

# THE ENERGY INDUSTRY TIMES

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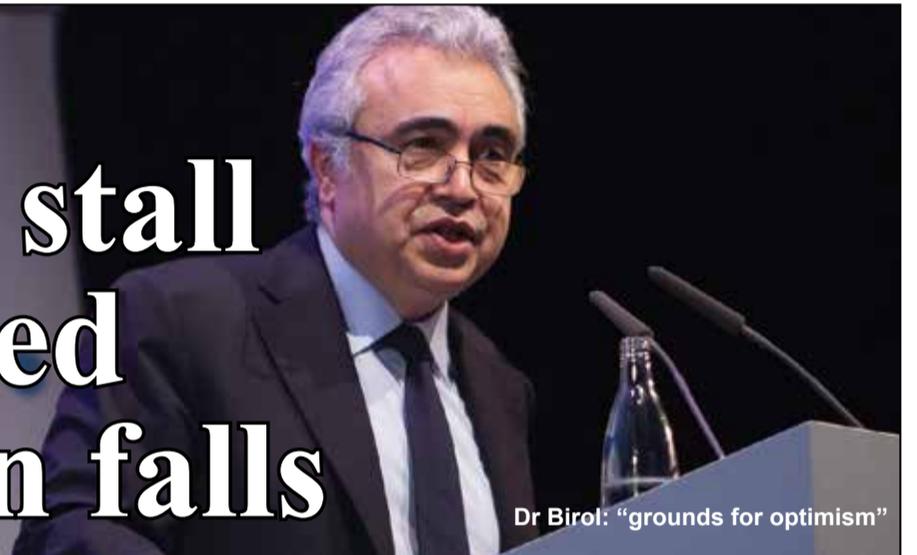
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# Global emissions stall as coal fired generation falls



Dr Birol: "grounds for optimism"

The fight against global warming may have reached a significant moment as growth in global carbon dioxide emissions stalled for the first time in two years. **Junior Isles reports.**

Global carbon dioxide output may have peaked following two years of growth, after CO<sub>2</sub> emissions were unchanged at 33 gigatonnes in 2019, according to the International Energy Agency.

IEA figures showed that energy-related CO<sub>2</sub> output rose in both 2017 and 2018 and earlier studies had suggested this trend was set to continue, casting doubt on efforts to drastically cut emissions to mitigate climate change.

The IEA says the fall was primarily due to declining emissions from electricity generation in advanced economies, thanks to the expanding role of renewable sources (mainly wind and solar), fuel switching from coal to natural gas, higher nuclear power generation and weaker electricity demand.

This resulted in power generation from coal plants falling by almost 15 per cent last year. Other factors included milder weather in several countries and slower economic growth in some emerging markets, according to the IEA report.

Commenting on the findings, Dr Fatih Birol, the IEA's Executive Director, said: "The clean energy transition is starting to accelerate very strongly. This makes me hopeful we are seeing a peak in emissions and they will now start to decline."

Across advanced economies, emissions from the power sector declined to levels last seen in the late 1980s, when electricity demand was one-third lower than today, said the IEA.

"A significant decrease in emissions in advanced economies in 2019 offset continued growth elsewhere. The

United States recorded the largest emissions decline on a country basis, with a fall of 140 million tonnes, or 2.9 per cent. US emissions are now down by almost 1 gigatonne from their peak in 2000.

"Emissions in the European Union fell by 160 million tonnes, or 5 per cent, in 2019 driven by reductions in the power sector. Natural gas produced more electricity than coal for the first time ever, meanwhile wind-powered electricity nearly caught up with coal fired electricity. Japan's emissions fell by 45 million tonnes, or around 4 per cent, the fastest pace of decline since 2009, as output from recently restarted nuclear reactors increased.

"Emissions in the rest of the world grew by close to 400 million tonnes in 2019, with almost 80 per cent of the

increase coming from countries in Asia where coal fired power generation continued to rise," states the report.

Dr Birol, commented: "This welcome halt in emissions growth is grounds for optimism that we can tackle the climate challenge this decade. It is evidence that clean energy transitions are underway – and it's also a signal that we have the opportunity to meaningfully move the needle on emissions through more ambitious policies and investments."

To support these objectives, the IEA will publish a 'World Energy Outlook Special Report' in June that will map out how to cut global energy-related carbon emissions by one-third by 2030 and put the world on track for longer-term climate goals.

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## EU countries accelerate coal phase-out

Several of the EU's major economies have announced plans to accelerate the phase-out of coal fired power generation.

Last month British Prime Minister Boris Johnson said Britain is set to bring forward by a year its deadline for phasing out coal. The government's goal is to bring coal's share to zero, by closing the last coal fired plant in the country by October 1, 2024. The previous deadline for that was 2025, announced in 2015.

The move was announced during the Year of Climate Action launch event ahead of the COP26 Climate Summit in Glasgow in light of statistics showing that Britain's reliance on coal fired power generation has dropped from 70 per cent in 1990 to around 40 per cent in 2012 and to less than 3 per cent in 2019. The

contribution of renewables, meanwhile, is now "at record levels" standing at 33 per cent.

The news came as the UK Government's Office of Gas and Electricity Markets (Ofgem) set out its plan to bring the country's emissions to net zero. The Decarbonisation Action Plan details nine steps the agency will take to achieve the UK's target of net zero emissions by 2050.

The plan to bring forward the target date for phasing out unabated coal will be subject to a public consultation. It will be undertaken as part of the country's efforts to decarbonise its power sector as it aims to achieve a net-zero emissions level by 2050.

According to the latest government statistics, the UK's greenhouse gas emissions have declined by 2.1 per cent between 2017 and 2018 mainly

thanks to the wave of coal plant closures. Last year, Great Britain, which now has four active coal generators, ran for 3700 hours, or more than five months in total, without using coal.

"This phenomenon of global warming is taking its toll on the most vulnerable populations around the planet," Johnson said. "That's why we are pledged here in the UK to deliver net zero by 2050. We are the first major economy to make that commitment, and it's the right thing to do."

Spain also recently said it was speeding up plans to phase-out coal. At the start of February the country said that only three out of 15 coal fired plants in the country will remain operational by 2022. Coal's share of power production has been reduced from 15 per cent to 5 per cent in less than a year, and it will be completely

replaced before 2030.

In January German Chancellor Angela Merkel and ministers from the coal-mining states of Saxony-Anhalt, Saxony, North Rhine-Westphalia and Brandenburg agreed a shutdown plan for the country's coal plants. Plants would be closed by 2035, instead of 2038 as previously planned.

At the start of February Uniper presented its closure programme for its hard coal fired power plants in Germany. The company intends to close about 1.5 GW of hard coal capacity by year-end 2022, corresponding to three generating units at the Scholven power plant in Gelsenkirchen and the Wilhelmshaven power plant. In addition, Uniper plans to shut down another 1.4 GW at Staudinger and Heyden power plants by 2025 at the latest.

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Dr Birol acknowledged that emissions would need to fall more sharply still to meet the goals of the Paris climate agreement, which aims to keep global temperature increases to less than 2°C on average. But he said the first step was to stop them from rising. “We have the energy technologies to do this, and we have to make use of them all,” Dr Birol said. “2019 is a year that gives me hope that the 2020s will be a decade of relief.”

Dr Birol said the new numbers were evidence that the world’s governments are capable of doing more. “We are making a big push in the power sector... but governments need to increase the focus on energy in transport and energy in industry.”

A recent report published by research company BloombergNEF (BNEF) claimed that electrification of the transport, buildings and industrial sectors in Europe could slash greenhouse gas emissions by 60 per cent between 2020 and 2050.

Written in partnership with Eaton and Statkraft the report, ‘Sector Coupling in Europe: Powering Decarbonization’, outlines a plausible pathway of electrification, taking account of current levels of policy ambition in countries like the UK and Germany.



**Victoria Cuming, Head of global policy analysis for BNEF**

Victoria Cuming, Head of global policy analysis for BNEF, commented: “Electrification, or ‘sector coupling’ as it’s known in some countries, could make a huge contribution to the achievement of governments’ emission reduction targets by exploiting the low-carbon transition already under way in the power generation sector.”

Electrification could take place via a mix of ‘direct’ and ‘indirect’ changes. ‘Direct’ would involve the proliferation of electric vehicles in as much of the transport sector as possible, and the spread of electric heating systems like heat pumps in buildings and some parts of industry; and ‘indirect’ would involve a switch to ‘green hydrogen’ – produced by electrolysis using renewable electricity – as a fuel to provide heat for buildings and as many industrial processes as possible, that otherwise would rely on fossil fuels.

“However, action from policy makers will be needed if these changes are to happen,” Cuming said. “Governments should introduce incentives or requirements to cut emissions from buildings and heat, support demonstration projects for electrification, and iron-out barriers to the production of green hydrogen.”

The report estimates that the power system could need 75 per cent more generation capacity by 2050 compared to what would be needed without additional sector coupling, with low-cost wind and solar plants comprising most of that.

# Wind continues to pick up across globe

Wind energy continues to grow worldwide and could become the dominant energy source for power generation by 2050, according to new figures.

Junior Isles

The deployment of wind power is accelerating worldwide. In a new report, ‘Future of the Wind’, the International Renewable Energy Agency (IRENA) says that by 2050 wind energy could account for 35 per cent of global energy needs.

However, for that to happen, the current capacity of wind energy would need to increase tenfold to 6000 GW, including 5000 GW on land and 1000 GW offshore.

“Wind power, along with solar energy, would lead the way for the transformation of the global electricity sector,” IRENA says. “Onshore and offshore wind would generate more than one-third (35 per cent) of total electricity needs, becoming the prominent generation source by 2050.”

Notably, Europe continues to set records for new offshore wind. According to statistics recently released by WindEurope, Europe installed 3.6 GW of new offshore wind capacity in 2019 – a new record in annual installations.

The deployment of offshore wind is accelerating as costs continue to fall. WindEurope reported that last year’s auctions – in the UK, France and the Netherlands – delivered prices for consumers in the range of €40-50/MWh, cheaper than electricity from gas, coal or nuclear.

Ten new offshore wind farms came online across five countries. The UK accounted for nearly half of the new capacity with 1.7 GW. Then came Germany (1.1 GW), Denmark (374 MW) and Belgium (370 MW). And Portugal installed 8 MW of floating offshore wind. Europe now has 22 GW

of offshore wind. The UK and Germany account for three-quarters of it. Denmark, Belgium and the Netherlands share nearly all of the rest.

According to Wood Mackenzie figures, offshore wind will constitute 25 per cent of total wind demand in 2028 – up from 10 per cent in 2019. With a diverse 314 GW global offshore wind portfolio to tap into and cumulative offshore wind capacity expected to increase more than seven-fold by 2028, the industry is set for a strong decade ahead, said the research firm.

Wind energy also saw strong growth elsewhere. The Global Wind Energy Council (GWEC) calculated that at the end of 2019 there was 13 427 MW of installed wind energy capacity in the western hemisphere, up 12 per cent from end-2018. The United States was the largest market, with

9143 MW, followed by Mexico with 1284 MW, Argentina (931 MW) and Brazil (745 MW). GWEC forecasts over 220 GW in new capacity in the Americas in 2020-24.

In its latest capacity figures, released as part of its annual statistical release in the lead up to the Global Wind Report 2019, the GWEC said Africa and the Middle East installed 894 MW of wind energy capacity in 2019, a decrease of 7 per cent compared to 2018 installations.

Total installed wind capacity in Africa and the Middle East is now over 6 GW. Wind energy capacity in the region is expected to surge by 10 732 MW over the next five years, says the report, driven by installations in South Africa (3.3 GW), Egypt (1.8 GW) and Morocco (1.2 GW) and Saudi Arabia (1.2 GW).

## Interest grows in SMRs

The development of small modular reactors (SMRs) is picking up speed, as technology developers begin to outline plans for the roll-out of the technology.

At the beginning of last month GE Hitachi Nuclear Energy (GEH) announced it is beginning the licensing process with the Nuclear Regulatory Commission (NRC) for its SMR design.

The proposed design, the BWRX-300, is based on a design already licensed by the NRC in 2014, and the company hopes to leverage this existing work to make a cheaper SMR that can “become cost-competitive with power generation from combined cycle gas plants and renewable energy platforms”.

SMRs have attracted industry interest as a potential way to make new nuclear power plants economically viable after multi-billion dollar cost overruns at conventional nuclear plant projects.

At the end of 2019, GEH submitted its first licensing topical report to the NRC, kicking off a regulatory review that the company says in a statement could be a “foundation” for a preliminary safety analysis report that a utility interested in using the BWRX-300 could submit to the NRC.

GEH next intends to send more topical reports to the NRC as a precursor for “utility-led applications for a construction permit and operating license”, according to industry reports.

The start of the licensing process coincides with the news that GEH and CEZ, a.s. (CEZ), an integrated electricity conglomerate, have entered into a Memorandum of Understanding through which the companies have agreed to examine the economic and technical feasibility of potentially constructing a BWRX-300 in the Czech Republic.

CEZ operates two nuclear power plants in the Czech Republic, which generate approximately one-third of

the country’s electricity. The Czech government plans substituting aging coal plants with new nuclear build and renewables in the near future.

Elsewhere, in late January Rolls-Royce said it will lead a consortium that plans to install and operate SMRs in the UK by 2029.

The consortium – which includes Assystem, SNC Lavalin/Atkins, Wood, Arup, Laing O’Rourke, Bam Nuttall, Siemens, National Nuclear Laboratory (NNL) and Nuclear AMRC – plans to build and operate up to 15 mini nuclear reactors, with the first set to go online in nine years.

Under Rolls-Royce’s plan, between 10 and 15 mini-nuclear power stations could be built across the UK, with each reactor producing 440 MWe of electricity.

“We think we can get the cost of a power station producing 440 MW to about £1.75 billion,” said Rolls-Royce Chief Scientific Officer Paul Stein in an interview with the *BBC*.

“If you go through the maths of the cost of capital, it means we are selling electricity below 60 per MWh, which puts it into the territory of many of the renewables.”

Stein added: “The obvious sites to put them are what we call brownfield sites where we’re running elderly or decommissioned nuclear power stations. There are two sites in Wales and one in the northwest of England. Eventually in the UK, we’ll be rolling out 10 to 15. We’re also looking to a significant export market. In fact, the current estimate for the export market for SMRs is £250 billion, so this could be a huge industry.”

Interest in SMRs has been growing over the last year. In December 2019, NuScale Power’s SMR design cleared the fourth of six phases of the United States Nuclear Regulatory Commission (NRC)’s review process. It is the world’s first SMR to undergo design certification review by the NRC, and is on track for approval in 2020.

## Hungary faces challenges on carbon-free ambitions

The government of Hungary says it will need about \$165.4 billion to convert its entire economy to carbon-free status by the year 2050, in order to meet the European Union’s mandate of climate neutrality.

Hungary’s Innovation and Technology Minister Laszlo Palkovics said 90 per cent of Hungary’s electricity production should be carbon-free by 2030.

Palkovics added that the government expects Hungarian companies, which are the biggest polluters across Europe, to cover most of the massive cost rather than EU subsidies or taxpayers contributions.

Palkovics said his ministry will develop a national clean development

strategy by the end of the year, including a plan that from 2022 will see only electric buses available for sale in Hungarian cities with more than 25 000 people.

The government plans to cut its greenhouse gas emissions by 40 per cent by 2030 from 1990 levels. Renewable energy sources will account for at least 21 per cent of Hungary’s total energy mix by 2030, up from the current 13 per cent level.

With respect to the Matra coal fired power plant in northern Hungary, the last of its kind in the country, Palkovics said the ministry will upgrade and clean up the plant by 2030 in order to reduce its environmental impact. The

transformation of this plant will cost up to \$1 billion, the majority of which will be covered by EU subsidies and the EU’s Modernisation Fund.

However, Erzsébet Schmuck, an environmentalist and member of the opposition LMP party, said the government’s climate targets were inadequate. She noted that carbon emissions have been rising again for the past five years. She further said her party wants to close the Matra power station by 2025.

The government also insists that nuclear has to remain part of the energy mix. Earlier this year Prime Minister Viktor Orban, said he would not agree to the EU’s carbon neutrality

goals for 2050 until he received assurances from Brussels that Hungary could continue to rely on nuclear energy. “Without Paks [Hungary’s sole nuclear plant], we cannot have our climate protection,” Orban said at the time.

Hungary gets more than 20 per cent of its power from nuclear energy and two more reactors are due to be built at the Paks plant.

But some strongly oppose nuclear power. Schmuck criticized the government for seeking to upgrade Paks. Mate Kanasz-Nagy, a senior official of LMP, has called for the cancellation of any upgrades at Paks and a shut-down of the entire plant.

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# US funding backs coal, H<sub>2</sub>

■ Next-generation focus for coal ■ \$64m for H<sub>2</sub> research

Siân Crampsie

The US government has announced funding to develop coal fired power plants with the flexibility needed to support future grids.

The Department of Energy (DOE) will award up to \$64 million of cost-shared funding to projects aimed at developing next-generation coal technologies that are “transformational” in their efficiency and flexibility.

The DOE expects to spread the award across some 14 projects as part of its Coal FIRST (Flexible, Innovative,

Resilient, Small, Transformative) initiative.

“Coal is a critical resource for grid stability that will be used in developing countries around the world well into the future as they build their economies,” said US Secretary of Energy Dan Brouillette. “Investing in R&D for cleaner coal technologies will allow us to develop the next generation of coal plants for countries to use this valuable natural resource in an environmentally responsible manner.”

“The evolving US energy mix requires cleaner, more reliable, and

highly efficient plants,” noted Assistant Secretary for Fossil Energy Steven Winberg. “Technologies developed for the Coal FIRST initiative will lead to just that – reliable, highly efficient plants with zero or near-zero emissions.”

The National Energy Technology Laboratory (NETL) will manage the projects supporting Coal FIRST, which is a joint initiative among the Office of Fossil Energy’s Transformative Power Generation, Supercritical Carbon Dioxide Technology, Advanced Turbines, Gasification Sys-

tems, and Carbon Capture research programmes.

Last month the DOE also announced \$64 million of funding to finance research and development (R&D) projects that will further expand the country’s hydrogen (H<sub>2</sub>) market.

The funding will be extended by the DOE with the goal to open new markets for the so-called H<sub>2</sub>@Scale initiative – a concept that explores the potential for wide-scale hydrogen deployment in various applications. It is also expected to lift the scale of hydrogen production from the current 10 million

tonnes per year.

Up to \$15 million of the total funding will go for projects aiming to cut the cost of H<sub>2</sub> from MW- and GW-scale electrolyzers, while an additional \$15 million will target cost reductions of compressed gas and hydrogen storage tanks by advancing carbon-fibre technology.

Some \$10 million will be channelled for advancing the development of domestically manufactured fuel cell components and up to \$8 million are earmarked for R&D on the use of hydrogen in steel manufacturing.

## Colbun wind farm swells



Chilean power utility has boosted the output of its proposed Horizonte wind farm from 607 MW to 980 MW.

The utility has submitted the environmental impact study for the planned project in the Atacama desert commune of Taltal in the Antofagasta region. According to the filing with the Chilean environmental evaluation service (SEA), the company anticipates investments of up to \$700 million will be required for the project.

The Horizonte project will feature 140 wind turbines with up to 7 MW capacity, installed across an 8000 ha site.

A recent report by Banco Security said that Colbun has “solid margins” that would enable it to invest more heavily in renewable energy.

Banco Security added that overall in Chile, the electricity sector enjoyed a healthy financial performance in 2019 despite the riots and protests that engulfed Chile during the fourth quarter.

However some new legislation drawn up in response to the riots – including a price stabilisation mechanism and a distribution law that reduces the profitability of power distributors – would affect the sector in 2020.

Other negatives in the market include the coal retirement plan, which will affect the largest utilities with coal-fired capacity, and a continued drop in hydro generation due to the drought.

■ Xinjiang Goldwind Science & Technology has connected the Loma Blanca II wind farm – its first wholly-owned project in South America – to the Argentine grid. Loma Blanca II is part of the 250 MW four-project Loma Blanca wind complex in Chubut province, Patagonia. The Chinese wind turbine company acquired the Loma Blanca portfolio along with the 97.65 MW Miramar wind project in Buenos Aires province.

## Brazil eyes offshore prize

Renewable energy developers are showing signs of interest in Brazil’s offshore wind sector.

BI Energia, a Brazilian-Italian joint venture, has plans to invest BRL5 billion (\$1.2 billion) in the offshore wind sector of Brazil’s Rio Grande do Norte state, according to a statement by the local government.

The state has an offshore wind energy potential of 200 GW, according to the state government, which is developing a wind atlas to help attract investors.

BI Energia is also developing a 600 MW offshore wind farm off the coast of neighbouring Ceara state and has announced plans to hold a public hearing on the proposed project later

this month [March].

The Caucaia offshore wind farm will have 48 offshore wind turbines and 11 near-shore turbines located south of Fortaleza. It will be Brazil’s first offshore wind farm, with turbine installation planned to start in late 2021, the company says.

A recent study by Brazil’s state-owned energy research firm EPE said that the country has a total offshore wind energy potential of 700 GW in water depths of up to 50 m.

However it indicated that a lot of changes will need to be made for the country to reach its offshore wind potential, including the adaptation of environmental licensing procedures and establishing supply chains.



US policy on solar energy equipment imports has cost the country around 10.5 GW of new capacity, according to the Solar Energy Industries Association (SEIA).

A market impact analysis carried out by the SEIA says that tariffs imposed on imported solar cells and modules have “devastated” the sector with the loss of more than 62 000 jobs and \$19 billion of investment since 2017.

In addition to its economic impact, tariffs on solar have caused 10.5 GW of solar installations to be cancelled, SEIA said in a statement.

The analysis comes as the mid-term review process for the tariffs begins at the US International Trade Commission on December 5th, and covers tariff impacts from the beginning of the 2017 trade complaint by Suniva through the end of the tariff lifecycle in 2021.

“Solar was the first industry to be hit

with this administration’s tariff policy, and now we’re feeling the impacts that we warned against two years ago,” said Abigail Ross Hopper, President and CEO of the Solar Energy Industries Association. “This stark data should be the predicate for removing harmful tariffs and allowing solar to fairly compete and continue creating jobs for Americans.”

The US administration imposed Section 201 tariffs on solar goods in early 2018, with a 30 per cent tariff on solar cells and modules.

The policy has helped solar companies with manufacturing facilities in the USA such as Suniva, which brought the original complaint to the International Trade Commission.

According to SEIA’s analysis, each new job created by the tariff results in 31 additional jobs lost, 5.3 MW of solar deployment lost and nearly \$9.5 million of lost investment.

According to the report, uncertainty caused the market to lose out on 3 GW of installations as rumours and actual tariffs disrupted contracts in 2017 and 2018. The actual tariffs then reduced the market for new projects by 7.5 GW from 2019 - 2021.

The reduced solar deployment figures will also impact the USA’s emissions, it added, because higher prices for solar energy push economics in favour of substitutes, including gas-fired power plants.

Tariffs on solar are most harshly affecting nascent solar markets including Alabama, Nebraska, Kansas, and the Dakotas. These markets “won’t be able to get off the ground” because tariffs make solar uncompetitive, SEIA said in a statement.

The Section 201 solar tariffs began at 30 per cent in 2018, and ramped down to 25 per cent in 2019, 20 per cent in 2020 and 15 per cent in 2021.

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# Vietnam Energy Plan 2.0 targets clean affordable energy

■ Plan would increase use of gas and renewables ■ World Bank recommends new approaches for solar projects

Syed Ali

The second edition of the Made in Vietnam Energy Plan (MVEP 2.0), a business case for the primary use of Vietnam's domestic resources to stimulate investment in clean, secure and affordable energy generation was published at the end of February.

Based on the 2016 edition – MVEP 1.0, the report recommends that Vietnam prioritises renewable energy in national power planning; increases the use of natural gas generation as the current best-fit base load to complement renewable energy; creates a regulatory and permitting environment that attracts private sector and smaller scale off-grid investment in clean energy generation and energy efficiency; invests in grid infrastructure to improve

stability and capacity; and halts approvals of any new coal.

Six key policy actions are proposed in the report to help Vietnam move toward a more financially, socially, and environmentally sustainable energy future. They include: engaging energy specialists from the private sector in producing Vietnam's Power Development Plan VIII with a strong prioritisation on investment in domestic renewable energy, natural gas, battery storage and energy efficiency.

The report also suggests the implementation of regulatory frameworks and incentives that encourage investment in renewable energies, such as rooftop solar, battery storage, floating solar, and offshore wind projects, with simplified approval processes, while still maintaining safe power systems.

According to the report, Vietnam should standardise the renewable energy Power Purchase Agreement (PPA) and Sleeved Direct Power Purchase Agreement (DPPA) as internationally bankable agreements; publish a Roadmap to Retail Electricity Tariffs to 2025 that depicts the move toward market-based pricing, revising the number of Peak Tariff hours, and consider a differential Retail Tariff in different power regions and for disadvantaged households.

Additionally, the report recommends that the country assesses the urgent demands on the grid transmission system and the least-cost means of developing grid infrastructure to support increased renewable energy and increased distributed energy generation; and evaluate the cause and solutions

for Vietnam's extremely high and growing energy intensity as compared to regional neighbours with similar and higher GDP per capita and prepare a public education campaign on reducing energy waste.

In a separate report released earlier, the World Bank recommended new approaches to bidding and deployment for solar projects that will help Vietnam substantially boost and effectively manage its abundant solar energy resources.

It said such approaches could boost Vietnam's solar generation capacity from the current 4.5 GW to tens of GW in ten years.

The report comes as Vietnam is considering moving from a feed-in-tariff (FIT) policy to a competitive bidding scheme for solar projects to reduce the

cost of solar generation.

The FIT has been successful in recent years, spurring the deployment of projects. However, this success has also given rise to new issues, including curtailment, or underuse of solar generation capacity.

The report, supported by the Global Infrastructure Facility (GIF) and the World Bank's Energy Sector Management Assistance Program (ESMAP), recommends two new deployment schemes for projects: competitive bidding for solar parks, and 'substation-based bidding' – competitive bidding based on available capacity at electrical substations.

These approaches would address the curtailment issue as well as improve risk allocation between public and private investors.

## Japan still looks to coal for baseload

Japan is planning to build as many as 22 new coal plants at 17 different sites over the next five years, as it attempts to fill the gap left by nuclear plant closures following the meltdown at the Fukushima nuclear power plant in March 2011.

Critics argue that the proposal comes at a time when the world needs to slash carbon dioxide emissions to fight global warming. Together the 22 power plants would emit almost as much carbon dioxide annually as all the passenger cars sold each year in the United States.

Yokosuka, the site for two of the coal burning units, has prompted notable pushback in Japan, where environmental groups more typically focus their objections on nuclear power. Some local residents are suing the government over its approval of the new coal fired plant.

The plaintiffs say the government

rubber-stamped the project without a proper environmental assessment.

Japan currently relies on coal for more than a third of its power generation needs. And while older coal plants will start retiring, eventually reducing overall coal dependency, the country still expects to meet more than a quarter of its electricity needs from coal in 2030.

The plan for new coal plants is one unintended consequence of the Fukushima nuclear disaster, which forced Japan to all but close its nuclear power programme.

In late January, an expert panel advised the Japanese government that radioactive water from the stricken Fukushima plant should be released into the ocean or vaporised into the air. The proposal is non-binding and sets no deadline for the government to decide or carry out procedures to deal with the water.

## AboitizPower plans 975 MW of wind, solar

Philippines power company Aboitiz Power Corp is investing close to Peso34 billion (\$670.7 million) to build 975 MW of wind and solar capacity in Pangasinan.

The power company is reported to be seeking to install some 650 MW of solar power and 325 MW of wind across several areas in the province.

Aboitiz has not yet studied the wind potential at chosen locations, but if it proves satisfactory, the company will proceed with the development, according to the *Philippine Star*.

The newspaper says that Aboitiz has already entered into an agreement with the Department of Environment and

Natural Resources, as the project execution would require mostly public and forest land.

About 650 MW of solar is being eyed for the areas of San Manuel, Labrador, Bugallon, Aguilar and Mangataram, Infanta, Mabini, and 325 MW of wind energy in Aguilar, Bugallon and Mangataram for a total of 975 MW.

Cris Faelnar, Senior Vice President for operations and maintenance of Aboitiz Power Corp. for business and community relations, said the company would have to study the potential of the wind capacity at the sites for one year and if everything is satisfactory, would push through with the project.

# UOB activates Asia's first solar industry ecosystem

U-Solar, Asia's first solar industry ecosystem, has been launched by United Overseas Bank (Thai) in Thailand to power the development and adoption of renewable energy across the country.

Through the U-Solar programme, activated in February, the bank connects businesses and consumers across the entire solar power value chain and helps each in their transition to a low-carbon economy.

The programme is also available in Indonesia, Malaysia and Singapore. In supporting the growth of the solar power industry, UOB provides solar project developers with solutions in green financing, project loans and

portfolio financing, as well as cash management services.

For engineering, procurement and construction (EPC) contractors, UOB offers end-to-end contract-based financing solutions, from bid bonds and letters of credit issuance to performance guarantees and working capital facilities.

To promote the adoption of solar power by the end-users, which include companies and consumers seeking solar power solutions for their factories, offices or homes, U-Solar offers a one-stop shop for them to plug easily into the services provided by UOB's partners across the region. They can also tap UOB's financing

solutions for the installation, operation and maintenance of solar power systems based on their business or personal needs in making the switch to solar power.

The launch in Thailand was officiated by Sontirat Sontijirawong, Minister of Energy and Anupap Kuvinchikul, Senior Director of Banking Supervision Department, Bank of Thailand.

The government has been continuously promoting renewable energy in Thailand. It aims to increase the share of the country's total renewable energy power generation from 10 per cent in 2019 to 37 per cent or 20 755 MW in 2037.

# Vattenfall cleared for Kriegers Flak build

■ Permit awarded after additional EIA ■ SGRE installs 11 MW giant

Siân Crampsie

Vattenfall is on-track to complete the 605 MW Kriegers Flak offshore wind farm after receiving formal approval for the project from the Danish Energy Agency.

The agency has granted an environmental permit for the project, which is located in the Baltic Sea and set to be Denmark's largest offshore wind farm when completed at the end of 2021.

The environmental permit is open to an appeals process until March 2, 2020, after which Vattenfall will be able to start construction.

Kriegers Flak will comprise 72 Siemens Gamesa 6.4 MW wind turbines mounted on monopile foundations 15-40 km off the Danish coast.

Vattenfall began the construction process for the wind farm in May 2019 but a ruling by the Danish Energy Complaints Board on the environmental impact assessment (EIA) process for offshore wind farms forced the company to prepare a supplementary EIA for Kriegers Flak.

Vattenfall said it had managed to accommodate the extra EIA work within the existing flow of the project and so remains on track with the project

schedule.

Last year Vattenfall said that Denmark's new approach to EIAs – which requires developers to carry out project-specific EIA studies as well as strategic EIAs – would delay other offshore wind farm projects in the country by several years.

Vattenfall is developing two other offshore wind farms in Denmark – Vesterhav Nord and Vesterhav Syd – with a combined capacity of 350 MW and also featuring Siemens Gamesa 8.4 MW units.

Last month Siemens Gamesa completed installation of its SG 11.0-193

DD Flex prototype turbine at the Østerild Test Center in Denmark.

The 11 MW wind turbine was launched by Siemens in late 2019 and will be installed at Vattenfall's Hollandse Kust Zuid 1&2 offshore wind farms in the Netherlands in 2022.

The SG 11.0-193 DD Flex offshore wind turbine features a 193 m diameter rotor and can reach a capacity of 11 MW under certain site conditions, according to Siemens Gamesa.

Siemens started installation of the 11 MW prototype at Østerild in late 2019 and completed installation of the third and final blade on the nacelle in

early February. The unit will undergo a period of testing to monitor reliability and performance.

■ MHI Vestas has successfully completed the installation of its flagship offshore wind turbine, the V174-9.5 MW, at the Østerild Test Centre in Denmark. The company has a 934 MW order pipeline for the turbine, including projects in Europe and Asia-Pacific. The first units for commercial installation will be erected in 2022 as part of Iberdrola's 476 MW Baltic Eagle project and Parkwind NV's 257 MW Arcadis Ost 1 project off the German coast.

## EDF buys into Codling plans

Ireland's commitment to tackling climate change helped EDF with its decision to buy into the proposed 1 GW Codling offshore wind farm project, the French company said.

EDF has purchased a 50 per cent stake in the wind project from Hazel Shore and will partner with Fred Olsen Renewables to develop and build the wind farm, which is located off the

east coast of Ireland.

In a statement EDF indicated that Ireland's clear commitment to reducing carbon emissions – in particular its adopted Climate Action Plan – formed part of its decision to invest in the project, located south of Dublin, some 13 km off the coast of County Wicklow.

"We are very pleased to join the

Codling offshore wind project in partnership with Fred Olsen Renewables," said Bruno Bensasson, EDF Group Senior Executive Vice President of Renewable Energies and Chief Executive Officer of EDF Renewables. "We are committed to contributing to the Irish government's renewables goals.

"This important project clearly

strengthens our strong ambition to be a leading global player in the offshore wind industry. This is consistent with the CAP 2030 strategy that aims to double EDF's renewable energy generation by 2030 and increase it to 50 GW net."

Ireland's Climate Action Plan was adopted in July 2019 and aims for renewables to provide 70 per cent of

electricity generation by 2030. Offshore wind is expected to deliver at least 3.5 GW in support of reaching this target.

"Over the next couple of years, project development will continue with the intention that Codling will make a significant contribution to achieving the Irish Climate Action Plan targets," EDF said in a statement.

## Legal action stalls Drax

Plans for a new large-scale gas fired power plant in the UK have been put on hold by a legal challenge from environmental group Client Earth.

The organisation has launched a High Court challenge against the UK government's decision to grant consent for the project, being developed by energy group Drax in Yorkshire, northern England.

Client Earth is aiming to overturn the consent on the grounds that its carbon emissions would contribute to climate change and are at odds with the government's own plans to decarbonise the economy.

It says that the proposed 3.6 GW combined cycle plant would account for up to 75 per cent of the UK's power sector emissions and that the decision to approve the project contravened the advice from the government's own planning advisors.

"The Secretary of State has ignored the recommendations of her own planning authority, and her decision is at odds with the government's own climate change plans to decarbonise in a cost-effective manner," said Client Earth lawyer, Sam Hunter Jones.

Client Earth objected to Drax's 3.6

GW planning proposal last year. The generator says that the project – involving the conversion of two existing coal-fired units at its Selby site to gas-firing – is an important part of its plans to develop a flexible portfolio of assets and become carbon negative by 2030.

"We are exploring a range of options using different, flexible technologies, including this high efficiency gas project," said a Drax spokesperson. "It could support the continued decarbonisation of the energy system, helping the UK on its path to net zero by 2050, in line with the government's policies."

Analysis by Client Earth and Sandbag shows that over its lifetime the project could create 400 per cent more greenhouse gas emissions than in the scenario where the plant is not built.

The government's latest forecasts estimate that the UK will need 6 GW of new gas generation through to 2035. However, it has already greenlit more than 15 GW of large-scale gas plants, Client Earth says.

The government's climate body, the Committee on Climate Change, has warned there should be no more gas on the UK grid by the mid-2030s with-

out carbon capture and storage (CCS).

In its planning application, Drax said its proposal for four combined cycle units was warranted to replace its existing two coal fired units ahead of the government's proposed coal phase-out in 2025. However, ClientEarth believes that the combination of the project's scale, emissions intensity and operating life made it a significant threat to the UK's carbon targets.

Hunter Jones added: "In its planning application, Drax failed to explain how this emissions-intensive gas project squares with the UK's carbon targets and its strategy for clean growth. And the government's own energy forecasts show that the UK does not need a major roll-out of new large-scale gas generation capacity."

■ UK energy regulator Ofgem has launched a Decarbonisation Action Plan to ensure the UK reaches its 2050 net zero goal. The plan is made up of nine actions designed to support the expansion of renewable energy and facilitate electric vehicle growth. The actions include development of an offshore grid and creation of a new fund to unlock investment in innovative low carbon solutions.

## Germany floats hydrogen strategy



Germany could build up to 5 GW of hydrogen electrolysis capacity by 2030 under draft plans to develop a green hydrogen industry.

Economics Minister Peter Altmaier has drawn up a draft national hydrogen strategy that calls for widescale use of hydrogen across the economy and establishing Germany as a global pioneer in hydrogen technology.

According to German newspaper, *Der Spiegel*, the draft strategy has so far been circulated among Germany's government ministries and calls for 20 per cent of the hydrogen used in

Germany to be made from renewable energy by 2030. Much of the hydrogen required would have to be imported and the strategy proposes establishing partnerships with other countries able to make hydrogen in large amounts.

Germany initially announced plans for a hydrogen strategy in 2019 as part of its energy transition, which aims to end the use of fossil fuels and nuclear energy.

The strategy proposal is due to be formally published in the coming weeks, *Der Spiegel* reported.

# South Africa moves to break Eskom grip

Eskom could see its grip on South Africa's power sector loosened as the government tries to overcome the continued rolling blackouts plaguing the economy.

South African President Cyril Ramaphosa says that plans are afoot to create

a new electricity generation company to break the monopoly of Eskom, the failing state-owned energy company, while towns and cities will be permitted to buy independent power.

In a state-of-the-nation address last month, Ramaphosa said that the South

African "economy has not grown at any meaningful rate for a decade" because of the electricity crisis. Its recovery has stalled "as persistent energy shortages have disrupted businesses and people's lives," Ramaphosa added. Eskom currently owns 95 per cent of

the electricity used in South Africa and also purchases power from independent producers of green energy. The proposed new electricity company could be state-owned or a public-private partnership, and would utilise a range of energy sources, including gas,

solar power and clean coal, according to the Ministry of Mineral Resources and Energy.

The model would require the creation of a new regulatory framework and has been welcomed by the industrial sector, and the mining sector in particular.

## Renewables spike in sub-Saharan Africa

- Investors looking beyond mature markets
- Challenges remain for renewables growth

Siân Crampsie

Sub-Saharan African countries are seeing increasing capital flows into renewable energy, according to analysis from research company BloombergNEF (BNEF).

In 2018, \$2.8 billion was spent on renewable energy projects in sub-Saharan Africa (excluding South Africa) – a regional record and \$600 million more than the previous year, BNEF said.

The company cites falling technology costs, investor familiarity and subsidy schemes as being key drivers for the growth, with assistance from multilateral institutions helping technologies to gain footholds in the region's emerging markets.

According to BNEF, around 1.2 GW of solar photovoltaics (PV) are expected to come online in 2021 outside of South Africa – more than twice the amount commissioned in 2018.

Country-level targets and incentives in new markets are backed by assistance from multilaterals, which remain a key source of finance and have helped roll-out renewable energy auction programmes.

The World Bank's Scaling Solar

programme for instance awarded just under 400 MW of PV capacity over 2015-18, equivalent to 39 per cent of the total installed outside of South Africa over the same period. Such auctions have yielded some of the world's lowest bid prices for solar power – several projects have won capacity at prices under \$0.04/kWh.

But such auctions are double-edged, BNEF says. On the one hand, they prove that large-scale renewables can be procured throughout the region and help develop local familiarity with clean energy. Many are bundled with features designed to reduce project costs and risk, such as pre-secured sites. Yet, as BNEF analyst Antoine Vagneur-Jones points out, "that helps lower prices, but can also lead to government expecting to procure power at the same rates for projects that are not backed by such frameworks".

Other hurdles for renewables in the region include an apparent surplus of generating capacity in some countries. This can weaken the case for investment in renewable energy capacity, but plant availability issues and transmission constraints mean that the gap between supply and demand is often less clear than it would seem.

Meanwhile, a prevalence of take-or-pay contracts means that producers are remunerated for power that is not consumed. Whether by attempting to terminate or renegotiate contracts, governments are striving to reduce their obligations in countries such as Ghana, Kenya and South Africa.

According to BNEF, the development of regional power markets will allow countries to move beyond such bilateral agreements. Power has long been traded in southern Africa, and nascent power pools in eastern and western Africa will enable countries to exchange surplus electricity across their borders.

However, a lack of private investment in transmission infrastructure, concentrated power markets and small generation fleets will hinder their growth.

■ The global wind energy sector is projected to deploy over 626 800 MW of new capacity over the next decade, with over \$1 trillion expected in investments, according to a new report by Navigant Research. Growth could be led by expansion in Asia-Pacific, Latin America and the Middle East and Africa. China, Taiwan and Europe will lead the offshore market.

## Oman studies offshore wind potential

Oman will conduct a study examining offshore wind speeds in the Arabian Sea to gain a better understanding of its offshore wind energy potential.

According to H E Salim al Afi, Oman's undersecretary in the Ministry of Oil & Gas, existing data shows that nearly 10 m/s average wind speeds, at the height of 100 m, have been observed at certain near-shore areas in the Omani waters, rivalling the wind speed observations in the North Sea.

Speaking at an event in Muscat, Afi added that Oman has been considering the need for offshore wind energy capacity for several years, and could announce formal plans this year.

"For offshore wind power projects, we were looking at the possibilities for a long time. But, we are much more determined to look at them now," Afi

was quoted as saying by local media. "There are certain advantages such as larger turbines having higher capacity that can be set up offshore. The power generation capacity can be as high as 10 MW per turbine."

"We are doing some work in that space, and going forward there could be more announcements this year in this direction."

Oman is aiming for renewables to provide 30 per cent of its energy mix by 2030, equivalent to around 4.8 GW of capacity. At present, the country is tendering for solar energy of 1.7 GW and procurement of another 2.6 GW to be added in the pipeline.

Oman has commissioned one pilot onshore wind farm and is conducting studies to determine the best locations for adding more onshore capacity.

## Egypt kicks off Lekela build



Egypt has formally marked the start of construction at the 250 MW West Bakr wind farm in Ras-Ghareb.

Renewable energy company Lekela is building the project, which will form a key part of the country's ambition to generate 20 per cent of its electricity from renewable sources by 2022.

West Bakr will include 96 Siemens Gamesa SG 2.6-114 turbines and is expected to start operating in mid-2021. Lekela has signed a power purchase agreement and network connection contract with the Egyptian Electricity Transmission Company (EETC) and the New and Renewable Energy Authority.

The project will boost Egypt's wind

energy capacity by 18 per cent. Other key renewable energy projects in Egypt include the \$2 billion Benban solar project, a 580 MW wind farm at Jebel al-Zeit and three further solar projects at Siwa, New Valley and the Red Sea Governorate.

Last month EETC Chairman Sabah Mashali said that new power linkage contracts with Saudi Arabia would be signed in May 2020 as part of plans to cement the country's position as a regional energy hub.

Mashali noted that Egypt has turned its 3000-6000 MW energy shortage into a 40 per cent surplus, and that the country is also planning to establish power ties with Europe through Cyprus.

## Barakah given operating license

The UAE's first nuclear power plant has been given the formal go-ahead for 60 years of operations.

Unit One at the Barakah nuclear power plant has received its operating license from the UAE's Federal Authority for Nuclear Regulation, marking a key step in the country's nuclear energy regime.

When all four units at the Barakah plant are complete, the station will

supply 5600 MW of electricity, meeting up to 25 per cent of the UAE's electricity needs, according to the World Nuclear Association (WNA).

"This is a big step towards the start-up of Barakah, which will soon supply clean and reliable electricity to the UAE for generations to come," said Agneta Rising, WNA Director General.

With the operating license granted,

Nawah, the plant's operator, has begun the process of fuel loading, where 241 fuel assemblies will be lowered by crane into position in the reactor vessel. Following tests, start-up of the nuclear chain reaction and connection to the grid is expected later this year.

UAE will join several other newcomers to the global nuclear energy sector, including Belarus, which is due to start operations at Ostrovetz later this year.

Reactors are also under construction in two other newcomer countries, Bangladesh and Turkey, and projects are in development in Uzbekistan and Egypt.

The UAE largely depends on gas and oil to meet its power requirements and in 2012, got 98 per cent of its energy from hydrocarbons. It aims to cut this down to 76 per cent by next year and for half of its energy to come from

renewable sources by 2050.

The country began construction of its South Korean-designed nuclear power plants in 2013, with four reactors each designed with a capacity of 1.4 GW.

The UAE signed a '123 agreement' with the US for the peaceful civilian use of nuclear energy and also has agreements with Argentina, Japan and Russia to co-operate in the atomic power sector.

# Vestas leads rankings after record 2019

- 2020 outlook strong
- Competition heats up in global market

Siân Crampsie

Vestas has held its position as the world's largest wind turbine supplier following a record order intake for 2019.

The latest analysis of the global wind market by BloombergNEF (BNEF) shows that the Danish manufacturer holds an 18 per cent market share, ahead of key rivals Siemens Gamesa, Goldwind and GE.

Vestas announced last month that its wind turbine order intake increased year-on-year in 2019 by 3663 MW to 17 877 MW, a new record. It also increased profits and revenues over 2018, it reported.

The company closed 2019 with a net profit of €700 million (\$772.8 million), rising from €683 million a year back, as revenues grew to €12.15 billion and were close to the higher end of Vestas' forecast of €11-12.25 billion. At 8.3 per cent, earnings before interest and tax (EBIT) margin before special items was also within expectations, as were total investments, which rose to €729 million from €603 million.

"Wind energy manifested its position as a leading global energy source in 2019, driving Vestas' order intake to a record 17.9 GW, 20 per cent growth in revenue and expected high activity levels in the coming years,"

explained President and CEO Henrik Andersen.

Vestas also indicated that in spite of industry challenges such as trade wars, 2020 will also be a strong year with expected revenues of €14-15 billion.

According to BNEF, Vestas' 18 per cent market share is four percentage points lower than it achieved in 2018 as competitors made gains in the market. Vestas, Siemens Gamesa, Goldwind and GE collectively account for 55 per cent of the global market, but 2019 saw strong gains from Ming Yang, Windey and Dongfang Electric.

Siemens Gamesa jumped from fourth place to second in the rankings, BNEF noted.

Overall, global commissioning of wind turbines was up 22 per cent in 2019, thanks to a bumper year in China and the US, and an acceleration offshore, BNEF said. A further 24 per cent jump, to 75 GW, is expected in 2020.

Nearly half of all new megawatts installed in the US were from GE, enabling it to seize the top spot in its home market from Vestas. GE outperformed its rival by commissioning 40 per cent more than it had in 2018, while Vestas' installation total was stable. Siemens Gamesa enjoyed the biggest bounce of any of the players in the US, tripling its 2018 numbers and taking over the third place from Nordex.

"Underpinning each of the leading onshore players is a strong presence in either the US or China," said Oliver Metcalfe, wind analyst at BNEF and lead author of the report, '2019 Global Wind Turbine Market Shares'.

"2020 is set to be another strong year for installations in China and the US, as developers rush to build before subsidies lapse, but uncertainty post-2020 could expose some bigger players unless they diversify to new growth markets," Metcalfe said.

Total onshore wind additions in 2019 were 13.3 GW in the Americas, 9 GW in Europe and 0.5 MW in Africa and the Middle East, while Asia Pacific accounted for 30.4 GW.



## Total inks solar JVs

French oil group Total has boosted its solar energy credentials with new deals in Spain and India.

The firm has established a presence on the Spanish solar energy market through agreements with Powertis and Solarbay, and has expanded an existing partnership with Adani Group to develop solar energy projects in India.

In Spain, Total will build 2 GW of solar photovoltaic (PV) projects, with the first projects expected to start operating later this year.

It describes Spain's solar sector as "fast-growing" and "one of the most dynamic in Europe". The deal with Powertis will see the two companies build-out an initial 800 MW pipeline, while its agreement with Solarbay includes 1.2 GW of projects in the regions of Andalusia, Aragon and Castile-La Mancha.

Total will own 65 per cent of the joint venture with Powertis, and has agreed to purchase 100 per cent of Solarbay's PV portfolio in Spain. All of the projects will be on-line in 2023.

"Spain benefits from a solar resource that is unparalleled in Europe," said Julien Pouget, Senior Vice President Renewables at Total. "Its photovoltaic

market is one of the most dynamic in Europe, with an expected capacity increase from 6 GW to nearly 40 GW by 2030. Total is pleased to enter on this fast-growing market through partnerships with local developers."

In India, Total and Adani Green Energy Limited (AGEL) will create a 50/50 joint venture into which AGEL will transfer its solar assets in operation. These projects are spread over 11 Indian states and have a cumulative capacity of over 2 GW. All the projects benefit from nearly 25-year power purchase agreements (PPA) with national and regional electricity distributors, with a fixed rate.

"Total is fully engaged in the energy transition and to supporting India, a key country in the fight against climate change, in diversifying its energy mix through partnerships in natural gas and now in solar energy," said Patrick Pouyanné, Chairman & CEO of Total. "This interest in over 2 GW of solar projects represents another big step of our investment in India's energy sector. It will support our ambition to contribute to the deployment of 25 GW of renewable capacities by 2025."

## Equinor sets sights on offshore strategy

Equinor has set new long-term targets aimed at strengthening its position in low carbon energy production and aligning its business with the goals of the Paris Agreement.

The Norwegian energy firm has launched a climate roadmap, under which it is aiming to reduce its net carbon intensity of energy produced by at least 50 per cent by 2050, and grow its renewable energy capacity ten-fold by 2026.

Offshore wind energy will be a key pillar of its renewable energy strategy, it said.

"Today we are setting new short-, mid- and long-term ambitions to reduce our own greenhouse gas emissions and to shape our portfolio in line with the Paris Agreement. It is a good business strategy to ensure competitiveness and drive change towards a low carbon future, based on a strong

commitment to value creation for our shareholders," said Eldar Saetre, President and CEO of Equinor.

In 2026, Equinor expects a production capacity from renewable projects of 4-6 GW, mainly based on the current project portfolio. This is around 10 times higher than today's capacity, implying an annual average growth rate of more than 30 per cent.

Towards 2035, Equinor expects to increase installed renewables capacity further to 12-16 GW, dependent on availability of attractive project opportunities.

The ambition to reduce net carbon intensity by at least 50 per cent by 2050 takes into account scope 1, 2 and 3 emissions, from initial production to final consumption. By 2050 each unit of energy produced will, on average, have less than half of the emissions compared to today.

As well as renewables growth, the ambition will be met through changes in the scale and composition of Equinor's oil and gas portfolio. Operational efficiency, carbon capture usage and storage (CCUS) and hydrogen will also be important, and recognised offset mechanisms and natural sinks may be used as a supplement.

"Equinor's strategic direction is clear. We are developing as a broad energy company, leveraging the strong synergies between oil, gas, renewables, CCUS and hydrogen. We will continue addressing our own emissions in line with the emitter pays principle. But, we can and will do much more.

"As part of the energy industry, we must be part of the solution to combat climate change and address decarbonisation more broadly in line with changes in society," said Saetre.

## Engie, EDPR sign offshore venture

Engie and EDPR are targeting construction of up to 7 GW of offshore wind capacity through a new joint venture.

The two companies have signed a 50-50 joint venture agreement to construct wind farms and secure a project pipeline with a focus on Europe, the USA and Asia.

The deal follows an announcement made by the two companies in May 2019 as well as their cooperation as consortium partners in the Dieppe Le Tréport and Yeu Noirmoutier fixed

offshore wind projects in France and Moray East and Moray West in the UK. EDPR and Engie are also partners in two floating offshore wind projects in France and Portugal.

Engie and EDPR will be combining their offshore wind assets and project pipeline in the new entity, starting with a total of 1.5 GW of projects under construction, including the 950 MW Moray East in the UK, the 25 MW Wind Float Atlantic in Portugal, and the 487 MW SeaMade in Belgium.

The agreement also includes 3.7 GW of projects under development. These include: the 800 MW-950 MW Moray West in the UK; the Tréport and Noirmoutier projects with a combined capacity of 992 MW in France; the 30 MW Leucate also in France; the 1336 MW Mayflower wind farm in the USA; and the 400 MW B&C wind farm.

Subject to European Commission regulatory approval process, the new company could start operating in the first quarter of 2020.

## 10 | Tenders, Bids & Contracts

### Americas

#### OHL bags 136 MW Chile contract

Spanish civil engineering group Obrascon Huarte Lain (OHL) has secured two contracts worth €80 million (\$86.4 million) to build 136 MW of renewable energy projects in Chile.

The company was awarded the engineering, procurement and construction (EPC) contract by Austria-based renewables investor Clean Capital Energy Group (CCE) for an 86 MW solar photovoltaic (PV) project in the region of Atacama.

Alongside the full EPC, the scope of the €70 million Atacama deal includes operation and maintenance (O&M) services, OHL said.

The second contract, worth €10 million, was awarded by Spanish renewables developer OPD Energy SA. The agreement covers the balance of plant (BOP) for the 50 MW La Estrella wind project in Chile's O'Higgins region.

#### Nordex turbines for 83 MW Rio Grande do Norte wind farm

The Nordex Group has received an order to supply the turbines for the fourth construction phase of a wind farm complex in Brazil.

The wind farm is located in the state of Rio Grande do Norte near to the city of São Miguel do Gostoso and is being developed in four phases. Nordex will supply 24 of its AW132/3465 wind turbines for the fourth phase, bringing its overall capacity to over 256 MW.

Nordex will install the 24 turbines on 120 m concrete towers. The contract also includes a long term service agreement for maintenance and repair of the turbines for a period of 15 years.

#### OPG awards VOR contracts

Candu Energy has been awarded two five-year vendor of record (VOR) contracts by Canada's Ontario Power Generation (OPG).

The first VOR contract is for machine shop services to support OPG's facilities while the second contract covers nuclear safety analysis at Darlington, Pickering and the Western Waste Management Facility adjacent to Bruce Power.

Under the contract for nuclear safety analysis, SNC-Lavalin's team of nuclear safety experts, project managers and reactor engineers will deliver projects important to safety for the workers, environment and public.

The scope of work under the machine shop services contract will include machining, fabrication, heat treatment, welding and assembly of equipment for all OPG-owned sites.

#### Siemens bags 205 MW Canadian order

Siemens Gamesa Renewable Energy (SGRE) has won a 205 MW turbine order for part of a 400 MW wind energy complex in Alberta, Canada.

Suncor Energy has placed an order for 45 SG 4.5-145 turbines with flexible power rating for the Forty Mile wind power project. SGRE will also maintain the machines for 20 years following their commissioning in 2021.

The entire capacity of the Forty Mile wind farm will be switched on in December 2022. It will comprise a total of 89 turbines.

### Asia-Pacific

#### MHI picked for Zhong Neng

MHI Vestas Offshore Wind has been selected as the preferred turbine supplier for the 300 MW Zhong Neng offshore wind farm in Taiwan.

The company says it is in the final stages of developing a local supply chain for the project, which is being developed by China Steel Corporation and Copenhagen Infrastructure Partners (CIP). Local industrial partners will be unveiled in the next few weeks, it added.

The wind farm is due to go into operation in 2024.

#### Success in China for Vestas

Vestas has won an order from an unnamed customer to deliver 52 MW of wind turbines for a project in China.

Under the contract, the manufacturer will supply 12 units of its V150-4.2 MW turbines in 4.3 MW power optimised mode. It expects to start delivering the turbines in the last quarter of this year and commission them in the same quarter.

#### Wärtsilä boosts Bangladesh growth

Bangladeshi developer Jamuna Power has awarded Wärtsilä a contract to supply a 78 MW power plant to support the growth of an industrial complex in northeast Bangladesh.

Wärtsilä will supply eight of its 34SG engines on a fast track basis for installation at the Jamuna industrial Park, which is in need of an independent power supply to ensure reliability and support growth.

Delivery of the Wärtsilä equipment will be completed during the first half of 2020, and the plant is expected to become fully operational in early 2021.

#### BHEL launches floating solar tender

Bharat Heavy Electricals Limited (BHEL) is inviting tenders for contractors to set up a 100 MW AC floating solar project for the National Thermal Power Corporation (NTPC) in Telangana, India.

BHEL won a contract to develop the \$3.66 million plant in December 2018. It has already launched a tender process for the design and supply of the project's floatation platform.

The scope of work includes the assembly of floatation devices and is expected to be completed within six months of the contract award.

#### Raghuganga places BHEL order

Raghuganga Hydropower Limited (RGHPL), a unit of the Nepal Electricity Authority (NEA), has placed an order with BHEL for the electromechanical works for the Rahughat hydropower project in Nepal.

Under the order, BHEL will carry out the design, engineering, manufacturing, supply, erection and commissioning of the complete electromechanical package involving supply of two Vertical Pelton Turbines (20 MW each) along with associated equipment, matching generators, governors, controls and instrumentation, protection system, transformers, 220 KV switchyard and balance of plant (BoP) packages.

### Europe

#### Bilfinger wins Hinkley contract

Bilfinger has won a contract from Hinkley Point C for the execution design, supplier management, fabrication and

installation of piping systems for the construction of the new nuclear power plant in the South West of England.

The £58 million (\$74.13 million) contract will be completed by 2025 and demonstrates Bilfinger's "outstanding capabilities" on large-scale new-build projects, the company said. It will provide execution design, pre-fabrication and supply of pipework for the balance of plant package, which comprises piping systems that support the operation of the power station. The piping systems consist partly of steel and partly of glass-reinforced epoxy (GRE) pipework.

Bilfinger was already recognised as a strategic supplier to EDF's Hinkley Point C project in 2018 and has since received contracts worth €20 million for design preparation and planning work. In November 2019, EDF reaffirmed its intention to award the NSSS (Nuclear Steam Supply System) contract to Bilfinger. The award is expected later in 2020.

#### Stena orders Vestas units

Danish wind turbine manufacturer Vestas has secured a wind turbine supply contract from its Swedish customer Stena Renewables.

According to the contract, Vestas will supply its EnVentus V162-5.6MW turbines for installation at the Riskebo wind energy project in Hedemora municipality, Sweden. The 39 MW project will be the first in the country to use that turbine type.

The contract includes supply, installation and commissioning of the wind turbines and a 30-year service agreement. Vestas is planning to deliver the turbines by the third quarter of 2021, with commissioning planned for the fourth quarter of 2021.

#### ABB to deliver Triton transformers

MHI Vestas Offshore Wind to supply its WindStar transformers to the Triton Knoll offshore wind farm, 33 km off the east coast of England.

MHI Vestas will deliver 90 wind turbines for the wind farm and ABB's WindSTAR transformers will be installed in each turbine. The transformers are designed to fit inside the wind turbine and can withstand strong vibrations, sudden movements and variable electrical loading, typical of wind power.

The transformers also increase voltage to 66 kV, the highest voltage category for wind transformers.

#### Minesto signs Faroe PPA

Marine energy firm Minesto has signed a power purchase agreement (PPA) with Faroese utility SEV for a proposed tidal energy project in the Faroe Islands.

The PPA comprises both the planned installations of two 100 kW systems of Minesto's subsea kite technology and an additional 2 MW allocated for installations of utility-scale tidal energy systems.

Minesto eventually hopes to install up to 70 MW of tidal energy capacity in the Faroe Islands, which has set a goal of sourcing 100 per cent of its electricity needs from renewable energy by 2030.

#### Framatome signs OL3 service contracts

Framatome has signed a series of service contracts with Finnish utility TVO to support the long-term operation of the Olkiluoto 3 nuclear power plant.

The contracts are a key step in TVO's work to prepare the 1600 MW Olkiluoto 3 (OL3) for commercial operation. They will cover nuclear plant outage and maintenance scopes, including engineering, instrumentation and control (I&C) and non-destructive testing services.

"Our presence in Finland will allow us to effectively deliver these service contracts for the Olkiluoto 3 EPR and positions us to further support our utility partners in Finland and Sweden," said Catherine Cornand, Senior Executive Vice President of Framatome's Installed Base Business Unit.

#### Helen opts for Valmet

Valmet will supply a flue gas condensing plant to Helen Ltd's Vuosaari C bioenergy heating plant in Helsinki, Finland.

The new bioenergy heating plant will achieve very high energy efficiencies, as the heat from flue gases will be recovered to increase district heat production by 69 MW with Valmet's technology.

Valmet's delivery will consist of a flue gas condensing plant and condensate treatment equipment, including a boiler make-up water production system. The plant will be handed over to Helen in December 2022.

### International

#### Samsung wins UAE plant contract

Samsung C&T Corp., the construction unit of Samsung Group, has secured a Won1.15 trillion (\$970 million) deal to build a power plant in the United Arab Emirates.

Under the deal with F3 Holding Company B.V., Samsung C&T will build a 2 400 MW combined cycle power plant in Qidfa in the Emirate of Fujairah by the end of April 2023.

#### Success for Siemens in Belarus

Siemens has won an order from Belarus to supply six industrial gas turbines to state-run energy provider RUE Minskenergo.

It will supply six SGT-800 gas turbines for a new gas fired power plant being developed in Minsk, which will boost grid stability and the reliability of power supplies in Belarus.

The 300 MW plant will be designed for 700 operating hours and 350 cold starts per year, Siemens said. Commissioning is scheduled for December 2021.

Siemens' complete scope of supply includes the six SGT-800 gas turbines as well as associated generators and the control system PCS 7. It also includes the gas receiving station as well as high-, medium-, and -low-voltage equipment.

#### GE equipment to power Azito extension

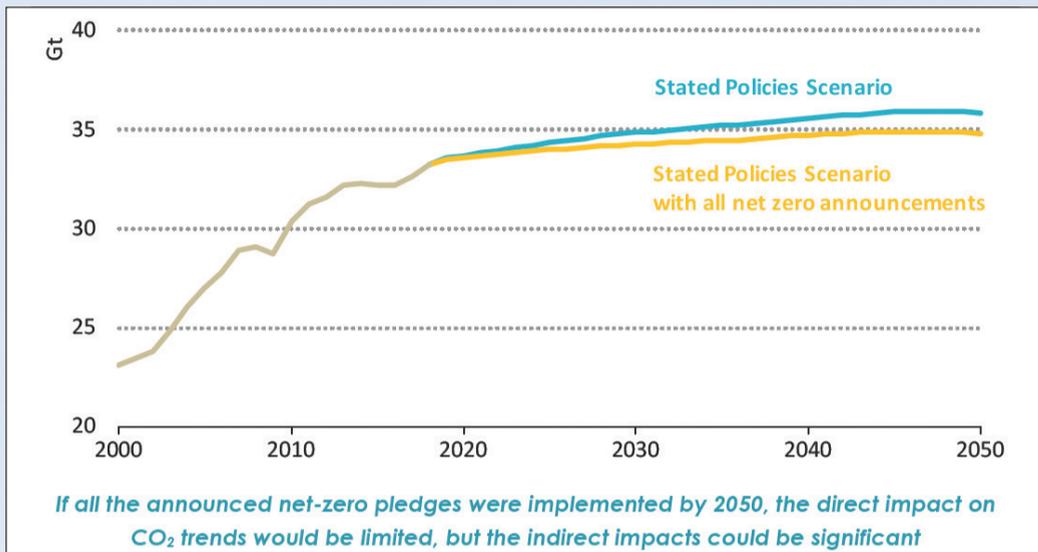
GE has been selected to provide generation equipment and 20-year services for Azito's phase IV extension combined cycle power plant in Côte d'Ivoire.

Under the order, placed by Azito Energie, GE will supply its GT13E2 gas turbine in combined cycle configuration, one heat recovery steam generator, one steam turbine generator, condenser and associated systems and maintenance services for 20 years.

The extension will add 253 MW to the gas fired power plant, located in Yopougon district of Abidjan in Côte d'Ivoire.

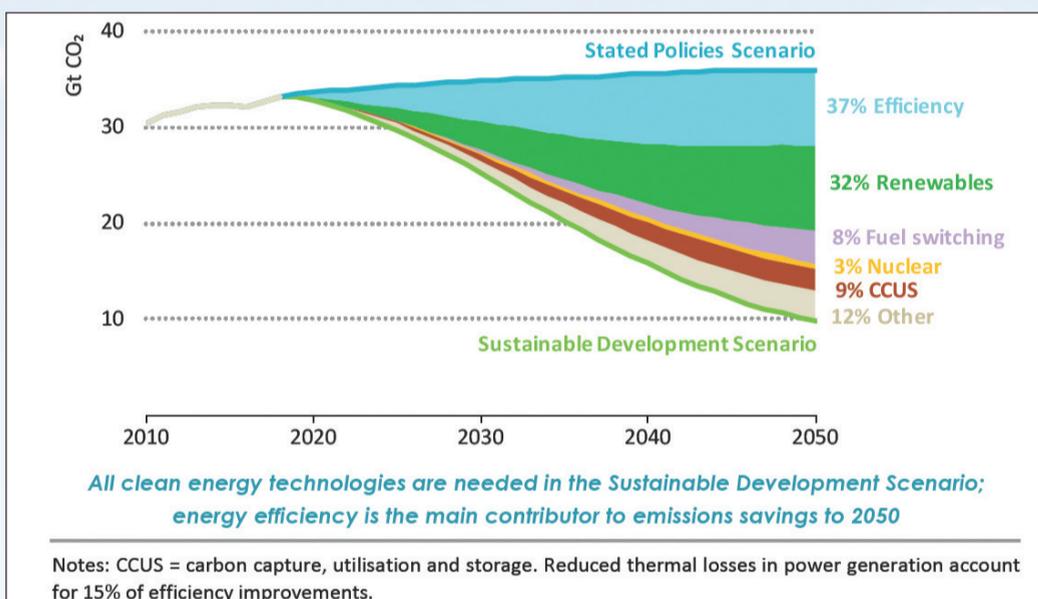


### Effects of including announced net-zero carbon pledges on CO<sub>2</sub> emissions in the Stated Policies Scenario



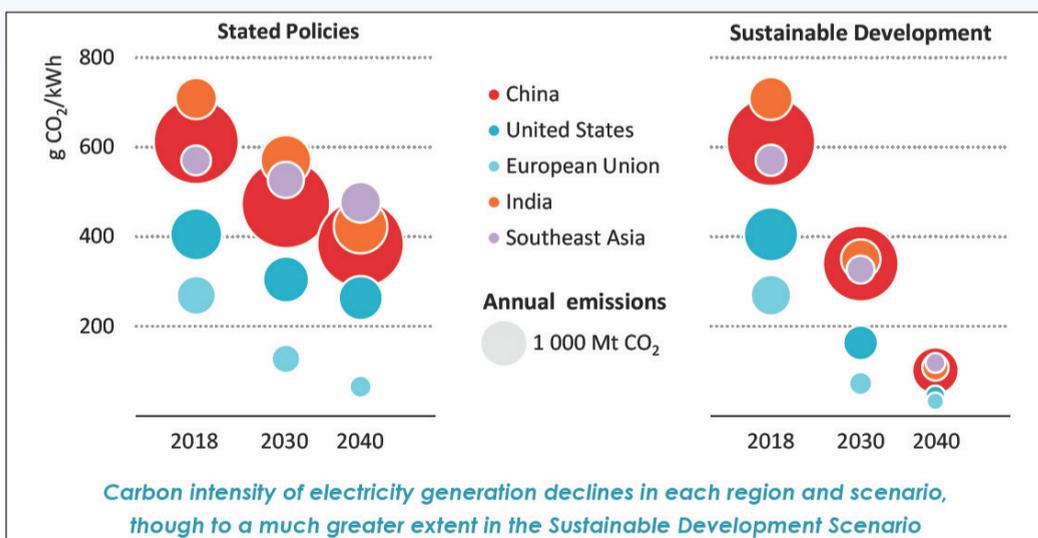
World Energy Outlook 2019, © IEA/OECD, Figure 2.15, page 100

### CO<sub>2</sub> emissions reductions by measure in the Sustainable Development Scenario relative to the Stated Policies Scenario



World Energy Outlook 2019, © IEA/OECD, Figure 2.16, page 102

### CO<sub>2</sub> intensity of electricity generation by region and scenario



World Energy Outlook 2019, © IEA/OECD, Figure 6.11, page 276

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# LNG demand will survive coronavirus

Despite slumping prices brought by the Covid-19 virus, long-term LNG demand will survive.

Gary Lakes

The novel coronavirus (Covid-19) has already had a major impact on global natural gas markets. As governments and international organisations prepare for what they fear could become an international pandemic, gas prices that were on a downward trend have slumped further, exacerbated by a continuing slip in demand in China, where millions of workers remain under quarantine and numerous factories remain closed or struggle to return to normal operations.

Falling gas demand in China was already having an impact on international gas markets prior to the outbreak, which is now affecting not just fuel demand, but other important industries that now use less energy than before the outbreak. Since the arrival of the Covid-19 virus, gas prices in Asia have fallen to under \$3/million Btu.

As February drew to a close, economists were already weighing the cost to the global economy and in many cases predicting a drop in economic growth, especially in China. Since China is such an important element in the global economy and the energy markets, the impact will be on an international scale. But at this point there is no way to tell just how serious it will get. Stock markets remain wary of conditions that continue to change. Despite efforts by the authorities in China and elsewhere to bring the disease under control, the number of people infected with Covid-19 continues to grow and the death rate increases.

Covid-19 is already responsible for serious business losses and if the disease spreads widely in other countries, the economic impact will drive energy demand downward in other parts of

the world. Certainly, Chinese demand for gas will slip further in the weeks ahead. Some estimates see natural gas demand in China falling by 6 to 14 billion cubic metres (bcm) during 2020.

According to a projection made by Wood Mackenzie, the restrictions on travel inside China and the disruption to economic activity will likely affect domestic gas production and pipeline delivery by a reduction of around 1.6-2.9 bcm, but LNG deliveries will be more affected. Under a best case scenario projected by the Edinburgh-based consultancy, demand for LNG could decline by 2.6 million tons, but a prolonged situation could see this rise to 6.3 million tons. Wood Mackenzie said the Covid-19 outbreak could not have come at a worse time for an already oversupplied global LNG market. Moreover, reduced demand does not bode well for the 27 million tons of LNG that is due to come on-stream this year, the company said.

The Covid-19 outbreak is creating a serious disruption in supply chains for a number of industries that rely on Chinese suppliers, including auto manufacturing, pharmaceuticals and digital devices. The shipping industry is also confronting major disruptions in its activities.

The shipping industry has reported that Covid-19 has forced a number of LNG tankers to divert to other destinations. Shippers also report that Covid-19 has caused quarantine measures to be put in place at many cargo ports around the world, creating logistical problems as vessels are screened for the virus by port authorities.

China is the most important LNG market in the world. Since 2015, the country has accounted for 40 per cent of global growth in demand, spurred mainly by China's drive to reduce emissions pollution into the air of its

cities caused by burning coal. Ironically, scientists have determined that the coronavirus is responsible for reducing China's carbon emissions by some 25 per cent, as cities have cut back on burning coal, according to a report in the UK's Independent.

Eventually the virus will hopefully be brought under control. Once demand for gas begins to recover, China is expected to resume its place among LNG importers. Currently in second place behind Japan, China is seen as moving into the number one slot within a few years.

However, the trouble that faces the LNG market today is not enough to lead LNG producers to despair. As the current glut is eventually absorbed, LNG is forecast to become an even more widely used source of energy.

Demand for LNG is seen as rising significantly as the world switches from coal-to-gas and Asia is viewed as being a key market. According to its 'LNG Outlook 2020', Shell said it expects to see the LNG market back in equilibrium by the mid-2020s and grow to 700 million tons by 2040 as natural gas plays a "growing role in shaping a lower-carbon energy system".

"The global LNG market continued to evolve in 2019 with demand increasing for LNG and natural gas in power and non-power sectors," the Shell report said. "Record supply investments will meet people's growing need for the most flexible and cleanest-burning fossil fuel."

The report said that global LNG demand rose by 12.5 per cent to reach 359 million tons in 2019, and that LNG imports to China increased by 14 per cent last year, while Bangladesh, India and Pakistan saw combined growth of 19 per cent with imports amounting to 36 million tons. "Asia is expected to

remain the dominant region in the decades to come, with South and Southeast Asia generating more than half of the increased demand," the report said.

During 2019, the report said, Europe absorbed most of the year's supply growth as competitively-priced LNG furthered coal-to-gas switching in the power sector and replaced declining domestic gas production and pipeline gas imports. Last year, 40 million tons of LNG supply became available and was consumed on the market and new projects with final investment decisions were made for 71 million tons.

"While we see weak market conditions today due to record new supply coming in, two successive mild winters and the coronavirus situation, we expect equilibrium to return, driven by a combination of continued demand growth and reduction in new supply coming on-stream until the mid-2020s," Shell's Director for Integrated Gas and New Energies, Maarten Wetselaar, said in a statement accompanying the report.

Shell said the LNG market is being encouraged by the fact there is an increase in diversifying contractual structures, providing a wider range of options to LNG buyers. "New spot-trading mechanisms and a wider variety of indices used for long-term contracts point towards LNG becoming an increasingly flexible commodity," the report said.

The 'Gas Exporting Countries Forum Global Gas Outlook 2050', released in early February, also forecasts a significant increase in demand and use for natural gas globally, particularly for LNG. The global gas trade is expected to increase by 84.6 per cent by 2050, at 1.9 per cent annually, and reach a level of 2141 bcm. LNG will be the "main driving force" and will exceed total pipeline trade by 2050, compared

to 2018 when it amounted to only half of pipeline trade, the report said.

The LNG sector is forecast by the GECF to increase by 2.9 per cent annually to 1077 bcm by 2050, while gas shipments through pipelines will grow at 1.2 per cent annually to 1063 bcm by mid-century.

Additional import demand for natural gas by 2050 will come from Asia Pacific, Latin America and Europe, with total increases of over 600 bcm, 140 bcm, and 100 bcm, respectively, the report said. This will be met in the medium-term by supply increases from Eurasia and North America, and in the longer term with new supply from Africa and the Middle East.

Sixty-three countries were importers of natural gas in 2018, but that number will grow to 81 by 2050, while net exporters will possibly grow from 28 to 32 countries by 2030 and stay there until 2050. Over the next 30 years, some \$9.7 trillion is earmarked for investment in the gas sector, most of which is upstream, according to the GECF, but infrastructure will require a further 400 billion, over half of which will go towards liquefaction plants. Most of that \$400 billion will be invested in Africa, Asia Pacific and Eurasia, the report said.

The GECF report added that LNG infrastructure will see a much faster build-up than pipeline trade as it requires far fewer intergovernmental agreements and is much less affected by geopolitical tensions. By 2050, LNG production capacity will be more than 800 million tons annually, compared to 380 million tons in 2018. At the end of 2019, there was 129 million tons of capacity under construction, which will be operating within the next five years. Over the next two decades, another 253 million tons of capacity is expected to be built.

# Utilities are key to the cars of the future

The UK recently announced plans to ban all polluting cars by 2035. Any country going down this path, however, will need to make changes to its existing grid infrastructure to manage the added demand from electric vehicles, says Oracle Utilities' Dan Byrnes

A shift to electric vehicles (EVs) has never been more viable than it is right now. For starters, consumers are opening up their minds to more environmentally friendly forms of transportation. This could be largely due to advancements in EV technology increasing vehicle range and new models and options making the price tag more tenable to a wider range of buyers.

Currently, Tesla is selling around 40 000 Model 3s a month, and every major manufacturer from Porsche to Volkswagen has new models in the making.

But electric vehicles aren't just a viable option. Soon, for motorists, they'll become one of the only options. Just last month, the UK government announced it will ban the sale of all polluting cars by 2035, and all eyes are on EVs as an alternative. The International Energy Agency predicts the installed base of EVs could reach as much as 125 million in 2030, compared to 3.1 million in 2017. But is our utility infrastructure ready for so many more cars plugging in?

While the rise of EVs will help in our global goal of being more environmentally friendly, it cannot happen without an impact on our existing electricity grid. The grids were built a long time before even cars were a commercially viable consumer product – let alone EVs. So, as transportation evolves from gas to the grid, utility retailers need to start

factoring in the substantial increase in energy demand across the country, but with peaks in certain areas.

Estimates suggest the shift to EVs will mean peak energy loads will grow from 1 to 4 per cent. That doesn't seem like a lot, but it could bring with it volatile, unpredictable energy spikes at both a local substation and feeder level. In certain urban areas, where the population is denser, EV charging could be responsible for as much as 30 per cent peak growth. For individual households, the impact will be just as significant, with energy usage increasing by 15 per cent or more. And during peak times, energy use could even double.

The year 2035 isn't that far away, so the pressure is mounting now for utility providers to start planning for the shift if we're to minimise its effects. The UK energy regulator, Ofgem, has proposed system reforms to support the electric vehicle revolution, planning for extra grid capacity to be built. The government's 'Automated and Electric Vehicles Act' has made it easier to install charging points at motorway services, meanwhile. But how do utility providers work out where to expand or in which locations to add additional charging points?

The first step will be understanding the impact EVs are currently having on the grid, including full visibility of the current footprint of EVs within concentrated areas, as well as the energy consumption habits of their owners.

Luckily, technology is available to help utilities better understand these factors. With machine learning and advanced analytics added to data intelligence from household energy patterns and Advanced Metering Infrastructure data (where available), utilities can now detect and disaggregate the presence of EVs within a household. Using this technology, utility companies can glean the time and frequency of charging, and as such, better predict energy consumption and forecast future demand as more EVs come online.

This is critical for several reasons. First, it helps time and resource-strapped utilities make needed assessments on grid investments. They can then assess whether enhancements are needed to meet supply and demand today or whether customer engagement programmes can help curb and even-out the flow of charging at peak times.

This insight also allows utilities to become trusted advisors to customers who may be in the dark as to how owning an EV is impacting their energy footprint and bill. By giving customers insight into both these factors, utilities can incentivise EV owners to change their charging

behaviour to plug-in at off-peak times – saving them money and supporting the health of the energy grid.

In the future, similar engagement programmes could be used to buy back unused energy from their customer's EV batteries, further benefiting the customer while balancing supply and demand in times of need.

EVs are set to change the way we get from A to B, and are also going to change the way we consume energy. But it'll be a disaster if the grid

just isn't ready to support an influx of EVs on the road. Utilities need to start planning now, to manage the changes that the EV explosion is going to bring. Advanced analytics and machine learning are helping utilities manage the shift, and ensuring the impact of EVs is a positive one, for consumers and energy grids alike.

*Dan Byrnes is Senior Vice President of Product Development at Oracle Utilities.*

## Global EV count climbs to 7.9 million

The number of electric vehicles (EVs) on the road worldwide has risen to around 7.9 million in 2019, according to a recent report by the Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW).

In terms of totals, China remains the global leader with 3.8 million EVs, followed by the USA with nearly 1.5 million. Norway takes third place with 370 800. Japan is in fourth place with around 300 000 e-cars, followed by France with 274 100 and the United Kingdom with 235 700. Germany is in seventh place with 230 700 electric vehicles, which is one higher than the previous year's placing.

New registrations reached a record high in 2019 at 2.3 million vehicles worldwide. However, the global growth rate was just four per cent, compared to 74 per cent in the previous year. This development is largely attributable to the reduced subsidies for battery-powered vehicles in China and the USA. Even so, the number of new registrations in these countries approached the previous year's marks with 1.204 million in China, down 52 000 from the previous year, and 329 500 in the USA, down 31 800 from 2018.

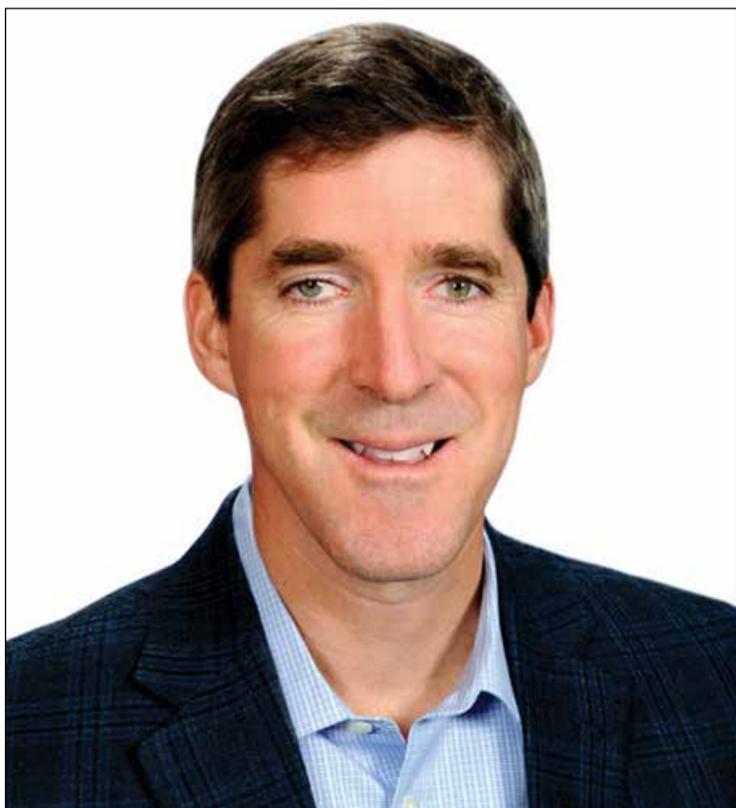
In Europe, Germany bucked the international trend as the number of new registrations continued to rise, topping last year's 24 per cent growth rate with 61 per cent this year. The country is now third worldwide with 108 600 newly registered electric cars, moving up one place from last year's showing. Norway follows in fourth place with 81 540 newly registered vehicles.

A different picture emerges when it comes to EV's share of total new passenger car registrations. More than one of every two new passenger cars in Norway is electric. This 57 per cent share is the largest worldwide. By comparison, electric cars account for three per cent of new registrations in Germany, five per cent in China and two per cent in the USA.

The report encompasses only those passenger cars and light commercial vehicles with battery-powered electric drives, range extenders and plug-in hybrids – that is, all vehicles that are charged externally with electrical power. It does not factor in full hybrid vehicles that can cover shorter distances with a relatively small battery, but cannot be charged externally; nor does it include mild hybrids and vehicles equipped with fuel cells. This assessment is based on data from the German Federal Motor Transport Authority, government agencies and NGOs abroad, and other sources.

The authors of the report were able to ascertain the number of previously and newly registered electric vehicles in countries worldwide. However, data on specific makes and models is not available on a global scale. The authors therefore based their analysis of newly registered makes and models on data sourced from the 18 largest markets for e-vehicles. ZSW says its figures represent a conservative assessment of actual developments.

**Byrnes: Electric vehicles aren't just a viable option. Soon, for motorists, they'll become one of the only options**



# Blustery conditions

Although offshore wind goes from strength to strength, the situation for onshore wind power has not been all plain sailing. **Junior Isles** explains.

These are challenging times for onshore wind. Although some markets around the globe have performed well, the uncertain outlook for some of Europe's key markets is having a negative impact on several of the sector's main original equipment manufacturers (OEMs).

Germany has long led the field in installing onshore wind power capacity in Europe and is the biggest market in the region. But its onshore wind sector has struggled in recent years, bringing domestic expansion down to the lowest level in 20 years in 2019.

According to the German Wind Energy Association (BWE), by the end of 2019, 29 450 onshore turbines with a total capacity of nearly 54 GW were in operation across the country. With a gross expansion of about 5.3 GW, the year 2017 saw the strongest capacity growth ever. However, expansion slowed by more than half in 2018 to 2.4 GW, and shrunk by more than half again the following year. In 2019 only 325 new onshore wind turbines with a capacity of 1078 MW were newly installed.

Obtaining permits for new projects remains challenging and the proposed new distance rule will not help. The government's proposal for a minimum distance of 1000 m from the next residential area in Germany's Climate Action Package has been widely criticised by industry. According to BWE, the rule would diminish potential construction space by 40 per cent.

Meanwhile the UK has also witnessed a dramatic decline over the last four or five years. The installation of new onshore wind farms fell dramatically after the government scrapped subsidy schemes four years ago. According to trade association, Renewable UK, just 23 new onshore wind farms began operating last year, a fraction of the 2014 peak when more than 400 new onshore wind projects were set up. The 2019 figures are also well below the UK average set over the last decade of 208 new

projects a year.

The difficult conditions, and in particular the collapse in Germany, which is widely blamed on regulatory problems that have held up permitting, has impacted the operations and future strategy of several of the world's leading OEMs.

In November, Enercon, the leading supplier to the German market said it would cut around 3000 jobs at its headquarters and outsourced production plants in Aurich and Magdeburg, with further job losses feared at suppliers, logistics firms and service providers.

The challenges in Germany and shifting pattern in global demand also affected competing manufacturers, including Vestas and Siemens Gamesa Renewable Energy (SGRE), which also announced there would be job losses in Northern Europe. And last year saw Senvion taken over by SGRE after filing for bankruptcy.

Assessing the market conditions Wood Mackenzie noted that the global onshore wind industry would reach maturity this decade.

According to the research and consulting firm, solar power has emerged as the biggest threat to onshore wind's dominance in the decarbonisation battle. However, the tools available to the wind sector to combat this challenge are diminishing, according to Wood Mackenzie. It said the "evolutionary marathon" that occurred during the last decade will continue in 2020 and beyond, although constraints on technology innovation are on the horizon for onshore turbines.

While further cost reductions could occur within the industry, the "low hanging fruit has already been picked", it said, adding that "additional reductions will be marginal and dependent on the extended value chain as turbines reach maturity".

Dan Shreve, Wood Mackenzie's Head of Global Wind Research, commented: "In some ways, the wind energy market is beginning to resemble the natural gas CCGT market.

"The final wave of consolidation is already upon us within wind turbine OEM ranks. Senvion has folded, Suzlon is under fire from investors in India and Enercon is reeling after the collapse of the German onshore market. Siemens acquired Gamesa in 2017, while Vestas joined ranks with Mitsubishi Heavy in 2013."

He also said that once US market demand normalises, OEMs looking to gain global market share might have an eye on Nordex Group due to its attractive global positioning. "The Nordex group will likely come back into play once the US market comes back down to earth in 2023," said Shreve.

According to the most recent data released by the Global Wind Energy Council (GWEC), the US saw an installation rush last year with nearly 10 GW installed. This was driven primarily by the Production Tax Credit (PTC) phase-out, and is expected to continue driving installations in 2020. Shreve says, however, that once the US market returns to normal it "will add an additional strain on western turbine OEMs who are locked out of a booming Chinese market".

Shreve added: "If regional giants fall prey to global corporations, it is feasible that 98 per cent of the western wind market will fall under the control of three companies. A similar dynamic is likely to occur within the Chinese wind energy market, especially given the highly concentrated asset owner segment within the country.

"The passing of industry pioneers is bittersweet, though likely a necessity to yield the next round of cost reductions for global wind."

Commenting on the Senvion acquisition, while announcing its 2020 Q1 results, Markus Tacke, CEO of Siemens Gamesa, said: "The service business of Senvion is attractive, somewhat in line with the profitability of our own service business. So the benefit is two-fold: it extends our service backlog – there is 9 GW of additional backlog we can work with in markets that are very relevant for us; at the same time it helps to build our competence to service non-Siemens Gamesa fleets."

SGRE completed the acquisition of Senvion's service business at the start of this year and said it expects to complete the acquisition of the blade factory in Portugal before the end of March.

Tacke also said that, given its market share, the slowdown in Germany has had "very limited impact" on SGRE. However, he added: "At the same time we are preparing our next generation product, the 5 MW platform, which addresses Northern European market conditions, including Germany. So we see that market coming back." Indeed Germany saw a fully subscribed auction for the first time in 2019 – the previous seven auctions had all been undersubscribed.

Tacke said Q1 delivered "mixed results" for the company with some positives around order intake and cash but profitability was clearly short of expectations. This he said was largely due to an unforeseen €150 million impact from costs on five onshore projects (1.1 GW) in northern

Europe, mainly Norway, caused by adverse road conditions and the unusual early arrival of winter weather, which delayed project execution substantially. The cost impact, however, is seen as a one-off. Tacke said: "...we do not expect it to recur in future quarters as we are taking the necessary measures. We have stepped up risk analysis to ensure project execution is on track and we will also strengthen our internal control system to avoid a recurrence."

SGRE maintains that despite the mixed results, the long term global outlook for the onshore sector remains solid. The company says the main growth opportunities are in emerging markets but says mature markets like the US will continue to be important.

In its recently published Annual Report, global market leader in onshore wind, Vestas, noted that the wind energy industry underwent significant change and consolidation in 2019. In the near-term, however, it said the onshore segment is seeing strong growth in global installed volumes and is expected to make a step-change to more than 40 GW or more a year from 2020 onwards compared to less than 30 GW in 2018, excluding China.

"Besides the large, well-known markets such as the USA, China, and Germany, and the EU's proposed renewable energy target of more than 50 per cent by 2030, global activity is increasingly shaped by the emergence of new sizable markets – for example, Colombia, Russia, Brazil, and India," the report stated.

In Europe meanwhile, Spain, France, Poland and Sweden look set to pick up some of the slack created by slowdowns in Germany and the UK. Notably, in December Poland held the largest European dedicated onshore wind auction ever with a total volume of 2.2 GW. The average bid of €49/MWh was lower than the wholesale electricity price.

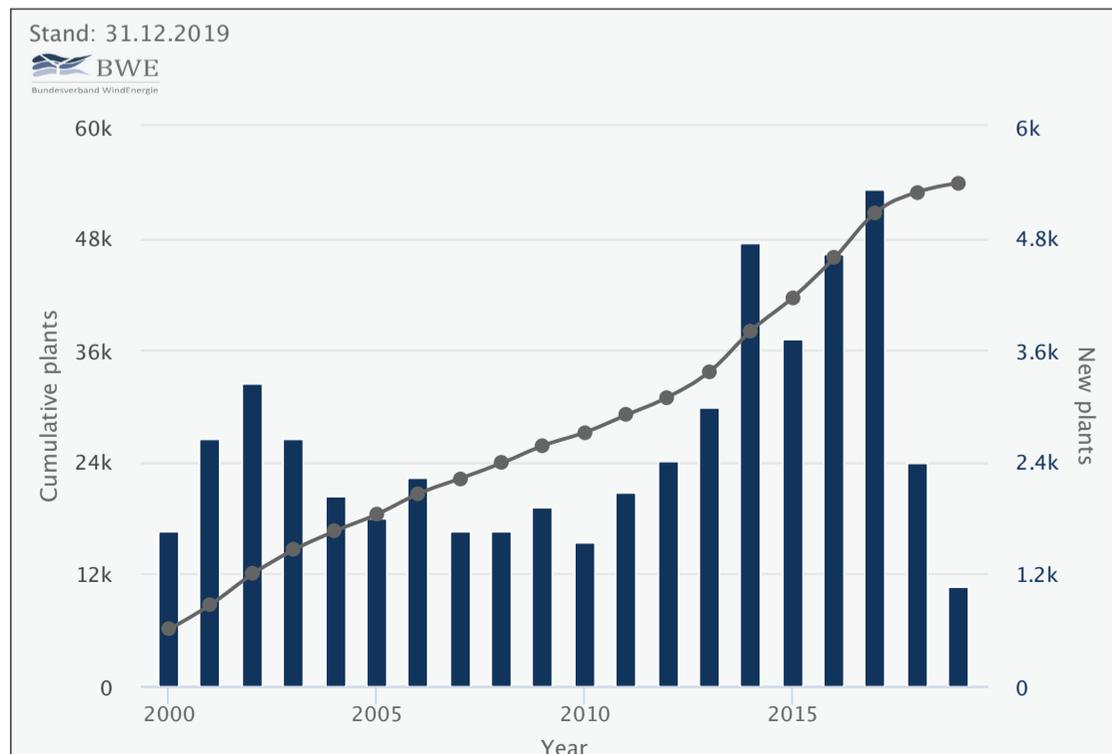
Globally, 2019 was a mixed year for onshore wind, which saw several of the major OEMs forced to make significant adjustments. But most are confident in their strategies and remain positive going forward.

Felix Losada, a spokesperson for Nordex Group, said: "With the internationalisation of markets and the high level of dynamic competition in recent years, supply chains are being adapted throughout the industry. For example, the proximity to large markets is sought in order to optimise logistics costs and offer them competitively. That's why we've globalised and expanded our production and supply chains. We now have production sites in Latin America, India and Europe – close to our volume markets."

With both Vestas and SGRE reporting strong order backlogs and the long term market growth predictions being solid, there is reason to remain confident that onshore wind will continue to play a leading role in global efforts to decarbonise.

The mood is perhaps best summed up by Tacke, who, during the results presentation, said: "We are in an industry with huge potential and we are taking advantage of this with intense commercial activity."

Installed wind energy capacity in Germany as of December 31, 2019. Expansion hit its lowest level in 20 years in 2019. Source BWE



## Technology

# Trading places

With the help of a new energy management and trading platform, energy managers can now trade based on evidence and statistical analysis via AI-driven technology, with no need to rely on just the opinion of a broker.

Junior Isles explains.

Energy management today is not just about reducing the cost of consumption. With flexible markets and the ability to trade, there are tremendous commercial opportunities for energy consumers, if their energy managers can make more accurate trades more reliably.

Last year, UK energy management consultants ZTP introduced what it sees as a revolutionary software platform that could be a game-changer in terms of managing energy costs and mitigating risks on energy trades.

ZTP was established in 2012, originally procuring energy for real estate clients. Joe Warren, co-founder

start trading the energy for our clients," said Warren. Taking this next step, however, was not straightforward.

Warren explained: "There was a massive challenge on the data side – the visibility of what's going on: what's my open position, what's my close position? For example, if the market moves two per cent today, does that mean my budget of £10 million has jumped two per cent? Or, if you consider that non-commodities represent more than half the bill, and I've already locked-out more than 80 per cent of my position, a two per cent rise may look scary on a graph but on my budget it's only a matter of pounds. We had none of this visibility whatsoever."

ZTP therefore set about building Kiveev, which is essentially a platform to improve business performance and mitigate risk. "It started off as this admin piece but we soon realised there was a massive opportunity on the risk management element," said Warren.

Kiveev has been designed to digitalise the procurement and management of flex power and gas contracts, providing users with enhanced clarity of position, risk mitigation, time saving and budget control.

ZTP says it spotted a gap in the market whereby many domestic and international multi-site businesses buying high volumes of energy on flexible/monthly contracts, had no system in place to monitor and forecast their energy usage, analyse current market prices, forecast future prices or build-in accurate risk calculations.

"Basically, what we are saying is if today's [energy] price is, say £40/MWh, what's the chance of that going up to, say £50/MWh tomorrow or in 5 days, 6 months or 12 months, for example? Or coming down to £30/MWh?" said Warren. "So we started looking at how we could build this risk management piece. There was no commercially available tool that we thought was anywhere near good enough."

Development of the platform was undertaken through a two-year project in collaboration with the University of Kent's Kent Business School (KBS) and School of Mathematics, Statistics and Actuarial Science (SMSAS). Funding for the project was secured in May 2018 from

Innovate UK and the Economic Research and Social Council (ESRC).

"With funding from Innovate UK, it had to be innovative. So we had to build new and very advanced risk modelling software, concentrating on UK power and gas. And once we'd gone as far as we could at that stage with the model, we would then start looking at Europe."

The two-year project would see the partnership design and build risk management algorithms that will enable UK and multi-national businesses to mitigate risk associated with open energy market positions. Ultimately, the platform will engage stakeholders from multiple countries and aggregate risk reporting to a single reporting facility.

A major milestone in the project was reached in March last year with the official launch of the platform. Using artificial intelligence (AI), the platform will enable users to: track and forecast consumption; build and analyse budgets; design trade strategies; assess market conditions and price forecasts; calculate risk; record trades and positions; evaluate strategies and report on performance.

As Kiveev constantly monitors the market, businesses can quickly react to market conditions and immediately see the impact against purchasing strategies. Investigation of price trends can also be performed through the Kiveev market dashboard. This dashboard provides: live data – live commodities exchange and OTC price data; market commentary – daily and weekly market insight commentary; delivered cost – total transparency with built-in non-commodity rate algorithms; strategy library – strategy builder and library provides users with more control; alerts – live alerts provide a constant over-watch; and legislative change – updates on legislation to ensure users are aware of changes.

With the UK modelling complete for now, although modelling is an ever-progressing process, the next stage is to carry out modelling for the European markets.

According to ZTP, there are two elements to doing this. The first is the "range", which Warren describes as "a fan chart of where prices may go". He explained: "We are using AI to apply different models to different forecasts. Tomorrow's range forecast might be a very different mathematical model to a six-monthly forecast. And we are using AI to determine which model, or combination of models, has been the most accurate."

The second element, which Warren says is perhaps the more exciting part, is price forecasting.

"Here, as well as predicting the chance of it being between this range, we are also predicting what the price will be. Again, it is using AI or machine learning to say, for example, determine what effect does oil have on UK power or what influence does wind production have? And doing the same for Germany, wind production, for example, will definitely have a very different influence on German markets to that of the UK. So we put different weightings on these predictors, which could be anything from weather to interest rates and any

number of commodities. For example, the models are constantly monitoring the price of carbon, as that is going to have a major impact on UK and European power prices. We use AI to say what level of impact that predictor is having and to enable the model to keep correcting itself. It basically uses all the data available to it to predict where prices will go."

So far, modelling has been done for nine EU power markets (in addition to the UK) and seven gas markets. State-by-state modelling is also ongoing for the US. "Modelling is now being client-led. If a client wants, say, Japan, the first check is: is it an open market and the second is can we get the data? If there is enough data, we can model it and get back to the client," said Warren.

ZTP also says it has branched out from real estate and is already speaking with a number of the biggest energy users in the UK. These include retailers, car manufacturers, chemical production companies and other industrial players.

Warren noted: "Previously these companies just wouldn't give any sort of time to a traditional energy broker – although we don't see ourselves as 'energy brokers' – because they probably know the energy market better than the person that's calling them. But now suddenly, they can have some technology and digitalised information that helps them trade much better."

"Kiveev is a really big turning point for them... no one has this level of risk modelling; certainly there is nothing nearly as advanced."

The payback for big energy consumers can be huge and in some cases immediate. "It could save a lot of money: we're talking double-digit percentages," said Warren. "Not necessarily by consumption reduction but by trading better. Although there is a cost to having the software, which isn't in anyone's budget... the payback could be from a single trade. So it could be one day. We recently saved a client over £100 000 on one trade – the cost of the software was nowhere near that for that particular client." He added: "It's trade, so it's not risk-free but it certainly mitigates the risk tremendously compared to what we see at the moment, which is basic gut decision and over-reliance on a consultant's opinion."

With the ability to predict with 98 per cent confidence that a future spend will fall within a given range, and all within a dynamic system, Kiveev demonstrates the power of AI as a new tool for energy managers.

Warren concluded: "It is impossible to keep up as a human: If you wanted to look at this level of detail on your Excel spreadsheets, you literally can't. So this is really exciting. And it digitalises the whole aspect of trading – of using your own data to see the implications on your budget or delivered costs. Users can then make much more informed trading decisions and open themselves to opportunities to reduce their costs massively, while protecting themselves against increases in costs. It's a fundamental improvement in how people can now trade energy."



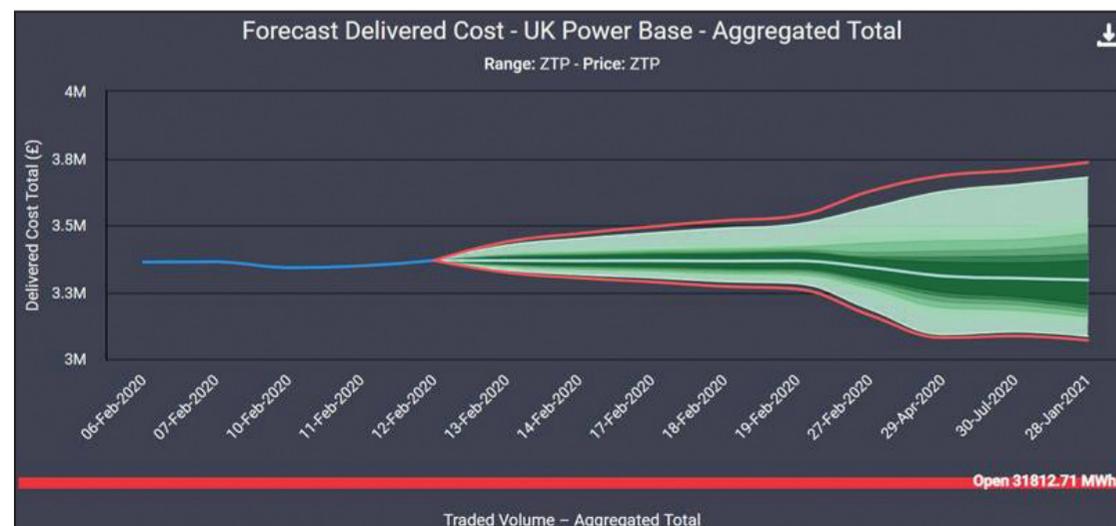
Warren: "We are using AI to apply different models to different forecasts"

and Director explained the challenges facing energy managers in the sector at the time.

"The immediate challenge back then was getting hold of data. Everything was run wholeheartedly manually. There were individual sites doing individual contract negotiations, getting individual bills by PDF and paying them, which would then go onto an accounting system somewhere else. We had to give people the ability to report on their costs, consumption and carbon emissions."

To address the issue ZTP developed its Trace software, which essentially digitalised the energy procurement, bringing visibility to consumption patterns across multiple buildings. This in turn then opened up the flexibility market to ZTP. "Suddenly we had a big enough consumption to allow us to

"Range" forecasting is an important part of the modelling





Junior Isles

# Ups and downs of a flatlining world

For want of a better word, February was “wavy” (not in the urban sense). On a personal level, the undulations of the Caribbean sea was a high; followed by a brief low of news that our cruise ship was suspected of having passengers that contracted the novel coronavirus just days after the end of our journey. Fortunately the results were negative; it seems we are in the clear – for now.

Meanwhile, news of global carbon emissions flatlining last month came as a pleasant surprise – and a welcome relief from the hugely worrying headlines surrounding the coronavirus, Covid-19, which is threatening to become a global pandemic.

In spite of widespread expectations of another increase, global energy-related carbon dioxide emissions stopped growing in 2019, according to data released last month by the International Energy Agency (IEA).

The Paris-based agency reported that after two years of growth, global CO<sub>2</sub> emissions remained unchanged in spite of the economy growing by

almost 3 per cent. The halt in carbon growth has largely been put down to progress in decarbonising the electricity sector – greater use of renewables, switching from coal to gas, and more nuclear. Subsequently, power generation from coal fired plants in advanced economies declined by nearly 15 per cent as a result.

The IEA said global power sector emissions declined by some 170 Mt, or 1.2 per cent, with the biggest falls taking place in advanced economies where CO<sub>2</sub> emissions are now at levels not seen since the late 1980s (when electricity demand was one-third lower). “Emissions trends for 2019 suggest clean energy transitions are underway, led by the power sector,” it said.

The power sector now accounts for 36 per cent of energy-related emissions across advanced economies, down from a high of 42 per cent in 2012. The average CO<sub>2</sub> emissions intensity of electricity generation fell by nearly 6.5 per cent in 2019, a rate three times faster than the average over

the past decade. In absolute terms, an average emissions intensity of 340 grams of CO<sub>2</sub> per kWh in 2019 is lower than all but the most efficient gas fired power plants.

According to the IEA, the growth of renewables in electricity generation in advanced economies delivered 130 Mt of CO<sub>2</sub> emissions savings in 2019. Wind accounted for the biggest share of the increase, with output expanding 12 per cent from 2018 levels. Solar PV saw the fastest growth amongst renewable sources, helping to push renewables’ share of total electricity generation close to 28 per cent. Coal-to-gas fuel switching for power generation avoided 100 Mt of CO<sub>2</sub> in advanced economies and was particularly strong in the United States due to record low natural gas prices. Higher nuclear power generation in advanced economies, particularly in Japan and Korea, avoided over 50 Mt of CO<sub>2</sub>.

Global CO<sub>2</sub> emissions from coal use declined by almost 200 million tonnes (Mt), or 1.3 per cent, from 2018 levels, offsetting increases in emissions from oil and natural gas. Economic growth in advanced economies averaged 1.7 per cent in 2019, but total energy-related CO<sub>2</sub> emissions fell by over 370 Mt (or 3.2 per cent), with the power sector responsible for 85 per cent of the drop.

Looking at where the most cuts in CO<sub>2</sub> were made, the US saw the largest decline in 2019 on a country basis – a fall of 140 Mt, or 2.9 per cent, to 4.8 Gt. US emissions are now down almost 1 Gt from their peak in the year 2000, the largest absolute decline by any country over that period. A 15 per cent reduction in the use of coal for power generation underpinned the decline in overall US emissions in 2019. Coal fired power plants faced even stronger competition from natural gas fired generation, with benchmark gas prices an average of 45 per cent lower than 2018 levels. As a result, gas increased its share in electricity generation to a record high of 37 per cent.

In the European Union, including the United Kingdom, energy-related CO<sub>2</sub> emissions dropped by 160 Mt, or 5 per cent, to 2.9 Gt. The power sector drove the trend, with a decline of 120 Mt, or 12 per cent, resulting from increasing renewables and switching from coal to gas. Output from EU coal fired plants fell by more than 25 per cent in 2019, while gas fired generation increased by nearly 15 per cent to overtake coal for the first time.

Germany spearheaded the fall in the EU. Its emissions fell by 8 per cent to 620 Mt of CO<sub>2</sub>, a level not seen since the 1950s, when the German economy was around 10 times smaller. The country’s coal fired power fleet recorded a drop in output of more than 25 per cent year-on-year as electricity demand declined and generation from renewables, especially wind increased (+11 per cent). With a share of over 40 per cent, renewables for the very first time generated more electricity in 2019 than Germany’s coal fired power stations.

The UK continued its progress with decarbonisation as output from coal fired plants fell to only 2 per cent of total electricity generation. Rapid expansion of output from offshore wind, as additional projects came online in

the North Sea, was a key driver. Renewables provided about 40 per cent of electricity supply in the UK, with gas supplying a similar amount.

Japan saw energy-related CO<sub>2</sub> emissions fall 4.3 per cent to 1030 Mt in 2019, the fastest rate of decline since 2009. The power sector experienced the largest drop in emissions as reactors that had recently returned to operation contributed to a 40 per cent increase in nuclear power output. This allowed Japan to reduce electricity generation from coal, gas and oil fired power plants.

Emissions outside advanced economies grew by nearly 400 Mt in 2019, with almost 80 per cent of the increase coming from Asia. Coal demand continued to expand in the region, accounting for over 50 per cent of energy use, and is responsible for around 10 Gt of emissions. Fortunately, this was offset by cuts in advanced economies.

In addition to declining emissions in advanced economies, the IEA also attributed the halt in CO<sub>2</sub> output to milder weather in several countries and, notably, slower economic growth in some emerging markets.

However, it is far too soon to rest on our laurels, with the IEA warning that emissions would need to fall more sharply still to meet the goals of the Paris climate agreement. “We now need to work hard to make sure that 2019 is remembered as a definitive peak in global emissions, not just another pause in growth,” said Dr Fatih Birol, the IEA’s Executive Director.

But although 2019 might the year CO<sub>2</sub> emissions stopped rising, 2020 could be the year it gets moving again. And not because of lack of effort.

Last year emissions in China rose, even though tempered by slower economic growth and higher output from low-carbon sources of electricity. As is often the case, the words ‘China’ and ‘emissions’ are never far apart. Unfortunately, this time it is human ‘emissions’ infected with Covid-19 that are the immediate concern.

As of February 28th, the virus had infected around 85 000 people globally – nearly 79 000 of which were in mainland China, where it originated. The outbreak has had a severe impact on China’s industries and subsequently the world economy. For example, last month Hyundai was forced to halt output across all its car factories in South Korea after running out of engine components from China. At the same time, many of the world’s stock markets plummeted to their lowest levels since the 2008 financial crisis.

The impacts of the virus have been profound and it will be some time before supply chains in the energy sector and other industries return to normal. And as energy consumption slumps due to falls in industrial output, so will emissions rebound.

While we are all hoping for the virus to be brought under control quickly, it will be interesting to see how the IEA’s figures for global carbon emissions play out in 2020. No doubt there will be a huge spike as China gets the virus under control and returns to normal economic production.

A harbinger of doom might surmise: it seems one way or another, we’re all doomed; if the virus doesn’t get us, the impact of carbon emissions will.

