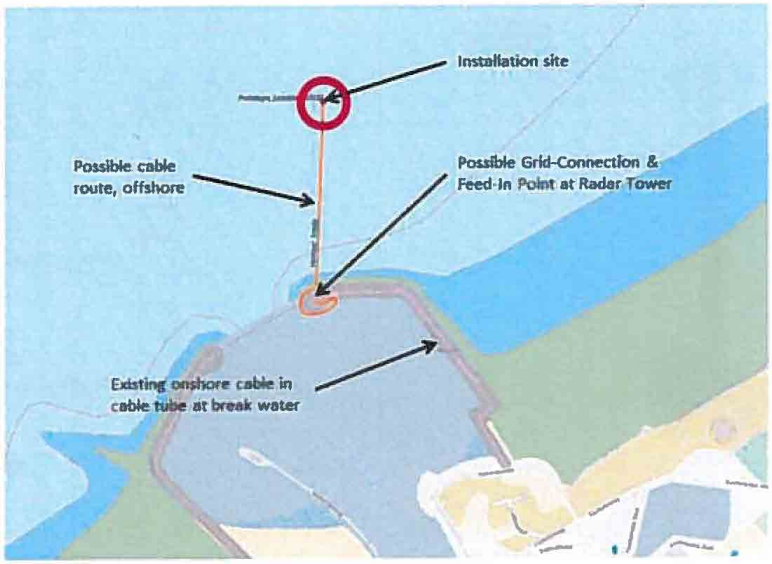
On 15th December 2015, Laminaria signed a cooperation agreement with the **European Marine Energy Centre** (EMEC) on the Orkneys in the presence of Minister President Geert Bourgeois, who expressed his full support.

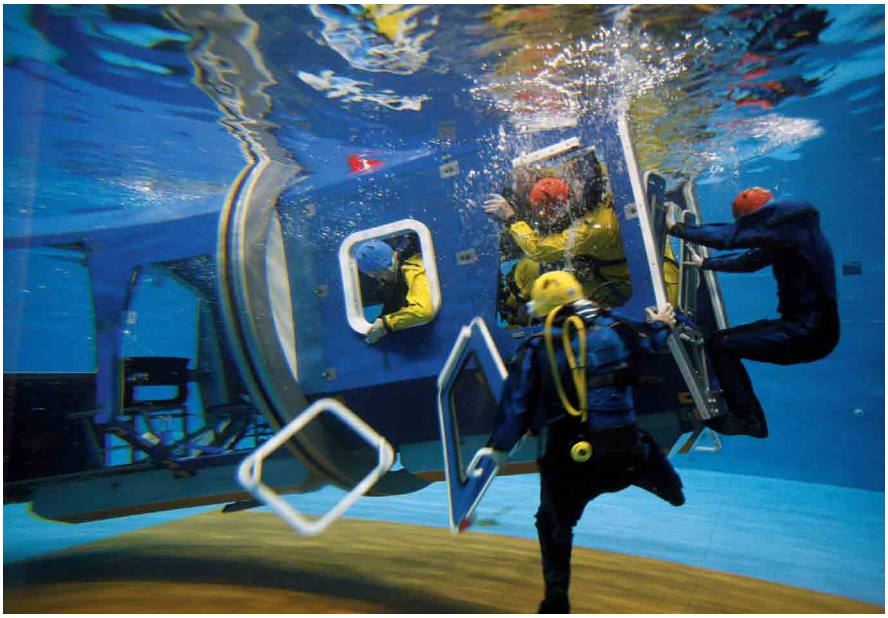
On the photo from left to right: Steven Nauwelaerts (Laminaria), Geert Bougeois, Neil Kermode (EMEC managing director).

> NEMOS Gmbh is a German company founded in Duisburg in 2012 with the intention of developing an **innovative system** to generate usable electricity from **ocean waves**.

The NEMOS system consists of an elongated floating body that is connected to the seabed by three cables. By the movement of the cables it transmits mechanical energy to a generator positioned above sea level, and thus protected from seawater. The system was tested on scale 1:100 in the Saint-Nazaire wave basin.

A 1 to 1 prototype is now ready for testing, about 1 km outside the eastern breakwaters of Oostende. The system is connected to the grid in order to reflect the actual circumstances. The test would take about a year and should result in a system ready for the market.





Falck Safety Services - specialized security and safety training centre

5. TRAINING

Without suitable and trained people, development is not possible. There are no appropriate courses in the young Blue Growth branch so it's vital to respond very quickly to the **new career opportunities** that arise. In this way young people get the opportunity to develop themselves in this innovative environment, and companies can fill their vacancies with well-trained and ambitious people.

Therefore, the **Academy for the Future** was founded by POM West Flanders. It is a partnership of several technical schools, colleges, Syntra West and VDAB to ensure the efficient influx of new employees into companies through the realization of a demand and future-oriented training offer.

The **TUA-West** (Technical University Alliance) initiative should also be mentioned here. By developing, attracting and locating actors for higher education and research, transformation to a knowledge-based economy is accelerated and the social services for companies are strengthened.

For training, there is of course the brand new **Falck Safety Services training centre.** The original Danish Falck expanded to become the global leader in providing security training for offshore or maritime activities in general.

In Oostende they have their **largest and most modern training centre**. The Port of Oostende pre-financed the building. The offshore safety requirements are particularly strict: without the necessary certificates you cannot be at sea. The availability of such a training centre at local level is an incredible asset for the further development of the Oostende cluster. Daily, **50 to 60 students are trained**, including many from far beyond our borders.

5. THE BREAKTHROUGH

Based on the above opportunities and initiatives, companies, research institutes and socio-economic actors have reached the consensus to consolidate forces in a **Flemish Blue Cluster** with Oostende as a base. From a perspective that covers the entire value chain, the cluster offers solutions for social challenges and thus exploits economical potential.

It is now the intention to group and strenghten all these initiatives in a **Blue Growth Cluster**. In this cluster, all stakeholders active in the domain of Blue Growth can cooperate with the aim of developing, testing and marketing of integrated maritime solutions. Of particular importance is a strong cooperation to conquer export markets.

> *"It is indispensable that the Flemish government recognizes this partnership as a spearhead cluster."*

The spearhead cluster Blue Growth does not have to start from scratch. The 130 companies currently united in the Flanders Maritime Cluster and the 30 companies located on the site of the Port of Oostende are deeply aware of the need to cooperate and be innovative if they are to break through internationally. Within FMC world players like Deme, Jan de Nul, Exmar, Sioen, Bekaert, Engie Fabricom and Falck cooperate shoulder to shoulder with medium and small Flemish companies.

> *"They all have one ambition: grow in the expansive international Blue Growth world by uniting forces and by innovation."*

The Flemish universities and research institutions have a wealth of knowledge. With the appropriate organization and (adapted) infrastructure that knowledge can be made available to the companies. On the other hand, they can respond very well to specific questions of companies.

Now it is important to realize the intended support infrastructure as mentioned earlier:

> Finishing the construction of the **wave tank with wave, tidal and wind generation** and organizing efficient management in function of research institutes and companies.

> Realizing an **investment plan** for Blue Growth focusing on the implementation of test facilities on, near and offshore, and on accommodation for companies located in the cluster.

Undoubtedly, the organization of the spearhead cluster Blue Growth will still reveal a wide range of opportunities. Its task is to guide these so that they become concrete, market-ready and export-oriented products.

"Flanders has world players in hydraulic engineering and offshore energy and the North Sea is an ideal testing laboratory,"

Alain Bernard, CEO DEME.

"With its strong marine scientific knowledge and its innovative SMEs, Flanders disposes of all the necessary elements to acquire a leading position in the blue economy. To realize that position we need to unite strengths."

List of speakers Supply & Demand sessions

	Aanvangsuur	Voornaam	Achternaam	Organisatie
1	14:20	Eric	Finé	Smulders
2	14:26	Jan	Leyssens	Septentrio NV
3	14:32	Bart	Van der Speeten	ADEDE
4	14:38	Stefan	Milis	OWI-Lab (Sirris)
5	14:44	Erwin	Leys	GEOxyz
6	14:50	Rudy	Possemiers	G4S Belgium
7	14:56	Dominique	Lambert	Galva Power Group
8	15:02	Nanou	Populiere	Witte Raven Advies bvba
9	15:08	Renson	Dennis	Cofely Fabricom
10	15:14	Johan	Heiler	High Wind
11	15:20	Jos	Smits	IMDC NV
12	15:26	Louis-Robert	Cool	dotOcean NV
13	15:32	Peter	Van der Krans	Pinta Nieuwburg
14	15:38	Carl	Heiremans	Jan De Nul NV
15	15:44	Herman	Bynens	Maex Precision-Production nv
16	15:50	Luc	Rom	Manora Logistics
	16:00		NETWERKSESSIE 1	
17	16:20	Antoine	Willems	OWA
18	16:26	Stefaan	Mensaert	Nexans Network Solutions div. Euromold
19	16:32	Gert	De Sitter	24Sea
20	16:38	Yves	Van Ingelgem	Zensor
21	16:44	Yvon	Timmerman	Advanced Shipbuilding
22	16:50	Pieter	Haers	Phibo Industries
23	16:56	Emmanuël	Timmermans	Rebo
24	17:02	Stijn	Hinnekens	Condor Safety
25	17:08	Paul	Vermeiren	REM-B INDUPRO
26	17:14	Gino	Van Den Driessche	Siemens Industry Software NV
27	17:20	Bruno	Stuyts	Cathie Associates
28	17:26	Vic	Bauwens	Subcon Europe nv
29	17:32	Wim	Biesemans	Parkwind
30	17:38	Rudi	Roegiers	Survitec Group
31	17:44	Wendy	De Kempeneer	Viking Life-Saving Equipment
32	17:50	Lothje	Vandesompele	Vincotte

6. RESULT

"The companies surf the waves of Blue Growth"

More than 30 companies are already established or represented in the Blue Growth Cluster in Oostende. The establishment of the Gen4Wave program also involved about 30 companies and organizations (see page 91).

A very important signal was the response to a meeting of users and suppliers in the Blue Growth sector, called **"Supply & Demand, Opportunities for Offshore Energy":** 147 participants from highly diverse organizations and companies (15th October 2015).

Companies were given the opportunity to introduce themselves briefly (5 minutes) to the participants who were looking for customers or suppliers. No less than 32 companies seized that opportunity, including many SMEs. It was clear to everyone that they are in a growth market with great potential for the most diverse products and services.

Equally encouraging is the **interest in test infrastructure**. At a first call (on 28/01/2016) to check the interest of companies for the GTI realizable test infrastructure, 14 companies made constructive proposals for using their specific product.

The 14 interested companies were 5 SMEs with innovative project developments. In order to **realize the test infrastructure** a lot of legal and technical obstacles still have to be overcome but it is feasible. The port of Oostende would be responsible for management and maintenance.

The initiatives to bring together companies will be continued by FMC. It proves to be a very fertile ground for developing several activities in Blue Growth, which result in setting up local businesses.

cover 2 Seas Magazines, compiled by AGHO in English, French and Dutch

Cruise conference Miami

brochure cruises Oostende - Zeebrugge

V. COOPERATION WITH OTHER PORTS IN EUROPEAN CONTEXT

Port management, logistics, renewable energy and blue industry should keep developing preferably in a **European and international context.** The long-standing negotiations concerning the logistic Ten-T corridors and filling in the Blue Growth Agenda indeed prove that the challenges are defined internationally.

In this European context, **small and medium-sized enterprising ports,** having extensive maritime knowhow, occupy a prominent place: they provide links between regional economies and act as bridges between the sea and the direct hinterland, where agriculture, fishery, industry and tourism are vital arteries of the coastal communities. In this way they provide an invaluable contribution to the local economy. However, they are barely valorised or recognized in their existence in an international logistic context, dominated by the numerical logic of containers and the imposing mega-cruise ships.

For these and other reasons, the Port of Oostende has taken the lead in developing **international networks;** thus, this organisation has a stronger profile in this international world and can share her knowledge with similar partners.

BCCP

In 2009 port authority founded **BCCP**, the **Belgian Coast Cruise Ports**, together with the port of Zeebrugge. As the ports of Oostende and Bruges share the same tourist hinterland for their respective cruise ships, they teamed up to publish an annual cruise brochure for the benefit of the international cruise companies. One business developer allows shipping companies to choose freely between Zeebrugge and Oostende as port of call. In practice the ships that are nautically suitable for Oostende (length < 200 m) choose this port; the larger vessels choose Zeebrugge.

In 2015 both ports acted in consort to present their maritime infrastructure and tourist hinterland at the meeting of the Itinerary Planners at the cruise fair in Miami. So far, this collaboration is the only valid example of concrete cooperation between Flemish ports.

PATCH

In 2009 the Port of Oostende took the lead in establishing an active port collaboration with English, French and Dutch ports in the context of the project PATCH: **Ports Adapting to Change.**

final conference Sustainable Seaports

Launching Seanergy Ports

In this project, the ports in the Channel Zone and the Southern North Sea have examined together how the industry and technology of renewable energy can bring added value to their operation and the development of ports and port communities.

As energy consumers, some ports have installed and evaluated a few **new energy technologies**, such as heating systems functioning on seawater or reuse of heat streams in port areas through the development of thermal networks.

In addition, these ports as economic turning discs have also investigated how they can play an economic role in the development of offshore wind farms, both in terms of installation and maintenance of these parks.

LOPINOD

In 2010, AGHO took the initiative to develop port cooperation in the North Sea region, together with Danish, Norwegian, Scottish, German and Dutch small and medium-sized ports within the framework of the **LO-PINOD** (Logistics Optimisation for Ports Intermodality: Network, Opportunities, Development) project.

The central objective of this cooperation is the identification of opportunities for economic diversification of port activities: how can small and medium-sized ports attract new revenues and thus better combat the fierce competition in the logistics market and, on the other hand, create added value for the region.

Improving internal access to small and medium-sized ports was also a key issue, as most national and European investments are concentrated in the major ports. Finally, initiatives were taken to cope with new European regulations, which increasingly impose heavier burdens on port management, without taking into account the size of the ports.

Finally, efforts were made to **embed ports in an urban environment:** how can small and medium-sized ports have a fair legal opportunity to carry out their core activities without succumbing to a story of allotments and construction projects.

Important result of this project is the launch of the **SEANERGY network**, which is being developed as a platform for knowledge exchange between ports that are active in the installation and maintenance of wind farms, and where REBO NV acts as an anchor point.

SUSTAINABLE SEAPORTS

In 2011, the Port of Oostende developed the **Sustainable Seaports** project together with the 3 Flemish seaports and Zeeland Seaports. Together, these ports are working out a strategy to make port development sustainable. In Oostende the master plan focuses on the development of the site of blue energy. It has outlined a strategy for the integration of the new companies in the Blue Energy Cluster.

In 2012 the Port of Oostende developed a new project as part of its strategy as a hub in Flanders for blue industry: **BEPPo** (Blue Energy Production In Ports). Together with UGent, Scottish, Norwegian and Danish partners, they investigated how small and medium-sized ports can play a part in the innovation and expansion of blue industry. The gap between researchers in blue industry and ports is huge.

The objective of the project is on the one hand to better define **the role of ports in relation to the needs of researchers in blue industry.** On the other hand, the project investigates how the existing maritime knowledge and services in ports can be better used to support innovative projects at sea. The results of this project were successfully presented in 2015 during the annual ESPO (European Sea Ports Organisation) conference and the European Maritime Days in Athens.

In 2013, the Port of Oostende actively participated in the European project **SAIL**: together with British, Danish, German, Friesian and Scottish partners, the possibility was explored to develop hybrid ships powered by wind energy combined with the new technologies for energy storage. Such ships can then be reused for commercial (bulk) shipping (and not just for recreational navigation).

Much attention was paid to the development of a business case, the optimization of technological components and the certification of the used technologies on board the vessels.

DUAL PORTS

In 2015 project leader the Port of Oostende took the initiative to develop a new European cooperation project: **DUAL ports** (Development Low Carbon Utilities, Abilities and Potential for Regional Entrepreneurial Ports) in consultation with Danish, Dutch, German and Scottish ports and companies.

Central focus of the project is how the small and medium-sized ports can efficiently implement a **strategic policy** concerning **Low Carbon**, both in infrastructure and management, in close consultation with regional industries.

The project was approved by the end of 2015. In this project, the port authority has focused on the development of the **Dockland concept** in the inner port: SMEs in the **chemical sector** are joining forces in a cluster in order to share logistical and other services to work more efficiently and environmentally friendly. Other pilot projects relate to further expansion of **multifunctional LNG platforms,** efficient installation of LED in seaport terminals and the use of hydrogen for energy storage.

In addition to the **European project work**, the port of Oostende also works on the development of strategic partnerships. For instance they have regular contacts with **APLM**, the French organization for SME ports in the Channel Zone and Brittany, which are also active in the development of blue industry.

Contacts have been made with **Rosmorport St. Petersburg**: here too, a memorandum of understanding (MoU) is being prepared with the ports of Vytotsk and Vyborg in the Leningrad oblast. They focus on bulk traffic and the development of offshore energy systems, adapted to the severe winter conditions in the region.

There are also close contacts with the **Swedish-Finnish** cross-border port company **Kvarkenports** in the Gulf of Bothnia because of the strong presence of innovative energy technology and the development of innovative ferry ships in cross-border management. Finally, contacts with a number of **English ports** on the English South and East Coast are maintained in view of the trade relations between the Benelux and the United Kingdom and the development of offshore wind farms.

In view of the various economic developments within the Port of Oostende, the purpose is to further expand the international dimension of these actions.

OFFSHORE WIND PORTS PLATFORM

During the summer of 2016, REBO nv and the Port of Oostende cooperated with the European interest federation WIND EUROPE to create the Offshore Wind Ports Platform.

WIND EUROPE, the voice of the wind industry in Europe, is actively promoting wind energy. More than 500 companies and institutions are members worldwide, including the largest producers of wind turbines, research institutes, electricity and component suppliers, contractors of specialized works at sea and on land, managers of wind farms and financial institutions active in the sector.

The establishment of the Offshore Wind Ports platform aims at developing a consultation platform so that the offshore ports can communicate with industry representatives in a direct way and make their specific operation clear to the European Commission in the light of current and future European legislation. The overall objective is to make the offshore wind industry more efficient.

On 7th September 2016 the first consultation took place between a number of offshore ports and the industry in Oostende: representatives of Dong, Deme, Jan de Nul and Smulders had a constructive dialogue with the ports of Groningen, Amsterdam, Den Helder, Oostende and Duinkerke.

A follow-up meeting took place on 28th September 2016 at the wind power fair in Hamburg, where some ports were present. There was a deeper discussion of the core themes that can be included in the Offshore Wind Ports Platform. There are two main themes:

- The relationship between offshore ports and offshore wind industry, focusing on facilitating mutual communication and exchange of good practices between ports.
- Wider recognition of offshore wind ports by the European Commission, both financially, legally and competitively. It is important that, at all levels, the offshore ports are not only considered as an expense, but also as a competence centre with a lot of maritime information about the sea.

The intention is to actively involve more and more offshore ports in the platform and to expand its operation considerably. From 2017 this platform will obtain the status of a permanent work group within the organization **Wind Europe**.

INN2POWER
(INNOVATION TO PUSH OFFSHORE WIND ENERGY REGIONS)

Interreg V B North Sea programme - priority 1: economic growth

The expansion of wind industry at sea is an important stimulus for **economic development in the North Sea region** and includes several SMEs, spread across different regional clusters and sectors.

In order to break through in the transnational North Sea market, these SMEs are faced with problems such as complex procurement procedures, national protection measures, high costs and insufficient insight into the opportunities of their services.

To overcome these obstacles, the purpose is to make these SMEs work together at regional, sectorial and transnational level.

Under the **project leadership of the province of West Flanders**, the regional SME clusters in the North Sea region will closely collaborate to support companies in the development of innovative processes at transnational level. The main objective of the project is to improve the innovation capacity of SMEs in the maritime wind industry and to facilitate their access to the transnational market of the offshore wind industry.

More specifically, the project aims at:

- Connecting the **regional SME clusters i**n the offshore wind industry to stimulate collaboration;
- Developing **innovative port logistics concepts** and test facilities for the intended SMEs;
- **Improving** the **competencies** of employees and self-employed workers in the offshore wind industry.

This project is being realized in cooperation with regional partners in West Flanders, Bremerhaven, Norfolk, Kent, Groningen and the Danish wind industry. In this project, the port of Oostende will actively cooperate as a knowledge partner (development of low-carbon port), as a working partner (support for hybridization of a.o. work boats) and as a learning partner (development of an efficient business model for the storage of renewable energy in the port).

The project started on 1.11.2016 and will be realized before 31.10.2020. The total project budget is 5 560 107 euros.

PECS (PORTS ENERGY AND CARBON SAVINGS)

On July 12th 2017 the monitoring committee of the Interreg 2 Seas program approved the PECS project, of which the Port of Oostende is project leader.

The motivation for the project is the fact that many **SME-ports** in the Southern North Sea experience difficulties to have **access to new technologies for energy efficiency and methods for CO2 reduction.** In many cases existing technologies are insufficiently adapted to the needs of the small ports.

The PECS project consists in **having new and existing technologies tested i**n a variety of smaller ports in Belgium (Flanders), the Netherlands, the UK and France. As an example Oostende is building a **prototype Xant windmill i**n a maritime surrounding, pontoons for Operations & Maintenance activities are converted into smart pontoons using IOT applications.

The local company **Blue Power Synergy** builds a prototype of an energy-pontoon for storage of renewable energy on the water. This prototype will be tested in different locations in the Port of Oostende, herewith writing a new page in the book of Blue Growth. Other examples are Indachlor in Dunkirk and the port of IJmond building heat-exchange networks.

The ports are assisted by knowledge institutes such as Solent University, Cerema, Hogeschool Zeeland and University of Ghent, who will also provide the tool for performing energy-audits in smaller ports.

The PECS project is spread over 3 years and commences on 01/09/2017. The total budget for the 10 partners amounts to € 8 670 649, of which € 1 176 685 is attributed to the port of Oostende, European subsidy level is 60%.

VI. SUSTAINABILITY

The term **'sustainability'** is often associated with ecology and the environment but involves many more aspects. The Port of Oostende also pays attention to other aspects, such as sustainable use of energy, mobility, buildings, ships, people, ...

The port is partly embedded in an urban fabric, partly in a polder landscape. The development of the port (activity, added value and employment) and the preconditions imposed by the environment must be carefully balanced. This objective can be translated into the following principles of the port:

- Minimizing **traffic congestion** by making different areas within the port accessible by different approach roads.

- Minimizing **visual and noise pollution**. To this end, green fences have been created in areas where industrial sites are too close to residential areas.

- Striving for **sustainable and intensive use of space**: optimising the available space in the port. A number of incorporation efforts, which only underline this principle, have already been implemented in the port. At the time the new industrial area Plassendale 1 was already set up with the vision on sustainability: the discharge of rainwater through an open canal system instead of through sewage pipes. In addition, Oostende (here we mean the region and not just the port area) is currently the city with the largest number of Brownfield projects (some are even recognized Brownfield covenants). Also in the port there are several such projects to prepare old industrial sites for reuse.

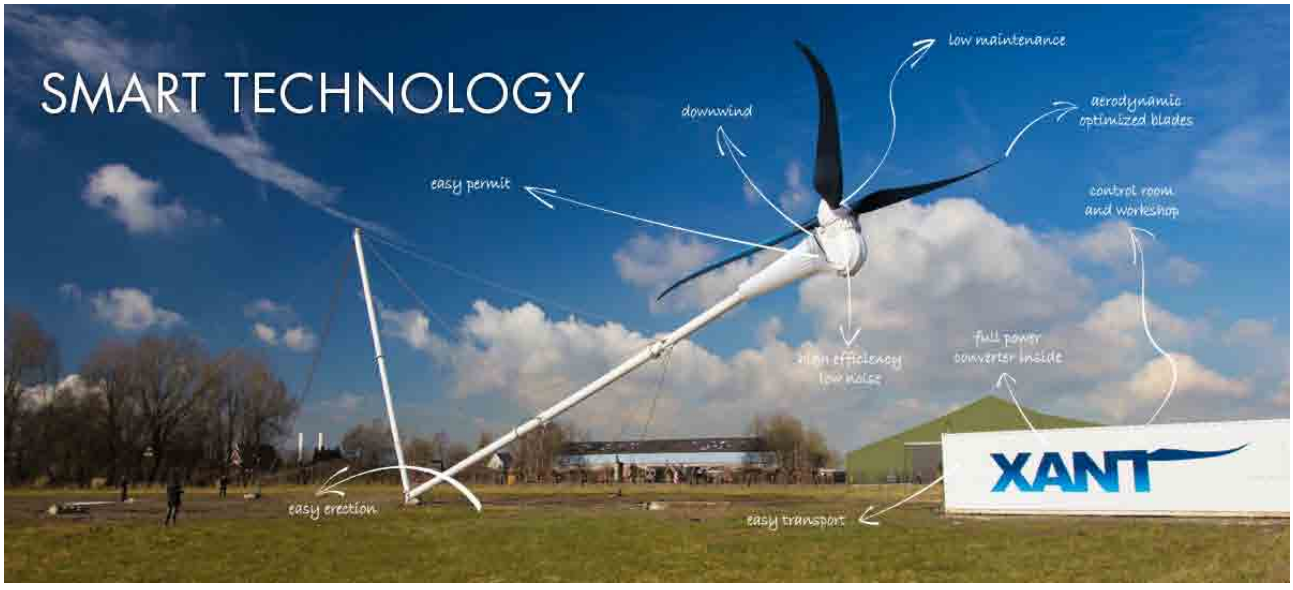
- **Conserving and enhancing** the **environment and ecological infrastructure** within and just outside (adjacent to) the seaport area. This also concerns life underwater (the marine environment) to which a lot of attention has been paid recently, especially in and around the wind farm areas. Meanwhile there are already a lot of (research) companies in our port that are engaged in this domain.

- Using **water and energy in a sustainable and economical way**. The port has recently built and converted establishments for new companies, which all contain elements to reduce energy and water consumption. All buildings have rainwater wells so that this water is reused for the sanitary facilities in the buildings. Solar water heaters have been installed so that staff (especially those coming from the wind farms) can have a shower with sun-warmed water. In addition, the buildings have been insulated and ventilated according to the EPB 40 standard.

- Using **shore power** where possible. All crew transfer vessels that daily go to the wind farms (when weather permits) with a maximum of 12 technicians aboard have been using shore power when they are berthed in the port since the beginning (in 2008). This principle is expanded as much as possible to larger vessels. It is obvious that vessels that only stay in the port for a few hours cannot connect to shore power. But all vessels at berth for a longer period (like roroships at berth in the port awaiting sale for 9 months last year, or even the dredger Amerigo Vespucci, at berth here for 3 months to be refitted) are connected to shore power.

- Own **electricity production: the Xant wind turbine**. The Xant is an innovative and small-scale wind turbine that connects directly to the port's internal electricity grid. The generated power will be utilized 100 % for the energy needs of the buildings and installations in the Blue Growth Cluster. An in-depth study shows that the Xant wind turbine reimburses itself in 6 to 7 years (ROI = 14 %). The return, the reduction of CO2 emissions and the exemplary role of the port using sustainable energy, form the basis for the decision to invest in this wind turbine.

The licensing procedure was started in May 2016. Several environmental factors require a lot of study and monitoring. If this can be done to everyone's satisfaction, the installation will take place.



The Xant turbine is an idea of four engineers of the study agency 3E and is produced by the company Vyncke from Harelbeke with the support of Jo Versavel. The Xant has a shaft height of 38 m and a power of 100 kW. The expected electricity production is approximately 200,000 kWh. The Xant has the advantage of being a very simple and reliable construction that guarantees a long service life with minimal maintenance. The design allows the Xant to produce electricity fully independently while the complete installation fits into a 40 'container. The container has the necessary electrical equipment to connect directly to an electricity grid. This makes the Xant ideal for deploying in remote areas. In Flanders two Xant turbines are currently active: one at the production company Vyncke and one at headquarters of the Demegroep in Zwijndrecht, supplying the buildings with electricity.

site Proviron

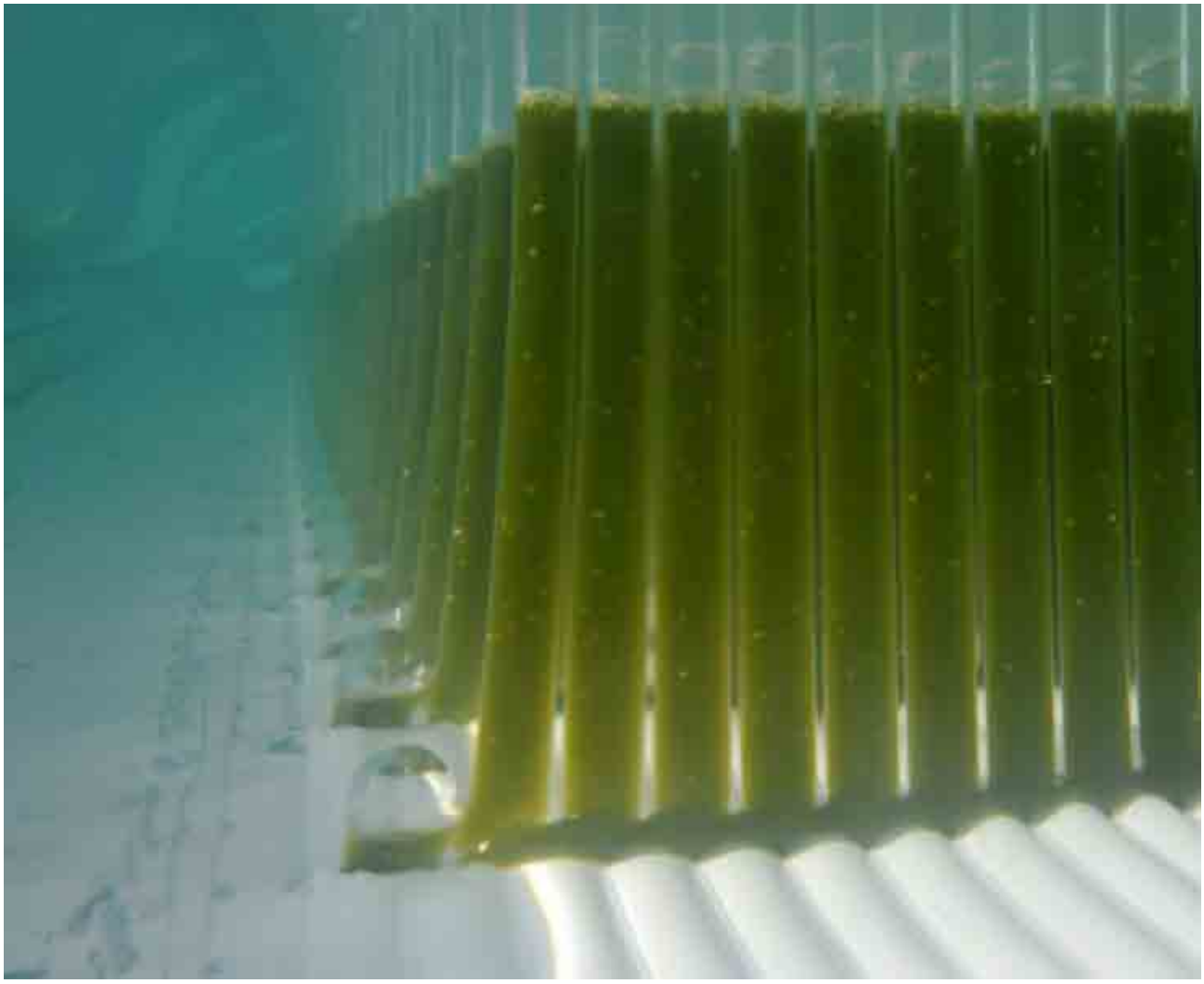
For the last 10 years industry has gradually changed its approach in favour of **green economy**. This new sustainable sector is already well established in Oostende: green energy and biofuel production, circular economy.

The company **Bionerga** has taken over the Electrawinds biosteam plant. This plant can burn up to 160 000 tons a year to produce green power for 35 000 families.

In the immediate vicinity there are also two biofuel plants that produce renewable electricity from animal oils and waste fats. These plants guarantee reduced CO2 emissions of 86 258 tons and annual electricity for 38 000 families.

However, it is almost impossible to manage this plant profitably on the basis of the current electricity price. Its future is therefore uncertain because it depends on the evolution of energy prices.

In 2007, further along the canal, on the **chemical site**, **Proviron** started production of FAME (Fatty Acid Methyl Ester), better known as **biodiesel.** It is also made from vegetable oil or animal fat and is thus a sustainable energy source. Steam available on this site is reused for production . The Belgian government has recognized Proviron's biodiesel unit, which allows the sale of an official annual quota to oil companies.



Production microalgae at Proviron

AIM Recycling

Here there is a link with **circular economy**, which implies that all production materials are recycled, treated and brought back into the production chain as secondary raw material and/or source of energy. This is how we counteract depletion of our natural resources.

In the inner port we have two companies from the Verhelst group specializing in this: **TOP-Mix** and **TopAsfalt**. TOP-Mix specializes in the processing of various waste streams, mainly from the construction sector. TopAsfalt specializes in the production of asphalt and also processes recuperation asphalt.

Proviron has established a pyrolysis process for the sustainable production of microalgae. Algae are a **promising and sustainable raw material**. Biomass can serve as a raw material for chemical production processes. If it is possible to produce algae on a large scale in a cost-effective way, chemical industry will also become less dependent on fossil fuels and oil derivatives. For example, Proviron contributes to the transition to a biobased economy. In short, the project is a good example of circuit closure.

In addition, Proviron is a global player in **chemical niche products,** such as green - thus renewable softeners for plastic materials or additives for animal feed ensuring that preventive antibiotics are no longer necessary for chickens and cattle. This is another example of sustainable technology.

In January 2016, on the other side of Proviron, **AIM Recycling Europe** opened its recycling facility for non-ferrous metals from metal waste. There is also demolition, sorting and recycling of old aircrafts at the airport; the sorted items would be transported from the port.

The Belgian Railway company Infrabel has recently decided to build a large recycling centre on a plot of 8,5 ha where railway connection is already be present. Materials to be recycled as well as the recycled products can be transported by railway which obviously for a railway company is the most efficient way.

VII. CONCLUSION

The port of Oostende has chosen a clear strategic option for the future: developing as a service port for everything happening at sea now and in the future.

But there is much more. The activities at sea, especially wind farms, are the engine for the development of a true Blue Growth Cluster in the port and on adjacent sites.

Companies who see their future in it support the Blue Growth Cluster.

They create **growth, added value and employment through** their activities. A company will settle or expand its activities in the Oostende Blue Growth Cluster if it has a good reason to do so.

Motivations of companies to settle in the port of Oostende are **an attractive range of preconditions**:

- Market (growing investments and activities at sea);
- Accommodation concentrated on one site;
- Expansion possibilities;
- Easy access to and from land and sea;
- Flexible organization;
- Presence and accessibility of research institutes and test infrastructure;
- Availability of staff who are specifically trained on the site, on the one hand for technical skills at different levels, on the other hand for obtaining various certificates for safe working at sea and on land.

It is quite obvious that the Port of Oostende is fully devoted to **further development of these preconditions** so that companies can develop in a stimulating environment.

In order to create and maintain that business-friendly environment, the port must be sure **of the cooperation of many parties**.

- The support of the **Flemish Region** is indispensable for the development of maritime access and basic infrastructure in the port, but also for the support of research institutes and infrastructures.

- The **Federal Government** is responsible for the sea and, consequently, a partner to facilitate constructions and testing facilities at sea.

- **FOD Mobility** - Maritime Transport certifies and controls the training programs.

- The **Province** stimulates Blue Growth through initiatives such as Factory for the Future, Academy for the Future and various others.

- **European projects** enable innovative actions in cooperation with other ports.

- The **Port of Oostende** itself invests in housing and logistical accommodation, mooring facilities and efficient management systems. The port is the engine for funding with its own and external resources. For example, Rebo nv was established for the financing and operation of heavy load quays and grounds.

At the end of 2016 all this resulted in a cluster of some 40 companies that are established or represented and employ more than 350 people on the spot.

However, Blue Growth is still in the starting blocks. About **40% of the expected capacity of wind turbines has been built.** Many other, very diverse projects using the sea and its energy are in the pipeline. This new and innovative sector gets support from all policy levels.

The goal of at least 50 active companies and more than 800 permanent jobs is realistic.

We assume that the **planned 2.2 GW** wind turbines will be installed. Other projects will arise from the stimuli and support of **various government agencies** and **research institutes** that **encourage companies** to innovate and invest. This movement is already under way and can only further develop positively. The Port of Oostende will closely follow-up all these evolutions, realize partnerships and provide appropriate infrastructure.

Together with the training institutes, the **inflow of adequately trained staff** is a very important criterion for a company that wants to settle.

Blue Growth undoubtedly has an extraordinary potential, especially for the port of Oostende. The foundation has been laid, the cluster of companies keeps growing and the cooperation between the various actors and companies is remarkably good.

The message now is: have strong confidence in the future and keep following the chosen path.

In the meantime, the **traditional port activities** remain part of the operation of the Port of Oostende. Transhipment of bulk goods at various terminals is an important activity, which also entails a great deal of logistical activity. The largest transport companies at the coast are located in Oostende. Hence the demand for a possible roro ferry connection with the UK remains; however, it is very difficult to realize it in the current circumstances.

The Port of Oostende can look forward to the future with confidence as long as it continues to excel in the niche markets. These were chosen within the framework of the innovative potential of growth, added value and employment.