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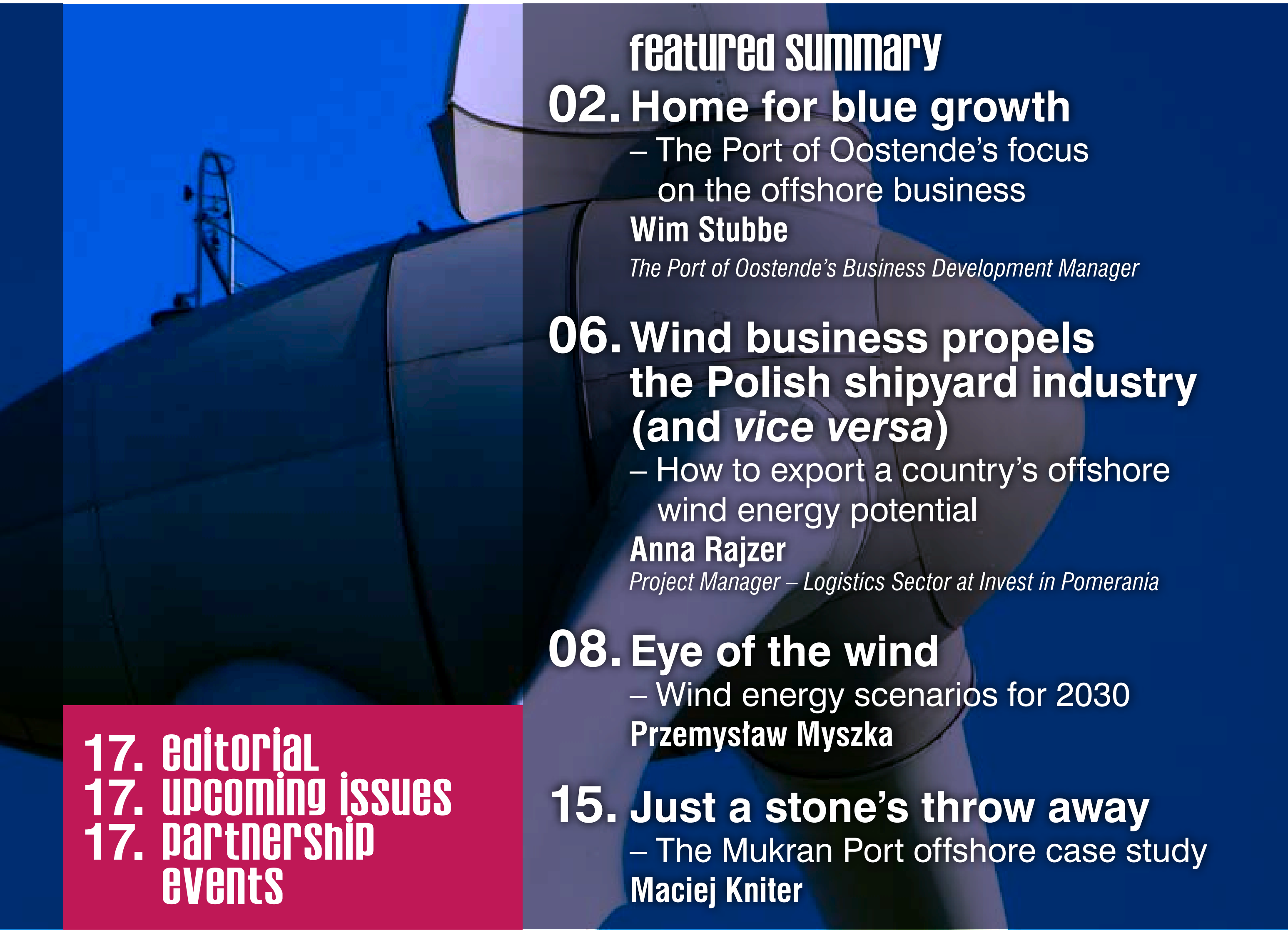
Ports role in developing the offshore wind energy business



featured summary

featured article

The Port of Oostende's focus on the offshore business

Home for blue growth

by **Wim Stubbe**
the Port of Oostende's Business Development Manager

Wim, a Master of Laws from the University of Leuven, has been working as Business Development Manager at the Belgian Port of Oostende since 2008. He's a sworn advocate of smaller and less-fashioned seaports, eagerly and what's most important also successfully finding for them new business opportunities in a world where everybody seems to be buzzing only about TEU records.

Looking at the port business through news headlines (particularly the media centres of big harbours), one could get the impression that seaports are solely about more and more TEUs moved by giant cranes from football stadium-big carriers, thousands of tonnes of coal unloaded at once, and oil pumped in the amount of Switzerland's lakes (at least). Who then needs small- and medium-sized seaports not able to handle the largest ships and their hinterland-rich freight? Luckily, a great deal of industry players find them utmost important as partners in developing various offshore ventures.

Take for starters Oostende, one of four Flemish seaports in the south of the North Sea. It is also by all means an in-city port, with its inner part stretching 7 km alongside the Bruges-Oostende canal, linking the harbour with the European inland waterways network. The port is also well rail & road-connected. However, considering the pressure from the side of real estate developers and "visionary" urbanists, it is no longer possible to expand Oostende's outer port. As such, the nautical access is restricted to vessels 200 m long with no more than 8.0 m of draught.

But there is more than just cargo traffic in the North Sea. The title of the European Commission's strategy paper to the European Parliament in 2012 outlined this fairly clearly: *Blue Growth, opportunities for marine and maritime sustainable growth*. In other words, the economic potential is situated in the sea.

For instance, the Belgian North Sea's wind farms make an important contribution to achieving the country's renewable energy targets. Today, a total of 182 wind turbines are up & running, producing energy for approx. 600 thou. households. The aim is to install 450 wind turbines with an overall capacity of 2,245 MW and an annual electricity output of 770 TWh, equivalent to 9.5% of the 8,085 TWh electricity consumption in Belgium. And, if you want to install a turbine out in the sea, you need a port.

Blue energy and offshore wind – early days and today

The Port of Oostende took its first steps in the blue growth sector in 2007-2008 with the construction of the first phase of the C-Power offshore wind park (six 5.0 MW turbines). This new economic activity needed

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a dedicated infrastructure as well as space within the outer port in order to be able to realize the construction works at sea.

Considering that the Belgian government has issued licences for the set-up of eight offshore wind parks, it was clear that the Port of Oostende had to re-think its basic infrastructure to handle all the related installation and maintenance. As such, in 2009, Oostende revised its core strategy, taking on the ambition of becoming the Flemish service port for the blue growth economy.

This has in turn resulted in the set-up of a new public-private partnership called NV REBO (Renewable Energy Base Oostende), involving the ARTES Group, DEME Blue Energy, Offshore & Wind Assistance, Participatiemaatschappij Vlaanderen (owned by the Flemish government), and naturally the Port of Oostende. The primary goal of NV REBO is to become an efficient and cost-effective offshore terminal for handling, lifting, storing, assembling, and transporting all kinds of offshore components. In this regard, in 2011, Oostende port and NV REBO invested over EUR 5 mln in setting up a heavy load quay and associated storage space, together with an office, for different offshore industry service providers. However, Oostende does not just want to be a ship-in-out assembly plant – it aims at being a cluster of knowledge, best practices, and technology research & development to the offshore industry. The Port of Oostende is therefore making the necessary investments to facilitate the installation, management, and maintenance of offshore wind farms.

Installation & management

Over the years one has learnt that each and every project is different and has its own unique challenges. The quality & design evolution of offshore components is enormous, and experience shows that every sea has its own characteristics: What holds true for Belgian waters, does not work when dealing with the seabed off Danish coasts in the Baltic. For that reason, preparing offshore wind farm elements in a specialized port is of utmost importance before their departure for the installation site. As such, the idea that a wind park can be built using a computer in an office somewhere in Barcelona, linked with a spreadsheet of an accountancy department in Eastern Europe, is a sheer illusion.

Efficient and cost-effective handling of offshore components is a key task of

Oostende port and NV REBO's management. Together with the client we can investigate different options to organize the upcoming port operations. The at-port construction and sea transportation of six gravity-based foundations, with an average weight of 2,700 tn each, is still a landmark within the history of Oostende. Installation vessels like Fred Olsen's *Bold Tern* or DEME's *Innovation* and *Neptune* are regular guests at the Port of Oostende, including very special ceremonies like the one that took place on April 28th, 2016, when Queen Mathilde of Belgium re-baptized Jan De Nul's *Vidar* jack-up heavy-lift vessel as *Vole au vent* in the port. Fancy as it sounds, Oostende nonetheless does not forget about the things which make it all possible, i.e. improving its port's nautical access, extending the turning circle, straightening the quay walls in line with the leading lights, etc.

Managing the whole venture implies, among others, that electricity production at sea needs to be monitored in accordance to the grid supply capacity and at an efficient price-setting, all influencing the profitability of an investment. From a technical point of view, this means that wind farm managers have daily interactions with different subcontractors, service providers, and turbine manufacturers. Wind park managers like C-Power, Otary (having the Rentel, Seastar, and Mermaid concessions), and Parkwind (Rental, Seastar, and Northwester 2) have chosen to establish their headquarters at the Port of Oostende, organizing permanent monitoring of their parks at sea here.

Operations & maintenance

Harnessing the power of wind isn't only about hammering a big steel pole into a seabed and then letting nature do all the work. As in the case of any other business, we're essentially talking about achieving and maintaining optimal efficiency. In effect, several service companies have installed their offices at the Port of Oostende in order to secure the maintenance, while others have asked to open a representation in the Oostende offshore village.

Considering the stable growth of the cluster, the port management has developed a master plan to install these different enterprises on the spot; a plan that takes into account not only safety and security aspects, but also places sustainability high on the agenda (e.g. the port authority is investigating the economic opportunity of installing a prototype of the mid-size 100 kW Xant wind turbine to provide the site with electricity). Implementation of this process is the daily and ongoing business for the port.

Furthermore, the turbine manufacturers Senvion, Vestas, and Alstom have installed their offices, warehouses, and workshops in the Oostende offshore village to quickly respond to emergency maintenance. To make this possible, the port has refurbished several buildings next to the NV REBO terminal, as well as built new premises. As to the offshore industry subcontractors, a wide range of services ranging from IT to training have found their way to the Port of Oostende, including e-Bo, CMI, Multitech, G4S, CG, Buijsse, and Falck Safety.

Additionally, no operations & maintenance activities could do without crew transfer vessels. A number of shipping companies are operating such ships to/from Oostende and Belgian wind farms, just to mention Windcat, Nordfjord, Sima Charters, Sea Contractors, MPI, MCS, Stemat, Turbine Transfers, Geosea, and Offshore & Wind Assistance (the last two being Belgian operators). Moreover, the company GEOxyz, specialized in highly advanced technological underwater surveys and crew transfer, has based its fleet of 17 ships at the port. Next to GEOxyz, Survitec has opened a new premise in order to secure the safety and security onboard the vessels.

In order to broadly support these activities, the Port of Oostende will invest in better mooring infrastructure along with performant IT systems to ensure efficient communication between port users and nautical authorities. Lastly, more land will be prepared for an innovative shipbuilding company that is open to developing more efficient vessels that meet the various needs of wind park operators.

On a challenge wave

Offshore wind parks' construction and maintenance represent the most important part of the blue growth development at the Port of Oostende; however, it's not the only one related to renewable sources of energy. For instance, together with Marintek, Sintef, Highlands & Islands Enterprise, the universities of Aalborg and Brindisi, we have analysed within the framework of the BEPPo – Blue Energy Production in Ports project the role small and medium-sized seaports can play in the development of wave and tidal energy. The Port of Oostende actively supports several other practical initiatives stemming from experimental development to full-scale testing, e.g. the wave projects Flansea and Laminaria have tested their solutions in and around Oostende port's breakwaters.

There are other blue growth opportunities that can be considered for realization. Due to climate change and rising

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temperatures, the water level in the North Sea is increasing. To cope with this challenge it is important to develop new techniques and technologies for monitoring the sea level, as well as on- and offshore hydraulic and underwater constructions. The Flanders Bays project (Vlaamse Baaien) has given a positive impulse, opening the door to developing new technologies in this field.

Next, the port is investigating the possibility to establish temporary and permanent test facilities in close cooperation with the marine and maritime industry. Moreover, the existence of wind parks creates an opportunity for the offshore aquaculture to establish new projects in cooperation with wind park managers within the framework of the marine spatial planning, where there is room for the exploitation and management of the seabed, promotion of marine biotechnology, cultivation of algae, all in full respect to the North Sea's eco-system.

In order to realize these ambitions and targets, the Port of Oostende is working in close cooperation with different organizations and institutions that have established themselves in the harbour. An important partner in these developments is the West Flanders Development Agency, which launched the Factory of the Future Blue Energy in 2012 to support clustering and branding of the marine and offshore industry in coastal areas.

As to research, a joint venture has been set up with Ghent University which has resulted in building the GreenBridge incubator centre in Oostende's inner port, hosting start-ups and companies finding their way into the world of renewable energy and blue growth. Other knowledge centres that have established their headquarters here are the Flemish Institute for Agricultural and Fisheries Research (ILVO), and the Flanders Marine Institute (VLIZ). The former investigates new technologies for fishing and management of fish stocks in the North Sea, whereas the latter functions as a coordination and information platform for all the scientific marine and maritime research in Flanders. VLIZ has its own research vessel (named Simon Stevin after the Flemish mathematician, physicist, and military engineer), and has built an internationally renowned data-centre. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has established its project office for the International Oceanographic Data & Information Change (IODE) at the Port of Oostende, too. In 2010, the port brought its relations with the industry even closer thanks to setting up as one of the founding fathers the Flanders Maritime Cluster, an interest group for all the industries that are active in and around the sea, with offices in Oostende's port house.

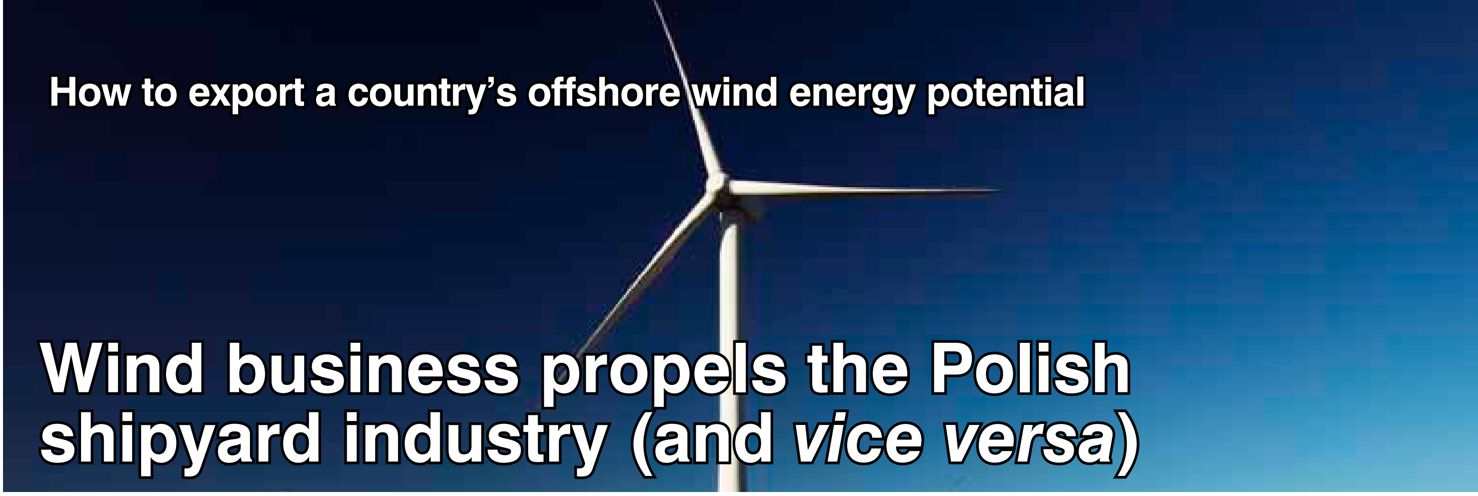
And most recently, the Belgian Offshore Cluster (BOC) was established, gathering different industrial players from the offshore wind sector, organizing the second edition of the Belgian Offshore Days at the Port of Oostende in April 2016. The BOC will also be present at the Wind Energy Hamburg meeting later this year in September, voicing how much added value can come from the blue industry (hopefully, the Flemish government in Brussels will prick up its ears as well). Finally, the Port of Oostende is currently investigating cooperation opportunities together with the International Airport Ostend-Bruges, whereby crew transfer and cargo supply will be discussed.

The new blue-coloured normal

As has been the case for decades, Oostende will continue to function as a traditional harbour, taking care of various break-bulk, ro-ro, and dry bulk freight, serving at the same time cruise ships, also being a safe haven for fishermen and their boats. But we as a port authority must adapt to the new normal of mega vessels and all the perils this trend brings about for small and medium-sized ports. Alike in sports (and warfare), the best defence is attack.

The realization of the blue growth strategy – along with other projects from the field of a circular economy, fine chemicals or inland navigation – has given the Port of Oostende a new pillar to rest on in order to guarantee its long-term viability amidst neighbouring seaports where containers stack high & mighty. Anybody wanting to diversify its port business portfolio is more than welcome to visit us and talk about finding one's way through the new normal, painted in blue. ■


Photos: Port of Oostende



Wind business propels the Polish shipyard industry (and *vice versa*)

by **Anna Rajzer**
Project Manager – Logistics Sector at Invest in Pomerania

Anna Rajzer graduated from the University of Gdańsk (Economics). Since 2013 she holds the position of Project Manager at Invest in Pomerania – a regional investor assistance centre. She is responsible for initiatives related to the logistics and manufacturing sector.

With a potential of 7.5 gigawatts (GW), shallow waters, no tides, and wind blowing year-round, Poland is said to be the most favourable location within the Baltic Sea region for constructing wind farms off the coast. However, the country's offshore wind capacity remains untouched (its first park is to be built by early 2022), even though Poland is unquestionably one of the main supply chain players for the offshore sector.

According to the European Wind Energy Association (EWEA), approx. 75% of all wind turbine foundations produced in Europe are stamped "Made in Poland." What's more, the country's shipyards also specialize in the construction of tailor-made towers, posts, transformer substations, as well as technically advanced wind farm installation jack-up vessels.

The beacon of Innovation

Gdynia-based Crist Shipyard with its heavy jack-up vessel *Innovation* is undoubtedly a shining example of the Polish shipyard's industrial capabilities. The ship's crane of 1,500 tn lifting capacity and overall pay load of up to 8,000 tn has set a new standard for safer and more cost--effective offshore wind farm installations. The EUR 200 mln worth vessel can install 6 MW+ wind turbines with overall heights of more than 120 m, as well as heavy foundations in water areas 65 m deep. The Belgian company DEME, today's owner of *Innovation*, employs the vessel virtually on a daily basis.

Energomontaż-Północ Gdynia, on the other hand, focuses on the construction of steel elements, mainly foundations and transformer substations for offshore wind farms. Its offshore potential is well developed under the part of Gdańsk Shipyard Group – GSG Towers, currently a Top 5 global producer of onshore wind towers. Wind business constitutes an important part of other entities' activities, including Vistal, Mostostal Chojnice, and Bilfinger Mars Offshore.

It can be better

A 2012 report on the impact of the offshore wind sector on the Polish economy, published by Ernst & Young, indicated then that wind business may soon become

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one of the flywheels of Polish economic growth. The report states that if Poland achieves a level of 6.0 GW by 2025, the offshore wind sector will contribute to over EUR 17 bln of value added to the country's economy, and will generate approx. 32 thou. new jobs. Estimates based on the British experience show that 1.0 MW during the construction phase generates 17 full time equivalents (FTEs), whereas during the operational phase – less than one. Besides shipyard production, the wind business also boosts steel, machinery, and heavy industries.

Unfortunately, five years ahead, we already know that the 6.0 GW goal by 2025 will not be achieved. Polish shipyards

Photos: CRIST

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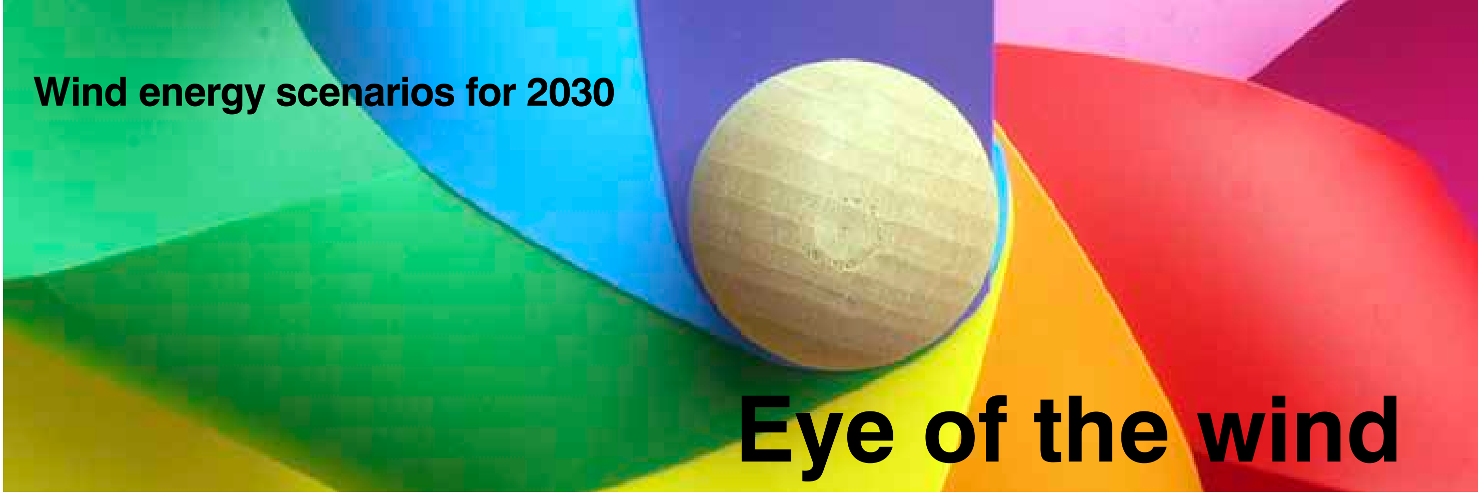
benefit from the growing number of offshore wind farms projects, but only those carried out in the North Sea.

So far Polenergia's Bałtyk Środkowy III is the most advanced project in the Polish maritime area, involving 120 wind turbines of a total capacity of 1.2 GW. The company plans to construct its offshore wind farm 23 km from the coastline, in the vicinity of the town of Ustka. By 2018's end Polenergia plans to receive its final building permit, while some three years later the Bałtyk Środkowy III wind farm is to be commissioned. PGE Energia Odnawialna is another player in the game, which has been given the conditions for grid connection at a 2.2 GW level. And that's basically all there is, as the current grid will not allow to accommodate more offshore power for the time being.

Poland has favourable natural conditions and the indispensable know-how for the development of its own offshore wind farms, both to the benefit of its economy and environment. The only aspect missing is the political will and lack of the right legislation. Investors underline the necessity of conducting legislative changes which would reduce economic risks and create a predictable investment perspective. Moreover, following the example of other countries, the offshore wind sector should be included in the national long-term energy policy.

Poland's shipyards have found their way through these shortages, simply by focusing on serving stable and prospective clients. However, they surely would be in a jubilant mood if they could supply another market with their products and services – the domestic market of their domicile of origin. ■



Eye of the wind

by **Przemysław Myszka**

The 21st Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) that took place in Paris last year in December set the tone for curbing global temperature rises below 2.0 centigrade by the end of the 21st century. On the power generation side, the answer to this challenge is quite simple – renewables in general, and wind energy in particular.

back in August, 2015, the European Wind Energy Association (EWEA) updated its scenarios for year 2030, as "recent regulatory and economic developments in the EU have significantly changed the wind energy perspective for the next 15 years," EWEA's *Wind Energy Scenarios for 2030* report reads.

Blowing on hindrances

There's a great deal of uncertainty surrounding the EU's binding climate and energy targets, where the minimum 27% share of renewables in EU-wide energy consumption in 2030 is one of the landmarks (these 27% equal approx. 46-49% in terms of electricity generation). Already a few Member States lag behind their 20-20-20 goals, namely France, Malta, Luxembourg, the Netherlands, and the UK; moreover, the last three even have shortcomings when it comes to the 2013/2014 interim targets, according to the European Commission's 2015 report on renewable energies progress.

EWEA's experts mention several key driving factors here, which can both speed up things if played right, or hamper development owning to mismanagement. Widening or limiting the uptake of wind energy will depend on the governance of the so-called Energy Union, designing the new European power market, reforming the Emission Trading System (ETS), providing adequate spatial planning, and of course – on money.

Security seems to be the leitmotif of the Energy Union, since the EU is very much hooked on external sources of energy. The EU has insufficient internal deposits of fossil fuels and must therefore import 90% of its crude oil, 66% of natural gas, 42% of coal and other solid fuels, as well as 40% of uranium and other nuclear fuels. As an effect, the EU imports as much as 53% of all the energy it consumes at an expense

Fig. 1. EU Member States 2030 capacity and electricity production according to EWEA's Central Scenario

	Capacity Installed (MW)			Electricity Produced (GWh)		
	2030 Central	2030 Low	2030 High	2030 Central	2030 Low	2030 High
Austria	5,800	5,000	6,650	12,194	10,670	14,192
Belgium	6,300	4,850	7,800	17,976	13,750	22,517
Bulgaria	1,220	1,000	1,440	2,565	2,134	3,073
Croatia	1,800	1,600	2,000	3,784	3,415	4,268
Cyprus	483	447	581	1,016	953	1,240
Czech Republic	2,200	1,040	4,320	4,625	2,219	9,219
Denmark	8,130	5,950	11,320	22,659	16,792	32,378
Estonia	1,183	365	2,000	3,669	779	6,586
Finland	8,526	5,026	12,026	17,966	10,766	25,705
France	35,250	25,000	43,000	88,301	62,623	114,942
Germany	80,000	75,000	87,500	195,786	183,232	221,497
Greece	9,000	8,000	12,500	18,922	17,073	27,448
Hungary	973	925	1,051	2,045	1,975	2,244
Ireland	7,692	5,525	9,590	17,433	11,829	22,320
Italy	13,600	10,768	17,268	28,593	22,980	37,624
Latvia	308	234	430	647	500	918
Lithuania	1,110.2	878	2,200	2,334	1,874	6,240
Luxembourg	141	123	169	296	263	362

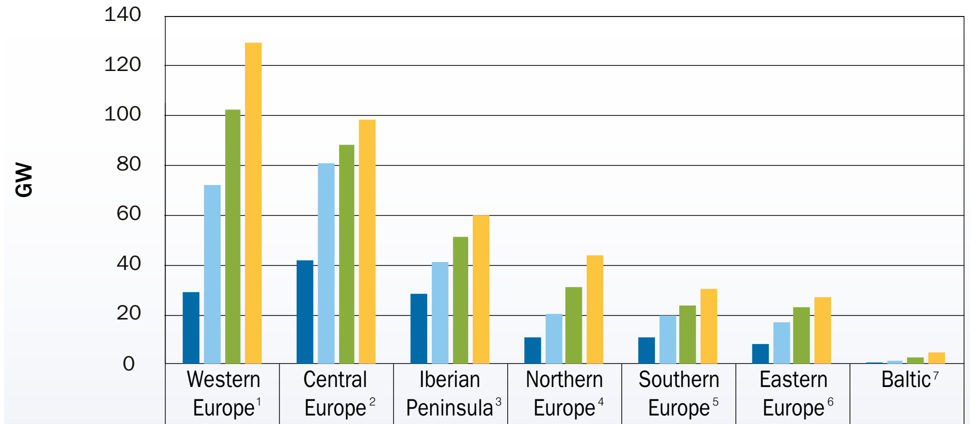
	Capacity Installed (MW)			Electricity Produced (GWh)		
	2030 Central	2030 Low	2030 High	2030 Central	2030 Low	2030 High
Malta	49	30	80	102	64	171
Netherlands	12,567	11,872	13,391	36,670	34,606	39,394
Poland	13,150	8,400	15,700	29,775	18,699	36,904
Portugal	6,400	5,951	7,039	13,498	12,742	15,063
Romania	5,000	4,500	6,000	10,512	9,603	12,804
Slovakia	331	300	486	696	640	1,036
Slovenia	49	33	75	103	71	159
Spain	44,505	35,005	52,500	93,575	74,711	112,811
Sweden	14,300	8,802	20,000	31,641	19,096	45,772
UK	40,000	24,300	55,000	120,362	70,399	171,453
Total	320,066	250,926	392,116	777,744	604,460	988,340

Source for all figures and tables: EWEA's Wind Energy Scenarios for 2030 *(2015)*

Tab. 1. Wind energy development scenarios in Europe till 2030

Scenario	Installations [GW]			Generation [TWh]			The EU's electricity demand covered			Employment [thou. jobs]			Investments [EUR bln]			CO_2 emissions reduced [mln tn]			No. of wind turbines		
	Onshore	Offshore	**Total**	Onshore	Offshore	**Total**	Onshore	Offshore	**Total**	Onshore	Offshore	**Total**	Onshore	Offshore	**Total**	Onshore	Offshore	**Total**	Onshore	Offshore	**Total**
Low	206.3	44.6	**250.9**	440.2	164.2	**604.5**	13.8%	5.2%	**19.0%**	136	170	**307**	279	88	**367**	92	247	**339**	68,764	7,439	**76,203**
Central	253.6	66.5	**320.1**	533.1	244.5	**777.7**	16.7%	7.7%	**24.4%**	150	184	**334**	343	131	**474**	299	137	**436**	84,526	11,081	**95,607**
High	294.0	98.1	**392.1**	627.5	360.8	**988.3**	19.7%	11.3%	**31.0%**	162	193	**591**	398	193	**591**	202	351	**554**	98,014	16,346	**114,360**

Fig. 2. 2030 installed capacity per region



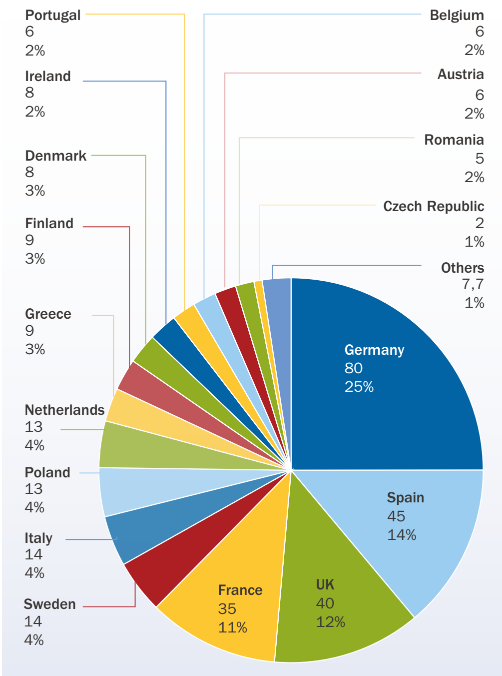
	Western Europe[1]	Central Europe[2]	Iberian Peninsula[3]	Northern Europe[4]	Southern Europe[5]	Eastern Europe[6]	Baltic[7]
2014	28.8	41.5	27.9	10.9	10.8	8.2	0.6
Low	71.7	81	41	19.8	19.2	16.8	1.5
Central	101.9	88	50.9	31	23.1	22.5	2.7
High	129	98.5	59.5	43.3	30.4	26.8	4.6

[1] Belgium, France, Ireland, Luxembourg, the Netherlands and the UK
[2] Austria, Czechia, Germany
[3] Portugal, Spain
[4] Denmark, Finland and Sweden
[5] Cyprus, Greece, Italy and Malta
[6] Bulgaria, Croatia, Hungary, Poland, Romania, Slovakia and Slovenia
[7] Estonia, Latvia and Lithuania

of over EUR 1 bln/day. In total, the above-mentioned energy imports account for 20% of all of the EU's take-ins. But it's not only about economics; energy is used as political leverage, just recall Russia twisting off to-Europe gas valves during its dispute with Ukraine in 2009. Now, the EU's energy market – and subsequently related industries like heavy-duty transport & logistics or private and public locomotion – could undergo a considerable decarbonisation change by shifting to internal and renewable energy sources, be it wind, solar, geothermal, hydrogen, next-gen biofuels, etc. A number of technological breakthroughs (e.g. better battery storage performance), as well as green infrastructure developments (i.a. fast recharge stations), are still needed; however, Elon Musk's Tesla cars prove in a fairly curvy way that already today electric vehicles aren't exactly the ugly and slow twin of their combustion engine counterparts.

Then again, it's far easier to adjust or swiftly turn-off/switch-on gas-powered power plants to current and predicted demand than control wind speeds or sun exposure (not to mention the issue of storing renewables-generated energy). As such, Europe's power market requires a re-design in order to accommodate the increasing share of renewables in post-2020. In other words, the EU's grids, better interconnected between the Members States, are to be made "fit for renewables" (Denmark is a good example in this regard, as it can buy

Fig. 3. 2030 wind energy installed capacity by country according to EWEA's Central Scenario (GW)



> **Under EWEA's Central Scenario, 320 GW will be installed in the EU by 2030, producing nearly 778 TWh of electricity which could satisfy 24.4% of the EU's demand.**

on demand clean hydro energy from Norway, aligning its sometimes erratic wind supply to the country's needs).

Next, the ETS is in need of a deep reform. As *The Economist* shortly summarized some time ago, "The ETS has long been a mess," to some extent because of the economic crisis which cut down industries' demand for the permits, as well as due to too many allowances initially put on the table, resulting in a price per CO_2 tonne plunge from EUR 20 in 2011, to somewhere near EUR 5-6 nowadays (and some days even the half of this). One of ETS' worst sins today is shaking the market in the opposite direction than initially planned, i.e. towards coal-fired plants. A short-term remedy called backloading – taking off permits, some 900 mln, from the market to put them again in the future when their prices are more renewables-friendly – was rejected by the European Parliament in 2013. EWEA's report writes about the so-called liner factor which could ease this tough situation thanks to cutting off the overall quantity of market allowances by increasing the annual rate of reduction from 1.7% to 2.2%. Money obtained through the reformed ETS could be used to set up the NER400 Innovation Fund (follow-up of the EUR 2.1 bln NER300 programme), financing low carbon technologies. Another option is a direct on-fuel carbon tax instead of subsidies.

Legislation is crucial as well. The traditional power generation industry has always been underlining the subsidy-affected price of electricity from renewable sources (at the same time failing to mention the external costs it puts on the environment and health itself). While the renewable sector is decreasing the levelised (incl. the set up expense) electricity generation cost through research & development and increased industrialization, the EWEA report's authors advocate in favour of a market-oriented support mechanism, like e.g. a feed-in premium mechanism granted through tenders, all in accordance with the EU's laws on state aid. The Association's paper also gives a few examples of how retroactive legislative changes can impede investments. For instance, Bulgaria installed as much as 286 megawatts (MW) of wind energy in 2010, down to only 9 MW four years later; Romania went down from 923 MW in 2012 to 354 MW in 2014, whereas Spain noted a -46% compound annual growth rate in the 2007-2014 period concerning installations (+3.5% for the whole of the EU at the same time). Poland is the latest example of a policy shift; the new ruling party, a sworn advocate of state-owned coal mines, pushes a bill according to which it will be virtually impossible to erect a turbine onshore, particularly in locations with the most favourable wind conditions (the previous ruling coalition was in turn very effective in beheading the country's offshore potential).

Tacking

Depending on how these issues will be tackled (insufficiently/good/better-than-expected), the European offshore industry along with their logistics partners, such as Europe's seaports, will see their businesses growing at different paces according to three different scenarios produced by EWEA (Tab. 1 and 2).

Year 2015 serves as a baseline with its 141.6 GW of wind energy production capacity (+9.8% year-on-year, or +12.8 GW, of which over 3.0 was off-, and nearly 9.8 GW onshore). During an average wind year, this capacity can produce as much as 315 TWh, able to cover approx. 11.4% of the EU's total electricity (1.5% by off-, and 9.9% by onshore installations).

Under EWEA's Central Scenario, 320 GW will be installed in the EU by 2030 (254 GW on-, and 66 GW offshore), producing nearly 778 TWh of electricity which could satisfy 24.4% of the EU's demand (16.7% from on-, and 7.7% from offshore). This rise stands for 96 thou. new wind turbines, EUR 474 bln of investments, 334 thou. new

Tab. 2. Capacity scenarios per country (MW)

	2014			2020 Target (Central scenario)			Low 2030 scenario			Central 2030 scenario			High 2030 scenario		
	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total
Austria	2,095	-	2,095	3,400	-	3,400	5,000	-	5,000	5,800	-	5,800	6,650	-	6,650
Belgium	1,247	713	1,959	3,000	1,500	4,500	2,650	2,200	4,850	3,300	3,000	6,300	4,000	3,800	7,800
Bulgaria	690	-	690	1,500	-	1,500	1,000	-	1,000	1,220	-	1,220	1,440	-	1,440
Croatia	347	-	347	600	-	600	1,600	-	1,600	1,800	-	1,800	2,000	-	2,000
Cyprus	147	-	147	300	-	300	447	-	447	483	-	483	581	-	581
Czech Republic	282	-	281	1,000	-	1,000	1,040	-	1,040	2,200	-	2,200	4,320	-	4,320
Denmark	3,603	1,271	4,845	3,700	2,800	6,500	3,300	2,650	5,950	4,600	3,530	8,130	6,000	5,320	11,320
Estonia	303	-	303	700	-	700	365	-	365	433	750	1,183	500	1,500	2,000
Finland	607	26	627	2,500	26	2,526	5,000	26	5,026	8,500	26	8,526	12,000	26	12,026
France	9,285	-	9,285	18,500	1,500	20,000	19,000	6,000	25,000	26,250	9,000	35,250	28,000	15,000	43,000
Germany	38,369	1,049	39,165	45,000	6,500	51,500	60,000	15,000	75,000	62,500	17,500	80,000	65,000	22,500	87,500
Greece	1,980	-	1,980	4,500	-	4,500	8,000	-	8,000	9,000	-	9,000	12,000	500	12,500
Hungary	329	-	329	600	-	600	925	-	925	973	-	973	1,051	-	1,051
Ireland	2,246	25	2,272	4,000	25	4,025	5,500	25	5,525	6,892	800	7,692	8,390	1,200	9,590
Italy	8,665	-	8,663	12,000	-	12,000	10,768	-	10,768	13,600	-	13,600	16,768	500	17,268
Latvia	62	-	62	200	-	200	234	-	234	308	-	308	430	-	430
Lithuania	279	-	279	600	-	600	878	-	878	1,110	-	1,110	1,200	1,000	2,200
Luxembourg	58	-	58	100	-	100	123	-	123	141	-	141	169	-	169
Malta	-	-	-	30	-	30	30	-	30	49	-	49	80	-	80
Netherlands	2,565	247	2,805	4,000	1,400	5,400	5,872	6,000	11,872	6,067	6,500	12,567	6,391	7,000	13,391
Poland	3,834	-	3,834	10,000	-	10,000	7,900	500	8,400	11,800	1,350	13,150	13,500	2,200	15,700
Portugal	4,913	2	4,915	5,700	25	5,725	5,924	27	5,951	6,373	27	6,400	7,012	27	7,039
Romania	2,954	-	2,954	3,200	-	3,200	4,500	-	4,500	5,000	-	5,000	6,000	-	6,000
Slovakia	3	-	3	300	-	300	300	-	300	331	-	331	486	-	486
Slovenia	3	-	3	30	-	30	33	-	33	49	-	49	75	-	75
Spain	22,982	5	22,987	26,000	5	26,005	35,000	5	35,005	44,500	5	44,505	52,000	500	52,500
Sweden	5,220	212	5,425	6,000	212	6,212	8,600	202	8,802	13,300	1,000	14,300	18,000	2,000	20,000
UK	7,953	4,494	12,440	11,500	9,500	21,000	12,300	12,000	24,300	17,000	23,000	40,000	20,000	35,000	55,000
Total	121,021	8,044	128,744	168,960	23,493	192,453	206,291	44,635	250,926	253,578	66,488	320,066	294,043	98,073	392,116

direct and indirect jobs, as well as approx. 436 mln tn of CO_2 emissions avoided.

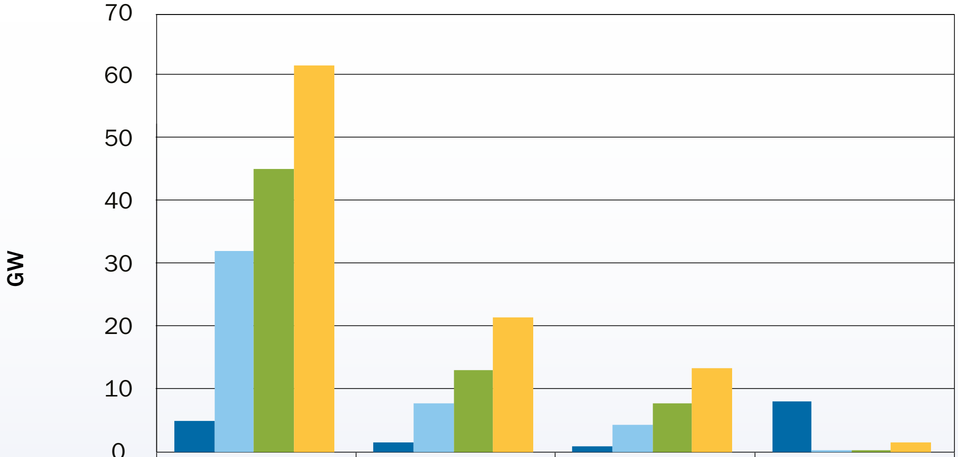
The Low Scenario, in contrast, predicts 251 GW of wind energy in 2030 (206 GW on-, and 45 offshore), generating a little over 604 TWh of electricity, covering 19% of the EU's demand (13.8% from on-, and 5.2% from offshore). A total of 76 thou. new wind turbines sees the light of day during EUR 367 bln worth of investments, providing 307 thou. of jobs, and saving the climate some 339 mln tn of CO_2.

In turn, the High Scenario predicts 392 GW in place by 2030 (294 GW on-, and 98 GW offshore), producing almost 989 TWh, equivalent to the EU's 31% electricity demand (19.7% from on-, and 11.3% from offshore). EUR 591 bln investments will erect 114 thou. new wind turbines, and expand the labour market by 366 thou. jobs. More than half a billion CO_2 emissions will be avoided.

Where the winds will blow

Up-to-date, Central Europe (i.e. Austria, Czechia, and Germany, as per EWEA's terminology) and the Iberian Peninsula (Portugal, Spain) have been leading the way in developing wind energy across the EU (Fig. 1). Under the Central

Fig. 4. Offshore wind installations per sea basin (2015 vs. 2030 scenarios)

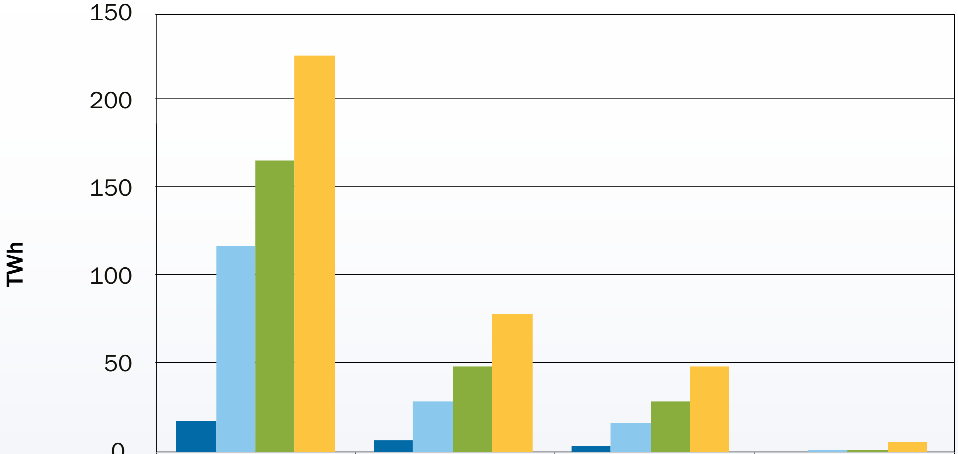


	North	Atlantic	Baltic	Mediterranean
2015*	5.1	1.8	1.1	0
Low	32.1	7.9	4.6	0.02
Central	45.2	13.3	7.9	0.02
High	61.5	21.5	13.5	1.5

*Figures current as of July 2015, EWEA. (2015). The European offshore wind industry - key trends and statistics 1st half 2015.

> **"Giles Dickson, EWEA's CEO: "But perhaps there is something more that we can bring. Targets set in Brussels call for renewables to make up at least 27% of energy consumed, we invite policy makers to reflect on this point, and to go beyond the bare minimum. Ambition lies at the heart of success."**

Fig. 5. Offshore wind electricity production per sea basin (2015 vs. 2030 scenarios)



	North	Atlantic	Baltic	Mediterranean
2015*	18.7	6.6	4.2	0
Low	118.4	28.9	16.9	0.06
Central	166.4	48.9	29.3	0.08
High	226.3	79.1	49.8	5.6

*Figures current as of July 2015, EWEA. (2015). The European offshore wind industry - key trends and statistics 1st half 2015.

Scenario, new capacity installations will be concentrated in Western (Belgium, France, Ireland, Luxembourg, the Netherlands, the UK) and Central Europe, putting online 73 GW and 46 GW, respectively. Northern Europe (Denmark, Finland, Sweden) will add over 20 GW, followed by 14 GW in eastern (Bulgaria, Croatia, Hungary, Poland, Romania, Slovakia, Slovenia), and 12 GW in southern parts of Europe (Cyprus, Greece, Italy, Malta). Lastly, the Baltic States of Estonia, Latvia, and Lithuania will plug in an additional 2 GW (Fig. 2).

Concerning the EU's waters, the North Sea will be the most busy wind farm construction site with 45 GW erected by 2030, according to EWEA's Central Scenario. The Atlantic will see 13 GW coming, the Baltic Sea – 8 GW, while the Mediterranean – a very modest 23 MW. These wind farms will supply EU citizens with 166, 49, 29, and 0.08 TWh of electricity per respective basin (Figs. 4 and 5).

Giles Dickson, EWEA's CEO, wrote in yet another of the Association's publications, "Current targets set out for 2030 in Europe will see the wind energy sector and other renewable technologies transform the power sector and bring positive impacts to the European power system and the economy as we pivot towards the new normal of renewable energy becoming our main source of electricity. But perhaps there is something more that we can bring. Targets set in Brussels call for renewables to make up at least 27% of energy consumed, we invite policy makers to reflect on this point, and to go beyond the bare minimum. Ambition lies at the heart of success." ■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Just a stone's throw away

by **Maciej Kniter**

Rügen is not only known for being the largest German island. It also houses the Mukran Port located in its north-eastern part. It is a well-recognized port service provider to the wind energy industry thanks to the harbour's Offshore Terminal South, opened in July 2014, which provides all the necessary facilities to serve energy wind farms built approx. 30 km from the German Baltic seacoast.

> **In the future the port authority will build three other offshore terminals. First, the 100 thou. m² industrial area big Offshore Terminal North with direct access to the quay side. Next, the Offshore Terminal South (I), a 40 thou. m² of inland space extension of the current facility. And finally, the Offshore Terminal South (II), an offshore service port for Crew Transfer Vessels (CTVs), and other service ships.**

In general, Mukran Port is one of the major German seaports within the Baltic Sea region, handling some 3.0 mln tn of various freight each year. The port comprises three sea and one rail terminal and has direct ferry and ro-ro links to Baltiysk, Ust-Luga, Trelleborg, and Rønne.

The 10.5-12.5 m deep Mukran Port is directly located on the open sea, providing an uncomplicated approach, which in turn makes it possible to swiftly serve offshore wind farm projects in the Baltic Sea. As a result, the offshore energy-related economic development of Mecklenburg-Vorpommern in particular, and the southern Baltic in general can be secured via Mukran Port.

Wind fanning

In this context, Mukran Port has recently been very proud of its Offshore Terminal South. Designed in such a way that all the necessary works can be carried out smoothly in the terminal, it can handle components up to 70 m tall (tower segments), 50-60 m long (rotor blades) and weighing roughly 300 tn. The total quay length here is 410 m while the water depth is 12.5 m. Construction works commenced in Summer 2010 and included i.a. building of a 200 x 210 m quay wall, flushing of sand by a hopper suction dredger, soil settlement and installation of light masts, fenders, bollards, fences, as well as water drainage. The terminal also features two warehouses, one of a 1.5 thou. m² roofed storing area, and the other – an insulated storage house of 740 m² space.

The seaport is already planning to strengthen its ties with the offshore business. In the future the port authority will build three other offshore terminals. First, the 100 thou. m² industrial area big Offshore Terminal North with direct access to the quay side. Next, the Offshore Terminal South (I), a 40 thou. m² of inland space extension of the current facility. And finally, the Offshore Terminal South (II), an offshore service port for Crew Transfer Vessels (CTVs), and other service ships.

Offshore home port

Taking stock of Mukran Port's offshore efforts, the energy heavyweight E.ON chose the port as its logistics base (and operations centre in the future) in June, 2015, for the set-up of the 385 MW Arkona Becken Südost park to be erected some 35 km off the shores of Rügen Island, and generating electricity for 400 thou. households. Up to 300 people will be directly employed during the two-year construction phase, as well as some 50 permanent jobs will be created for highly skilled operations, administration and maintenance staff over Arkona's service life of 25 years. Additionally, another 100

Photos: Mukran Port

> New offshore wind farms in the Baltic not only preserve existing construction jobs but also create new.

people will indirectly find new jobs as external service providers.

Christian Pegel, Mecklenburg-Vorpommern's Energy Minister, commented on E.ON's decision, "Arkona Becken Südost would represent another step forward in our efforts to harness more of our offshore wind resource to generate renewable power. It would also increase value creation in our state. New offshore wind farms in the Baltic not only preserve existing construction jobs but also create new, long-term jobs in operations and maintenance, as would be the case with Arkona Becken Südost. I'm therefore very glad that E.ON chose the Mukran Port as its logistics base."

Iberdrola and its subsidiary Renovables Offshore Deutschland have also decided to base their operations at the Mukran Port for the under construction 350 MW Wikinger wind park; earlier EnBW did the same with its today fully commissioned 288 MW EnBW Baltic 2.

Mukran Port is a good example showing that the world's economy is going forward and a port does not necessarily only need to be a place for loading & unloading cargo. A modern harbour can successfully become a base for next-gen energy industry. ■

upcoming issues

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