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Get connected

The importance of more interconnected transmission systems is being recognised by the European Union.
Page 13

Catching the beat

Developers and OEMs are warming to the beat of Brazil's wind energy auctions.
Page 14

Final Word

It's time to change course or risk sinking, says Junior Isles.
Page 16

News In Brief

Hydrogen economy gains momentum
The use of hydrogen as an alternative energy carrier is continuing to gain momentum in Europe and Asia.
Page 2

California commits to 100 per cent renewables goal
The state of California has set a new high bar in clean energy in the US by pledging to reach 100 per cent renewable electricity by 2045.
Page 4

South Australia warns on renewables without storage
South Australia's Energy Minister has warned that Victoria's push for wind and solar without storage is putting its security of supply at risk.
Page 6

End of China-EU solar trade war seen as "watershed" moment
Europe's removal of tariffs on imported Chinese solar panels could make solar the continent's dominant energy source in just a few years.
Page 7

Nuclear cast aside in new SA plan
South Africa has favoured the expansion of renewable energy, natural gas and hydropower over nuclear energy.
Page 8

Six becomes five as UK competition heats up
The UK's so-called "big six" of energy retail is set to become the "big five" after the competition authority provisionally approved a merger between SSE and Innogy.
Page 9

Fuel Watch: Power of Siberia project nears completion
The Power Siberia Project will boost Russian-Chinese energy cooperation.
Page 12

Technology: Milking the ORC
A dairy in Italy is set to install a cogeneration plant that uses an Organic Rankine Cycle (ORC) that will operate at a high temperature.
Page 15

Transition will double electrification of energy demand, says new report

Electrification of sectors such as transport and industry will see the role of electricity in energy demand almost double by mid-century, according to a new report. **Junior Isles**

A new report says that continuing rapid electrification will see electricity's share of the total energy demand more than double to 45 per cent in 2050.

According to DNV GL's *'Energy Transition Outlook (ETO) 2018: Power Supply and Use'* report, this will be driven by substantial electrification in the transport, buildings, and manufacturing sectors. In the transport sector, the uptake of private electric vehicles (EVs) will continue to escalate rapidly, with 50 per cent of all new cars sold in 2027 in Europe expected to be EVs.

DNV GL's ETO 2018 report, which provides an outlook of the global energy landscape up to 2050, says the surge in global electricity production will be powered by renewable sources accounting for an estimated 80 per cent of global electricity production in 2050. As the costs for wind and solar continue to fall, those two energy sources are set to meet most of the electricity demand, with solar PV delivering 40 per cent of electricity generation and wind energy 29 per cent.

One of the report's major findings is that rapid electrification will lead to major expansion of electricity transmission and distribution systems both in the length and capacity of transmission lines. DNV GL predicts that the total installed power line length and capacity will more than triple by 2050.

While this will make the system operators' tasks substantially more complex, there may well be less energy flowing across the networks, resulting in fixed costs becoming a greater part of the bill, the report claims.

Despite major expansion of high-capital-cost renewables and electricity networks, energy will become more affordable. It is predicted that the total cost of energy expenditure, as a share of global GDP, will fall from 5.5 per cent to 3.1 per cent, a drop of 44 per cent. Absolute energy expenditure will still grow by 30 per cent over the forecast period, to $6 trillion/yr. DNV GL foresees a shift in costs, from operational expenditure, principally fuel, to capital expenditure. From 2030, more capital expenditures will go into electricity grids and wind and solar than into fossil-fuel projects.

Fossil fuels will, however, continue to play an important if reduced role in the energy future with its share set to drop from around 80 per cent today to 50 per cent by the middle of the century. The other half will be provided

Continued on Page 2

Power sector transformation crucial to EVs

Although electric vehicles can generate up to 67 per cent lower greenhouse gas (GHG) emissions than a gasoline internal combustion engine (ICE) car on a well-to-wheel basis, their competitive advantage depends on power sector transformation.

According to Wood Mackenzie's latest research on mobility transition, comparing GHG emissions from an EV and a petrol ICE car is not straightforward, noting that even though EVs have zero tailpipe emissions, they are not GHG emissions-free when evaluated on a well-to-wheel basis.

Notably, the research found that when there is a high share of coal or other fossil fuels in the power mix, typical in Asia Pacific countries, the competitiveness of EVs versus ICE cars decreases.

The company says its analysis is unique in that it focuses on well-to-wheel assessment. This involves a number of factors – how the fuel is produced in refineries, where the crude oil is sourced from, mileage of the car, how the electricity is produced, and the energy use associated with vehicle and battery manufacturing and charging. These factors differ from country to country.

Aman Verma, Wood Mackenzie Research Analyst, said: "When using our integrated model, based on the existing electricity generation mix in developing economies such as China and India, an EV can only displace up to half the GHG emissions of an ICE gasoline car."

Commenting on the findings of the report, Prakash Sharma, Wood Mackenzie Research Director, said: "The most crucial factor in sustaining the current advantage for EVs is decarbonisation of the power sector. As gasoline ICE vehicles become more fuel efficient, the power mix must comprise more renewables for EVs to remain GHG competitive. Currently, the power sectors in the UK and US are 30 per cent less emissions intensive than markets in Asia.

The organisation points out that the findings in the report reflect the current state, noting that "only time will tell" if power sector decarbonisation will go hand-in-hand with EV cost reduction and adoption.

Transport is largely viewed as the second major sector after power that needs to decarbonise. At the recent Global Power and Energy Exhibition (GPEX) 2018 in Barcelona, Spain, Oliver Weinmann Managing Director, Vattenfall Europe Innovation noted that "electricity has been quite a success story" but there was still a need to decarbonise transport – where emissions were still rising – and heat.

Chairing a discussion at the conference on decarbonising transport, Albert Cheung, Head of Global Analysis, Bloomberg New Energy Finance said there were now 4 million EVs globally and that figure was rising by 1 million every six months. In Europe, he said BNEF data showed that in Europe, EVs currently represent 2.5 per cent of vehicle sales but that figure would rise to 14 per cent by 2025.

Continued from Page 1

by renewables. Natural gas will become the single largest energy source in 2026 and will meet 25 per cent of the world's energy needs by 2050. Oil will peak in 2023 and coal has already peaked. Solar PV (16 per cent of world energy supply) and wind (12 per cent) will grow to become the most significant players amongst the renewable sources with both set to meet the majority of new electricity demand.

Commenting on the findings Remi Eriksen, Group President and CEO of DNV GL said: "The attention of boardrooms and cabinets should be fixed on the dramatic energy transition that is unfolding. As money and policy increasingly favour gas and renewables, the rapidly electrifying energy system will deliver efficiency gains that outpace GDP and population growth. This will result in a world needing less energy within half a generation from now."

He added: "We need to capitalize on the affordability of the energy transition and take extraordinary measures to create a sustainable future. We have a window of opportunity to increase energy efficiency, renewable energy and carbon capture and storage to meet the Paris Agreement but we must act now."

DNV GL says that "the transition is undeniable", noting that last year, more gigawatts of renewable energy were added than those from fossil fuels. "This is reflected in where lenders are putting their money," Eriksen said.

Eriksen: the attention of board rooms should be fixed on the dramatic energy transition

Despite the positive outlook on the expansion of renewable energy and the electrification of key sectors, the energy transition will not be fast enough to meet global climate targets. In fact, DNV GL found that the first emission-free year will be 2090, if the energy transition continues at the pace predicted in its report.

"The 'Energy Transition Outlook' has some very encouraging findings, and the good news is that the energy transition is achievable and affordable. However, the rapid transition we are predicting is still not fast enough to achieve the goal of the Paris Climate Agreement," commented Ditlev Engel, CEO of DNV GL's Energy business. "If we are to decarbonise the world's energy system at the required speed, we need to adapt and automate our electricity grids, and regulators and politicians will need to re-think, reshape and take major policy decisions about market models."

In a separate report released by ResearchAndMarkets.com, the global renewable energy market will close out 2018 with 154.6 GW of new power generation capacity and $228.3 billion in investments. According to its '*Global Renewable Energy Outlook 2018*' report, investments in power generation is forecast to decline slightly (-0.7 per cent) over 2017 due to reductions in solar capacity additions in China, but this restraint will be offset by the growth in most technologies and regions.

UK nuclear programme stutters forward

- Jobs axed as Moorside seeks investors
- Bechtel takes on new role at Wylfa

Junior Isles

The United Kingdom is continuing to face an uphill struggle as it pushes forward with plans to build a new fleet of nuclear power plants.

NuGen, the company responsible for developing the Moorside project in Cumbria is still seeking a major new investor after power company, Korea Electric Power Corp (Kepco), lost its preferred bidder status in July.

Last month, a Toshiba spokesperson confirmed that early talks with multiple bidders are ongoing. The announcement followed rumours it was in talk with Canada's Brookfield Asset Management to broker a deal.

While Toshiba branded the rumours as speculation, a spokesman said the company "continues to consider additional options", including sale of its shares in NuGen to Kepco. "We are carefully monitoring the situation, in consultation with stakeholders, including the UK government," he said.

The NuGen project in Moorside faced setbacks after Toshiba's nuclear arm Westinghouse ran into financial trouble last year.

The future of the Moorside Nuclear Power station was thrown into further doubt in September after around 70 out of 100 jobs were axed.

Commenting on the job losses, Justin Bowden, of trade union GMB, said: "The looming collapse of this vital energy project has been depressingly predictable for months." He called on the government to take a stake in Moorside, to secure the project's future and reduce the overall cost of the scheme, which will ultimately be paid for by consumers through their bills.

Speaking at an industry conference in Cumbria last month, Tom Samson, Chief Executive of NuGen vowed to "fight tooth and nail" to salvage the £15 billion project. In his first public address following the announcement of the job losses, he warned that the threat of winding up the company was "very real". He said: "The deal with Kepco may still come to fruition, but we cannot just wait for them to make a decision. It is essential that this project (Moorside) goes ahead and we therefore have to consider alternative ways forward."

Kepco is understood to have a deal for NuGen on the table but will not sign on the dotted line until it has undertaken a study into the risks and profitability of applying the Regulated Asset Base model to finance Moorside, which allows government regulators to ensure stable returns and finance through government support.

Although Samson and other nuclear supporters have voiced the importance of nuclear in the electricity mix, the change that has taken place in the energy landscape since the project were first proposed now throws their economics into question.

A recent report from the National Infrastructure Commission (NIC), an independent body that provides the government with impartial advice on major long-term infrastructure challenges, recommended delivering just one more nuclear power station after Hinkley Point C. It said that project should be the Horizon Nuclear Power project at Wylfa Newydd. It advised the government to then pause for around 10 years to gather evidence on how competitive renewable energy and battery storage projects are in comparison.

In late August, the UK's embattled nuclear plans received a brief respite with the news that Bechtel would continue its participation in the proposed Wylfa nuclear power project in Anglesey. The announcement followed reports in early August that the US engineering would withdraw from the project based on its assessment that the drastic rise in construction costs would make it hard to make money on the project.

The company has now been appointed the new role of Project Management Contractor, leading contractual and commercial communications with suppliers on the North Wales scheme. Under the deal, Bechtel will send about 200 employees to Horizon to jointly select subcontractors and equipment suppliers. Earlier, Horizon planned to outsource the selection work mainly to Bechtel. Cooperating with Bechtel on the operations will help curb costs, Hitachi said.

There was more positive news with another of the UK's proposed projects as China General Nuclear (CGN) confirmed that it would remain the majority financial investor for the Bradwell nuclear station. The company also said that the station will be built using China's flagship third generation nuclear technology.

The company, however, has admitted that political sensitivities could prompt it to give up the chance to operate a new atomic power plant in the UK, as the group also outlined ambitious plans for an industrial partnership with Britain.

The news will help allay fears surrounding Chinese involvement in projects that are deemed important to national security.

CGN is due to hold a majority stake in the Bradwell plant, with France's EDF having the remainder, under a contract signed between the two companies in 2016. But Prime Minister Theresa May – in contrast to her predecessor David Cameron – has put Chinese investment in the UK's nuclear energy sector under increased scrutiny since she took office.

Zheng Dongshan, Chief Executive of CGN's UK subsidiary told the *Financial Times* it would consider not running the Bradwell plant.

Hydrogen economy gains momentum

The use of hydrogen as an alternative energy carrier is continuing to gain momentum in Europe and Asia.

Under a non-binding agreement signed by energy officials at a meeting in Linz, Austria, in September, EU member countries said they will "aspire to investigate how to integrate renewable hydrogen into the gas grids gradually".

Speaking at the meeting, Austrian Energy Minister Elizabeth Kostinger said Austria submitted to EU energy ministers the hydrogen initiative, which attracted several member states, organisations and companies. "It is a big challenge to be able to use renewable energy at those times when the sun is not shining, the water level is low or the wind is not blowing," she said.

She also said that energy storage solutions are crucial to stock energy and to store it in the case of overproduction.

The initiative calls for member states, companies and organisations to enhance cooperation on research into the potential for hydrogen use as a future energy source, she added.

EU energy and climate chief Miguel Arias Cañete welcomed the initiative, saying it could help Europe meet its obligations to cut carbon emissions under the 2015 Paris accord. He also told reporters it could contribute to energy security by reducing imports of natural gas, much of which is shipped from Russia and countries outside of Europe.

Hydrogen made with renewable energy has long been proposed as an effective replacement for fossil fuels, but the practical uptake has been slow, with more support for electrification instead.

Advocates say that using more hydrogen can stabilise energy prices and supply that can be erratic from fluctuating supplies of wind and solar. Converting electricity generated by renewables into hydrogen means the energy can be stored in large tanks for long periods and released again when necessary.

They say hydrogen fuel cell vehicles become just as clean as electric vehicles (EVs), which need large lithium-ion battery packs to store their energy. Fuel cell vehicles generate power on board, taking away the range restrictions EVs face; and the fuelling can be done in less than five minutes versus a half hour or more for recharging an EV.

Countries such as Japan, Australia, parts of the US and, most recently, Korea, have been taking steps down the hydrogen path.

Last month South Korea said it will draw up a comprehensive road map on developing its hydrogen industry by the end of the year to support the emerging sector and reduce the country's air pollutants.

The Ministry of Trade, Industry and Energy said it would set policy goals for hydrogen technology development, industrial complexes and incentives to facilitate its role in the renewable energy system. It plans to submit a bill later this year to provide a legal framework for the hydrogen industry, management and market, and include its use in the third basic energy plan.

Baltic and EU grids move closer to synchronisation

Plans for further EU grid integration took a major step forward last month when the transmission system operators (TSOs) of Estonia, Latvia and Lithuania signed the application for joining the Baltic power grids with the Continental Europe Synchronous Area by 2025.

The application was next due to be submitted to Poland, which was then expected submit an official application to the European Network of Transmission System Operators (ENTSO-E) in late September.

The synchronisation will be carried out through a 1000 MW AC LitPol Link between Lithuania and Poland and a 700 MW DC undersea cable.

In order to ensure energy security, other stabilisation technologies such as synchronisation compensators and electricity system stabilisers will be employed.

Lithuania's Litgrid, Latvia's AST and Estonia's Elering on October 11th will submit an application to the Connecting Europe Facility (CEF) for €432 million in funding for the project's first stage. The total estimated cost of the project is €1.4 billion, 75 per cent of which will be covered by the EU.

The 2025 deadline for completion of the synchronisation was decided in an agreement signed in June by the Baltic countries, Poland and the European Commission.

California commits to 100 per cent renewables goal

■ Carbon neutral goal set for 2045 ■ Offshore wind sector sees opportunity

The state of California has set a new high bar in clean energy in the US by pledging to reach 100 per cent renewable electricity by 2045.

Governor Jerry Brown last month signed Senate Bill No. 100 into law, creating a new state policy of sourcing all of the state's electricity needs from renewable and other zero-carbon sources by the end of 2045. He also signed an executive order directing the state to achieve carbon neutrality by 2045 and net negative greenhouse gas emissions after that.

"This bill and the executive order put California on a path to meet the goals of Paris and beyond. It will not be easy. It will not be immediate. But it must be done," said Governor Brown.

Senate President pro Tempore Emeritus Kevin de Leon, author of the legislation, said that the move would "send a message to the rest of the world" over climate change.

California's existing RPS sets a target of 33 per cent renewable electricity by the end of 2020, 40 per cent by the end of 2024 and 50 per cent by the end of 2030. This will now be revised to 50 per cent by 2025 and 60 per cent by 2030.

The legislation could pave the way for California to exploit its offshore wind resources, campaigners say.

Responding to the signing of the bill, Liz Burdock, Executive Director of the Business Network for Offshore Wind, said Governor Brown and the state of California had taken an historic leap forward for clean energy.

"Recent commercial advancements in floating technology mean California's offshore wind resource is an awakening goliath," said Burdock. "By including offshore wind as a key resource to meet its new goal, California will grow local businesses, create thousands of good jobs, attract billions of dollars in private investment and deliver not only clean but affordable electricity to California's grid."

Burdock added: "Experience has shown that bold state policy goals are key to establishing an offshore wind development pipeline over time."

Offshore wind activity in the US has so far been focused on the east coast. In addition, Pacific coast offshore wind energy would have to use floating wind turbine technology because of deeper coastal waters.

In September northern California energy authority RCEA and a consortium of private companies, including Aker Solutions and Principle Power, submitted a lease application to advance the first commercial scale project for floating offshore wind in the United States.

The partners are proposing to develop around 150 MW of offshore wind capacity off the coast of Humboldt county in northern California. The project would help to kick-start the region's offshore market, the partners said.

"SB 100 positions the Golden State to reap the benefits of this growing industry," said Burdock. "California's offshore wind resource is the perfect balance to the state's massive solar programme, because it provides peak power in the winter and in the late afternoon/early evening, when electricity demand is high and solar production is less strong."

Governor Brown said in a statement that California would aim to reach its carbon-neutrality goals by maintaining continued carbon emissions reduction and increased carbon sequestration in forests, soils and other natural landscapes. It will also implement programmes focused on improving air quality and public health.

RenovAr Round 3 to contract 400 MW of clean energy

Buenos Aires: Argentina is seeking more clean electricity

Argentina is gearing up to launch the latest round of its RenovAr renewable energy auction programme.

Renewable Energy Deputy Secretary, Sebastian Kind, said last month that RonovAr round 3 would be held in October 2018 and would aim to contract around 400 MW of clean energy.

According to Kind, the maximum capacity set per bid is 10 MW, while the minimum output of each project is set at 0.5 MW. The auction is expected to procure 350 MW of solar and wind capacity, 25 MW of biomass, 10 MW for small hydropower, 10 MW for biogas and 5 MW for landfill gas.

The tender will be officially launched in October. Bids will be accepted in March 2019 and the awarding of contracts should happen in July next year, the government said.

Argentina has so far held three RenovAr auctions – Round 1, Round 1.5 and Round 2. In Round 2, held in November 2017, 66 projects were awarded for wind, solar, biomass, biogas, landfill gas and small hydro.

US offshore wind pipeline grows

The USA is expected to have around 2000 MW of operating offshore wind energy capacity by 2023 thanks to a growing pipeline of projects.

The US Department of Energy's (DOE's) National Renewable Energy Laboratory (NREL) says that the offshore wind project pipeline has reached 25 464 MW of planned generating capacity. The growth is largely due to new state-level commitments, advances in permitting and energy offtake processes, and strategic research investments.

Walt Musial, principal engineer in charge of offshore wind research at NREL said: "While many factors impact the US offshore wind market surge, state commitments to adopt offshore wind deployment targets and their favourable procurement policies have accelerated our nation's offshore wind market activity, primarily along the Atlantic Coast."

NREL expects the offshore sector to expand into the Great Lakes, the southeast, the Gulf of Mexico and the Pacific.

IDB loan boosts Ecuador

■ Loan aimed at equipment renewal
■ Japan pledges finance

Ecuador is set to revamp and improve the reliability of its electricity system with the help of a $100 million loan from the Inter-American Development Bank (IDB) and a separate, $70 million facility from the Japanese government.

The IDB has approved a loan that will provide continuity to the bank's existing support regime for Ecuador as well as contribute to the government's efforts to promote investment in the electricity sector.

It has a 25-year term, a 5-year disbursement period, a 7.5-year grace period and a LIBOR-based interest rate.

In September, Japanese Prime Minister Shinzo Abe pledged low-interest loans to help Ecuador expand its power grid and promote the use of renewable energy.

The IDB loan will focus on equipment renewal, replacement and repowering in the national transmission and distribution systems. It will also help strengthen management and planning capabilities.

With the new IDB loan, the government of Ecuador will implement projects that will ensure service continuity, including technological measures aimed at enhancing the system's digitalisation and promoting its integrated management, IDB said.

In addition, these investments will improve the system's operational capabilities by replacing equipment that has reached the end of its life cycle or met its design capacity limit.

The funds will also support projects to boost environmental waste management capabilities and institutional strengthening to improve energy prospecting and analysis.

A6 auction adds to Brazilian grid

Brazil will add 2100 MW of capacity to its grid following the country's latest A6 energy tender.

The tender, which took place at the end of August, was slightly delayed due to a decision by a Federal Regional Court to allow Evolution Power Partners' UTE GPE Bahia I thermal energy project to take part in the auction.

Contracts for about 16 033 684 MWh at an average price of BRL140.87 per MWh ($34.84/MWh), or BRL23.67 billion ($5.70 billion/€4.89 billion) in total, were signed during the auction. Contracts were awarded for wind, biomass, hydropower and natural gas projects.

Wind energy won the lion's share of the capacity auctioned, with 1251 MW, followed by hydropower (458 MW), natural gas (363 MW) and biomass (28 MW. Winning bidders will be awarded long-term power purchase agreements for their projects, which are due to be commissioned by 2024.

EDF Energies Nouvelles said that it had won 276 MW of wind capacity in the auction, while EDP Renováveis (EDPR) won 429 MW.

EDF will implement a 147 MW addition to the 114 MW Folha Larga wind park, while the second project is a 129 MW expansion of the 183 MW Ventos da Bahia, which is due to start operating this autumn.

EDPR won capacity for its 176 MW Jerusalem and 253 MW Monte Verde projects, which will both be located in the northeastern state of Rio Grande do Norte.

South Australia warns on renewables without storage

South Australia's government has raised concerns about its neighbour's drive to ramp up renewable generation without sufficient associated storage.

Syed Ali

South Australia's Energy Minister Dan van Holst Pellekaan has warned that Victoria's push for wind and solar without energy storage is putting its security of supply at risk.

He said the Victorian Labor government's push to install almost 1000 MW of extra renewable energy generation without associated storage capacity is "deja vu" for South Australia (SA) and its failed experiment across the border.

van Holst Pellekaan, who took on the energy portfolio when the SA Liberals formed government in March after 16 years of Labor administration, said the new Victorian policy appeared blind to the failures of SA's Rann and Weatherill government experiments.

A rush to renewable power generation in SA, coupled with the former Labor government's anti-coal agenda, led to an over-reliance on wind and solar that resulted in load shedding and the state paying the highest power prices in the world, he claimed. In January it was revealed SA relied on Victoria for almost a third of its electricity needs during a summer heat wave via a sole interconnector.

"South Australia doesn't want to be overly reliant on a Victorian electricity system that is heading for the same problems we are now fixing in South Australia," van Holst Pellekaan told *The Australian*.

He said the history of SA Labor previously ignoring its own expert advice and having too many wind farms without storage gave South Australians the most expensive and least reliable electricity in the nation.

According to van Holst Pellekaan, Frontier Economics was paid more than $1m to advise the Weatherill government following several load-shedding incidents, and told the government there would be a "big problem" in Victoria once new renewable generators made existing operators unviable.

"And that's just a question of when… there will be fallout unless it's combined with something else," said van Holst Pellekaan. "It's not a theoretical thing. We've experienced this (in South Australia), so I'm not quite sure why we haven't learnt from this."

Last month, the state of Victoria announced that six projects totalling 928 MW had been successful in its first renewable energy auction. The capacity that will be delivered as a result of the tender exceeds by almost 45 per cent the tender's initial target of 650 MW. The state government also noted that the auction had attracted wind and solar projects with a combined capacity of more than 3.5 GW.

The 928 MW of power plants, once operational, are estimated to generate almost 3 GWh of electricity per year. Acciona, developer of the 157.5 MW Mortlake South wind farm, which will use 35 Nordex wind turbines, said it would also add between 5 MW and 7 MW of battery storage. It has yet to decide the length of the storage.

The recent flurry of activity means Australia looks certain to sail past its 2020 large-scale renewable energy target (RET) of 33 000 GWh/year. In its latest monthly update, the Clean Energy Regulator said there was now nearly 9000 MW of capacity from new large-scale wind and solar energy projects under construction or already built, considerably more than the 6400 MW it has said in the past would be required to meet the RET.

Australian National University (ANU) published an analysis in September, which claims that Australia is on its way to running on 100 per cent renewable energy by the early 2030s and could also result in it reaching the half way goal of 50 per cent renewable energy, set at the Paris Agreement, by 2025.

Southeast Asia to invest in smart grids

Southeast Asia will invest $9.8 billion in smart grid infrastructure between 2018 and 2027, with the largest markets being Indonesia, Malaysia, Thailand, Singapore, the Philippines and Vietnam, according to a recent study by Northeast Group, LLC.

"Singapore and Malaysia are clear leaders in the region, already starting national smart meter rollouts," said Ben Gardner, President of Northeast Group. "Thailand has also demonstrated a real commitment to smart grid infrastructure build-out, with long-standing plans finally underway, which should help to jumpstart the rest of the region,"

According to the company, Southeast Asia has lagged behind expectations as a region, but some key changes have come about only in the last year or two allowing the market to "finally start taking shape".

The report says the market will mainly be driven by regulations that either encourage or mandate smart grid development. These policies fit within broader future energy strategies that emphasize greater energy efficiency, the incorporation of clean energy and meeting demand in a rapidly growing region.

The market for microgrids and battery storage in particular will experience high levels of growth as countries seek solutions for remote and island communities.

Several prominent international vendors, including Itron, Trilliant, Cisco, Honeywell, Kamstrup, Landis+Gyr, are already active in the region.

■ The Asian Development Bank (ADB) will provide a $350 million loan and $7.5 million in grants for a project to develop two power lines in support of Bangladesh's national target of electricity for all by 2021. The project is due for completion in June 2023.

Higher wind tariffs could push projects forward in Vietnam

Higher feed-in tariffs (FiT) for wind power projects announced last month could help push forward the completion of wind power projects in Vietnam.

Under a revision announced on September 10th, FITs will be increased from 7.8 to 8.5 cents/kWh for onshore and 9.8 cents/kWh for offshore wind power projects. The in-principle approval comes into effect from November 1, 2018.

The new tariffs will apply to projects that will achieve their commercial operation date (COD) before November 1, 2021 and will be in force for 20 years after the COD.

For new power plants commissioned before November 2018, the new FiTs will be applicable for the remaining term of the project's power purchase agreement (PPA).

According to the government's decision, the Ministry of Industry and Trade (MOIT) will have to devise an auction mechanism for selecting wind projects after November 1, 2021.

The German international development agency (GIZ)'s Energy Support Programme project director, Tobias Cossen, applauded the adjustment. He said it is a significant signal to all market players looking to further invest in the wind power market, which currently only accounts for 200 MW of installed capacity (with 100 MW under construction).

"Now, with the clear signal from the Vietnamese government to increase the tariff, we expect many projects to push through and be implemented," said Cossen.

Experts have long argued that low retail prices have stymied investment, which in the face of strong economic growth, could lead to the country experiencing severe power shortages in the next few years.

GIZ estimates that the technical potential of wind power in Vietnam is huge – at about 27 GW – and able to replace a large share of future planned thermal (coal and gas) power generation.

At the same time, the country is also looking at its requirements for energy storage. In early September Vietnam Electricity (EVN) received a grant from the US Trade and Development Agency (USTDA) to assessing the feasibility of installing energy storage technologies such as batteries and flywheels.

Japan to slash solar feed-in tariffs

The Japanese government plans to reduce solar power feed-in tariffs (FiTs) by more than 50 per cent by around the middle of the next decade, according to news agency *JIJI*.

The step is designed to ease the burden on electricity bills. In fiscal 2018, the costs of utilities' obligatory purchases of solar power are expected to increase 13 per cent year-over-year to Yen3.1 trillion ($27.47 billion), of which Yen2.4 trillion are to be shouldered by their customers.

The tariffs for solar electricity produced by companies are to go down from Yen18 ($0.16) per kWh in the current fiscal year to JPY 8.5 by about fiscal year 2022 to 2024. Households that generate solar electricity will face a fall from Yen26 now to Yen11 around fiscal 2025 to 2027.

The reduction in FiTs also likely reflects the falling cost of renewables, which have been increasingly embraced following the Fukushima nuclear disaster in 2011.

In late August it was reported that the government planned to loosen restrictions on building wind power plants to boost the introduction of the renewable energy source. It is hoped the deregulation will reduce the time and financial burden on wind farm developers.

Under the current system, wind power plants with an output of 10 MW or more are required to undergo the assessment. According to reports, the ministry plans to raise the output from the current level.

The government is seeking to achieve 10 GW of wind power capacity by fiscal 2030 but as of late December, it stood at only 3.39 GW.

Ofgem price cap proposals draw mixed reaction

Energy UK's Lawrence Slade says the decision will pose a significant challenge for many suppliers

The UK's energy industry is questioning how effective an energy price cap will be.

Siân Crampsie

The UK's decision to impose an energy price cap on some domestic tariffs has drawn a mixed reaction from industry groups.

Regulator Ofgem has published a consultation document on the price cap, which will be implemented following legislation passed in July 2018, and which will be designed to protect domestic customers from excessively high energy prices.

Under Ofgem's proposals, around 11 million households that use so-called standard variable tariffs (SVTs) would save around £75 per year, while a typical consumer on the most expensive SVT would save over £120 per year. In addition, energy suppliers will not be allowed to charge more than £1136 a year for a typical dual fuel customer paying by direct debit.

SVTs are the 'default' tariffs that consumers are placed on if they have never switched energy supplier, or if the tariff deal they have with their existing supplier comes to an end.

While switching rates in the UK are at a 10-year high, almost half of all residential customers in Britain are thought to be on SVTs. The cap was proposed by the government as a way of tackling rising household bills.

Gillian Guy, Chief Executive of charity group Citizens Advice, said it was "a step in the right direction" and a "good start in tackling the cost of being a loyal customer". Other industry commentators, however, warned that the cap would have little long-term benefit for consumers and might distort the market.

Wilf Lytton, Senior Researcher of Bright Blue, said: "This energy price cap, which is designed to prevent overcharging, is good news for passive billpayers but any notion of giving customers a fairer deal overlooks the obvious: what energy companies forfeit from standard tariffs, they can recoup from customers on other tariffs. The end result will likely be zero net change in bills for retail energy consumers."

He added: "Instead of fixing prices, government should require energy companies to automatically switch users to the best deal they have. After all, the £75 average price cap saving pales in comparison to the potential benefits of switching tariffs, which can in many cases amount to hundreds of pounds."

Joe Malinowski, founder of price comparison website, theenergyshop.com, said that consumers can easily save £200/year by switching.

Moody's said that the move amounted to a partial re-regulation of energy prices and would result in a reduction in cash flow for most utilities. Ofgem estimates a total saving for consumer of £1 billion, and that the vast majority – 90 per cent – of the revenue hit will fall onto the income statements of the so-called "Big Six" British energy retailers.

Energy UK's Chief Executive Lawrence Slade said: "There are over 70 suppliers in the energy market who will now be assessing how this impacts their individual business, however for many suppliers this will pose a significant challenge. It is crucial that the cap ensures we have an investible energy sector where efficient and financially robust companies can trade, and innovation and engagement can continue to flourish and deliver benefits for consumers."

End of China-EU solar trade war seen as "watershed" moment

Europe's removal of tariffs on imported Chinese solar panels could make solar the continent's dominant energy source in just a few years, industry groups say.

In a statement issued at the end of August, the European Commission confirmed that it would bring an early end to the Minimum Import Price (MIP) sanctions that it has imposed on solar goods imported from China since 2013. It said that the decision was in "the best interests of the EU as a whole", particularly in light of the EU's new renewable energy targets.

The decision to end the trade war with Beijing was widely welcomed by the solar industry. "Lifting of the trade duties was a decision long due. The whole PV sector is going to benefit greatly from this change," said Deividas Varabauskas, CEO of Sun Investment Group. "Solar energy is already the most competitive form of energy in southern Europe. With the cost of CO_2 emission rights on the rise and the reduction of the cost of solar modules, solar will most likely become the most competitive form of energy in the bigger part of EU by 2020."

Dr Christian Westermeier, President of SolarPower Europe, said: "This is a watershed moment for the European solar industry. By removing the trade duties, the European Commission has today lifted the single biggest barrier to solar growth in Europe. The Commission's move to end the trade measures is unquestionably the right one for Europe, we expect to see a significant increase in solar jobs and deployment – which will only propel the energy transition in Europe."

The MIPs officially expired on September 3, 2018. The measures had included minimum import prices and import volumes for Chinese imports of crystalline solar cells and modules, adding up to 64.9 per cent to the price of goods. The agreement was negotiated as a compromise between the EU and China, and came into force instead of anti-dumping and anti-subsidy duties.

Eggborough consent puts large gas fired plant back on UK map

Construction of a new large-scale natural gas fired power plant in the UK could start in mid-2019 after the developer was granted consent for the project.

Eggborough Power Ltd (EPL) has received approval for a 2500 MW power plant at the site of its coal fired power station at Eggborough near Selby, North Yorkshire. The firm wants to build three combined cycle gas turbine units as well as a gas-fired peaking plant with a capacity of up to 299 MW.

EPL submitted an application to the government for development consent in May 2017. It said it was "delighted" with the decision, which would enable the site to "continue to play a key role in both the local economy and in the security of electricity supplies nationally."

EPL has received approval for a 2500 MW power plant at Eggborough

EPL is a subsidiary of EPUKI, which owns and operates a number of power stations, including South Humber Bank and Langage CCGTs, and Lynemouth power station, which has been converted to biomass.

EPUKI is also advancing proposals for a new gas fired power station at King's Lynn in Norfolk and an energy recovery facility in Immingham, Lincolnshire.

■ Copenhagen Infrastructure Partners (CIP) has started operations at its 27 MW Kent Renewable Energy combined heat and power plant. The facility uses locally sourced wood supplied by EuroForest as fuel and produces heat and power for a nearby science and business park.

Walney pushes UK past 20 GW offshore wind mark

The commissioning of Ørsted's 659 MW Walney Extension offshore wind farm last month pushed the UK's cumulative installed wind capacity past the 20 GW mark.

Trade group RenewableUK said that the UK had met a "historic milestone", with 20 128 MW of operable onshore and offshore wind capacity installed. It believes that offshore wind alone in the UK can reach at least 30 GW by 2030 thanks to a strong pipeline of projects in development.

"It took 14 years to install the first 5 GW of wind energy in the UK and we've now installed the same amount in under two years," said Emma Pinchbeck, RenewableUK's Executive Director. "That phenomenal growth shows just how quickly the UK is moving to a smart, low carbon power system and wind energy is at the heart of that."

RenewableUK noted that the growth of onshore wind in the UK is being stifled by the exclusion of the technology from the contracts for difference (CFD) auction system. That means that "consumers will miss out on low-cost power that can keep the bills down", Pinchbeck added.

In September Vattenfall officially opened the European Offshore Wind Deployment Centre offshore wind farm in Aberdeen Bay, Scotland, which features eleven 8.8 MW turbines – the most powerful operating anywhere in the world.

The wind farm also uses suction bucket foundations – the first of their kind to be deployed in UK waters – and is demonstrating the use of 66 kV cables.

RenewableUK's Chief Executive Hugh McNeal said: "This project is a great example of modern offshore wind energy infrastructure being built here in UK waters. These turbines, foundations and cables are state-of-the art pieces of big kit which help developers to build projects faster and produce more power, more cheaply.

"Investing in this kind of innovative technology is central to the offshore wind industry's ambition to meet a third of the UK's power needs by 2030".

Ørsted's Walney Extension wind farm is located off the coast of Cumbria, northwest England, and features 40 MHI Vestas 8 MW turbines and 47 Siemens Gamesa 7 MW turbines.

Nuclear cast aside in new SA plan

Falling technology costs and slowing electricity demand has forced South Africa's government to abandon plans for new nuclear capacity.

Siân Crampsie

South Africa has favoured the expansion of renewable energy, natural gas and hydropower over nuclear energy in the latest version of its Integrated Resources Plan (IRP).

The government unveiled the much-delayed draft IRP document, which outlines plans for the growth of and investment in the country's electricity sector.

The IRP is subject to consultation but appears to confirm that earlier plans to invest in new nuclear power plants in South Africa have been abandoned.

It also shows that South Africa could add 5670 MW of new photovoltaic (PV) capacity to its grid by 2030, and 8100 MW of new wind capacity. It also indicates that electricity demand in the country has been declining.

"This approach… provides the necessary policy certainty while creating the space for all of us to engage in detail on the impending energy transition and the options available to us as South Africa," Energy Minister Jeff Radebe said.

Radebe also told parliament that the decision to drop nuclear energy was based on lower electricity demand and falling costs of other generating technologies.

South Africa's existing IRP calls for the development of 9600 MW of new nuclear energy capacity and over the last five years the South African government made some progress towards implementing new projects, including signing cooperation agreements with Russia and France.

In 2015 the government issued a request for proposals for 9600 MW of nuclear capacity but in 2017 a court ruling effectively declared the new build programme invalid.

The new draft IRP also calls for the addition of 1000 MW of new coal capacity by 2030, 2500 MW from hydropower and 8100 MW from natural gas. With the proposed new capacity additions, wind would account for 15 per cent of the installed capacity in 2030, and PV ten per cent. The mix would also include one per cent, or 600 MW, of concentrated solar power, and four per cent hydro. Coal would have the largest share of the generating capacity mix, with 46 per cent.

EBRD supports Afken ambitions

Turkey's Afken Renewables will draw on the assistance of the European Bank for Reconstruction and Development (EBRD) to build new renewable energy facilities.

Afken has announced plans to build 13 wind and solar power plants in Turkey, and has agreed a $102 million financing package with the EBRD to support the investments.

Afken said in a written statement that it would provide $167 million of the $530 million investment required. A number of other banks, including Isbank, Vakifbank, Garanti Bank, Yapi Kredi Bank and KfW IPEX-Bank, are also supporting the venture.

Afken's plans include four new wind farms and nine solar PV plants with a combined capacity of 327 MW.

"The new financing demonstrates the EBRD's commitment to the Turkish economy and confidence in the fundamental momentum behind the global shift to renewable energy," the EBRD said in a statement.

Akfen Renewables, or Akfen Yenilenebilir Enerji as it is known in Turkey, owns and operates wind, solar and hydropower plants. The EBRD and the IFC, a private sector arm of the World Bank, are minority shareholders in the company with a 15.98 per cent stake each.

The company is now investing in four new wind farms with a total capacity of 242 MW: Üçpınar (99 MW), Kocalar (26 MW) and Hasanoba (51 MW) in Çanakkale, a province in northwestern Turkey on the Dardanelles Strait, and Denizli (66 MW) in the eponymous province in the south west of the country, according to the statement.

For nine new solar photovoltaic plants in five locations across Turkey, the EBRD is lending up to $52 million. The combined capacity of the new solar PV plants will be 85 MW.

"With the projects that we will realise, we are taking firm steps towards our aim to reach a total installed capacity of 1000 MW in clean energy generation by 2020. We will continue to make new investments and potential acquisitions, especially in the wind power sector, in the forthcoming period," said Akfen Renewables CEO Kayrıl Karabeyoğlu.

In line with its renewable energy action plan developed by the country's Ministry of Energy and Natural Resources with the support of the EBRD, Turkey aims to install 27 GW of non-hydro renewable generation capacity by 2023, 20 GW of which is expected to be wind and 5 GW licensed solar.

Ethiopia studies geothermal feasibility

The US Trade and Development Agency (USTDA) is to support Ethiopia's bid to grow its geothermal energy sector with a grant for a feasibility study.

The study will support the first phase of the 520 MW Tulu Moye geothermal project in Ethiopia.

USTDA will grant an undisclosed sum to TM Geothermal Operations Pvt Ltd Co (TMGO), an Ethiopia-based firm owned by infrastructure fund manager Meridiam and sector specialist Reykjavik Geothermal (RG). TMGO will coordinate the feasibility study for the first 50 MW project as part of Tulu Moye. The study itself will be conducted by US firm Delphos International Ltd.

Ethiopian Electric Power inked implementation deals and power purchase agreements (PPAs) in December 2017 to enable the private sector to develop the Corbetti and Tulu Moye geothermal projects totalling 1 GW. According to USTDA, the total estimated private investment in these projects will exceed $4 billion.

Ethiopia is seeking to quadruple power generating capacity by 2020 and expand power sales abroad. The government is also aiming for 100 per cent electrification of households by 2025, up from around 30 per cent currently.

Electricity demand in Ethiopia is growing rapidly, largely due to the growth of the industrial and agricultural sectors. Installed capacity is currently around 4.3 GW.

Chinese firms to build 6 GW Hamrawein coal plant

- 6 GW ultra-supercritical plant planned
- Progress made on hydro and renewables projects

A Chinese consortium led by Dongfang Electric will help Egypt to add 6000 MW to its electricity grid with the construction of a new coal fired power plant.

Dongfang has signed a general contract with Egypt's Ministry of Electricity and Renewable Energy for the 6000 MW Hamrawein clean coal plant – set to be the largest of its kind in the world. It will collaborate with Shanghai Electric Group as well as local firm Hassan Allam Construction to build the project.

The Chinese companies bid $4.4 billion to build the plant, beating a rival bid from Orascom Construction, Elsewedy Electric and Mitsubishi Hitachi Power Systems, state news outlet *Al Ahram* reported.

The plant will use ultra-supercritical technology and will also be equipped with environmental technologies to reduce emissions, Chinese state media reported.

Egypt is also continuing efforts to add renewable and low carbon sources of generation to its grid.

The Ministry of Electricity is starting negotiations with Chinese company Sinohydro to establish a pumped storage hydroelectricity plant in Ataka with an output of 2400 MW.

Local media reported that the Exim Bank of China will finance the hydro plant, which is likely to cost $2.4 billion.

Last month Egypt's New and Renewable Energy Authority and the Spanish energy giant TSK Grupo signed a contract to set up a 26 MW photovoltaic plant in Kom Ombo in Aswan, Upper Egypt.

The PV plant will cost €20 million to build and will cover an area of 500 000 m^2. It is due to start operating in 2019.

The project will be funded by the French Agency for Development through a soft loan of €40 million, with the rest of the loan to be channelled into financing other energy projects in Egypt.

The agreement is part of a strategy by Egypt's New & Renewable Energy Authority and Electricity Ministry to diversify energy sources, increase renewable energy use, and reduce the consumption of traditional energy.

The move is also part of Egypt's renewable energy plan to produce 20 per cent of all energy production through renewable sources by 2022, and 37 per cent by 2035.

- Talks between Saudi Arabia's ACWA Power and the Egyptian Ministry of Electricity over building the 2250 MW Dairut power plant have been stopped, according to local media. The two parties have been negotiating over a power purchase agreement (PPA) for the gas-fired project, but have failed to reach a deal, Al Borsa newspaper stated, citing government sources.

Six becomes five as UK competition heats up

SSE and Innogy are on track to merge their UK energy retail units to create a major new market player.

Siân Crampsie

The UK's so-called "big six" of energy retail is set to become the "big five" after the country's competition authority provisionally approved a merger between the retail units of SSE and Innogy.

The UK's Competition and Markets Authority (CMA) said it has given preliminary approval to the proposed merger of SSE Retail and npower after conducting an in-depth review. A key part of its investigation was the impact that the merger would have on energy prices for households.

The proposed merger would create an independent energy supply and service company with a market share in electricity retail of 24 per cent – just higher than the current leader, British Gas, which has a 22 per cent market share.

Its market share in gas retail will remain below that of British Gas, however. Overall, it will have just under 13 million accounts and will be listed on the London Stock Exchange.

The proposed merger still requires final CMA approval and is seen as a response to growing competition in the UK energy retail sector and an increase in the number and popularity of smaller, independent retailers. The CMA noted in its preliminary report that the number of energy consumers switching suppliers is the highest in a decade, and that there are over 70 energy companies to choose from.

"It is vital that householders have a range of energy suppliers to choose from so they can find the best deal for them," said Anne Lambert, Chair of the CMA Inquiry Group. "But many people don't shop around for their energy. So we carefully scrutinised this deal, in particular how it would impact people who pay the more expensive standard variable prices.

"Our analysis shows that the merger will not impact how SSE and npower set their SVT prices because they are not close rivals for these customers."

The CMA also said that the proportion of consumers on standard variable tariffs (SVTs) – which tend to be more expensive – has fallen, and that the upcoming energy price cap – due to be implemented by the end of the year – would help to protect consumers.

SSE said it would engage with the CMA as it prepares its final report. The company expects the deal to be completed by the end of March 2019.

Innogy will own 34.4 per cent of the new company, while SSE shareholders will own 65.6 per cent.

Ovo makes push into Germany

OVO Energy, an independent UK energy retail company, has embarked on a plan to diversify internationally with the purchase of a 55 per cent stake in German utility 4hundred.

Ovo is the largest energy provider in the UK outside of the "Big Six" retailers with a three per cent market share. It says that the purchase of 4hundred marks its evolution to an international, integrated, technology-driven energy services company.

4hundred is a new entrant to the German market and has ambitious targets for growth. It currently offers a 100 per cent green electricity tariff to over 2000 customers in Germany and is on track to reach 10 000 customers by the end of 2018.

The German firm shares a "cultural fit" with Ovo as a digital energy provider with "an engaging brand voice", Ovo said in a statement.

"The energy transition isn't isolated to the UK. It's global," said Stephen Fitzpatrick, CEO and founder of Ovo. "The opportunity for the intelligent technology and IP we are developing here in the UK to be exported internationally is huge. We're going to help solve some of the great challenges like how to bring bringing more renewables onto the grid and connect millions of electric vehicles, on an international scale.

"4hundred's digital offering, technological expertise and rigorous approach to great customer service made them an attractive business for OVO to invest in. With customers across the world demanding clean, affordable energy, we're confident that with 4hundred, we'll have strong growth and continued success."

Ovo currently has 890 000 customers in the UK.

Tractebel strengthens offshore engineering

Tractebel says that its acquisition of Overdick will help it to expand in the field of offshore wind and to reinforce its position as an energy sector consulting and engineering firm.

Engie-owned Tractebel has bought Overdick, a specialist in offshore engineering, through its subsidiary, Lahmeyer International. Overdick has an impressive list of project references and will enable Tractebel to offer clients a wider portfolio of services.

Founded in 2000, Overdick is one of the leading specialists in modern offshore engineering and design, maintenance and inspection services. The company offers a wide range of services within the areas of offshore wind, offshore oil and gas, naval architecture, marine operations, platform removals and salvage. Tractebel will benefit from Overdick's deep know-how in detailed design, construction, transportation and installation of wind turbine and offshore high voltage substation (OHVS) foundations.

"With the acquisition of Overdick as a strong and experienced company in detailed engineering, Tractebel will participate in the growing offshore wind market, which will reach an installed capacity of more than 100 GW in 2030," said Olivier Biancarelli, CEO of Tractebel.

Lahmeyer CEO Martin Seeger said: "With Overdick, we have brought a traditional company with a high reputation into our company, with which we will continue to grow in the coming years."

Total leading the EV charge

- Deal signed with Nexans
- Accelerates growth in EV and clean energy

Oil firm Total is accelerating the growth of its electric vehicle (EV) charging business with the acquisition of G2mobility, a leading French provider of EV charging solutions.

Total says that it now fully owns G2mobility after finalising an agreement with the firm's previous shareholders, including Nexans and Bpifrance.

It also says it has signed a new deal with Nexans to support its move into the EV sector.

"Total is pursuing its expansion in new energies for mobility," said Momar Nguer, President, Marketing & Services and member of the Executive Committee at Total. "Following the acquisitions of PitPoint in Europe in 2017 and of 25 per cent of Clean Energy in the US this year, which has allowed us to accelerate in natural gas fuel for vehicles, the G2mobility transaction is a pivotal step in improving our electric vehicle charging offering."

G2mobility has developed, and markets, a comprehensive charging solution with connected charging stations operated by a web platform that can remotely control the charge points, offer services, particularly smart energy management systems. With almost 10 000 points managed by its services platform, G2mobility supports both municipal governments and private businesses.

"Current growth in the electric vehicle industry is bringing charging solutions into a new era in terms of ambition and capacity," added Pierre Clasquin, Chief Executive Officer and co-founder of G2mobility. "Today, you have to offer integrated solutions, from electricity supply to an end-to-end charging service. In joining Total, G2mobility can enthusiastically pursue its growth and keep contributing to the energy transition."

G2mobility has a market share of more than 25 per cent of charging points for local governments and saw growth in revenues of over 50 per cent last year. Its purchase is the latest move in Total's strategy to increase its presence in clean energy markets.

Total has also signed a partnership agreement with Nexans giving Total access to Nexans' production capacity and industrial expertise. The deal will help to speed up the growth of infrastructure for EVs, Total said.

Last year Total acquired an indirect 23 per cent stake in Eren RE, a global renewable energy project development company.

SNC-Lavalin and ABB JV will bring substation cost efficiencies

ABB and SNC-Lavalin say that a new joint venture will bring cost efficiencies and other benefits for customers operating in the electrical substation field.

The two companies have created a new joint venture company for the execution of electrical AC substation projects. The new company – known as Linxon – was due to start operating at the beginning of September 2018, undertaking turnkey electrical alternating current substation projects related to renewable and conventional power generation, electricity transmission as well as transportation solutions.

Turnkey solutions will include project design, engineering, procurement, construction, management, commissioning and after-sales support. Linxon will have an opening order backlog of $340-million.

"We are delighted to join forces with ABB and bring together our respective strengths to deliver sustainable energy solutions for substations, while providing value for customers through cost efficiencies and an enhanced delivery capability," said Marie-Claude Dumas, Chair, Board of Directors, Linxon and President of Clean Power, SNC-Lavalin.

Americas

Vestas secures 202 MW order for Whitla

Capital Power has placed an order with Vestas for 202 MW for the Whitla wind power project in Alberta, Canada.

Vestas will provide its V136-3.45 MW wind turbines delivered in power optimised mode for the project, which is scheduled to start operating at the end of 2019.

The Whitla project is one of four projects selected by the Alberta Electric System Operator in Alberta's first renewable energy auction in 2017. The order includes supply and commissioning of the turbines as well as a ten-year service agreement, Vestas said.

Avangrid places 144 MW wind order

Danish wind turbine maker Vestas Wind Systems has received an order for 144 MW of turbines from Avangrid Renewables for a wind project in Illinois, USA.

The turbines will be installed in the Otter Creek wind farm. Vestas will supply and commission V136-3.45 MW turbines delivered in 3.6 MW power optimised mode at the site. The deal also includes a multi-year service agreement.

Bechtel to design and build South Field CCGT

South Field Energy has selected engineering firm Bechtel to design and build the $1.3 billion, 1182 MW South Field Energy combined cycle gas turbine (CCGT) plant in Ohio.

Bechtel will be responsible for the engineering, procurement and construction of the power plant, which will use General Electric power generation equipment including two natural gas turbines. The plant will be a dual-fuel facility with ultra low sulphur diesel used as back-up.

A 3 km gas pipeline also will be built to link the plant with an existing Dominion pipeline about 3 km west of the 35 hectare plant site located in the village of Wellsville. The plant will be owned by an investor group comprising Advanced Power, Kyushu Electric Power, NH-Amundi Asset Management and PIA Investment Management, RS Global Capital Investment (a joint venture between Development Bank of Japan and Showa Shell Sekiyu), Shikoku Electric Power Co., and an affiliate of Bechtel Development.

Upon completion in the second quarter of 2021, Advanced Power will manage the gas-fired plant and its energy, capacity and ancillary services will be sold into PJM Interconnection markets.

Vestas wins contract for Bolivian wind farms

Vestas has marked its entry to the Bolivian wind energy market with a 108 MW order for three wind farms.

The San Julin, Warnes, and El Dorado wind farms, all located in the municipalities of Cocota, Warnes and Cabezas in Santa Cruz, central Bolivia, will have capacities of 40 MW, 14 MW and 54 MW, respectively.

The wind farms are collectively known as the Santa Cruz wind project and will help to accelerate Bolivia's journey towards phasing out fossil fuels and reaching its goal of sourcing 74 per cent of its electricity from renewables by 2025.

The order was placed by ENDE, a Bolivian state-owned electric utility. The project is supported financially by Danish development organisation, Danida.

Asia-Pacific

Meridian extends Senvion service in Australia

Senvion has secured a contract renewal for the maintenance of Meridian Energy's 131.2 MW Mt Mercer wind park in Australia.

The wind farm, located in the state of Victoria, uses 64 of Senvion's MM92 turbines that have been generating electricity since 2014. Following the contract extension, the German manufacturer will maintain the machines for 15 years until 2035 through a local service base.

Sharp to build Vietnam solar plants

Sharp Energy Solutions has won contracts to build two utility-scale solar farms in Vietnam.

The company will build 49 MW solar plants in Binh Thuan and Long An Provinces. It said it has received the orders from Gia Lai Hydropower Joint Stock Company and TTC-Duc Hue Long An Power Joint Stock Company, respectively.

The solar farms fall under Vietnam's plans to reach 850 MW of solar power generating capacity by 2020. They will receive a feed-in tariff to support their operation.

ABB lands Philippine geothermal retrofit order

ABB has won a multi-million-dollar order from Energy Development Corporation (EDC) for a major retrofit project to upgrade six clean energy geothermal units at two power plants in the Philippines.

The new solution will increase operational and maintenance efficiency and assist management decision-making by providing improved access to better operational information. It will also facilitate central control and remote monitoring of the power plants and steam fields from one location.

The scope of the contract includes the conversion of a mechanical electro-hydraulic governor to a digital version and the replacement of the existing low-pressure turbine hydraulic equipment with a new a high-pressure solution. ABB will also provide performance calculation and comprehensive cyber security solutions to protect the customer's assets.

Doosan signs MoU for IRT's 2 GW coal plant

South Korean engineering company Doosan Heavy Industries (DHI) has signed a memorandum of understanding (MoU) with Indonesian power company PT Indo Raya Tenaga (IRT) for the construction of two 1000 MW ultra-supercritical coal fired power plants in Cilegon, Indonesia.

The Jawa 9 & 10 power units will cost a total of $1.68 billion to build, with Doosan's contract worth around $1.33 billion. The two units are scheduled to be built in 2023 and will be operated by IRT, a joint venture (JV) between PT Indonesia Power and PT Barito Pacific.

Enercon enters Vietnam wind market

Enercon has taken its first order in Vietnam, securing contracts to supply the equipment for 77 MW of wind projects.

The German wind turbine manufacturer will deliver its E103 EP2 machines for the 16-turbine Mui Dinh and the 17-turbine Trung Ma, projects. The turbines will be mounted on tubular steel towers at a hub height of 85 m.

Siemens inks 3600 MW Bangladesh contract

The government of Bangladesh has signed an agreement with Siemens for the construction of a 3600 MW LNG-fired power plant.

The proposed plant will be built adjacent to the 1320 MW Patuakhali thermal power plant and is due to be completed in two phases between December 2021 and December 2022. It will comprise three 1200 MW units based on H-class advanced gas turbines.

Though the project cost was not officially revealed, Bangladesh Power Development Board (BPDB) sources confirmed that the amount is around $3 billion.

Europe

Hydrogen storage boosts Norwegian wind farm

Hydrogenics Corporation and its European consortium partners are to supply a 2.5 MW electrolyser-based energy storage system to a 45 MW wind farm in Norway.

The Varanger Krafts wind farm is located in Raggovidda but its operation is restricted by limitations on the local transmission grid. The addition of the energy storage system will enable excess energy from the wind farm to be used in the production of hydrogen.

The energy storage system – known as Haeolus – will be remotely controlled and monitored due to environmental conditions at the wind farm.

TenneT issues Dutch offshore platform call

Dutch offshore grid operator TenneT has issued a call for competition for the construction, transport and installation of an offshore platform for a Hollandse Kust offshore wind zone.

TenneT will develop at least 3500 MW of offshore connections by 2023, all with a standardised concept of 700 MW per connection. The platforms will connect offshore wind farms to the onshore grid by HVAC sea cables.

The platforms within one area will be connected by a 66 kV cable. The platforms are to carry high-voltage switching and transformation equipment as well as auxiliary facilities.

KPA Unicon signs boiler contract

Dalkia Est and KPA Unicon have signed a contract for the delivery of a 45 MW bubbling fluidised bed boiler plant to Pomacle in France.

The boiler will be part of the Cogecab power plant, which generates energy for Européenne de Biomasse HPCI's black pellet plant. It will use biofuel, including chips and bark, recycled wood and cuttings from vines.

The boiler plant will generate superheated steam for electricity production as well as hot water and steam for the black pellet production process and other nearby industrial processes. The plant will be put into operation in 2020.

Framatome to upgrade EDF reactor fleet controls

Framatome has won a contract to upgrade the instrumentation and control systems on EDF's 900 MWe reactor fleet in France.

The project forms part of the overall French nuclear reactor modernisation programme designed to extend the lifespan of the reactors beyond 40 years. Framatome, as prime contractor, will leverage its own expertise and partner with other French companies to procure a part of the technology associated with this contract.

The first on-site operations will begin in 2019, coinciding with the fourth ten-yearly inspections of the 900 MWe series reactors. These works are scheduled to be carried out on 32 reactors.

WindPlus orders MHI Vestas floating wind units

The WindPlus consortium has signed a firm contract supply agreement with MHI Vestas Offshore Wind for a 25 MW floating wind power project in Portugal.

MHI Vestas will install three V164-8.4 MW turbines on Principle Power's triangular, semi-submersible WindFloat foundations. The so-called WindFloat Atlantic project will be executed about 20 km off the coast of the Norte Region at a sea depth of 100 m.

International

KNPC invites solar bids

The Kuwait National Petroleum Company (KNPC) has initiated a tender for the installation of up to 1.5 GW of solar power capacity.

The Dabdaba solar complex will be constructed within the Al-Shagaya Renewable Energy Park, near the Saudi Arabian border. According to the tender notification, the scope of work includes the supply and construction of the solar park, and operations and maintenance (O&M) for 25 years.

The deadline for submitting bids is December 16, 2018. Winners in the competitive selection will have to meet a 30 per cent local content requirement for both equipment and services.

Egypt selects Siemens for CCGT O&M

Siemens has been selected by the Egyptian Electricity Holding Company (EEHC) to provide operation and maintenance services for the Beni Suef, New Capital and Burullus power plants for the next eight years.

The agreement is the largest ever for the Siemens Power Generation Services in terms of power generated, and includes the implementation of the company's Omnivise digital service solutions.

Each of the three 4.8 GW power plants is considered to be the largest gas-fired combined cycle plant ever built and operated. Together the plants represent approximately 40 per cent of Egypt's power capacity.

The multi-year agreement covers all on-site equipment including 24 gas turbines, twelve steam turbines, 36 generators, 24 heat recovery steam generators and three 500 kV gas-insulated switchgear systems.

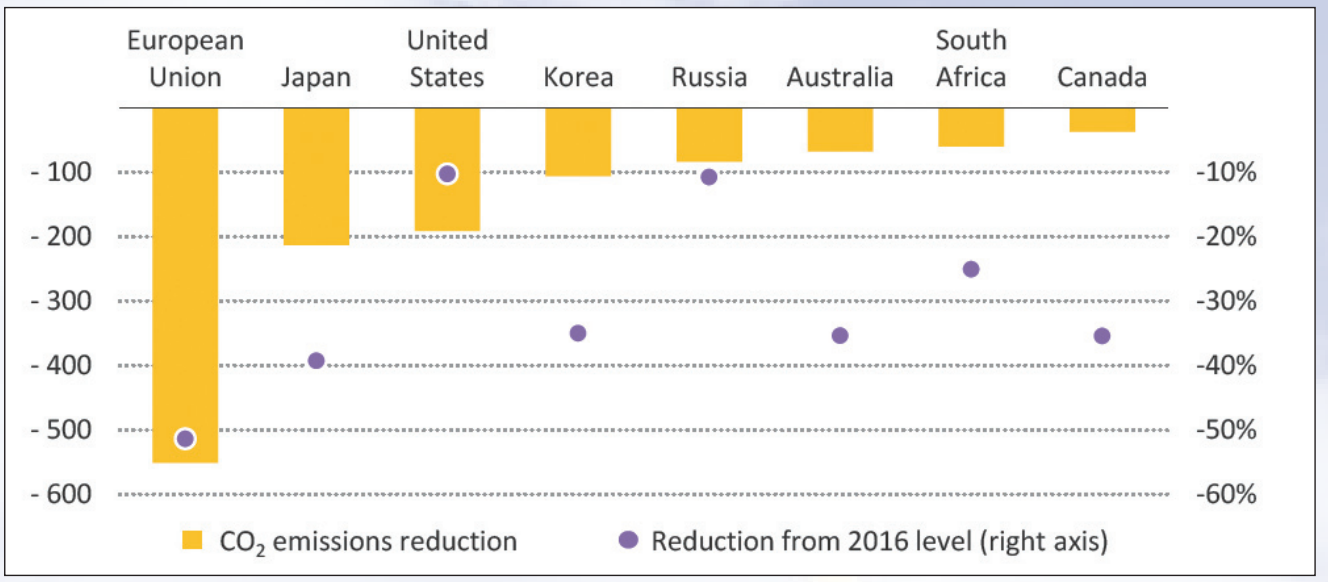
Fuji confirms 70 MW geothermal order

Fuji Electric has won a contract to supply a new 70 MW geothermal unit at the Olkaria I power plant in Kenya.

The order was placed by Japan's Marubeni Corp, which recently announced that it has secured a full turnkey contract for the construction of the geothermal facility in Nakuru County. The engineering, procurement and construction (EPC) deal was awarded to Marubeni by state-owned power producer Kenya Electricity Generating Co Ltd.

The Olkaria I facility is Kenya's first geothermal power station. It currently runs five turbines with a combined capacity of 185 MW. Marubeni and Fuji will build the sixth power generation unit. The expected year of commercial operation is 2021.

Reduction of power sector CO_2 emissions in selected countries in the New Policies Scenario



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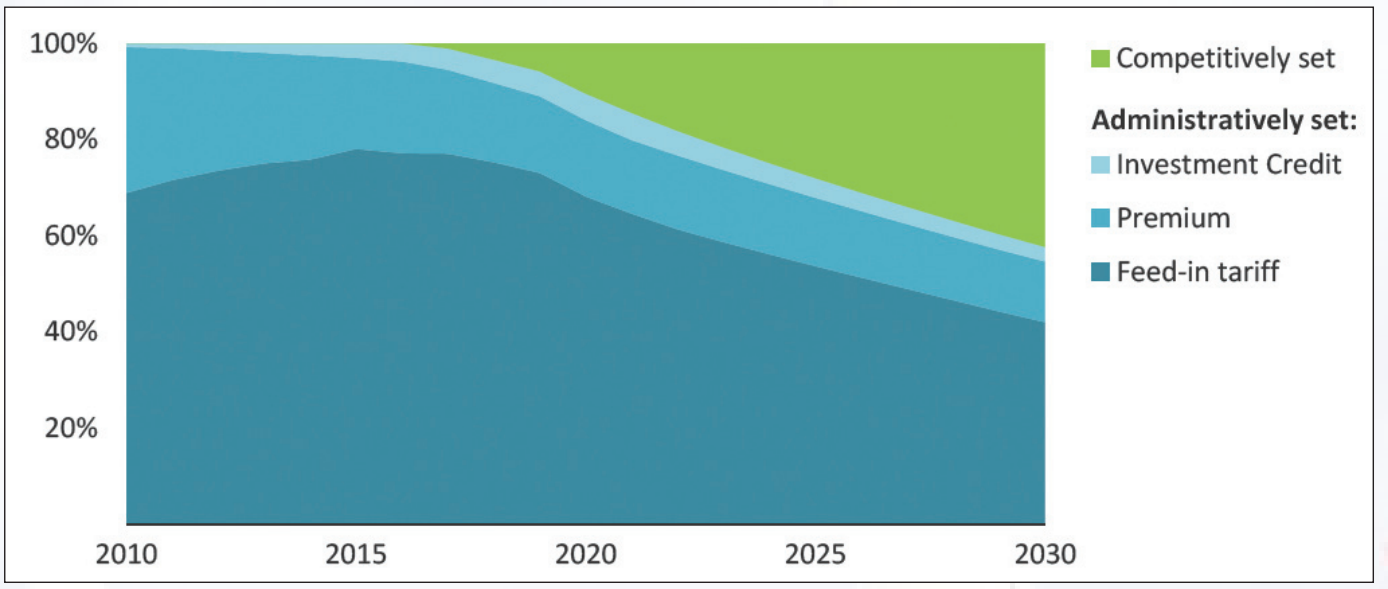
Share of supported wind and solar PV generation by mechanism type in the New Policies Scenario



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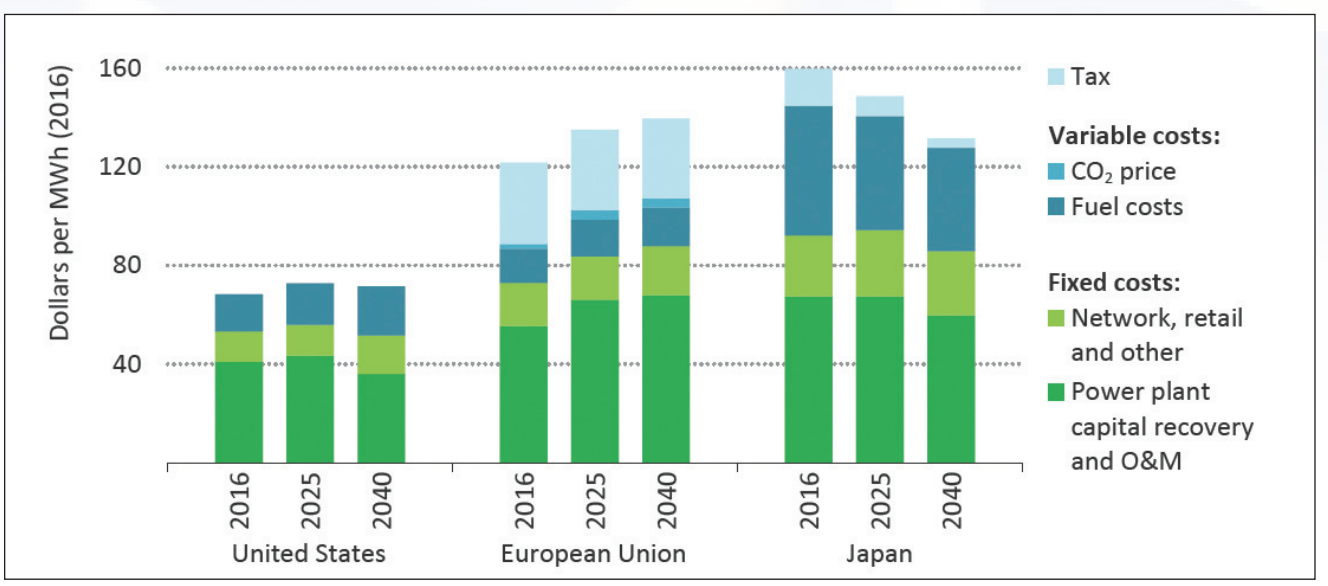
Average industry electricity prices by region and cost component in the New Policies Scenario



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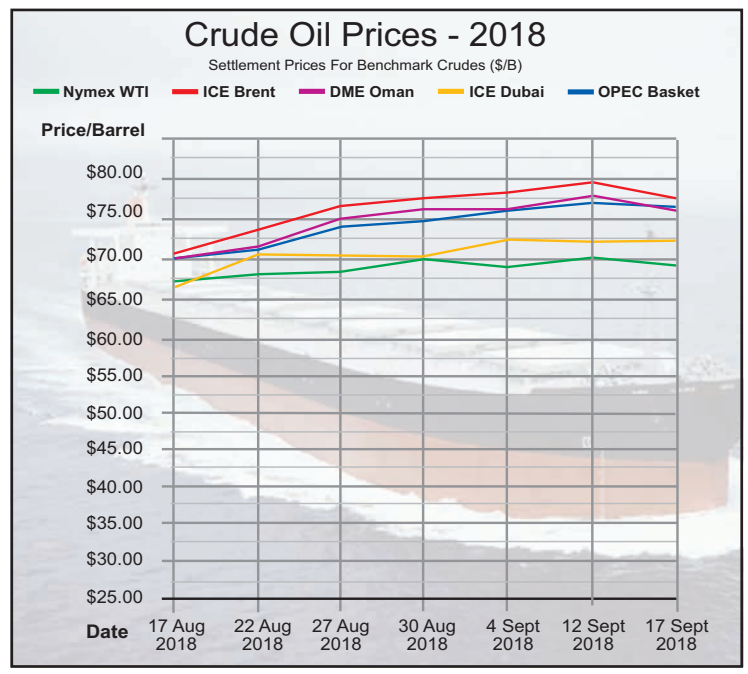
Source: World Energy Outlook 2017

Oil

Opec, Non-Opec see no reason to boost output

- Trump calls for Opec to get prices down
- Saudi Arabia says markets adequately supplied



Mark Goetz

With gasoline prices in the US at around $3/gallon at the pump and the mid-term Congressional elections just weeks away, US President Donald Trump is keen to see the cost of oil decline, but the Opec/Non-Opec ministerial conference in Algiers in late September signalled that it sees no reason to boost crude supplies – a move that would likely lead to a drop in gasoline prices at the pump and possibly help President Trump's Republican Party allies at the polls.

Days before the Algiers gathering Trump tweeted a demand that oil prices be lower: "We protect the countries of the Middle East, they would not be safe for very long without us, and yet they continue to push for higher and higher oil prices! We will remember. The Opec monopoly must get prices down now!"

It is probably with some delight that many of the Opec and non-Opec producers at the meeting found it unnecessary to provide Trump with the result he was looking for. Especially Iran, which is beginning to see its crude oil sales decline as US sanctions against Iranian oil exports come back into place after Trump decided to withdraw the US from the Iran nuclear agreement.

Taking hundreds of thousands for barrels, if not a million or more, of Iranian oil off the market will only lead to higher prices. And there are few in the crowd who feel compelled to do the US any favours. Non-Opec Russia, itself under US sanctions, can only be pleased with any grief it causes Trump, regardless of whether it preferred a Trump presidency over one headed by Hillary Clinton.

All the Opec, non-Opec producers are happy to see more money, but with Brent crude at around $80/b it is a tricky situation. Sustained high oil prices might not just be a problem for Trump at the November polls, but they could also lead to an economic situation that complicates things globally. The high cost of fuel forces the price of everything up and leaves consumers with less disposable income. That's not good anywhere as it only leads to other problems. Remember 2008?

Trump does, however, look to Saudi Arabia, the Opec leader and the one Opec member to have the capacity available to boost production, to increase output. Washington is supporting Riyadh in its regional rivalry with Iran, and supplying weaponry to the Saudis as they fight the Iranian-backed Houthis in Yemen. Therefore, he is expecting pay back.

Following a decision by Saudi Arabia in 2014 to turn on the taps in an attempt to force US shale oil producers out of the market with low prices, oil fell to prices that did damage to most of the economies of oil exporters, particularly Saudi Arabia which in 2016 partnered up with Russia and agreed on measures that would cut oil production in order to wipe away a surplus of 3 million barrels and cut a huge inventory of oil stocks. The Opec/Non-Opec alliance achieved that during the course of this year and has since has managed something of a tightrope act in an effort to get supply down and prices up.

Speaking at the end of the Algiers meeting, Saudi Oil Minister Khalid al-Falih said Saudi Arabia since June had responded to meet the demand for every barrel that had been requested. And in what can be seen as a rebuff to Trump stated: "I do not influence prices."

"My information is that the markets are adequately supplied," Falih said. "I don't know of any refiner in the world who is looking for oil and is not able to get it." Furthermore, he expressed Riyadh's commitment to covering any shortfall: "Whatever takes place between now and the end of the year in terms of supply changes will be addressed," he said.

Russian Energy Minister Alexander Novak supported Falih's position but added that US sanctions against Iran and the US-China trade war were not helping the situation.

The Opec/Non-Opec actions resulted in deeper cuts to production than their original agreement called for and thus the group is producing below the compliance quotas that they had agreed to, meaning that they could actually produce more oil and not be breaking their own rules. But as far as the alliance is happy with output and see the market to be 'in balance', oil prices will very likely remain close to where they currently are – except for a little spike here and there.

Gas

Power of Siberia project will boost Russian-Chinese energy cooperation

With the Power of Siberia pipeline nearly complete, Russia is set to become the largest supplier of natural gas to China in the coming decades.

David Gregory

Russia's Gazprom reported late last month that the Power of Siberia pipeline, which will link gas resources in Russia's eastern regions to China, is more than 90 per cent complete and on track to start delivering 5 billion cubic metres (bcm) of natural gas annually by December. This volume will increase gradually to 38 bcm/year by 2024 and contribute to meeting China's huge forecast for future gas demand.

Russia is planning to become the largest supplier of natural gas to China in the coming decades. According to Gazprom, China's consumption of Russian gas could reach 80-100 bcm/year by 2035.

This would be when the Power of Siberia is working at full capacity and when another planned pipeline route – the 'Western Route' of the Power of Siberia, which would have a 30 bcm/year capacity – is open to China and pumping at full throttle. Deliveries of LNG from Russia's Arctic would also figure into this estimated total.

After years of negotiation, Russia and China in May 2014 agreed on a 30-year deal requiring an investment of billions of dollars for resource development and infrastructure construction for Power of Siberia.

Together with the sales and purchase agreement, the entire deal is worth more than $400 billion. Known also as the Yakutia-Khabarovsk-Vladivostok pipeline, Power of Siberia will cover a 3000 km stretch and will have a total capacity to transport 61 bcm annually.

Gazprom reported recently that 119 operational wells have been completed in the Chayandinskoye field in Yakutia, where technical infrastructure is currently being installed, and also that some 2000 km of pipeline has been constructed between Yakutia and the Chinese border, the state-owned company said, adding that construction of the Amur Gas Processing Plant is also on schedule.

Gazprom invested $3.2 billion in the pipeline in 2017 and will put another $2.3 billion into it this year, according to Russia's *TASS* news agency.

Power of Siberia will not only transport gas to China, but gas distributed through the pipeline will also be used to develop Russia's economy in its far eastern regions. The pipeline running from Yakutia will in Khabarovsk connect with the Sakhalin-Khabarovsk-Vladivostok pipeline that will supply gas to a LNG project and a petrochemical plant in Primosky Krai.

Reports last month from the Eastern Economic Forum in Vladivostock, where Russian President Vladimir Putin met with Chinese President Xi Jinping, said the deal for the western route of the Power of Siberia was nearing completion with all the technical aspects of the project agreed.

Chinese demand for gas is expected to skyrocket in the years ahead as it moves to reduce its dependence on coal in an effort to clear up its polluted air. China is now the world's second-largest importer of natural gas and according to data released by the US Energy Information Administration (EIA), it is forecast to account for 25 per cent of all growth in global gas consumption between 2015 and 2040. The Paris-based International Energy Agency (IEA) forecasts that China will become the world's largest gas importer during 2019, and that imports will go from 39 per cent of its consumed gas now to 45 per cent by 2023 as domestic gas production will not be able to meet demand.

According to CNPC, China's gas consumption rose by 17 per cent in 2017, but domestic output rose by half that rate, the National Bureau of Statistics (NBS) reported. Demand for the first half of 2018 rose by 16.8 per cent, but domestic gas production increased by 4.6 per cent, according to NBS data. Furthermore, LNG imports rose by 26.9 per cent in 2017, according to the General Administration of Customs (GAC), whose data shows that through August of 2018, LNG imports rose by 34.8 per cent.

Meanwhile, China is in the midst of preparing for the coming winter by implementing plans that will avoid the serious gas shortages experienced last winter when the government banned the use of coal, resulting in numerous homes being left in the cold when there was not enough gas available to substitute for coal-powered heating. The heating shortage forced the government to relent and return to coal but it is now working to build more gas storage, install more LNG terminals and set better guidelines for closing coal-fired power stations.

Furthermore, it remains to be seen how the US-China trade war will play out and how that might impact China's gas imports. In late September, in retaliation for additional tariffs placed on Chinese goods by the US administration, China imposed a 10 per cent duty on US LNG imports. With China clearly in need of more gas and the fledgling US LNG industry keen to sell to China, the situation is unlikely to prove beneficial to either party.

Get yourself connected

With the need to integrate a growing amount of renewables, the importance of more interconnected transmission systems is being recognised by the EU.
David Appleyard

Europe's electricity transmission grid is becoming more connected. Driven by technical advances in high power solid-state electronics that allow the efficient long-distance transmission of power, international markets for electricity are now a growing reality and an increasingly vital necessity.

The importance of more interconnected transmission systems is being recognised by the European Union which has declared energy interconnection a Project of Common Interest (PCI).

In November 2017 the Commission published the third list of PCIs containing 173 projects of which 106 are electricity transmission developments. For example, under the auspices of the PCI, new 380 kV AC overhead lines of about 92 km are being developed to connect Endrup in Denmark and Niebüll in Germany. The plans are designed to support the integration of existing and projected future growth of onshore wind capacity in the Schleswig-Holstein region.

Indeed, the dramatic growth in renewable energy is a key driver of European integration – and that of other regions.

Erik van der Hoofd, Team manager for markets at Dutch transmission company TenneT, explained: "It makes sense to build interconnection capacity to optimise the generation fleet and that's even more true when we see the trends that support more and more renewable energy. If we can spread that energy, exchange it over a larger area, we can make more efficient use of the generation asset. That makes economic sense."

van der Hoofd continued: "In the past, every country had to ensure that they had sufficient generation capacity available for peak load. If every country has enough, all of them together have far too much. That is what we're solving with interconnectors."

Exchanging energy in an economically efficient way also offers other business opportunities, a point emphasised by Dr Frank Schettler, Principal Key Expert and Product Life Cycle Manager of Siemens' HVDC PLUS solutions. He said: "We have different prices for electricity in some areas especially when we talk about the extended use of renewable energy."

Certainly the most favourable conditions for producing renewable energy are tied to geographical and environmental conditions, Norwegian hydropower for example. In addition, Europe's major load centres are typically far removed from the best renewable resources.

Schettler observed: "Better integration of the European network would allow this energy to go wherever it is needed."

In an interconnected Europe, Scandinavian pumped storage hydropower capacity could be used to absorb and store excess renewable energy as it is produced, before exporting power when demand increases.

Development of high voltage DC (HVDC) began as a practical proposition with the emergence of high power semiconductor devices like thyristors in the 1970s. Today, the efficiency of long-distance HVDC and the cost of the equipment has developed to become a commercially viable approach to bulk power transmission and the potential for profitable cross-border trade.

Schettler said: "If you look the distances for such transmission then it's very clear that you are in the range now that HVDC is the most economic solution. With AC, the transmission conditions are often such that such a proposition would not be possible at all in some cases and would be a higher cost solution than for comparable DC systems."

Furthermore, HVDC also offers a number of additional advantages. For instance, HVDC interconnectors feature a converter station at each end of the line to translate AC to DC and vice versa. This confers the ability to avoid potential phasing issues between asynchronous regions. In Europe there are currently five synchronous network zones, for instance the Nordic countries and the Baltic Interconnected Power System.

With HVDC offering a relatively low-cost and efficient mechanism for long distance bulk power transmission, a swathe of projects have been developed across Europe already with many more set to be completed and commissioned over the coming few years.

In 2008, for example, ABB commissioned the 700 MW, 580 km NorNed HVDC connection between Norway and the Netherlands and has also executed lines between Estonia and Finland (Estlink 1), and Finland and Sweden (Fenno-Skan 2) among others.

Siemens is another leading player in European HVDC interconnector development and is currently behind a number of international projects. For instance, the company is currently executing a 1 GW HVDC project linking Germany and Belgium on behalf of Amprion and Elia. The €273 million ALEGrO project it is another PCI. It features a 90 km-long underground HVDC cable and is scheduled to commence commercial operation in 2020.

Meanwhile NordLink, due for commissioning in 2020, will be the first direct power connection between Germany and Norway. Again designated as one of the European Commission's PCIs, this 623 km-long line will enable the exchange of 1400 MW of renewable energy – hydro from Norway and wind from Germany. ABB is developing the $900 million project on behalf of utilities Statnett and TenneT.

As Schettler observed: "HVDC is definitely one of the key enablers of European system integration and therefore also the utilisation of renewables."

Beyond Europe, HVDC projects are also underway linking markets and enabling energy trade. For instance China is currently set to host an 1100 kV HVDC link, scheduled for commissioning in 2018. With a transmission capacity of 12 GW, the 3324 km long interconnector will transmit electricity from the north-western Xinjiang region to Anhui Province in eastern China.

With long distance power transmission now technically and economically feasible development of a more liquid and tradable market for renewables is clearly an opportunity and also opens the door to further renewable energy development.

However, in Europe and elsewhere a number of regulatory and market structural issues also need to be addressed in order to provide a mechanism for the development of this type of asset.

In Europe the capacity allocation and congestion management system sets out the methods for calculating how much space market participants use on cross border lines without endangering system security and harmonises how cross border markets operate. The Capacity Allocation & Congestion Management (CACM) code is the cornerstone of a European single electricity market and is designed to increase competitiveness as well as renewables integration.

van der Hoofd notes: "The commercial structures related to interconnector development vary and there is no set example of state-owned or privately backed project. We see both, but there are companies that now see viable business cases for commercial interconnectors whereas previously that was mainly the domain of the national TSO."

Indeed, a novel structure for finance has emerged from Tennet in the form of a hybrid green bond issue. Instead of going to principle lenders it's a different way of raising finance.

van der Hoofd explained: "These offshore infrastructures to connect wind farms obviously have a very strong environmental component and therefore clearly marketed as being green. That helps us to attract other sources of funding if investors are looking for green and a good investment opportunity.

Backing this green bond, the European Investment Bank (EIB) has purchased €100 million worth of the hybrid bond, which will support the construction of the NordLink interconnector. The bond deal follows a number of EIB loan agreements last year that are also earmarked for Nordlink financing.

With projects already demonstrating the success of HVDC interconnectors, a still more ambitious project has been mooted for Europe.

The North Sea Wind Power Hub proposal envisages the creation of an offshore island in the North Sea to which multiple wind farms – and countries – would be connected. Backed by TenneT and others, this 'hub-and-spoke' concept would support both offshore wind development and cross-border interconnection between the six North Sea European nations.

van der Hoofd said: "We are very busy working through our schedule for the period to 2030 but for the longer-term period after 2040 we are looking into the possibility to make all kinds of interconnectors between European countries like England, Norway, Denmark, Germany."

Although a radical concept, its backers argue that it represents a lower cost approach to long-term offshore wind development as nearshore shallow regions are developed and projects move further offshore into deeper waters. A single island hub could connect up to 30 GW of wind power, effectively creating a nearshore environment far out at sea with optimal wind conditions.

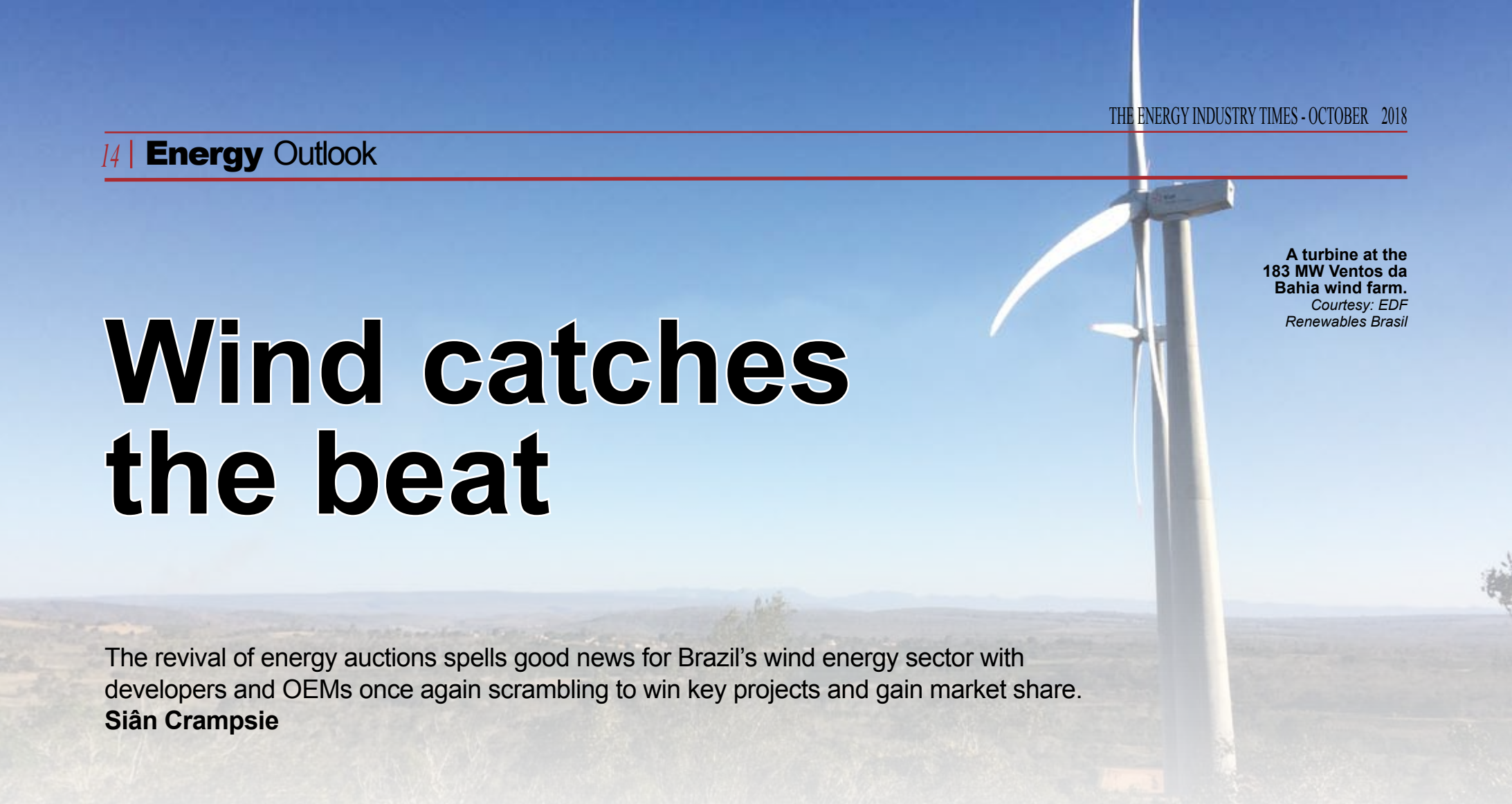
As Schettler observed: "I think this is quite interesting because we would have a huge wind farm cluster in the middle of the North Sea that is quite close to the centre of the direct path between Scandinavia and between the UK and continental Europe. If you connect part of it to the UK and part to Germany then it becomes very easy to interconnect the two. This is definitely something that is not too far off."

This kind of approach would reduce the costs of the interconnector transmission assets and the overall cost of network development and expansion goes down as a result. "It basically increases flexibility and increases the utilisation of the link and I think this is definitely something that's of benefit to the business case for such systems," said Schettler.

Looking even further ahead, higher voltages and capacities in HVDC suggest even longer distance interconnectors that enable power flow between, say, America and Europe may be possible. This opens the possibility of exploiting time zone changes and the relative shift in peak demand hours.

Schettler concluded: "There are definitely some options for the mid to long-term future where we could benefit from the time shift even more. From a realistic perspective, it's not tomorrow we're likely to see trans-Atlantic HVDC, but technically it's definitely an option."

Clearly HVDC is enabling greater renewable penetration across Europe and better utilisation of renewable generation assets. But perhaps more important than the market opportunity, in a renewable energy dominated electricity system interconnectors are delivering system stability.



A turbine at the 183 MW Ventos da Bahia wind farm. *Courtesy: EDF Renewables Brasil*

Wind catches the beat

The revival of energy auctions spells good news for Brazil's wind energy sector with developers and OEMs once again scrambling to win key projects and gain market share.
Siân Crampsie

Brazil's onshore wind energy market is once again heating up following a revival of the country's energy auctions in late 2017.

In the latest A6 auction, held at the end of August, 48 wind farms with a combined total capacity of 1251 MW were awarded contracts by regulator Aneel. This followed on from an A4 auction held in 2018, in which 114 MW of wind was contracted, and A4 and A6 auctions at the end of 2017, which saw 1.4 GW of onshore wind contracted.

The auctions brought a welcome end to the two-year hiatus in auction activity initiated by the government in 2016 in response to an economic recession and the resulting drop in electricity demand. The country's economy is once again on the up, with power consumption at the end of 2017 forecast to be on a par with that in 2014 and rising in 2018, according to Brazilian energy research agency, EPE.

In 2018, GDP is expected to rise by more than two per cent, and reach almost three per cent in 2021, says EPE. As a result, electricity consumption is anticipated to rise by 3.7 per cent from 2017 to 2021.

"There has been a pause in the market for the last couple of years due to political uncertainty and poor economic growth," said John Bosche, President of technical advisory firm ArcVera Renewables. "But now the market is back and so by comparison, the market is busy once more. It is maybe not as robust a market as it was four or five years ago, but it is robust."

Renewable energy auctioning in Brazil has brought with it an aggressive bidding landscape, ArcVera says, as developers seek to get backed-up projects to market and capitalise on the opportunities available to gain market share. They are also able to take advantage of the fall in wind turbine equipment prices that have taken place in the last two years.

At the end of 2017, energy auctions procured wind energy at an average price of R98.62/MWh ($23.87/MWh). Brazil's A4 auction in April 2018 resulted in a record low bid from EDF to sell energy from four wind projects at R67.6/MWh ($20.23/MWh). In the August 2018 A6 auction, winning wind energy bidders will receive an average price of R90.45/MWh ($22.29/MWh).

Successful bidders in Brazil's recent auctions include EDP Renovaveis (EDPR), which won capacity for its 176 MW Jerusalem and 253 MW Monte Verde projects, both located in the northeastern state of Rio Grande do Norte. EDPR's CEO João Manso Neto remarked in September 2018 that Brazil was a "strategic" market for the company. "The abundance of the wind resource, stable regulation and our experience in the market are factors that leave us optimistic in the future."

French giant EDF also saw success in the most recent auction, winning two wind projects in northeastern Bahia state with a combined capacity of 276 MW. Both projects are extensions of other wind farms that are currently under construction – the 114 MW Folha Larga site and the 183 MW Ventos da Bahia site. "There is a great energy demand in the country and a favourable regulatory environment for the expansion of renewable energies," said Paulo Abranches, CEO of EDF Renewables do Brasil.

Italian firm Enel Green Power remains a leading force in Brazil's wind energy market with 842 MW in operation and a large development pipeline. Notably, in July it awarded Nordex a contract to supply and install turbines for the 595 MW "Lagoa dos Ventos" wind farm. Under what is its largest single contract, Nordex will supply 191 turbines.

Enel Green Power told *TEI Times* that it has doubled its installed wind energy capacity in Brazil in the last 14 months, and plans continued growth through a "solid portfolio of projects in execution". In December 2017, it won 618 MW of wind capacity from three projects submitted for the A6 auction. It will invest around $750 million in the three projects – Lagoa do Barro (510 MW); Morro do Chapéu II (78 MW); and 30 MW Delfina Extension.

In early 2018, the company started operations at its 172 MW Morro do Chapéu Sul wind farm in Bahia state.

Carlo Zorzoli, Enel's country manager in Brazil commented: "Wind power is currently the most competitive source for the expansion of Brazil's generation system and it nicely complements the country's existing installed large hydropower capacity.

"Brazil is extremely rich in wind resource potential, especially in the northeast region. Wind generation is actively contributing to lowering the cost of energy in the country, and it can remain a competitive sector if barriers, such as import duties, are avoided. The country is a prime example of successful promotion of clean energies."

Up to two more energy auctions could be held in Brazil in 2018, according to local reports. Under the auction system, Aneel sets a ceiling price and developers place bids downward to the level at which they are willing to sell energy from their projects. The lowest offers win contracts with a 20-year agreement to sell power.

A stable regulatory regime and good wind resources make Brazil an attractive market for developers, and continued fierce competition in auctions, coupled with falling technology costs, is expected to drive a continued reduction in energy prices.

In some of the A6 auctions, where developers have six years to build projects, bidding is to some extent based on wind turbine models and technology that does not yet exist, Bosche says.

With prospects for continued lower energy prices, some developers are seeking alternative routes to market for their projects, including private power purchase agreements with either utility clients or corporate end users.

"In the past all projects went through the auction system and obtained power purchase agreements that way. Now the power pricing in the auctions is so low that many developers are opting to forego the auction process and directly negotiate power purchase agreements with end users," Bosche notes.

In May, power utility Compañía Energética de Minas Gerais (Cemig) held its own auction for procuring energy supplies. The auction resulted in contracts for over 400 MW of wind and solar energy, with Cemig signing 20-year PPAs with winning bidders. Cemig will in turn sell the power from the contracted power plants to Brazil's deregulated national electricity market.

According to the Global Wind Energy Council, Brazil added 2022 MW of onshore wind energy capacity in 2017, bringing cumulative installed capacity to 12 763 MW. Continued growth in the market is expected, partly due to government policy, but also in part because of the country's excellent wind conditions.

"Brazil has some of the best wind conditions in the world, with high wind speeds and high capacity factors," said Bosche. "At the same time, it is very benign wind as it always blows from the same direction and it doesn't have high turbulence or 50-year gusts.

"It is possible to put a class three wind turbine (designed for low wind speeds) there in these high winds and easily hit capacity factors well into 50 or even 60 per cent."

In 2017, Brazil's wind generation record was broken with ten and 11 per cent of national electricity demand met by wind power in August and September, respectively.

Overall, wind accounts for closer to seven per cent of electricity consumption. According to Enel, this rises to over 70 per cent in the northeast of the country, where the best wind resources exist.

The country has also made progress on overcoming transmission challenges, including a successful transmission auction in late 2017 that will spur investment in some 5000 km of new transmission lines.

Other potential market barriers are also being resolved: Brazil has implemented a programme to strengthen the private banks to improve the prospects for wind energy finance. The Brazilian development bank, BNDES, has also decided to substitute long-term interest rates with a new long-term rate that is more aligned with market prices.

According to GWEC, the hiatus in energy auctions in 2016 and 2017 will result in a dip in onshore wind capacity additions in 2019-2021. The growing market for private PPAs may offset some of this, however, and there is a strong pipeline of over 5 GW of onshore wind in the country that bodes well for the future of the sector.

The Brazilian government's ten-year energy plan highlights the importance of wind energy to the country, in particular in diversifying the generation mix away from hydropower. It forecasts that installed wind capacity in Brazil will reach 28.5 GW by 2026.

Milking the ORC

A dairy factory in Italy is set to install a cogeneration plant that uses an Organic Rankine Cycle (ORC) that will operate at a higher temperature than existing systems. **Junior Isles** reports.

Owners of small Industrial facilities that require predominantly steam, as opposed to hot water and/or electricity, are often faced with a choice of either installing steam turbines, small or micro gas turbines or reciprocating engines – none of which are an ideal solution for processes with large steam requirements but little electricity.

A recent technology advance, however, now offers what appears to be the ideal solution for this market niche. Italian company, Turboden, has just announced that it is to deliver what it says will be the first high 'Steam & Power Organic Rankine Cycle (ORC)' plant to Centrale del Latte di Brescia for milk pasteurisation.

The new high temperature cogeneration solution is claimed to have an overall efficiency of more than 90 per cent with a high steam output – typically producing about 75 per cent steam, 15 per cent electricity and no hot water.

Commenting on the new technology, Paolo Bertuzzi, Turboden's Managing Director and CEO, said: "In terms of the market, we realised that we could address a niche – in terms of a different combination of steam, power and size – that is not covered by other existing cogeneration technologies."

Turboden's new technology will target projects between 500 kWe and 3 MWe, which corresponds to a steam output of 5-30 t/hr.

It is a market segment that is generally too small for a cogeneration system based on a single gas turbine. And although microturbines could be used, projects become complex if too many are required.

"Gas turbines are almost not present at this size," noted Bertuzzi. "Internal combustion engines are the leading technology at this size. However, although they give you about 40-45 per cent in terms of electrical efficiency, you only get about 18 per cent of steam. So, if you don't need hot water, you will lose 35-40 per cent of the energy input. If you do not need the power or hot water, this is not the most suitable technology."

With the new ORC technology, heat is received at a higher temperature than the 300°C used in its current ORC for CHP biomass applications. Normally this will deliver hot water at 80-90°C, which is suitable for low temperature cogeneration applications such as district heating or drying processes. The Steam & Power ORC increases the system inlet temperature to 400°C to deliver steam at different pressures, ranging from 6 bar up to around 18-20 bar.

Turboden first began developing the technology two years ago, analysing which applications required large amounts of steam, little electricity and little or no hot water. It found that industries such as dairies, food and beverage, paper, chemical, textile, and oil & gas could all benefit.

"We had all the components and were confident we could move our existing system technology to this new higher temperature," noted Bertuzzi.

Through a research and development project supported by the Italian Ministry of Economic Development's Fund for sustainable growth, Turboden designed a new ORC. The new system is based on a modified turbine, which uses a working fluid that is suited to the higher temperature. The company has a budget of about €5 million to develop the project.

The Rankine Cycle is a thermodynamic cycle that converts heat into work. Heat is supplied to a closed loop, which typically uses water as working fluid. The Organic Rankine Cycle's principle is based on a turbogenerator working as a conventional steam turbine to transform thermal energy into mechanical energy and finally into electrical energy through an electrical generator. Instead of generating steam from water, the ORC-system vaporizes an organic fluid, characterised by a molecular mass higher than that of water, which leads to a slower rotation of the turbine, lower pressures and no erosion of the metal parts and blades.

First developed in the 1950s, Turboden believes ORC technology has big potential, believing it can go from the current approximately just under 300 MW/year (of which 200 MW/year is in geothermal) to about 1 GW/year.

Speaking at a presentation earlier this year in Brescia, Italy, Bertuzzi said: "ORC for geothermal can go up to 400-500 MW/year, taking market share from steam turbines. Biomass could also be 100 MW/year, easily. And a market that has huge potential, is waste heat recovery for processes and oil & gas. This could be an additional 200-300 MW/year."

Development of the new ORC system will help realise this potential. According to the company, the components in the new system are the same as its existing cogeneration technology but new materials capable of withstanding the higher temperatures are used.

Pasteurisation in milk production will be a prime application for the new high temperature Organic Rankine Cycle technology

"We have validated all the components – we have selected and tested all the materials. Therefore we do not see any particular technological risk to this new development. We are used to designing units that run at different temperatures – very low in geothermal, medium in waste heat recovery, higher in biomass."

According to Bertuzzi, the new technology could make more small-scale industrial installations with high steam requirements become feasible. "To receive certain subsidies, such as White Certificates, you often need to comply with an overall efficiency that is sometimes very high. So if you don't need hot water, it is very difficult to meet these overall efficiencies."

With the possibility of receiving subsidies, which support project economics, payback times are impressive. Looking specifically at the dairy industry, where the first system will be installed, Bertuzzi notes that cogeneration systems are not so widespread.

"Most of them buy power from the grid and use gas fired boilers to produce steam. Investing in a cogeneration plant has a payback in the range of less than three years. It depends on the number of operating hours per year, the size of the project and other variables such as the price of the electricity – the higher the electricity price, the shorter the payback. The cost of the gas is almost neutral because you are already burning the gas to produce the steam."

The new unit at Centrale del Latte Brescia will be used to produce 700 kW of electric power and 5 ton/h of steam in the production processes for milk pasteurization.

Although the boiler can be designed to burn natural gas, biomass or recover waste heat, the Centrale del Latte Brescia installation will use a natural gas-fired thermal-oil boiler designed by industrial boiler manufacturer Bono Sistemi - Cannon group. The existing gas boiler at the dairy will be kept as a backup.

The new thermal-oil, gas boiler is not a conventional gas boiler that produces steam to drive a steam turbine. Instead it produces heat that is transferred to a thermal oil loop. The hot thermal oil evaporates the ORC working fluid and the organic vapour generated expands to the turbine, which drives an electric generator to produce electric power.

Downstream of the turbine, the organic vapour pre-heats the organic liquid in the regenerator and is then condensed at high temperature releasing its latent heat for steam generation, to feed the manufacturing process.

Delivery of the new ORC system is scheduled in 12 months. As a skid-mounted solution, erection and installation time is expected to be quite short. This will see startup of the unit at the end of 2019/start of 2020.

The owner of the unit is looking forward to the benefits it will bring to the operations. Dr Franco Dusina, President Centrale del Latte di Brescia, said: "Centrale del Latte is very sensitive to clean and environmentally friendly solutions; high efficiency cogeneration fits perfectly with our philosophy. For some years we have been looking for a suitable technology for our energy needs and for improving the energy efficiency of our production plant. We are sure that the synergy between Turboden and us, two important companies in the industrial context of Brescia, will lead to a successful project.

With this first project now firmly off the ground, Turboden is already targeting projects in other industrial sectors.

Bertuzzi said: "One will be in paper and the other is in chemical fibres. We are also aiming to have our first biomass project soon."

In terms of the technology, Centrale del Latte di Brescia is the first of what Turboden calls a "multiple size development" that will go up to 3 MWe and 25 t/h.

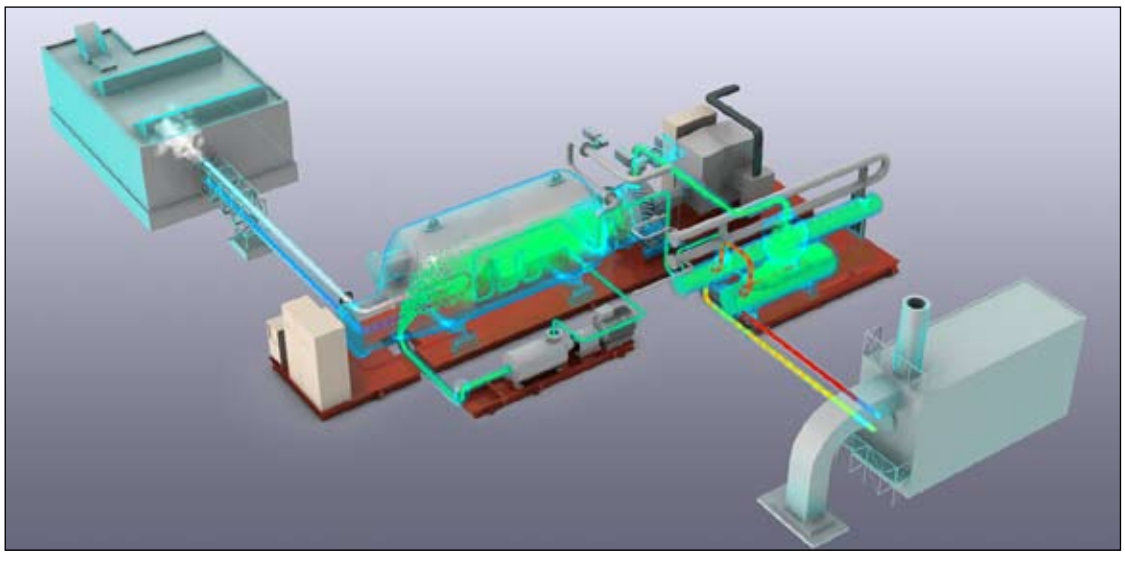
"We have a pre-design for four or five sizes but the detailed design of the larger sizes will be linked to the first project. Typically, each pre-design will validate the new size that will come to the market. We hope to conclude the development of the different sizes within two years from now," said Bertuzzi.

Commenting on geographic markets, he says the solution can be very attractive for all markets where cogeneration is either already best practice or in the development phase. "It depends on the price of electricity versus the price of natural gas and the presence of incentives to support high efficiency cogeneration. We are actively proposing this solution in Italy, UK and Ireland but will also be looking at other countries."

To support the roll-out of the technology, in addition to offering after-sales services such as remote monitoring and diagnostics, Turboden will also be looking at how it can support with financing installations.

Bertuzzi concluded: "In the cogeneration sector, most of the time customers are not eager to invest directly in a project but are used to having access to off-balance sheet solutions. With the support of financial partners and energy service companies, or even directly, we are available to study the best rental or energy service scheme or leasing facility, according to the customers' preference."

The gas-fired thermal oil boiler generates heat that is transferred to a thermal oil loop. The hot thermal oil evaporates the ORC working fluid and the organic vapour generated expands to the turbine to produce electricity. Downstream of the turbine, the organic vapour pre-heats the organic liquid in the regenerator and is then condensed at high temperature releasing its latent heat for steam generation



Time to change course

Junior Isles

When you are hurtling towards a cliff-edge at speed or sailing straight for an iceberg it's advisable to act quickly in order to avoid catastrophe. That was one of the key messages coming out of the Global Power and Energy Exhibition (GPEX) 2018 recently held in Barcelona, Spain, alongside Gastech.

The energy transition has been gathering momentum over the last few years and – for someone who has the mind set of a traditional utility or major energy company – is moving at breakneck speed. But many argue that the change is still not happening fast enough and traditional players need to take heed.

Referring to the need to tackle climate change, in his opening gambit Laszlo Varro, Chief Economist at the International Energy Agency (IEA) said: "We are heading toward the cliff at speed. We have only made it to base camp but have a tough climb ahead."

Laszlo pointed out that the energy markets that are closest to achieving "2°C stabilisation" have a ramp-up of wind and solar from the current levels by a factor of three. He stressed, however, that "at this level of solar deployment, we are not going stop the use of fossil fuels".

In the panel that followed, which discussed transitioning to a new energy landscape, Thierry Lepercq, Executive Vice President, Research & Technology and Innovation at Engie voiced his fears, as a large energy group. Engie has been reducing its dependence on fossil fuels and thermal power generation – closing coal fired generation and selling its oil and gas exploration operations – and moving more into energy services.

In February this year, it closed a $4 billion deal for the sale of its exploration and production business to Neptune Oil & Gas, which represents a big step towards its target to sell as much as €15 billion of fossil fuel assets.

But he questioned whether in fact the energy transition was truly under way, at least in the mindset of companies. He said: "We are reaching the point where we have to leap frog and that's the tough part. There is no transition; it's not moving step-by-step." Lepercq stressed the need for companies to move to remedy a situation where they faced having a significant amount of stranded assets. He cited the case of India, where he said companies were facing ownership of 75 GW in stranded coal fired assets due to the low price of solar generation.

"This is where we stand today. If I were to put it in more dramatic fashion, walking down the exhibition hall I would not resist the comparison with the Titanic. We have fleets of Titanics around the place. They are going to sink as surely as the Titanic and people have to get ready for it," said Lepercq.

Companies and the sector as a whole, therefore needs to change now and not just wait for things to fall apart, he added. Lepercq also said the industry needs to "bring about something else". That something else, he believes, is a system.

"It's not just about saying we are going to do traditional, or gradually more, renewables. We have to think about a system that can be a 24/7 system; not just an electric system – something that works every single month as well. And that, which is maybe the good news for people at this conference, will require gas but gas of another form – hydrogen."

Engie sees renewable hydrogen (hydrogen produced by electrolysis of water using electricity from renewable sources) as key to accelerating the energy transition, serving as a source of flexibility that enables storage and recovery of power generation overcapacity. The company is therefore rolling out a series of pilot projects and at the start of 2018, set up a new global business unit dedicated solely to renewable hydrogen.

Although sitting alongside Lepercq on the panel, João Paulo Costeira, COO Offshore & CDO at EDP Renováveis, had a more reserved view. On the issue of how boardrooms are reacting to driving the transition to a low carbon system, he looked at how the changes are affecting business models. While he agreed that many companies were behind the pace, he stressed that the situation was now more complex and caution was still warranted.

"The problem is, it should have been done 15 years ago," he said. "We spun-off renewables as a group around 12 years ago and put around 70 per cent of all our investment in green power. That was great back then but things have changed. Ten years ago, it was basically wind but now if you want to be a relevant player in the renewable generation field you have to do wind, wind offshore, PV, storage and you might have to do gas [hydrogen]."

With the price of energy falling, reducing margins and organisations becoming much more complex, it means that companies may have to pick technology winners when betting on how the landscape is changing.

Also, a CEO's decision on how and when to invest is further complicated by energy policy, which often does not provide clear investment signals. And the transition can only happen if there is investment. Already there are warning signals. According to the IEA's '*World Energy Investment 2018*' report, released in July, renewable power investment fell to $298 billion in 2017 from $318 billion in 2016. This represents the biggest absolute drop since the agency started keeping track of clean power in 2000. And with CO_2 emissions showing an increase in 2017, it is a worrying picture.

During the panel discussion, Romain Debarre, Managing Director of A. T. Kearney Energy Transition Institute, said the energy sector will have to double investment in the coming decades to make the transition happen, which would drive renewables from 15 per cent to 60 per cent in the next two or three decades. "These are huge investments that will probably not happen if we do not have proper regulation," he said.

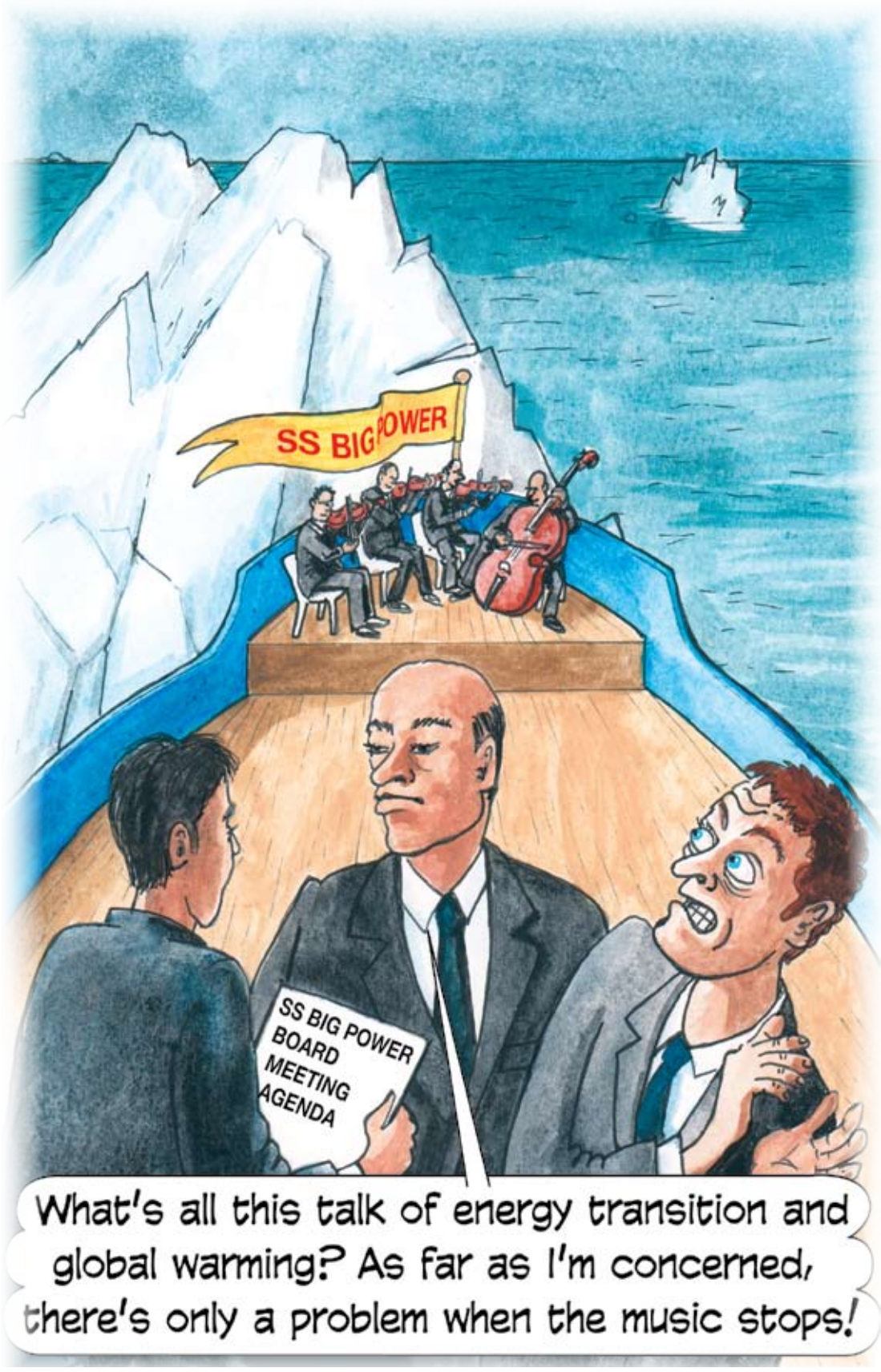
Yet decisions still have to be made and made quickly, or the traditional energy companies will fast become irrelevant and ultimately defunct, especially in Europe. With the rise of solar in southern Europe and wind in northern Europe, combined with the falling cost of storage and electrolysers, Lepercq stressed that company executives need to act – if not to save the planet, then from a purely economic standpoint.

"It makes business sense and if they can save the planet on top of that, then why not? We have a massive shift in Europe right now, which is fundamentally changing the dynamic of the European power market. All these elements that are shaping up, are driven by the market. And the shift can be extremely fast and boards better notice, because it's going to be tough and bloody."

While Costeira said he agreed with Lepercq, he did, however, offer a word of caution. "Most of those [renewables] projects cannot find finance. Although there are corporate customers who could or should be buying that energy, on one side they are not and on the other side, there is often no active regulation that will allow them to do so on a bigger scale than they are doing right now. So we should be cautious. With markets functioning I believe they will, but it could take more time than what we have."

Indeed time is running out – both in terms of the need to drastically cut CO_2 emissions and for companies to change how they operate in the fast-changing energy landscape.

Unfortunately, rather than orchestrate their way around the looming icebergs, there will always be those who continue to play the same tune on their violins even as the ship sinks.



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