

LONDON 6-8 JUNE

Offshore 'can supply 25% of EU energy'

CHRISTOPHER HOPSON DARIUS SNIECKUS

ffshore wind could churn out enough power to meet at least 25% of the EU's power needs by the end of the next decade at an average of €54/MWh in the "most favourable locations" off UK, Denmark, the Netherlands, Germany and France, according to a new resource assessment produced for industry body WindEurope by BVG Associates and Geospatial Enterprises.

But to reach this target — which is based on fixed foundations and includes grid connection — governments will have to up their game by removing barriers preventing the wider deployment of the technology via national energy, climate and economic development plans, as currently only 7-11% of EU demand will be met by offshore wind by 2030.

"Recent government auction



results show that the industry has achieved unprecedented levels of competitiveness through rapid progress in technology, industrial growth and a reduction in the cost of capital," says BVG director Giles Hundleby, lead author on the report, *Unleashing Europe's offshore wind potential*, released today at OWE 2017. "In our upside analysis — which is driven by a more optimistic scenario of 86GW being installed by 2030 — the cost of the same amount of resource falls to an average of €51/MWh, and the locations of the lowest cost resource widen significantly to include significant *CONTINUED on Page 3*

MHI Vestas launches 9.5MW offshore turbine

DARIUS SNIECKUS

HI Vestas has unveiled a mighty 9.5MW version of its V164 turbine, which has already been earmarked for several projects off Europe and will be immediately available as an upgrade for all current and future orders.

The souped-up design will have a retooled transmission system and fly the OEM's field-proven 80-metre "structural shell" blades powering a drivetrain with an ultra-high torque load gearbox, permanent-magnet generator and full-scale converter.

MHI Vestas V164 senior product CONTINUED on Page 4

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Siemens Gamesa wins 'full-scope' supply contract for Albatros

LEIGH COLLINS

iemens Gamesa Renewable Energy has been awarded the "full-scope" contract to supply sixteen 7MW turbines, monopile foundations and grid connection for EnBW's 112MW Albatros project in the German North Sea.

Albatros will be the first in German waters to use Siemens' Offshore Transformer Module (OTM), a slimline cost-cutting substation, which will sit atop a single monopile foundation. It will also offer considerable synergies in planning, construction and operation, as it will be built at the same time as the neighbouring 497MW EnBW Hohe See, which is also being supplied by Siemens.

"Through the project-specific approach, all technology components work perfectly aligned so that the risk for all involved parties is mitigated," says Siemens Gamesa. "At the same time, a bundling of installation works and a centralised project

WindEu

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planning create valuable synergies." The company says that the OTM is 30% smaller and lighter

OTM is 30% smaller and lighter

than a conventional substation, thus reducing installation costs and lessening "service and maintenance efforts".

After commissioning in 2019, Siemens Gamesa will provide service and maintenance for five years.

Albatros will be connected to the



grid via the Siemens-built BorWin Beta high-voltage direct-current converter platform, which also converts the power from the Veja Mate and Global Tech 1 wind farms.

Belgium's GeoSea will construct and install the monopiles for Albatros and Hohe See, while project owner, German utility EnBW, will be responsible for inter-array cabling and construction co-ordination.

"EnBW Albatros allows us to demonstrate our broad competence in offshore projects, ranging from project-specific engineering services and the beneficial combination of power generation and transmission technology to service and maintenance concepts", says Michael Hannibal, offshore chief executive for Siemens Gamesa. "This project has a high relevance for us since we will turn the 112MW wind power plant into a highly profitable investment for our customer via cutting-edge technology and smart details."

The first project to host Siemens' OTM will be the 588MW Beatrice project in the UK North Sea.

Although Siemens offers an OTM that wraps around the base of a turbine, both Beatrice and Albatros will use standalone versions of the technology without an attached turbine. They will, however, use the same foundations as the turbines in their respective projects — jackets for Beatrice and a monopile for Albatros. **G**

Offshore wind 'can supply at least 25% of EU energy demand'

FROM Front Page

areas in the Atlantic and Baltic as well as the North Sea, and to include floating as well as bottomfixed foundation solutions.

"The extra value of this upside scenario in terms of cost to the consumer and potential for technology export is significant, and justifies concerted action from governments and industry to make it happen."

The report highlights that Europe's current 12.6GW of installed offshore wind is only a fraction of the longer-term potential, with vast capacity that could be added from waters off Ireland, Poland, Latvia and Lithuania and from floating wind.

Pierre Tardieu, WindEurope's chief policy officer, tells Recharge that together with the industry it is working with relevant European countries to ensure they have ambitious offshore wind deployment plans to 2030.

"Having significant volumes, of at least 4GW per year in Europe, will be critical for the industry to sustain the current cost reduction pathway and become competitive with conventional energy ahead of 2030," he says.

The report authors note offshore wind has the theoretical potential to generate between 2,600-6,000TWh per year at €65/MWh using the technologies that "will have developed" by 2030, meaning it could meet between 80% and 180% of the EU's total electricity demand "in the baseline and upside scenarios respectively". **□**



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WIND ENERGY 2017

MHI Vestas unveils world's most powerful wind turbine

FROM Front Page

manager Anders Bach Andersen tells *Recharge* the 9.5MW will answer the market's growing demand for turbines that further reduce capital and operation expenditure.

^aFrom the market perspective, we have seen these extremely positive price developments due to the auctions in Germany and elsewhere and this points to the very big success story of the offshore wind industry driven by capex, cost of capital and risk reductions," he states.

"This machine will help the industry take even more capex out on a one-turbine, onefoundation basis, by offering even higher output per square metre of swept area."

The 9.5MW model uses a beefed-up version of the turbine's original three-stage, mediumspeed gearbox that is able to deal a gut-wrenching 9,500 kilonewton metres of torque, helped by a new flange connection featuring ultra-strong shear pins and a rejigged cooling system with a "rearranged" flow that absorbs extra heat by feeding the generator and converter with a lower temperature coolant.

"We have gained a great deal of operational experience on the prototypes at the testing sites at Østerild and Måde [in Denmark]... it was evident that we could increase the rated powered by making some key changes inside the gearbox to handle more torque," says Andersen.

MHI Vestas has long been a stalwart proponent of gear-based transmission system architectures, and Andersen believes the step-up of its V164 bears out the wisdom of its technology approach to supersize offshore machines, and would help lay the groundwork for 13-15MW class models that are anticipated for post-2025 projects.

The first of the 8MW V164s was installed late last year at the UK's 258MW Burbo Bank Extension. **I** RECHARGE | OFFICIAL EVENT DAILY



Will 13-15MW turbines be ready in time for zero-subsidy projects?

BERND RADOWITZ

hen Dong and EnBW won 1.38GW of offshore wind with zero-subsidy bids at the recent German tenders, both developers said one of the reasons they could offer such low bids is that turbines will have nameplates of 13-15MW by the time of project construction, generating far more bang for the buck.

"Moving up to 8-9MW, turbines have enabled the capex cost on a per-MW basis to be reduced by more than a third compared to projects using 5-6MW machines — and in some cases, has been closer to half the cost per MW," says K2 Management analyst Simon Luby.

"If such cost reductions can be achieved at this scale, using turbines of up to 15GW could open the door to vast capex savings."

But will such machines really be ready in time for project commissioning in 2024-25?

EnBW says it has talked "very intensely" with manufacturers about their development pipelines and future generations of turbines, Dirk Güsewell, the head of portfolio development at EnBW, tells *Recharge*. The company then double-checked this information against its own reverse-engineering data and cost calculations before making its bid.

Dong also expects turbines of 13-15MW to be available by 2024.

"We have inside information into what the OEMs are doing, but we are not allowed to comment on that, we are bound

We have inside information into what the OEMs are doing

by non-disclosure agreements," Samuel Leupold, the head of Dong's offshore wind unit, told *Recharge* during a recent interview in Brussels.

Offshore market leader Siemens Gamesa will only start serial production of its 8MW offshore machine this summer, but has long held plans to build a model larger than 10MW, but the OEM still hasn't decided what size it will be.

Siemens Gamesa's closest offshore rival, MHI Vestas, has just announced its 8MW will be beefed up to 9.5MW. Chief executive Jens Tommerup tells *Recharge* that the manufacturer's journey of technical upgradings will continue, but refuses to go into specifics.

"We still have a very strong technology platform which we are further improving and developing on all the time," he says. "Commenting on our

long-term pipeline, we will not do. But we are very confident that we will stay competitive in the market and be a market leader looking forward."

The other two Western offshore turbine makers, Senvion and GE, are also

said to be looking into building 10MW-plus models.

BMI Research analyst Daniel Brenden believes it is feasible for 13-15MW machines to be on the market by 2024-25.

"In offshore wind, we're not talking just about Europe, but also the US and Asia. So it makes much more sense to be the first ones to develop these big turbines," he says.

For more on this topic, read Recharge magazine's cover story, Zero-Subsidy: A Risky Business?

Next-gen vessels 'ready in 3-5 years'

BERND RADOWITZ

essels large enough to be able to install the next generation of 10MWplus offshore turbines will hit the market within three to five years, Jan Willem van der Graaf, the chief executive of installation group Seaway Heavy Lifting, tells *Recharge*.

"For the market as a whole, I think we will be seeing vessels [for 10MW-plus turbines] enter in about three to five years from now," he says, declining to reveal his own company's plans for confidentiality reasons.

Photograph | Seaway Heavy Lifting

Seaway's *Oleg Strashnov* can handle the foundations of most large turbines on the market today, and will even be able to install upgrades such as MHI Vestas' new 9.5MW machine, he says.

But "if you put a 14MW turbine in 60-metre-deep water, we would



have an issue," van der Graaf acknowledges, saying the industry will need to be very creative in the development of new vessels.

"These turbines are not just heavier, but they are also quite high above the water level," he explains. Van der Graaf adds that his company is also looking beyond the core European offshore wind market when developing new vessels.

"We see quite a solid market in offshore renewables not just in Europe, but also other parts of the world. We know we need to be able to play in those markets, and sort of grow with them," he says.

2GW offshore project proposed in Australia

BERND RADOWITZ

A 2GW offshore wind project off Australia — the country's first is in the early stages of development.

Local developer Offshore Energy has been working with the Australian government to establish the rights to investigate the feasibility of the project following a preliminary planning and environmental study.

The \$8bn Star of the South project would see up to 250 turbines installed off Gippsland, southeast Australia, and meet about 18% of the electricity demand in Victoria state.

"When placed in the right wind conditions like those off the coast of Gippsland, offshore wind delivers a high, consistent flow of electricity," says Offshore Energy managing director Andy Evans.



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WIND ENERGY 2017

Veja Mate completed four months early

Construction work on the 402MW Veja Mate offshore wind farm, *pictured*, has been completed four months ahead of schedule, after the last of the 67 Siemens SWT-6.0-154 turbines was installed.

The €1.9bn (\$2bn) project in the German North Sea, which began construction in April last year, is owned by the Highland Group, Siemens Financial Services and Copenhagen Infrastructure Partners.



Northland forms JV to build 1.2GW off Taiwan

Canada's Northland Power has formed a joint venture (JV) with Singapore's Yushan Energy to build 1.2GW of projects off Taiwan.

The JV, Hai Long, is proceeding with two offshore wind developments in the Taiwan Straits off Changhua county, with an aim to achieve commercial operation by 2023 and 2024.

Northland has emerged as a major developer off Europe through projects including the 600MW Gemini off the Netherlands.

LOC to lead study into utilty-scale floating wind

Consultancy LOC Group is to head up a consortium selected by the Carbon Trust-led floating wind joint industry project to investigate the infrastructure and logistics challenges faced by utility-scale floating offshore wind farms.

DNV GL to help develop China offshore standards

The World Bank has chosen a consortium including consultancy and certification firm DNV GL to support the development of three new standards in China — for offshore wind turbine support structures, substations and power cables.

Stiesdal's cost-cutting floater begins testing

DARIUS SNIECKUS

ank tests of a modular floating wind foundation concept being developed by modern wind pioneer Henrik Stiesdal to gear up industrialisation of the fast-emerging sector have kicked off at the Technical University of Denmark (DTU) near Copenhagen.

The design, a tetrahedral steel structure constructed from components derived from tower technology, will be put through month-long trials using a 10MW turbine model with two different rotor configurations, and with semisubmersible and spar variants of the Stiesdal floater.

"Turbine technology is being rapidly and successfully industrialised, but the infrastructure technology is not. Floating foundations are a prime example of this," states Stiesdal, who first launched the concept in September 2015 with a view to "halving" the capital cost of the floater units currently being piloted around the world.

"The idea is to have a design that is no more expensive and preferably cheaper than fixed foundations in around 40-50 metres of water," he says.

Fast-track fabrication is at the heart of Stiesdal's foundation concept, rejecting the idea of building floaters in shipyards or "similar harbour facilities", and instead opting for standardised modules manufactured in factories "wherever it is least expensive and most efficient" and transported by road to quayside for final assembly and float-out.

"With towers, I believe that onshore wind holds the worldrecord for low specific cost for large steel structures measured in euros per kilo. This is the sort of industrial optimisation we need to see in floating wind," he says. "Fundamentally, it is about a paradigm change in the mindset."

The 1:60 scale model now being tested at DTU will be put through its paces in a wave tank featuring a wind generator that permits the testing of the floating wind turbine under realistic conditions.

The latest version of the foundation is fitted with a counterweight suspended under the floater, which provides stability and enables the design to be optimised for different site conditions.

"I originally designed the floater as a TLP [tension leg platform], but it turns out that in some conditions a semisub or a spar topology may provide the lowest overall cost," says Stiesdal, "particularly at very shallow or very deep water the TLP is often not the best solution."

Stiesdal is exploring a range of opportunities for the installation of the first full-scale demonstrator, "ideally at a consented location offering a decent feed-in tariff", he says. "With a lot of luck it could be installed as early as in 2018," he adds.



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Green culture may slow offshore wind in California

KARL-ERIK STROMSTA

alifornia's "jealous guardianship of the ocean" could slow offshore wind development off the Golden State, say developers and regulators.

Offshore wind is on a much slower development curve off the US west coast than the northeast, largely because the continental shelf drops off more rapidly along the Pacific coast than the Atlantic. But things got interesting in January 2016, when the Bureau of Ocean Energy Management (BOEM) received its first-ever lease request for a commercial offshore wind farm off California, from Seattle-based Trident Wind.

from Seattle-based Trident Wind BOEM asked the industry if there was any other interest in the area, off Morro Bay, central California, and Norway's Statoil — currently building the five-turbine Hywind Buchan Deep floating wind project off



Scotland — said yes.

A competitive lease auction is expected at some point in California, the first to be held on the west coast, though BOEM officials will not give a potential timeline.

Trident chief executive Alla Weinstein, who previously led floating offshore wind specialist Principle Power, believes California needs offshore wind to meet its 50% renewables target for 2030, a case that becomes even stronger if the recent push for a 100% target becomes reality.

Weinstein predicts California will get its first offshore turbine in "2025 or 2026", and says there's a reason Trident filed its request a decade early: permitting challenges. "I think permitting

Experts

SEA

probably will be the critical path, more so than the [floating] technology," she says. "We're dealing with a market where people don't really want to see too many things in their ocean."

Joan Barminski, BOEM's Pacific regional director, acknowledged California's "jealous guardianship of the ocean", saying "people are vocal" in the state — and it will take a "robust" effort to get all the relevant state and federal permitting bodies and other stakeholders on the same page.

Famous for its majestic Pacific views and surfing culture, California will be "the hardest state in the nation to permit an offshore wind farm", says Jim Lanard, chief executive of offshore developer Magellan Wind.

He adds that the Department of Defense is a major local stakeholder "with which it's going to take a lot of work to find a collaborative outcome". **D**

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HIGHLIGHTS OF THE DAY

Tuesday 6 June

CONFERENCE

OPENING SESSION 9:30 - 11:00, Rooms 8-11

Kickstart the conference with keynote addresses from political decision-makers followed by industry reactions from our Event Ambassadors.

- Marie-Christine Marghem, Minister of Energy, Environment and Sustainable Development, Federal Government of Belgium.
- Rainer Baake, State Secretary for Energy, Federal Ministry of Economy and Energy, Germany.
- Kristoffer Böttzauw, Deputy Permanent Secretary, Ministry of Energy, Utilities and Climate, Denmark.
- Reactions from the Event Ambassadors.

OFFSHORE WIND AND THE WIDER ENERGY SYSTEM 11:45 - 13:00, Rooms 8-11

Two leading energy companies will share lessons from their journey from oil and gas into offshore wind.

Keynote speeches by:

- Irene Rummelhoff, Executive Vice President, New Energy Solutions, Statoil, Norway.
- Mark Gainsborough, Executive Vice President, New Energies, Shell, The Netherlands.

OFFSHORE WIND MARKET OUTLOOK 14:30 - 15:45, Room 11

A high-level panel will discuss the market outlook for offshore wind.

- Session Chair: Vera Brenzel, Head of Political Affairs, E.ON
- > Panellists: Jonathan Cole, Chair of the UK Offshore Programme Board, Scottish Power Renewables.

Nick Gardiner, Managing Director, Offshore Wind UK Green Investment Bank.

Michael Simmelsgaard, Vice President, Strategic Projects, Vattenfall.

Vincent Schellings, General Manager Product Management, Offshore Wind, GE Renewable Energy, The Netherlands.

TECHNOLOGY DEVELOPMENTS -SCALING UP AND BRINGING COSTS DOWN 14:30 – 15:45, Room 8

Industry leaders will take a closer look at the potential for scaling up technology while further reducing costs.

PORTS: A COOPERATIVE APPROACH TO INTEGRATION IN THE OFFSHORE WIND SUPPLY CHAIN 16:30 - 17:45, Room 7

This session will bring together port users and operators to discuss on the roles that ports currently play, and how ports can continue to meet the changing needs of a growing industry.



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EXHIBITION

DEMO ZONE (South Hall, S-D50)

It will showcase products from selected exhibitors throughout the event. Stop by during the below times.

11:05 - 11:30Floating Power Plant (FPP)13:30 - 13:55ProPlanEn presents WakeBlaster16:00 - 16:25Survitec

OUTDOOR VESSELS

Step outside the South Hall to see the mighty Atlantic Enterprise and Siem Moxie offshore service vessels. Free tours of these 80+ metre vessels will take place every day of the event. Visit their stands for more information: Atlantic Marine (S-K21), Siem (N-E10).

2050 - AN ENERGETIC ODYSSEY

Located in the South Hall this large-scale video installation demonstrates what should be done if we are to take the two-degree climate target seriously.



NETWORKING RECEPTION When: 17:30 – 19:30 Where: LM Wind Power Stand N-N20

Join sponsors LM Wind Power for the official Networking Reception. Taking place at the end of a busy first day, network with delegates over snacks and drinks!





VISIT THE WINDEUROPE STAND (S-G40)

WindEurope has not one but *two* limited-edition offshore wind Lego sets to give away to two lucky winners! Visit the WindEurope stand in the south hall, to find out how you can take one of these boxes home.

VISIT THE RENEWABLE UK STAND (S-H40)

Visit the RenewableUK stand on 7 June 2017 from 16.30 – 18.30 to enjoy some beer brewed from renewable energy sources and reserve prime exhibition space for Global Offshore Wind 2018.





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Glosten floater 'will compete on cost with fixed foundations'

DARIUS SNIECKUS

esurgent US floating wind designer Glosten has developed an innovative deep-water assembly and installation method with European vessel operator DEME-GeoSea that it says will mean its PelaStar tension leg platform (TLP) concept can be deployed at "cost parity" with current methods for bottomfixed turbines.

The new technique — which will use DEME-GeoSea's nextgeneration *Orion* installation ship, on track to be launched in 2019 — involves quicker quayside assembly and "minimal" time at sea.

"A fully-assembled PelaStar TLP is unstable until connected to the anchor tendons, which presents a cost challenge for demonstration- and pilot-scale projects," Glosten PelaStar project development director William Hurley tells *Recharge*. The novel assembly and installation concept for the PelaStar starts quayside with the full turbine-foundation divided into two sub-assemblies that reduce a port's required crane capacity and mobilisation and logistics constraints.

Once fastened onboard, the *Orion* will sail out the components to site where the vessel's heavy-lift crane will install each PelaStar in a swift, two-stage process.

To cut installation time at sea, the Glosten-DEME-GeoSea team has hatched a towerjoint concept with a "latch connection" — a temporary link designed to hold parts together until permanent connection bolts are secured; a joint alignment feature, for horizontal and angular line-up when connecting the upper tower; and a bolting surface for the base of the upper tower to connect to the quay for assembly, and to *Orion's* deck for transport. Hurley says Glosten is also working on a tendon connection design that will "further streamline" the connection operation.

"Floating wind can benefit significantly from bottom-fixed installation experience, where the duration of a tower and turbine installation has dropped to a remarkable 24 hours," he adds, pointing to other "efficiencies" such as articulated boarding ladders, blade handling fixtures, and crane operational techniques now developed.

"PelaStar now has a viable path to demonstration and to full-scale wind farms, where the advantages of minimal material in the water and lowest levelised cost of energy can be realised at commercial scale."

Last month, Glosten and German floating wind technologist Gicon formed a strategic business collaboration aimed at developing an "optimum" TLP foundation.

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Markus Tacke is chief executive of Siemens Gamesa Renewable Energy

MARKUS TACKE

n recent years, the world has made significant progress on many energy and environmental issues. But now, quite suddenly, we find ourselves on a more bumpy and uncertain path. The political consensus supporting our efforts is no longer as strong as it once was. Fossil fuel industries (for example coal in the US) are trying to mount a comeback. Most alarming, the science behind climate change is being questioned by some.

At this crucial point in time, the wind power industry must rise to meet these challenges. In my view, the best way to do so is by ensuring that our industry is stable and successful; demonstrating that we offer proven, reliable technology; and showing the world that we know how to make energy more affordable.

Within our industry, I would highlight three recent changes that have fundamentally altered how we work.

First, wind power has matured into a mature, mainstream technology. In parallel with this growth, a natural consolidation has taken place. Scale and size are more important today than ever before.

Second, our industry has become truly global. The days of regional champions and niche players selling to small local markets are coming to an end. Today's projects are too big, markets are too diverse, and the pace of technological change is too fast.

Third, cost pressures within our industry have intensified, as technology has become more standardised and low-cost manufacturing has evolved.

These three changes force all of us to re-evaluate our business strategies and models.

The company I work for — Siemens Gamesa Renewable Energy — was created recently as the merger of Siemens Wind Power and Gamesa took effect. We are confident that this merger will result in a stronger, more flexible, and more globally competitive company. And we believe it strengthens our ability to contribute to bigger goals — like helping to meet the UN's Sustainable Development Goals.

China continues to be the global leader in new installations with more than 23GW of new capacity installed in 2016, and we are working hard to further increase our market share in China. But we are also focusing on markets like India, Brazil and Turkey, three countries who together



The opportunities and challenges for newly formed Siemens Gamesa

accounted for more than 12% of new installations in 2016.

Even Saudi Arabia and Iran, both countries with vast oil reserves, are now investing in developing their wind power capacity. It is markets like these that companies must look to if they want to remain successful.

Success in these markets also requires a more flexible and localised business strategy. A company cannot simply deal with customers from 'head office'. An understanding of local conditions and needs is essential, as is a more diverse product portfolio. One-sizefits-all solutions are no longer adequate in this globalised marketplace.

One area where we see tremendous opportunities for continued growth is offshore, not just in established markets but worldwide. China has now overtaken Denmark, reaching third place in the global offshore rankings. As offshore wind power continues to drop in price, we are confident it will continue to grow in popularity.

Further innovation in offshore

technology is also very promising. Developments like the next-generation 10MW+ platform, floating projects, and continually improving O&M concepts will greatly expand power generation capabilities and will make new areas of the ocean accessible. This trend is also reflected in the latest price points in the market. The results of the first offshore auctions in Germany with an average top-up on the market price of €0.0044/kWh and €0/kWh as the lowest bid — are a remarkable signal for our industry. It is proof that operators and investors trust in the ongoing success of offshore wind.

We are confident that the global market for clean, affordable, and reliable wind power will continue to grow. But it will also change. Our challenge is to anticipate and prepare for these changes.

The business decisions we have made during these past months represent decisive and forward-looking steps to ensure that we can remain leaders in this rapidly-changing environment.

Photograph | Sieme



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Emma Pinchbeck is executive director of RenewableUK

EMMA PINCHBECK

e are living through a period of political uncertainty, both in Europe and internationally. In the UK, it has been particularly changeable. Last year, RenewableUK's offshore wind conference took place on the eve of the referendum which saw Britain vote to leave the EU.

This year's offshore conference, co-hosted with WindEurope — which will be the largest in the world — takes place just 60 miles from the world's largest offshore wind farm, London Array. On Thursday, the third day of the event, the British public will be voting in a snap general election.

Politics may be unpredictable, but the offshore wind market is reliable. Seventeen years ago, the UK's first offshore wind farm was built. Since then, this technology has grown to become part of the energy mainstream, and a serious force to be reckoned with. There are now over 14GW of installed offshore wind capacity around the world.

The industry is a new economic and energy powerhouse: 2016 alone saw capital spending in the offshore market hit \$29.9bn globally.

The transformation from disruptive technology to European powerhouse has been achieved through constant innovation. When the UK's first offshore wind farm was installed, it was less than a mile (1.6km) from shore and used a 2MW turbine.

The next round of projects here are up to 100 miles from shore, and a 10MW turbine could be on the horizon. The spectacular falls in the costs of projects, seen in all the recent European auctions is also testament to this industry's ability to learn, adapt, and grow. This kind of infrastructure innovation has been more common in sectors like telecoms than energy: it is right to call this progress unprecedented.

A new government is an opportunity for the UK to look again at support for offshore wind, both in terms of regulation and investment. Over the next five years, we expect strong political support for offshore wind to continue. But this support in principle must turn into a vision for the sector beyond the mid-2020s which recognises its potential scale. A new industrial strategy in the UK could be an opportunity to provide this vision, linked to the UK's Climate Change Act targets.



In uncertain times, offshore wind can be a rock for the UK

In the short term, industry will naturally want clarity on any Contract for Difference auctions in the coming Parliament. In the medium term, we will want to engage with government to evolve UK energy policy in line

[Government] support must turn into a vision for the [offshore] sector beyond the mid-2020s

with technology evolution, such as regulation to support a smarter and more flexible electricity grid.

These next five years will also answer the main questions about Britain's new relationship with Europe, as negotiations to leave the EU begin. We hope that the discussions between the UK and Europe make energy a priority, and enable the future growth of the UK's renewable-energy sector.

Priorities for action include clarifying the UK's relationship to the Internal Energy Market and ensuring the

> continued ability to move products, services and a skilled workforce between the UK and the EU. Offshore wind is a global opportunity, and we are clear that it is in interests of the UK and the wider industry.

Times are changing. But in the UK, we are clear: we must continue to demonstrate that industrialised economies can

decarbonise and grow at the same time. By investing in our world-leading offshore wind industry, the UK can

offshore wind industry, the UK can have the low-carbon energy system it needs to power our future.

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Photograph



AN INVESTMENT IN KNOWLEDGE ALWAYS PAYS THE BEST INTEREST

Benjamin Franklin

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