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World needs "laser-like focus" to bridge emissions gap, says WEO

Dr Birol says there is no single or simple solution

Putting electricity systems on a sustainable path will require more than just adding more renewables, according to the recently launched World Energy Outlook. It will call for a grand coalition of all parties committed to tackling climate change. **Junior Isles**

The International Energy Agency's recently released 'World Energy Outlook (WEO) 2019' has stressed that "rapid and widespread changes" across all parts of the energy system are needed to put the world on a path to a secure and sustainable energy future.

Launching the organisation's flagship publication, Dr Fatih Birol, the IEA's Executive Director, said: "The world urgently needs to put a laser-like focus on bringing down global emissions. This calls for a grand coalition encompassing governments, investors, companies and everyone else who is committed to tackling climate change. Our Sustainable Development Scenario is tailor-made to help guide the members of such a coalition in their efforts to address the massive climate challenge that faces us all."

The IEA says that despite rapid transformation in some parts of the energy sector, the momentum behind clean energy is insufficient to offset the effects of an expanding global economy and growing population. The rise in emissions slows but does not peak before 2040.

The Stated Policies Scenario, formerly known as the New Policies Scenario, incorporates today's policy intentions and targets in addition to existing measures. The aim is to hold up a mirror to today's plans and illustrate their consequences. The future outlined in this scenario is still well off track from the aim of a secure and sustainable energy future.

Putting electricity systems on a sustainable path will require more than just adding more renewables, says the IEA, noting that the world also needs to focus on the emissions that are "locked in" to existing systems. Over the past 20 years, Asia has accounted for 90 per cent of all coal fired capacity built worldwide, and these plants potentially have long operational lifetimes ahead of them.

This year's WEO considers three options to bring down emissions from the existing global coal fleet: to retrofit plants with carbon capture, utilisation and storage or biomass co-firing equipment; to repurpose them to focus on providing system adequacy and flexibility; or to retire them earlier.

"What comes through with crystal clarity in this year's World Energy Outlook is there is no single or simple solution to transforming global energy systems," said Dr Birol. "Many technologies and fuels have a part to play across all sectors of the economy."

The IEA noted that greater energy efficiency is crucial to its Sustainable Development Scenario. A sharp pick-up in energy efficiency improvements does more than any other energy

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Asia at the heart of climate change challenge

China and India will have to curb their coal use if the world is to have any chance of making its climate goals.

According to the International Energy Agency's recent 'World Energy Outlook (WEO) 2019', coal is responsible for 30 per cent of all energy-related carbon dioxide emissions, making it the biggest single contributor to greenhouse gas emissions.

If the world is to limit the increase in temperature as a result of climate change to less than 2°C (3.6°F), it is clear that coal consumption will have to be reduced far more dramatically than is currently forecast.

The International Energy Agency (IEA) said that under its Stated Policies Scenario China's coal use goes from 2.83 billion tonnes of coal equivalent to 2.84 billion in 2030 and 2.57 billion by 2040, but under the Sustainable Development Path it would need to drop to 2.07 billion by 2030 and 1.15 billion by 2040.

India's demand was 586 million tonnes of coal equivalent in 2018, and the IEA forecasts this to rise to 938 million by 2030 and 1.16 billion by 2040 under the Stated Policies Scenario, but to meet the sustainable development scenario it would need to be 546 million.

The two countries currently account for 60.2 per cent of global electricity generated by coal, according to data from the Institute for Energy Economics and Financial Analysis (IEEFA).

The IEA suggests that India effectively has to limit its coal demand to current levels, while China will have to cut its consumption by some 60 per cent by 2040.

This would require a major change in policy direction in both countries, something that would be difficult to achieve, both politically and financially. For China the challenge is harder, given the size of its coal sector and the subsequent cost of shifting away from the fuel.

The IEA suggests China may be able to deploy carbon capture and storage systems on a large scale, but this would be costly and there is currently little political impetus to make this happen. Replacing coal with renewables, hydro or nuclear will also be expensive, especially since the sustainable development path would mean retiring many coal fired power plants well ahead of their normal lifespan of about 50 years.

Recent research by Wood Mackenzie provided an indicator of the cost of decarbonisation in the region. The organisation indicates that Asia Pacific's decarbonisation bill could hit $3.5 trillion by 2040. This includes investments in solar, wind, hydrogen, nuclear, and hydropower, collectively referred to as zero-carbon energy between now and 2040, under Wood Mackenzie's accelerated transition scenario.

The majority of Asia Pacific's decarbonisation bill will come from the power and transport sectors, as both accounted for over 50 per cent of the region's carbon emissions last year. This significant shift requires investment and support from all stakeholders especially China and India.

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technology to bring the world towards the Sustainable Development Scenario over the next two decades. The report revealed, however, that global efficiency improvements slumped to 1.2 per cent in 2018, the slowest rate since the start of this decade and far below the 3 per cent rate that would be needed to help achieve sustainable energy goals.

The new report includes a special focus on the ways in which digitalisation is transforming energy efficiency and increasing its value. By multiplying the interconnections among buildings, appliances, equipment and transport systems, digitalisation is providing energy efficiency gains beyond what was possible when these areas remained largely disconnected. While efficiency in these areas has always had benefits for energy systems, digitalisation enables these benefits to be measured and valued more quickly and more accurately.

A separate report created by Capgemini in partnership with De Pardieu Brocas Maffei and Vaasa ETT also found that global energy demand and GHG emissions rose in 2018, threatening progress towards climate change goals.

The World Energy Markets Observatory (WEMO) report showed efforts to reduce GHG emissions stalled in 2018, with growth of 2 per cent compared to a 1.6 per cent increase in 2017 and no growth in Europe over 2014-16. The report stressed that without bolder measures that go beyond existing energy transition policies, the world will very likely fail to meet the objectives of the Paris accord.

Meanwhile renewables retained their status as the fastest-growing energy source worldwide, at 14.5 per cent in 2018 finds the reoprt. Renewable energy sources continue to get cheaper, with the electricity cost of solar photovoltaic and onshore wind declining by 13 per cent, and that of offshore wind by 1 per cent.

BloombergNEF's (BNEF) latest levelised cost of electricity (LCOE) figures show global benchmark LCOE for onshore wind and PV projects at $47 and $51/MWh today. The numbers are down 6 per cent and 11 per cent respectively from six months ago, mainly owing to cheaper equipment. The offshore wind LCOE benchmark sits at $78/MWh today, down 32 per cent from last year.

Colette Lewiner, Energy and Utilities senior advisor at Capgemini said: "Variable renewables generation share should increase as a result of digital levers such as sensors, connected objects, data collection, artificial intelligence, smart grids deployed at scale and demand-response, improving forecasting and

Vié: borders between players are blurring

operations efficiency."

Philippe Vié, Global Head of the Energy and Utilities sector at Capgemini, added: "With the combination of digital and sector technologies, borders between players are blurring and new actors penetrate the industry every month, which is leading incumbents to reinvent themselves and propose new business models through eco-systems."

Support needed for EU countries hit by costs of going green

There will need to be discussions on how some EU member states will be supported in their transition to clean energy sources following a decision by the European Investment Bank to stop financing unabated fossil fuel projects, including gas, from the end of 2021. **Junior Isles**

EU member states hard hit by the costs of going green should receive support as they make the transition away from coal, says the European Investment Bank (EIB).

The statement from the bank followed Poland, Hungary and Romania's vote in mid-November against a landmark decision by the lender to phase out fossil fuel lending by 2021.

Werner Hoyer, President of the European Investment Bank, told the *Financial Times* it was "understandable" that the countries voted against the decision, noting that they would be hardest hit by the move.

The EIB has outlined its five principles for future energy sector investment, which include prioritising energy efficiency under the new EU target in the EU Energy Efficiency Directive. It will also increase support for low and zero-carbon projects to meet a 32 per cent share in renewable energy across the EU by 2030 and increase financing for decentralised energy production.

EIB has also reduced its emissions performance standard from 550g of CO_2/kWh to 250g CO_2/kWh.

It made the decision based on a review process, which featured input from the energy industry and the general public, with 149 written submissions from organisations and petitions signed by over 30 000 people.

Explaining the decision, EIB Vice President in energy Andrew McDowell said: "EIB's ambitious energy lending policy is a crucial milestone in the fight against global warming. Following a long discussion, we have reached a compromise to end the financing by the EU Bank of unabated fossil fuel projects, including gas, from the end of 2021."

The decision could put gas on the same path as coal, which has seen a rapid decline in the electricity mix in recent years.

Wood Mackenzie research director Nicholas Browne, commented: "The EIB's new financing criteria will make lending to gas projects very difficult. It highlights that gas is also increasingly in the spotlight of the climate debate.

"When burnt, gas releases less carbon dioxide, nitrogen and sulphur oxides than coal and oil. Furthermore, coal-to-gas replacement has had a profound impact on air quality in northern China to the huge benefit of public health. It also has significantly lower full life-cycle carbon emissions than coal.

"However, while the comparative combustion benefits are undoubted, the sector may not be able to rely exclusively on this argument to make the case for gas and LNG. The benchmark looks like it will be set higher. Gas and LNG may be better but are they good enough?"

UN executive secretary for climate change Patricia Espinosa supported the move, saying: "We need similar strategies and policies from all lending institutions in order to achieve the temperature goals of the Paris Climate Agreement."

The EU is aiming to become the first climate neutral major economy in the world by 2050. The European Commission has estimated it will cost €300 billion to fund the economic transition to reach the target, with the bulk of spending needed in higher-polluting countries in central and eastern Europe.

In addition to rejecting the EIB decision to phase out fossil fuel investments, Poland, Hungary and the Czech Republic have not yet signed up to the 2050 goal due to concerns over the costs of the transition.

They are postponing their decision until Ursula von der Leyen, incoming Commission President, presents her promised "Green New Deal" in December, which will include a "Just Transition Fund" to help those countries and regions that will bear most of the economic cost.

The Commission says coal accounts for nearly 25 per cent of the EU's electricity production. It remains a significant industry in more than 40 regions and provides 240 000 jobs in mines and power plants.

Hoyer told the *FT*: "What can we offer the member states in order to support growth and jobs in these regions, [the] most affected regions – that's the challenge we are facing."

He said the EIB would still offer polluting countries economic support after fossil fuel funding was stopped. "We are going to certainly not reduce our lending to these countries only because we don't finance fossil fuel projects any more after 2021. Probably the opposite will be true."

Affected countries, including Poland, have demanded substantial EU funding to pay for the transition.

Moody's said in a report published last month that the Polish government will likely continue to intervene in the electricity markets as it seeks to mitigate the short-to-medium term impacts of the transition to a low-carbon energy sector.

"Given that the Polish utilities' traditional business model of producing and selling cheaply generated electricity is being severely disrupted by decarbonisation, we expect government intervention to continue," said Mark Remshardt, a Moody's Vice President - Senior Analyst.

Poland remains very carbon intensive compared with most EU members, with around 80 per cent of its electricity coming from fossil fuels.

Decarbonisation in line with EU targets would involve the rapid reduction or closure of thermal installations and mining operations, so the government steps in to secure supply, avoid unemployment and protect end users from price rises.

EU banks on electrification in plan to decarbonise by 2050

The European Commission says it needs to double the share of electricity in energy consumption if it is to decarbonise by 2050.

Speaking at an event in Brussels, Ditte Juul-Jørgensen, the new head of the Commission's energy department said: "We've already seen an increase in the last decade, but we need to go further."

Juul-Jørgensen, who started in her job as Director-General of the department in August, has come to the role at a pivotal time for energy. The 2050 decarbonisation proposal from the Commission, the EU's executive branch, is expected to be approved in December by EU national leaders. A veto from Poland that has blocked adoption until now is likely to be overcome if Poland and other Eastern European countries are offered financial assistance from a just transition fund, according to EU sources.

Ursula von der Leyen, the incoming President of the Commission, has promised to unveil a European Green Deal in her first 100 days in office designed to get the EU to its 2050 goal. Juul-Jørgensen will be working with the incoming EU Energy Commissioner, Kadri Simson, on designing the strategy. The overall aim will be to phase out fossil fuels, and increase the use of electricity from renewable sources.

"This will be about how do we best make use of electricity to feed into other sectors," Juul-Jørgensen explained. "We need to think about transforming it into other sources, and how to best transport it. But the biggest challenge from what I see today is that of investment and finance – the changes we have to make are very significant."

The Commission says it will to try to tackle the challenges of financing the energy transition with two tools: dedicated climate funding in the EU budget; and dedicated climate lending from the EIB. It expects this spending to amount to around €400 billion a year.

The Commission's proposed dedicated climate spending in the next seven-year budget must still be approved by the 28 EU national governments. Juul-Jørgensen said there is unanimous agreement on the amount: 25 per cent of the budget. But there is disagreement about how to determine what is green spending.

Juul-Jørgensen was speaking at an event organised by the Electrification Alliance, a broad group of 100 organisations from major industrial sectors and civil society that is calling on EU policymakers to accelerate the uptake of clean and renewable electricity as the most cost-effective and energy efficient strategy to deliver a climate neutral Europe.

The Alliance released its Declaration in early November, which calls on EU policymakers to deliver a meaningful Green Deal and fast-track Europe's electrification.

Upon the release of the Declaration, Laurence Tubiana, CEO of the European Climate Foundation and co-architect of the Paris Agreement, said: "The Electrification Alliance is delivering a clear signal to European Union decision-makers that they should be confident in committing to net-zero carbon emissions by 2050.

"Electrification must be the dominant way forward in the clean energy transition – and European businesses are prepared to pave the way. This, hand in hand with the European Green Deal, is a unique opportunity to carve out the EU's leadership on climate action and decarbonisation on the global stage."

US rolls back coal waste rules

■ More Obama regulations changed ■ US to withdraw from Paris Agreement

Siân Crampsie

Efforts by the Trump administration to reduce the regulatory burden on fossil fuel fired power plants has heightened the debate in the country around climate change.

The administration last month announced plans to relax Obama-era limits on waste generated by coal fired power plants, a move that it says will help keep plants open for longer and cut compliance costs.

It came as President Trump announced formally that he planned to withdraw the USA from the Paris Climate Agreement.

The new rules effectively extend the period of time that coal ash waste can be kept in unlined ponds and loosens regulations for the release of liquid waste from power plants. They also give utilities another two years to comply with some of the rules that were enacted by President Obama in 2015.

The Environmental Protection Agency (EPA) says the relaxed rules will save $175 million annually in compliance costs. It also says that the discharge of toxic contaminants into rivers and streams and creeks would actually go down, owing to increased voluntary wastewater clean-ups by utilities.

The plans have been welcomed by the USA's coal industry, which had voiced concerns over the impact of the 2015 rules on idling coal plant that it says are vital to energy security. "EPA's proposals appear to include enough flexibility to avoid these adverse consequences while, at the same time, protecting public health and the environment," said Michelle Bloodworth, President and CEO of America's Power, a coal industry association.

Environmental groups have criticized the plans, saying that they will increase the risk of water contamination by mercury, arsenic and other heavy metals. Legal group Earthjustice said that the proposed rules would "allow utilities to continue to use cheaper, less effective treatment methods on polluted wastewater from coal plants dumped into lakes, rivers, and streams, even though such wastewater is by far the largest source of toxic water pollution in the United States."

The proposals are part of President Trump's plan to promote domestic energy sources and energy independence. His policies include reducing the regulatory burden on energy companies, opening up federal land and offshore areas for energy exploration, promoting investment in oil and gas production, and withdrawing the USA from the Paris Climate Accord.

Earthjustice's Vice President of Litigation for Climate and Energy, Jill Tauber, said: "At this critical moment, our country should be leading the charge to combat the climate crisis. Instead, the Trump administration is once again trying to drag us backward and undermine global progress to benefit big polluters. Withdrawing from the Paris Agreement is the wrong decision for our planet, our economy, and our role on the world stage."

The withdrawal from the Paris Agreement will take effect from November 2020. WWF said that the move would send the "wrong signal" to other countries, and was at odds with bipartisan coalitions in the US Congress, as well as many businesses, cities and states, that have pledged to continue working towards climate goals.

According to US media, over ten state and local governments around the US have launched litigation seeking to hold energy companies accountable for their role in the changing climate and the local impacts of climate change.

In November, the US Supreme Court rejected a request from more than two dozen multinational energy companies to block a state court lawsuit brought by the city of Baltimore.

Wind growth spurs O&M spending

Spending on the operations and maintenance (O&M) of wind farms in the US is expected to jump about 50 per cent above the 2018 level to more than $7.5 billion (€6.7 billion) by 2030, according to a new report by IHS Markit.

The surge in O&M spending will follow the recent push to implement new wind energy projects before the expiry of the US federal tax credit. O&M spending last year reached some $12 billion, IHS said, adding that annual capital spending will average $14 billion in the period 2019-2021.

While this will be followed by a slow-down in capital spending on new projects, the current boom will drive growth in O&M spending during the next decade, IHS added.

In the early 2020s, the wind industry will experience a transition in employment opportunities from construction to O&M jobs. More specifically, the firm estimates that the number of O&M jobs in North America will rise to almost 9000 by 2030 from some 6000 today.

According to the American Wind Energy Association (AWEA), installed onshore wind capacity has reached 100 GW in the USA.

AWEA's third quarter 2019 report shows that developers installed eight new wind farm projects with a total capacity of 1927 MW in the third quarter, the highest third quarter for installations on record. Installations for the year total 3667 MW, a 123 per cent increase over the first three quarters of 2018.

Strong wind power deployment is expected to continue, AWEA said. The near-term wind project pipeline grew to yet another record in the third quarter of 2019, reaching 46.5 GW – equal to almost half of the wind energy operating today.

There are now 22 651 MW under construction and an additional 23 844 MW in advanced development, including 5792 MW of offshore wind. The total pipeline increased 11 per cent over the second quarter and 22 per cent year-over-year as project developers announced 10 090 MW of new projects in the third quarter.

Kepco inks Guam deal

Korea Electric Power Corporation (Kepco) is set to become the largest power provider in Guam after signing a contract to build a new power plant in the US territory.

Kepco has signed a deal with the Guam Power Authority (GPA) to build and operate a 198 MW power plant in Dededo and sell power to GPA for 25 years.

The project is a key part of GPA's plans to comply with federal clean air regulations and avoid a legal battle and hundreds of millions of dollars in federal fines. Once operating, it will allow other generating units to be retired.

The $3.12 billion plant will burn ultra-low sulphur diesel fuel, and will also help Guam to integrate more renewable energy capacity into the grid.

Mainstream finances 1.3 GW Chilean project

■ Phase 1 construction starts
■ Latin America poised for solar growth

Mainstream Renewable Power has broken ground at a 1.3 GW solar and wind farm site in Chile after raising $580 million in debt for the project.

The funds have enabled the renewable energy developer to reach financial close on its giant Andes Renovables project, which will be built in three phases starting with the 571 MW first phase, known as "Cóndor".

Construction of the first phase – comprising three wind farms and one solar photovoltaic (PV) site – has already started and is expected to be completed in 2021. The next two phases, "Huemul" and "Copihue", which have a combined capacity of 730 MW are on track to reach financial close in the coming months.

When completed, Andes Renovables will comprise seven wind and three solar PV generation assets.

Overall, Andes Renovables will require investments of $1.7 billion, Mainstream said.

"Breaking ground at Mainstream's 1.3 GW Andes Renovables platform is a major milestone in our long-term commitment to bringing low cost, clean energy generation to Chile," said Andy Kinsella, Mainstream's Group Chief Executive. "[This] will be closely followed by the financial close and start of construction at the second and third phases of Andes Renovables in the coming months."

The new wind farms will be built by Sacyr Industrial and Elecnor, with Vestas, Nordex Acciona and Siemens Gamesa supplying the wind turbines. Sterling & Wilson were selected to build the Río Escondido solar farm, while grid connection works will be carried out by Transelec, CGE, HMV and Siemens. All four main power transformers for the projects will be supplied by ABB.

According to the International Renewable Energy Agency (IRENA), renewable energy is growing rapidly in Latin America. Solar energy in particular will see a significant rise in key markets over the next 30 years, it said.

In a new report, IRENA forecasts that Latin America and the Caribbean could grow their installed solar capacity by a factor of 40 by 2050.

The growth will require annual investments exceeding $7 billion and will see the region's solar PV capacity rise from 7 GW today, to more than 280 GW by mid-century.

China still too heavily dependent on coal

China is ramping up construction of coal fired plants and cutting coal fired electricity tariffs in an effort to boost economic growth. The action not only threatens global efforts to combat climate change but could also jeopardize renewable projects.

Syed Ali

In a move that threatens to offset coal plant closures and associated carbon emissions elsewhere in the world, China is once again ramping up the construction of coal fired plants as it seeks to stimulate slowing economic growth.

According to a report from Global Energy Monitor, a non-profit group that monitors coal stations, 148 GW of coal fired plants are either being built or are about to begin construction. This almost equals the current capacity of the entire EU coal fleet.

Speaking to the *Financial Times*, Ted Nace, Head of Global Energy Monitor, said the new coal plants would have a significant impact on China's already-increasing carbon emissions.

"What is being built in China is single-handedly turning what would be the beginning of the decline of coal, into the continued growth of coal," he told the *FT*, adding that China was "swamping" global progress in bringing down emissions.

China halted construction of hundreds of coal stations in 2016 amid concerns over air pollution and over-investment in coal. Many have since been restarted, as the government looks to boost an economy that is growing at its slowest pace since the early 1990s.

The Global Energy Monitor report shows the pace of new construction starts of Chinese coal stations rose 5 per cent in the first half of 2019, against the same period last year. About 121GW of coal power is actively under construction in China, slightly lower than the same point a year ago.

The findings follow an announcement in late October that China will overhaul its coal fired electricity pricing terms. Effective 2020, the new price of coal fired electricity supplied to the grid will comprise a benchmark price plus a variable element with a 10 per cent ceiling and a 15 per cent floor, with the aim of having a market-driven approach to price coal fired electricity, and to further reduce end-use electricity tariffs to cut manufacturing costs and boost the economy.

Wood Mackenzie believes this move will have a significant impact on both the power and coal markets. The firm calculates the average transaction price will fall to around RMB330/MWh, but this will still be about RMB15/MWh above the breakeven price.

The change in tariff, it argues, could mean renewable projects will face challenges in 2020. In a press note, Wood Mackenzie said: "Although renewables pricing has shifted to competitive auctions (compared to feed-in tariff previously), the coal on-grid tariff remains a key reference when evaluating the economics of renewables projects.

While projects sanctioned in 2020 and earlier will largely be unaffected, subsidy-free or low-subsidy projects approved from 2021 onwards will face greater uncertainty. With limited-to-no subsidies, new projects will be highly sensitive to coal on-grid tariffs."

■ China has developed a giant offshore wind turbine with a 210 m rotor diameter, which will be put into production soon, according to the science and technology bureau of southwest China's Chongqing Municipality. The wind turbine, coded H210-10MW, has a capacity of 10 MW and is China's first to have a rotor diameter of more than 200 m. It was developed by HZ Windpower, a subsidiary of the state-owned China Shipbuilding Industry Corporation.

Indian coal plants to miss retrofit deadline

More than half of India's coal fired power plants ordered to retrofit equipment to curb air pollution are set to miss the deadline, according to industry estimates and a *Reuters* analysis.

India, which has some of the worst air pollution levels in the world has a phased plan for plants to comply with new emission norms, with some plants having until end-December 2019, while others have up to the end of 2022 to comply. A total of 440 coal fired units that produce 166.5 GW have to comply with the regulations by December 2022. These deadlines already represent an extension to a December 2017 deadline.

A *Reuters* analysis of Central Electricity Authority (CEA) data indicates 267 units, which produce 103.4 GW of power, have to be compliant between December 2019 and February 2022, which is 27 months from now. Installations of flue gas desulphurisation (FGD) units, which cut sulphur emissions, take about 27-30 months. The data shows that of these, 224 units, which produce 84.8 GW of power, have not yet awarded contracts for installing FGD units.

That means at least 51 per cent of all coal fired units, which have the emission targets could fail to comply with the deadlines.

ADB supports gas fired generation

The Asian Development Bank (ADB) and Gulf PD Co Ltd have signed a Bhat5.4 billion ($180 million) agreement to build and operate a 2500 MW combined cycle gas turbine power plant in Rojana Rayong 2 Industrial Park.

The project will build the fourth-largest power plant and one of the largest combined cycle gas turbine power plants in Thailand. ADB Deputy director-general for Private Sector Operations Christopher Thieme said the project will be key to the Eastern Economic Corridor [EEC] development plan, which is "considered as the prime economic growth driver for the country until 2028".

The plant will be integral to Thailand's energy security, given that more than 8500 MW of ageing power plants – equivalent to about 20 per cent of current national energy capacity – will be retired between 2020 and 2025.

S. Australia puts faith in renewables plus batteries

South Australia is continuing to demonstrate its faith in a renewables-based electricity system with announcements of new investments in solar and battery projects. **Syed Ali**

In late November Neoen Australia said it would expand the Hornsdale Power Reserve in South Australia, already the world's biggest battery, by 50 per cent. Neoen said the 100 MW/129 MWh Tesla-built battery will see a 50 MW/64.5 MWh increase which will help back-up the record influx of renewable generation in South Australia.

Minister for Energy and Emissions Reduction, Angus Taylor, said the expansion will improve response times on the worst days when demand is at its highest and the wind is not blowing and the sun is not shining.

"Projects like this, combined with the gas and pumped hydro projects that are coming online, are extremely important to the future integration of renewable energy to the South Australian grid," said Taylor.

The battery expansion will provide additional fast response capacity to prevent tripping of the South Australian and Victorian interconnector, and react to sudden changes in load. This is expected to lead to a reduction in the cost of procuring services to manage the grid, ultimately resulting in savings for consumers.

The expansion will showcase the potential for grid scale batteries to provide 'virtual' inertia, which involves a contribution to the capability of the power system to resist changes in frequency and unlock new revenue streams and commercial pathways for other batteries.

Neoen will work with the Australian Energy Market Operator to test the potential for the battery to improve grid security sufficiently to allow an easing of the current curtailment arrangements for solar PV and wind generation in South Australia.

As Australia's electricity system is changing, the large influx of intermittent energy sources along with thermal generator closures means new measures are needed to support reliability in the National Electricity Market.

The changing market continues to attract renewables companies. Last month French energy company Engie said it is developing an investment fund in Australia designed to support 2000 MW of solar and wind energy projects over the next 10 years, *Reuters* reported.

Meanwhile Risen Energy Australia said it has completed the construction of its 100 MW Yarranlea solar park in Queensland and expects commercial operations to be launched at the start of 2020 after "continuous testing" needed to make it grid-compliant.

Also in in Queensland, Luminous Energy, the UK-based international solar and energy storage developer, announced the start of connection works for its 162 MWac (202 MWdc) solar farm.

Still, not all projects in the state have gone smoothly. The Kennedy Energy Park (KEP) in North Queensland, which combines wind, solar and energy storage technologies, is unlikely to reach full commercial operations in the next four to five months even though it has been fully installed and energised.

Windlab Ltd, one of the two companies behind the Kennedy Energy Park project, said in an update that the EPC contractor has failed to deliver in time a fully functioning, compliant generator performance standard (GPS) model and electrical plant meeting the network standards. This has so far prevented the registration of the project as a generator, which is key for launching full commercial operation.

The Kennedy Energy complex combines 43.2 MW of wind, 15 MW of solar and 2 MW/4 MWh of Tesla battery storage capacity. It started generating limited volumes of power in August 2019.

■ AGL Energy Ltd.'s Barker Inlet power plant began operations last month, Australia's first major new fossil fuel power station since 2012. The A$295 million ($204 million), 210 MW facility in South Australia will help supplement renewables, which regularly meet more than 50 per cent of the state's power demand, the company said in a statement. The plant is capable of reaching full capacity within 5 minutes, AGL said.

Taiwan aims to add another 10 GW of offshore wind

Taiwan's Ministry of Economic Affairs plans to set a goal of developing further 10 GW of offshore wind capacity between 2026 and 2035. This is in addition to the existing goal of developing 5.7 GW of offshore wind capacity by 2025.

Wind farms to be built from 2026 onward will have a bidding price lower than the average price of electricity sold to users in 2025, said the Ministry. The new plan will also contain local content requirements.

The announcement was made during the inauguration of the Formosa 1, Taiwan's first commercial offshore wind farm, and follows the launch of Formosa 2.

In late October, Siemens Gamesa Renewable Energy (SGRE) was awarded the contract to install 47 SG 8.0-167 DD offshore wind turbines at the 376 MW project. Construction of the project, located in Miaoli county, is expected to begin in 2020. The park is situated close to the site of Formosa 1, which consists of a total of 22 SGRE offshore wind turbines.

The project reached financial close at the end of October. Total funding for the project of TWD 62.4 billion ($2.1 billion) will be financed by a consortium of 20 international and local Taiwanese financial institutions.

The project is being led by Macquarie's Green Investment Group, the lead project sponsor, and Swancor Renewable Energy. UK Export Finance (UKEF) has provided a TWD9.2 billion project finance guarantee to support British ompanies involved in the construction.

Pakistan secures wind project finance

Pakistan took a significant step towards its goal of generating 20 per cent of its electricity from non-hydro renewable sources by 2025 after securing financing for six wind projects.

Last month the International Finance Corporation (IFC), a member of the World Bank Group, issued a press release saying that it has led the financing of a first-of-its-kind programme to build six wind power projects in the country, named the Super Six.

The IFC's total investment in the project is $450 million, which will help deliver cleaner, cheaper power to meet the country's critical demand for energy and reduce reliance on expensive imported fossil fuels. With this programme, the IFC will have made investments in 11 wind power projects in Pakistan.

The Super Six plants, with a combined capacity of up to 310 MW will be built in the Jhimpir wind corridor in Sindh province and will generate more than 1000 GWh hours of electricity annually.

"The government is aiming to increase the non-hydro renewable energy share in the overall generation mix from 4 per cent to 20 per cent by 2025 and it is welcoming to see Pakistan's local private sector behind these Super Six wind projects, supporting the government's long-term objective to see more wind and solar in the country's energy mix," said Federal Minister for Energy, Omar Ayub.

The cost of power from the Super Six projects is expected to be more than 40 per cent lower than the current average cost of generation.

The financing was secured after the Alternative Energy Development Board (AEDB) signed Implementation Agreements with the representatives of 11 wind power projects with a capacity of around 560 MW.

GB should target flexibility to reach net zero

The UK will have to provide clearer pathways to flexibility for net zero targets to be reached, associations say.

Siân Crampsie

Renewable energy generators in Great Britain say more incentives are needed to boost investment in flexibility to enable the net zero targets to be achieved.

The Renewable Energy Association (REA) says that Britain ranks second-to-last for power system flexibility out of nine north European countries and that regulatory uncertainty and technical challenges are delaying investment in flexibility.

A recent report published by the REA and commissioned by Drax and Eaton says that flexibility is crucial to power sector decarbonisation and that GB lacks the clear and stable regulatory framework needed for technology deployment.

The country is also behind in terms of progress on delivering smart electric vehicle charging and distribution network access, says the report, which reviewed regulation and market access, social and political support for the energy transition, and deployment of enabling technologies such as smart meters in nine northern European countries.

The Netherlands topped the league table of nine countries. Finland, Sweden, Denmark, Ireland and Norway also scored high, while Germany, Britain and France lagged.

Flexibility is becoming increasingly important as more variable renewables such as wind and solar replace Britain's large fossil-fuelled power stations to meet targets to cut carbon emissions. Storage technologies and services such as hot water tanks, batteries and demand side management can boost system flexibility, but clearer pathways for flexibility are needed, REA says.

"Decarbonising power means delivering flexibility," said Dr Nina Skorupska, Chief Executive of the REA. "In a world of very low-cost variable renewable electricity generation, grids need to be organised differently and some services which were once taken for granted need to be actively procured.

"Crucially, as renewable power prices fall around the world every country will be experiencing the same shift. If Britain becomes a flexibility pioneer, then a whole world of markets for exporting our products and services opens up."

REA and the Solar Trade Association (STA) recently criticised a decision by UK energy regulator Ofgem to implement its Targeted Charging Review (TCR) proposals.

Both organisations say that the new measures for recovering the residual element of network charges will stymie investment in flexibility and make net zero harder to reach.

The TCR regulations will see fixed charges applied to all households and businesses to recover costs, and are due to be implemented in 2021. Previously, the charges were based around time of use.

According to STA, the changes will impact the economics of subsidy-free renewables and will also reduce the incentive for consumers to use less power. REA said that the new rules will also undermine the business case for batteries and other forms of storage.

"Ofgem's Targeted Charging Review (TCR) has been closely tracked by the REA as its outputs will have major implications for the move to the more decentralised, flexible energy system needed if the UK is to achieve Net Zero," said Dr. Skorupska. "As 'embedded generation' types such as onshore wind and solar become evermore affordable and widely deployed, and fossil fuel generators come offline, the future grid charging and access regime will need to properly incentivise 'flexibility' technologies – mainly energy storage and demand response.

"Although there are a few consolations for larger generators, [the TCR] announcement undermines the move towards a more flexible power system. These reforms mean that businesses and homes which have taken responsible steps to install low carbon technologies will effectively pay more to use the wires needed to support the system."

Last month Energy Systems Catapult launched a Storage and Flexibility Model (SFM), a new whole energy system modelling tool designed to provide the most comprehensive view to date on how storage and flexibility technologies could help the UK decarbonise at least cost.

According to Energy Systems Catapult, there is a collective lack of knowledge about the extent of the role storage and flexibility could play in the future. Alex Buckman, Networks and Energy Storage Practice Manager at Energy Systems Catapult, said: "Without a deeper understanding of how these technologies could help in balancing energy networks, we will at best end up with a system that costs more than it needs to and at worst one that fails to manage supply and demand.

"The Storage and Flexibility Model fills a crucial space in the current energy system modelling landscape, enabling us to see more clearly than ever how energy storage and flexibility could help the UK transition to net zero at least cost."

Poland eyes nuclear in low-carbon push

- Plans for first nuclear plant by 2033
- Government prepares for offshore wind push

Poland is moving ahead with plans to build its first nuclear power plant by 2033.

Government officials indicated last month that the country is aiming to secure financing for a nuclear programme in 2020, and that it would establish a special purpose company to implement the project.

The special purpose company would be 51 per cent government owned with the remaining 49 per cent held by a foreign partner.

The Polish government wants to build six nuclear plants of 1-1.5 GWe each by 2043, with the first coming on-line by 2033. The plans will help to diversify Poland's energy sources, boost energy security and reduce carbon emissions.

Last month the Polish government drafted a bill to support the development of its offshore wind energy sector.

The Ministry of Energy says that the draft legislation will undergo further review and consultation before it is submitted to parliament.

Poland said it is planning to install some 10 GW of offshore wind energy capacity by 2040 and noted that a number of developers are formulating project plans in Poland's Baltic Sea territory.

In October RWE announced it had purchased a 1.5 GW offshore wind project pipeline in Poland, marking its entry into the country's nascent offshore wind energy sector.

The pipeline includes four projects, including the 350 MW WEF Baltic II project, which could start construction in 2023.

Poland generates 80 per cent of its power from black and brown coal, but its draft National Energy Policy until 2040 sets out plans to cut that to 60 per cent by 2030. This will be achieved by improving energy efficiency and generating 21 per cent of its electricity from renewable sources.

Recently grid operator Polskie Sieci Elektroenergetyczne published data showing that installed PV capacity in Poland reached 1007.2 MW at the end of September, with 600 MW of new PV coming online in the first nine months of the year.

The government expects total PV capacity to reach 1.3 GW this year.

EU backs floating solar programme

The European Union is backing a project aiming to reduce the costs of floating solar photovoltaic (PV) plants.

The EU's European Maritime and Fishery Fund (EMFF) is funding a consortium of Swedish, Spanish and Portuguese companies investigating ways of optimising the anchoring and mooring systems for floating PV.

Their project, known as Fresher (Floating Solar Energy mooring: Innovative mooring solutions for floating solar energy), started in November 2019 and is set to run for two years. It will showcase and validate new innovative anchoring technologies for floating solar power plants – including those in ocean environments – that will improve the levelised costs of energy (LCOE).

The project is led by Seaflex, and its partners include EDP, WaveC and ISI-GENERE.

"EDP is a pioneer in renewable energy production with more than 11 GW of wind and solar installed capacity and has also anticipated technology trends in floating offshore wind or smart grids," said João Maciel, Director for EDP CNET. "Floating PV is one of the new technology frontiers to embrace as it explores the synergies between hydro and solar. Fresher is likely to play a pivotal role in enhancing maturity and competitiveness of such promising technology."

In October, French renewable power producer Akuo Energy opened a 17 MWp floating solar park in France, thought to be the largest one in Europe.

Installed on the lake in the old Piolenc quarry in Vaucluse, southeast France, the O'MEGA1 photovoltaic (PV) array uses 47 000 units of Trina Solar's dual-glass PERC monocrystalline modules mounted on Hydrelio floating structures by Ciel & Terre.

Bouygues Energies Services was tasked with building the power plant, which will be selling its output directly on the markets via the E6 aggregator.

The project was backed with €12.8 million in debt from Natixis Energeco and some equity sourced through a crowdfunding campaign.

Africa report highlights investment needs

Improved energy policies will help Africa to expand its economy and achieve electrification goals, according to the International Energy Agency (IEA).

The Paris-based organisation has for the first time conducted detailed modelling of the energy mix for 11 countries in Sub-Saharan Africa and says that the continent's future energy prospects look bright, but only if governments can make the shift to more renewable energy sources.

In its 'Africa Energy Outlook 2019', the IEA finds that current policy and investment plans in African countries are not enough to meet the energy needs of the continent's young and rapidly growing population. Today, 600 million people in Africa do not have access to electricity and 900 million lack access to clean cooking facilities.

Current policies in Africa will leave 530 million people on the continent still without access to electricity in 2030. However, the continent has rich natural resources to draw on and the IEA believes that it could by 2040 meet the energy demands of an economy four times larger than today's with only 50 per cent more energy.

"Africa has a unique opportunity to pursue a much less carbon-intensive development path than many other parts of the world," said Dr Fatih Birol, the IEA's Executive Director. "To achieve this, it has to take advantage of the huge potential that solar, wind, hydropower, natural gas and energy efficiency offer. For example, Africa has the richest solar resources on the planet but has so far installed only 5 GW of solar photovoltaics (PV), which is less than one per cent of global capacity."

Africa also needs to radically increase its investment in power generation from the current $30 billion to $120 billion by 2040, if it is to achieve universal access to electricity, according to IEA.

If policy makers put a strong emphasis on clean energy technologies, solar PV could become the continent's largest electricity source in terms of installed capacity by 2040, IEA notes.

Natural gas, meanwhile, is likely to correspond well with Africa's industrial growth drive and need for flexible electricity supply. Today, the share of gas in sub-Saharan Africa's energy mix is the lowest of any region in the world. But that could be about to change, especially considering the supplies Africa has at its disposal: it is home to more than 40 per cent of global gas discoveries so far this decade, notably in Egypt, Mozambique and Tanzania.

The IEA also points out that Africa possesses major reserves of minerals such as cobalt and platinum that are needed in fast-growing clean energy industries.

"Africa holds the key for global energy transitions, as it is the continent with the most important ingredients for producing critical technologies," Dr Birol said. "For example, the Democratic Republic of the Congo accounts for two-thirds of global production of cobalt, a vital element in batteries, and South Africa produces 70 per cent of the world's platinum, which is used in hydrogen fuel cells. As energy transitions accelerate, so will demand for those minerals."

African countries are on the front line when it comes to climate change, meaning the continent's energy infrastructure planning must be climate resilient.

"Even though Africa has produced only around 2 per cent of the world's energy-related CO_2 emissions to date, its ecosystems already suffer disproportionately from the effects of a changing climate," Dr Birol said. "They are exposed to increased risks to food, health and economic security."

■ The Global Wind Energy Council (GWEC) and RES4Africa Foundation have signed a Memorandum of Understanding to increase cooperation through joint initiatives and activities to support sustainable energy in Africa. The MoU will pave the way for greater cooperation in the fields of renewable energy and climate change in Africa, and in particular on training programmes, thematic publications, and outreach activities.

Egypt inks GCC interconnection deal

Egypt and the GCC states say they could boost grid reliability with increased interconnections in the region.

The GCC Interconnection Authority has inked a memorandum of understanding (MoU) with the Egyptian Electricity Company (EETC) and Jordan's National Power Company to carry out a detailed technical study on electrical interconnection between the three parties.

The *Bahrain News Agency* reported that the agreement was signed during the 13th meeting of the Arab Ministerial Council for Electricity in Cairo and will enhance the reliability of electrical power systems, improve electrical energy quality, and pave the way to create an electrical energy market in the Arab region.

It will also enhance the uptake of renewable energy generation in the region.

The proposed interconnection would link the GCC Interconnection Authority Grid – which connects the six GCC countries through a 400 kV overhead line with a length of around 1400 km – to an interconnection point in Jordan, and then with Egypt, with a 400 kV overhead line with a length of around 780 km.

The proposed interconnection would transmit approximately 2000 MW of power between the GCC countries, Egypt, and Jordan in the first phase.

This power transmission capacity might be increased according to the electrical demand of the connected parties, GCC Interconnection Authority said.

It would use high voltage direct current (HVDC) technology, it added.

■ Engie Africa has completed construction and commissioning of the 262.5 MW Ras Ghareb wind farm in Egypt, 45 days ahead of schedule. Ras Ghareb is the first wind farm tendered in Egypt's Build-Own-Operate (BOO) scheme and is part of the government's drive to increase the share of renewables in the energy mix. It will sell energy to the Egyptian Electricity Transmission Company (EETC) under a 20-year power purchase agreement.

ACWA wins in Ethiopia PPP programme

ACWA Power is to build two 125 MWac solar photovoltaic (PV) plants in Ethiopia after winning contracts in the country's public-private partnership (PPP) programme.

ACWA Power and Ethiopia Electric Power (EEP), the state-owned electricity producer, and the Ministry of Finance have signed a Letter of Intent for the two projects, which were competitively tendered by the Public Private Partnership Directorate General (PPP-DG) of the Ethiopian Ministry of Finance.

ACWA expects to sign a long-term power purchase agreement for the projects at ¢2.52 /kWh over a time span of 20 years before the end of 2019, it said in a statement.

The two projects will help Ethiopia to address its energy shortfall as well as diversify its energy mix. They will be built in Dicheto, in the Afar region, and in Gad, in the Somali region of the country, and are the first to be tendered under the new public-private partnership framework in Ethiopia.

Battery scorecard boosts confidence

DNV GL says that its independent Battery Performance Scorecard will give the energy storage sector more confidence in the safety and reliability of battery technologies.

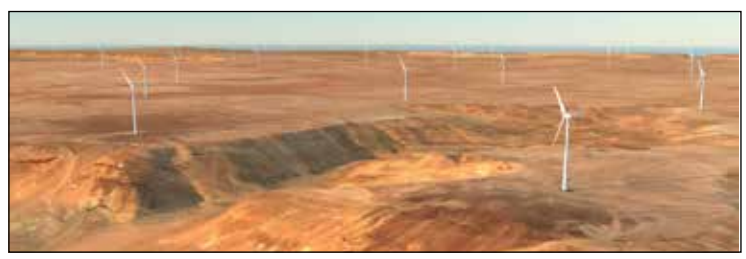
The firm has published its second annual Battery Performance Scorecard report, which provides an independent ranking and evaluation of different types of batteries, based on testing performed in DNV GL's battery performance and safety test laboratories. It also provides industry guidelines for developers and operators to ensure their systems have been designed to mitigate risks such as battery fires.

The Scorecard is designed to provide the industry with reliable, rigorous, and consistent data to determine what constitutes high battery performance. The report will help the sector to eliminate doubts over performance, reliability and safety that have been the cause of recent disputes, DNV GL says.

"The energy storage market is growing, and batteries are a crucial component of the energy transition. However, to ensure that the increasing number of energy storage projects and battery deployments are safe, reliable and high performing, a robust and independent testing programme is foundational to the future of the industry," said Richard S. Barnes, Executive Vice President North America at DNV GL - Energy. "The Scorecard will help to accelerate the market, making data about battery safety and performance more transparent and easier to verify with independent reviews."

While there is a very low probability of battery fires, the consequences of such fires can be great, whether the fire originates in the battery, or is caused by factors external to the battery system.

"Reliable and independent data about performance, lifetime, and safety have been historically hard to find in the energy storage industry," said Davion Hill, US energy storage business leader at DNV GL. "The Scorecard provides a roadmap for EPCs, developers, and owners to understand which battery technologies will work best for their project, mitigate risks like performance shortfalls or fire, and ensure that their project achieves its goals."



Wind OEMs grow in strength

The wind energy sector's consolidation trend will continue with dominant players seeking advantage from levelised cost of energy improvements and growth in the offshore segment, according to new research.

The global market for wind turbine equipment is consolidating after a decade of fragmentation, according to analysts.

The top five global wind turbine equipment manufacturers (OEMs) are strengthening their hold on the industry and growing their market shares at the expense of smaller, regional players, Wood Mackenzie says. By 2028, they are likely to control three-quarters of the market between them.

Wood Mackenzie's latest analysis shows that the leading three western turbine OEMs will increase their market share from 47 per cent – or 32 GW – in 2019 to more than 60 per cent – or 48 GW – by 2028. China's Goldwind will reach second place in the global rankings thanks to international expansion, the company says.

"Vestas reinforces its leading position by being the first turbine OEM to install more than 10 GW of annual capacity during 2019," said Shashi Barla, Wood Mackenzie Principal Analyst. "Vestas, SGRE, GE and Goldwind will each install around 10 GW in 2020 due to a surge in US and China market activity.

"Goldwind's leading position in China, combined with large projects in Australia and Canada, will see the company take the number two spot for the very first time in 2020."

According to Wood Mackenzie, OEMs' appetites to invest into the development of new products to lower the levelised cost of energy (LCOE) will help their commercial positions. "Regional players, however, will face an uphill battle to compete, as seen from recent troubles at Senvion and Suzlon," added Barla.

The outlook isn't all bad for regional players, however, notes Wood Mackenzie. Nordex and Enercon are expected to strengthen their presence with increasing investments in new wind turbine technologies. The former is expected to install a record 5.5 GW of average annual capacity in 2020 and 2021, a substantial increase of 40 per cent over 2019.

Predicted growth in the offshore wind energy sector will also boost OEMs active in that market, according to Wood Mackenzie.

"SGRE continues to be an undisputed offshore market leader, with more than 15 GW of backlogged orders," said Barla. "GE has made an enormous splash in this space, with a combined 4.8 GW of orders signed this year in the UK and the US.

"MHI Vestas' robust positioning will elevate its global rank to be within the top ten OEMs by 2023 and number five globally by 2027-2028, representing the only pure-play offshore player within the top five. The company already secured contracts in seven countries totalling more than 7 GW."

Other key offshore players include MingYang, which has become a "rising star" in the Chinese offshore market with more than 4.5 GW of orders signed in the last year, according to Wood Mackenzie. "A closer relationship in Guangdong province, the largest offshore market in China, will sustain MingYang's positioning in the long-term," added Barla.

Feed-in-tariff (FiT) phase-out in China is expected to trigger a surge in order volume to a combined 56 GW in 2019 and 2020.

"Ten of the top 15 turbine OEMs in 2020 will be Chinese, capitalising on a domestic demand surge."

Siemens, juwi secure mine deal

A new strategic partnership between Siemens and juwi will help the mining industry to secure cost-efficient renewable energy supplies for their operations.

The two companies have signed an agreement for a strategic technology partnership focusing on delivering microgrid solutions to the mining sector, where demand for reliable, clean energy sources is increasing.

Siemens and juwi will roll-out and develop advanced microgrid control systems that enables the seamless integration of power from renewable energy to a mine's off-grid power supply. Their offering will be based around Siemens' Sicam based microgrid control platform and juwi's Hybrid IQ microgrid controller and experience in delivering projects in the mining sector.

"Microgrids can bring high levels of reliability and improved energy quality to energy-intensive industries such as mining, and are an attractive alternative when autonomous power supply is needed," said Robert Klaffus, CEO Digital Grid at Siemens Smart Infrastructure. "We… believe it will boost the commercial appeal of renewable energy to the mining industry."

The two companies have already delivered a solar power plant at Agnew Gold in Australia, as well as a hybrid power solution to Australia's largest and oldest marine research station on the Great Barrier Reef. Heron Island now uses juwi Hybrid IQ to combine solar with a redox flow battery to replace diesel fuel.

Shell grows clean ambitions

- Shell buys up Eolfi
- Investment in PowerGen

Shell is ramping up activity in the clean energy sector with investments in the floating offshore wind and microgrids sectors.

The oil giant has sealed a deal to buy French floating offshore wind developer Eolfi, and has also announced an investment in PowerGen Renewable Energy, a company that develops, manages and supports micro-utilities in Africa.

Eolfi is focused on the development of floating offshore wind solutions, a growing segment of the offshore wind market. It is currently developing a pilot floating wind project off the coast of Brittany, France, which will see the installation of three MHI Vestas wind turbines on semi-submersible floats.

Dorine Bosman, VP Offshore Wind Shell said: "Eolfi has been a pioneer of floating wind development. We believe the union of Eolfi's expertise and portfolio with Shell's resources and ability to scale-up will help make electricity a significant business for Shell."

The development of floating wind technology could open up access to more site locations, including zones further from shore with stronger, more stable wind speeds. The global resource potential is enormous, and oil majors are well-placed to capitalise on its development because of their technical experience with offshore operations.

Shell's acquisition of Eolfi will place it head-to-head with oil rival Equinor, which developed the world's first operational floating wind farm, Hywind, off the coast of Scotland.

Last month PowerGen announced that it received Series B investment from Shell New Energies, as well as Omidyar Network, Acumen, Renewable Energy Performance Platform (REPP), EDFI ElectriFI, Sumitomo Corporation, DOB Equity, and Microgrid Catalytic Capital Partners (MCCP).

The company said that the funds will be used to strengthen PowerGen's position in its core African markets of Kenya, Tanzania, Sierra Leone and Nigeria. It said the funds will also be used to help it expand into new markets, as the demand for reliable, clean and affordable electricity in Africa continues to grow.

PowerGen aims to connect one million more people to reliable electricity over the next five years.

EIT InnoEnergy call goes global

Technology accelerator EIT InnoEnergy is looking for investment opportunities in US, Asian and European companies developing ideas to tackle climate change.

The organisation has launched its first ever global call for start-ups across the entire sustainability value chain, and says it is interested in investment opportunities in renewable energy, energy efficiency, heat and transport to solve the decarbonisation challenge.

InnoEnergy says it has expanded its call beyond its usual European territory because of the urgent need to tackle global warming.

"Delhi has just declared an air pollution emergency and in the US, the number of polluting motor vehicles on the roads has grown steadily to more than 270 000," said Elena Bou, Innovation Director at EIT InnoEnergy. "We are reaching a tipping point – we need to tackle climate change together, and through our trusted ecosystem of more than 460 partners, we can do just that."

EIT InnoEnergy's current call for start-ups will offer innovators business support to accelerate commercialisation, with the winner receiving €100 000. Start-ups from Asia and the US are of particular interest, where clean air and vast internal combustion engine vehicle uptake are causing a noticeable impact on society, the organisation said.

Bou added: "The US and Asia are facing their own climate challenges, but they are also hot beds of innovation. We want to access these great minds to accelerate the energy transition across the globe.

"From clean tech hubs like San Francisco and Boston in the US, to leaders in renewable energy like Singapore, we know their start-ups are on the cusp of monumental break throughs."

InnoEnergy says that a great deal of focus in the coming years will be on transport and heat, as these sectors have been hard to decarbonise.

The call window for applications closes on 19 December 2019.

Americas

GE equips Foard City

GE Renewable Energy was selected by Innergex Renewable Energy Inc. to supply 139 2.X-127 onshore wind turbines on 89 m towers for Innergex's approximately 350 MW Foard City wind project located in Foard County, Texas.

The wind farm achieved commercial operation in September. The order includes a 20-year full-service agreement.

Shell, EDPR secure offshore contract

The US state of Massachusetts has selected a joint venture between EDP Renovaveis and Shell to build an 804 MW offshore wind farm.

The Mayflower Wind Energy consortium will build the wind farm 30 km south of Nantucket and expects it to start operating in 2025. It had presented Massachusetts with a number of bid options in the tender, which was launched in August 2019 and which is a key part of the state's offshore wind procurement plans.

Mayflower said that its winning bid will deliver long term power prices below the original price cap of $84.23/MWh.

Asia-Pacific

Vestas seals 103 MW add-on

Vestas has signed a 103 MW engineering, procurement and construction contract with New Zealand-based electricity generator and retailer Mercury to extend the company's Turitea wind farm.

Vestas will provide 27 of its V112-3.45 MW turbines delivered in 3.8 MW Power Optimised Mode for the wind farm, located near Palmerston North. The extension will boost the output of the wind farm to 222 MW, from 119 MW, and make it the largest wind farm in New Zealand.

Vestas' order also includes a 25-year service agreement. Commissioning of the new turbines is scheduled for the second quarter of 2021.

Siemens preferred for Hai Long 2

Hai Long Offshore Wind has appointed Siemens Gamesa Renewable Energy (SGRE) its preferred supplier for the planned 300 MW Hai Long 2 wind farm in Taiwan.

The agreement is subject to a final investment decision by Hai Long Offshore Wind, owned by a consortium of Canadian independent power producer Northland Power Inc. and Taiwan-based developer Yushan Energy.

The 300 MW Hai Long 2 offshore wind power plant project was awarded through the 2018 grid allocation mechanism in Taiwan. The project site is located 50 km off the coast of Changhua County.

Hiep Phuoc 1 set for upgrade

Hiep Phuoc Power Co. Ltd. has placed an order with Siemens to provide the equipment to upgrade the existing Hiep Phuoc 1 steam power plant in Ho Chi Minh City, Vietnam, to combined cycle operation.

Siemens will supply three SGT5-4000F gas turbines, three generators, three heat recovery steam generators, related electrical equipment and the SPPA-T3000 control system for the project, which will increase the plant's output by roughly 780 MW to approximately 1200 MW.

The modernised plant will be fired with regasified liquefied natural gas (LNG) instead of the oil that has been used to date.

Recommissioning of the upgraded plant is scheduled for second half of 2022. To meet the current electricity demand in Vietnam, Hiep Phuoc Power Co. Ltd. will be able to provide around 520 MW to the grid by mid-2021 through simple cycle operation.

BHEL to upgrade Chilla

State-owned engineering firm BHEL has received an order worth Rs200 crore for the renovation, modernisation and uprating of the Chilla hydropower plant in northern India.

Located in Pauri Garhwal district of Uttarakhand, the plant comprises four 36 MW units, which will be uprated to 39 MW. The units have been in operation for more than 35 years.

BHEL's scope of work in the order includes design, engineering, manufacturing, supply, dismantling, erection, testing and commissioning of critical parts of the turbines, generators, governors, controls & instrumentation, protection and balance of plant (BoP).

GE ready for 715 MW China build

GE Renewable Energy and China Huaneng Group have signed an agreement to build a 715 MW wind farm in Puyang, Henan Province, China.

The deal represents GE's largest-ever wind order in Asia, as well as the single largest onshore wind deal ever awarded to a non-Chinese wind turbine OEM in China.

According to the agreement, GE Renewable Energy is set to provide 286 of its 2.5-132 turbines with 130 m soft steel towers to the wind farm, which will be developed by China Huaneng and located in the Puyang prefecture, Henan Province.

Poyry joins forces for Vietnam wind

Finnish consulting firm Poyry has won an owner's engineer contract for a 90 MW wind farm project in the town of Vinh Chau, Vietnam.

The contract was awarded by Thai company Banpu Power. Detailed engineering design for the first phase is due to start in December 2019, while site mobilisation will follow in February next year.

Once the park goes online, it will deliver its output to Vietnam Electricity Power Company under a standard power purchase agreement (PPA) for wind projects in Vietnam.

The wind farm will be built in three 30 MW phases.

Longest rotors for Taiwan project

Vestas has secured a 61 MW order with wpd for two new wind power projects in Taiwan.

The Chuangwei and Leadway projects will feature a total of 17 Vestas V117-3.45 MW wind turbines delivered in 3.6 MW Power Optimised Mode.

The turbines will have the largest rotors of any onshore wind farm in Taiwan, Vestas said.

The order is the first deal confirmed under a strategic frame agreement signed between Vestas and wpd for over 400 MW of onshore wind projects in Taiwan.

The order includes a 15-year service agreement.

Commercial operations at both Chuangwei and Leadway are expected to commence in the last quarter of 2020.

Europe

Salzgitter Flachstahl orders PEM

German steel firm Salzgitter Flachstahl (SFZG) has awarded Siemens Gas and power a contract to build a 2.2 MW proton exchange membrane (PEM) electrolysis plant at its Salzgitter works.

The project is part of SFZG's low carbon steel initiative and will start operating in late 2020 and will cover SZFG's entire current demand for hydrogen. The necessary electrical power will be generated by seven wind turbines with a capacity of 30 megawatt. These will be erected by Avacon AG on the Salzgitter Group site and will also enter service from 2020.

E.On agrees Winnington deal

Tata Chemicals Europe (TCE) has signed a new long term operations and maintenance agreement with E.On for the company's combined heat and power (CHP) plant at TCE's Winnington site in the UK.

The CHP plant generates 96 MW of electricity and up to 400 MW of heat in the form of steam for use by TCE to produce soda ash and sodium bicarbonate. It also provides heat and electricity to local industrial users and supplies electricity to the local distribution network.

The five-year agreement marks the continuation of a successful collaboration between the parties, first established in 2000 when E.On built the CHP plant for TCE under an own and operate arrangement. In 2013, TCE acquired the plant from E.On, which continue to operate and maintain on TCE's behalf.

Nordex boosts position in Turkey

Nordex has received orders for 248 MW in Turkey, it has announced.

The company has received two orders from Boydak Enerji – one for 21 N149/4.0-4.5 turbines with a rated capacity of 4.8 MW each for the Ömerli wind farm, and a second for 22 N117/3675 turbines for the Sibel project.

Both orders include a ten-year service agreement for the machines.

In addition to these two contracts, a utility has ordered 14 N149/4.0-4.5 turbines with a rated capacity of 4.8 MW for a 67 MW wind farm in the Marmara region. The order includes a Premium Service of the turbines for a period of 10 years as well.

TransnetBW orders GIS

German transmission grid operator TransnetBW has commissioned Siemens to build new switchgear in the 380 kV Daxlanden substation in Karlsruhe, Baden-Württemberg.

Two new gas-insulated (GIS) indoor switchgear, initially with 26 panels, will boost the substation's transmission capacity and cover the increased transport demand in the German high-voltage grid caused by increasing levels of renewable energy capacity.

The GIS will use Siemens' 'Clean Air' technology, replacing SF6 gas with treated air as the insulating medium in the bus ducts. Commissioning will take place in stages and will be completed in 2029.

Vestas tapped for Enlight project

Danish OEM Vestas has won an order from Enlight Renewable Energy for the 113 MW Malarberget wind project in Sweden.

The wind farm is located 150 km north-west of Stockholm and is Enlight's first wind farm project in the Nordic region.

Vestas will supply 27 of its V150-4.2MW turbines for the project and says that the contract underlines its "excellent fit" with Sweden's wind conditions.

Delivery of the turbines, which will feature Vestas SCADA solution designed to lower turbine downtime and optimise energy output, is scheduled for the third quarter of 2020, while commissioning is expected to start in the fourth quarter of the same year.

Nexans secures Seagreen contract

Nexans has won the contract for the supply of export cables for the Seagreen offshore wind farm in the UK.

Under the contract, Nexans will be responsible for the design, manufacture and installation of onshore and offshore export cables at the Phase I development of the Seagreen project, currently under construction off the coast of Scotland.

Phase I of the project includes Alpha and Bravo offshore wind farms and is expected to be equipped with a maximum of 120 turbines.

Expected to commence operations in 2024, the Alpha and Bravo wind farms together will have a combined capacity of 1075 MW.

International

Hyundai E&C wins hydro order

A joint venture between Hyundai Engineering and Construction, a major builder in South Korea, and its Turkish partner, Limak, has won a $737 million order to build a hydropower plant in Georgia.

The joint venture – IJV – will build a power plant, a dam and two tunnels on Nenskra River in the northwestern region of Georgia. The order was placed by Nenskra Hydro JSC, a joint venture between Korea Water Resources Corp. (K-Water), a state water resource development and management agency, and the Georgian government.

K-Water will operate the plant and sell electricity to a Georgian state power company for 36 years before it transfers management to the Georgian government.

ACWA signs Kom Ombo PPA

ACWA Power has signed a power purchase agreement (PPA) with the government of Egypt to develop, finance, construct and operate the Kom Ombo photovoltaic (PV) plant.

Construction of the 200 MW plant is expected to begin in the first quarter of 2021. Once operational, the plant is expected to power 130 thousand households, in addition to offsetting 280 thousand tonnes of CO_2 per year.

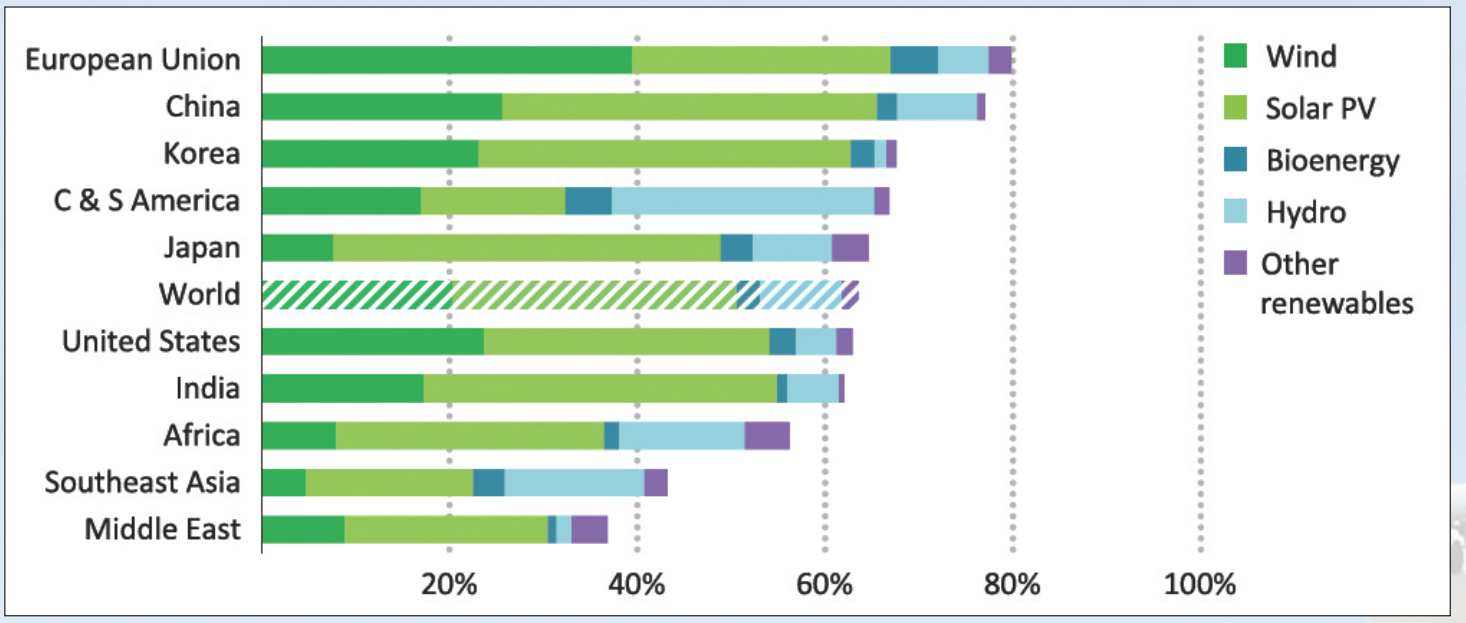
MAN Energy assists Brikama

MAN Energy Solutions is to provide two 9L51/60 engines for a new power plant in the city of Brikama, Gambia.

The project is part of a wider initiative to boost power supplies in the African nation, where just under half of the population has access to reliable electricity supplies.

The 18 MW plant will be owned by Gambia's National Water & Electricity Company (NAWEC) and will boost the country's generating capacity by around 20 per cent.

Share of renewables in total gross capacity additions by region in the New Policies Scenario, 2018-2040



World Energy Outlook 2018, © IEA/OECD, Figure 8.14 , page 345

For more information, please contact:

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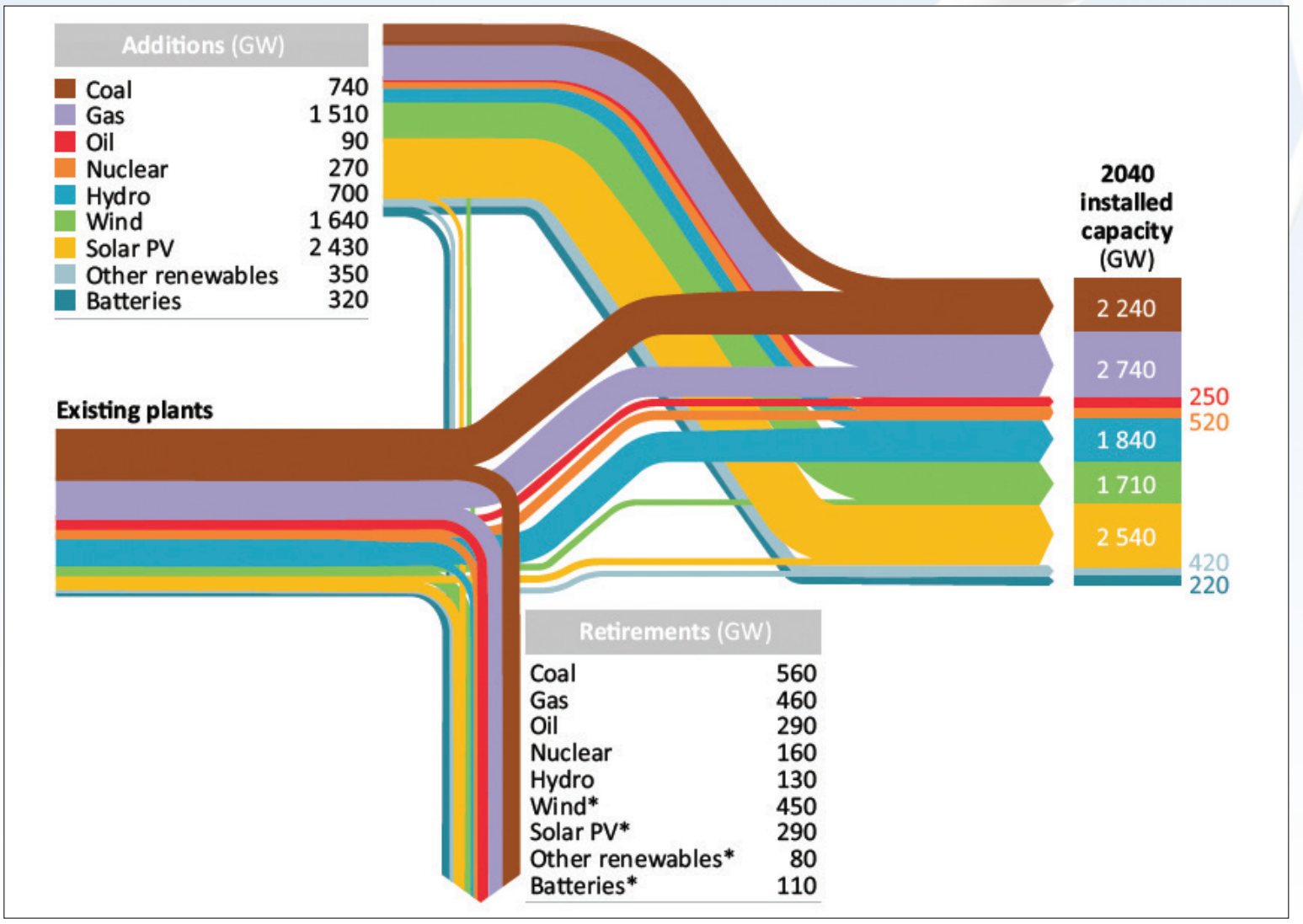
France.

Email: bookshop@iea.org
website: www.iea.org

Global power generation capacity additions and retirements in the New Policies Scenario, 2018-2040



World Energy Outlook 2018, © IEA/OECD,, Figure 8.15, page 346

Source: World Energy Outlook 2018

Oil

Saudi Aramco launches IPO in well supplied crude market

- Aramco IPO expected in December
- Future of oil coming under question

Mark Goetz

The big news is that after several years of consideration, Saudi Arabia will launch an initial public offering (IPO) for its state-owned oil giant, Saudi Aramco, in December. The overall value of the company, the largest oil company in the world, is set at $1.7 trillion, promising the possibility of raising $25 billion when the shares become available on the Saudi stock exchange, the Tadawul, on or around December 12.

Aramco shares will be priced at between SR30-32, about $8.00-$8.50, and 1.5 per cent of the company, some 3 billion shares, will be available to investors, putting its valuation at around $1.7 trillion, some $300 billion less that the $2 trillion that Saudi Crown Prince Mohamed Bin Salman had originally sought.

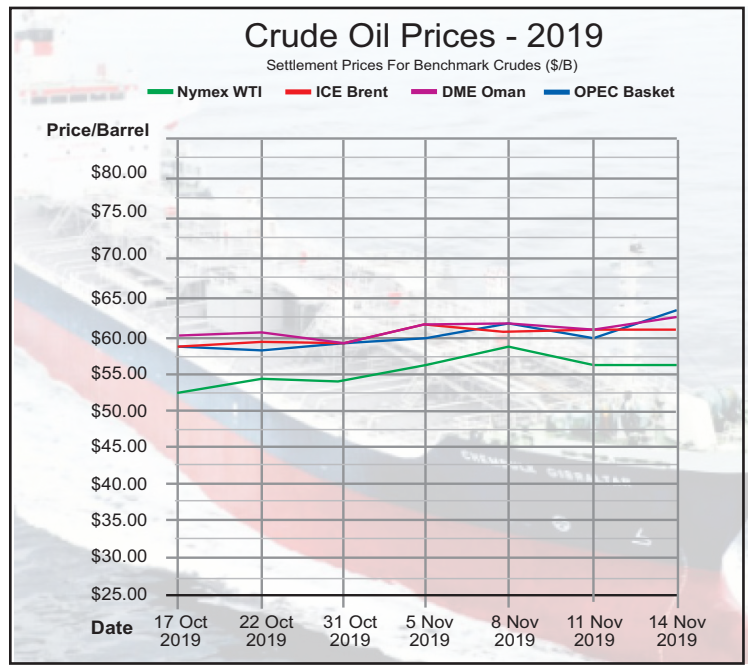
Shares will be restricted to Saudi nationals and foreign institutions that are permitted to trade on the Tadawul. Some market analysts have estimated Aramco's value lower, but the company is very profitable, reporting a net income of $111 billion during 2018. While for now the stock will not be available in New York or London, Aramco has taken on several major international financial institutions as financial advisors to help sell the stock.

Despite the prospect of huge dividends and the value of sizeable shareholdings, Aramco is facing a market in which the future of oil is coming under question as concerns about climate change and new technology, particular more efficiency in the automobile industry and alternative forms of energy, attract more and more attention.

'Peak demand' for oil is now a question that is becoming a part of serious debate within the oil industry. The International Energy Agency (IEA) has forecast that demand for oil will flatten in the 2030s. Furthermore, Saudi Arabia and other Opec members are likely to see more competition from non-Opec oil producers, particularly the US, Brazil, Canada and others.

Geopolitics is another issue. The Middle East continues to wallow in wars and political unrest. An attack on major Saudi oil facilities in September showed just how volatile Aramco's infrastructure is. A major conflagration in the region could cause major disruption to the oil market as the world now knows it.

The current oil market continues to face oversupply. Opec acknowledged in its October report on the oil market that the 2020 market remains uncertain as the US continues to pump oil at an ever-increasing rate. Opec forecast non-Opec production would grow by 2.7 million b/d in 2020 to 66.46 million b/d. Demand for Opec crude is seen as averaging 29.58 million b/d, compared to 30.7 million b/d in 2019. For its part, the US, which is continuing to progress its shale output despite ups and downs,



is expected to see output increase by 1.02 million b/d and produce an average for 2020 of 13.20 million b/d, according to Opec estimates.

The IEA in its monthly 'Oil Market Report' forecast non-Opec production to grow by 2.3 million b/d, citing production from the US, Brazil and Norway, and forecast demand for Opec crude during 2020 at 28.9 million b/d. It said a "hefty supply cushion" would build up during the first half of 2020 and demand for crude from Opec and its allies, known as Opec+, would fall. The IEA offered conciliation by saying the a continuously well-supplied oil market "will lend support to a fragile global economy".

The IEA recently released its 'World Energy Outlook 2019', which projects the future of energy through three scenarios: Current Policies, Stated Policies and Sustainable Development.

The Current Policies Scenario sees energy demand rise by 1.3 per cent annually to 2040, resulting in strains across all aspects of energy markets and a continued strong upward march in energy-related emissions, according to an IEA summary. The Stated Policies Scenario remains well off track from the aim of a secure and sustainable energy future. In 2040, hundreds of millions of people will be without electricity and CO_2 emissions would lock in severe impacts from climate change. The Sustainable Development Scenario requires rapid and widespread changes across all parts of the energy system, the IEA said. Sharp emission cuts are achieved thanks to multiple fuels and technologies providing efficient and cost-effective energy services for all.

Gas

Europe's winter gas supplies depend on Russia-Ukraine transit deal

A delay in the completion of Nord Stream 2 means Gazprom must now find some agreement with Ukraine to keep the gas flowing to Europe or risk a crisis with the European Union.

David Gregory

Delays in the completion of Russia's Nord Stream 2 pipeline through the Baltic Sea to Germany have caused Gazprom to seek from Ukraine an arrangement that will enable Russian gas to continue to flow to Europe through Ukrainian territory after the current transit deal expires at the end of the year.

New infrastructure that Moscow had planned to have operational is not ready, so in late November Gazprom officially proposed to Ukraine's state-owned gas company Naftogaz Ukrayiny that their current 10-year contract be extended by one year or that a new one-year contract be drawn up. Copies of the proposal were sent to Ukraine's energy minister and the European Commission for Energy Union.

At the heart of the matter is the fact that Russia is wielding the political weight of its gas exports against Ukraine. Moscow's plan is to bypass Ukraine by exporting gas to Europe through the Nord Stream and TurkStream pipelines. Each Nord Stream pipeline has a capacity to ship 55 billion cubic metres (bcm) annually, while the TurkStream pipeline to Southeast Europe has a capacity of 15.75 bcm/year.

Moscow had hoped to have Nord Stream 2 in operation by the end of this year, but it was delayed when it failed to obtain from Denmark a permit to lay the pipeline through Danish waters.

That permit was granted in October, but rather than having Nord Stream 2 ready for operation at the end of 2019, the project will now be complete in 2020. TurkStream will likely become operational in 2020-21.

Much to its chagrin, Gazprom must now find some agreement with Ukraine to keep the gas flowing to Europe or risk a crisis with the European Union. If it should cut shipments during the dead of a European winter as it did during a dispute with Kiev in 2006 and 2009, Moscow could cause itself some diplomatic trouble.

Kiev is driving a hard bargain. Through a number of suits and fines, it is demanding compensation of more than $20 billion from Gazprom, yet it wants to continue to have Russia gas transit its territory for which it receives some $3 billion per year in transit fees. Naftogaz has said it would drop all claims against Gazprom if it would agree to a long-term gas transport deal.

Talks between the two have taken place, but animosity is running deep. Gazprom's offer to extend the contract by a year comes with some demands of its own, including dropping claims made by Kiev in international arbitration; the annulment of a decision by Ukraine's Anti-monopoly Committee to impose a fine on Gazprom for abuse of its position as sole gas supplier; and the withdrawal of a request by Ukraine to the European Commission that Gazprom be investigated.

The European Commission has urged the two countries to continue their cooperation despite the fact that they have been at odds over gas transport for years, plus the fact that technically the two have been at war since 2014.

For decades Ukraine was the key export route for Russian gas to Europe, but arguments over gas prices and accusations that post-Soviet governments in Ukraine were siphoning off Russia gas in transit, caused Moscow to decide to stop shipping gas through Ukraine and other Eastern European states. The 2014 overthrow of a pro-Russian government in Kiev only made matters worse with Moscow.

Ukraine has the capacity to transport 140 bcm/year of Russia gas to Europe. Much of that infrastructure is Soviet-era and in poor condition, but the EU had urged that the pipeline be refurbished and that Russia continue to use the Ukraine route rather than build new infrastructure, which has been controversial in its own right.

Some 87 bcm of Russian gas transited Ukraine in 2018 and during the first 10 months of this year, 73 bcm have passed through the country to European customers.

For their part, Eastern European countries have taken note of the looming supply crisis and have stockpiled gas supplies. Storage facilities in Poland, the Czech Republic, Hungary and Slovakia are reported to be full.

It has been clear to the European Union for many years that Moscow is using its gas as a political tool. Since the 2006 and 2009 gas supply disruptions, Europe has been placing greater emphasis on security and diversity of supply.

Yet, as it continues to provide Europe with some 30 per cent of its gas demand, Russia remains an important energy source for Europe regardless of which route the gas arrives.

Energy communities and DSOs: the next innovation disruptors?

There is a trend towards distributed energy resources becoming increasingly managed within local energy systems. This clearly puts Distribution System Operators at a central pivotal point, using demand side flexibility as a strategy to decrease network management costs, investment costs, and working in coordination with local energy systems to minimise the creation of new congestion, ideally using them as one flexible asset, says Delta-EE's **Rita Desmyter.**

Reflecting upon what could be seen as a simple change, from high-carbon centralised generation assets to low-carbon distributed assets, the energy transition brings many technical and deep economical and socio-cultural challenges. From a field mostly dominated by incumbents, the energy sector now finds other industries knocking at its door. In Europe it is becoming the scene of many innovative business models and, at last, we see individuals, small organisations and players from other sectors forming energy communities to accelerate the pace of change, wanting to own part of the transition and to locally retain benefits from this revolution.

The increase of distributed energy resources (DERs) – such as in the Nordics where installed capacity increased by approximately 46 per cent between 2005 and 2017 – is changing the nature of interactions between buildings, districts, cities, and the overarching energy system. The impact and control level of distributed assets on the grid varies depending on their nature and connection type. On the medium-voltage, assets such as CHP and wind turbines can be seen, whereas at low-voltage levels, there is the emergence of residential assets such as heat pumps, solar PV and electric vehicles (EVs).

While the higher penetration of DERs may have positive impacts on the grid with energy loss reduction and possible reduction of voltage fluctuations, it can also create new congestion problems. We have seen such an issue in the Netherlands, when after a successful campaign to incentivise the uptake of solar PV, the grid did not have enough capacity to cope with the extra electricity generation. Now, while Dutch operators struggle to connect new generation assets, grid reinforcement deferral (copper in the ground) is seen as a temporary solution. By using the platform GOPACS, flexibility providers can place orders on an energy trading platform.

Desmyter: the competitive dynamics of flexibility markets are being re-drawn

The platform GOPACS was founded by the Dutch network operators including the Transmission System Operator (TSO) Tennet, all the Dutch Distribution System Operators (DSOs), and the spot market exchange ETPA in order to provide flexibility for DSOs. This gives DSOs a way of managing congestion whilst maintaining TSO system requirements, and gives providers an additional revenue stream option. By including their location data, GOPACS checks if an order can solve DSO congestion requirements. The platform uses existing intraday energy markets, and coordinates with the TSO to reduce congestion problems.

The pace of change to solve the decarbonisation of Europe creates new problems of network management for system operators. As we saw with the example of the GOPACS platform, amongst proactive solutions is the development of new ways of using demand-response with a trend toward a bottom-up approach of procuring flexibility. We see the emergence of three levels of demand-side flexibility (DSF) – turning down demand loads, using batteries for example to provide short-term power boosts, dispatching local generators, etc. – to manage the grid; at the transmission level with voltage and frequency management, at the distribution level with congestion management, and at the local level with local grid management and support to the distribution network. Indeed, we see a trend towards DERs becoming increasingly managed within local energy systems (LES). The use of DSF at these three levels will necessitate better TSO-DSO coordination and better DSO-LES coordination. This clearly puts DSOs at a central pivotal point, using DSF as a strategy to decrease network management costs, investment costs, and working in coordination with LES to minimise the creation of new congestions, ideally using them as one flexible asset.

At Delta-EE, whilst exploring the uptake of DSOs procuring commercial solutions for DSF across different countries in Europe, it became clear that the competitive dynamics of flexibility markets are being redrawn. The new EU 'Clean Energy for All Europeans' legislative package sets new rules for DSOs, encouraging them to procure flexibility as one of the cost-effective solutions to solving grid issues. The Member States must translate this into a regulatory framework.

The final national regulation and the pace of implementation are key drivers, which can provide commercial advantages and opportunities. DSOs and other flexibility stakeholders such as aggregators and suppliers, by being ahead of the learning curve in their home market, could seize interesting market shares from this new value stream and be ready to penetrate other market with the strong advantage of being established. Meanwhile, smaller and less innovative DSOs may not rest on their laurels operating business-as-usual.

On the one hand, there are already many lessons to be learnt from early movers. On the other hand, DSOs may be accountable to new stakeholder types who could threaten concession renewals for those like in Germany who are typically granted concession contracts to operate the grids, while local authorities keep the grid's ownership. We have seen such a case when back in 2013 in Berlin, the cooperative BuergerEnergie Berlin (Citizen Energy Berlin), unsatisfied with the Vattenfall subsidiary Stromnetz Berlin and criticised for not embracing the transition fast enough, decided to compete against the DSO for control of the grid. Finally, in 2019, Stromnetz lost the grid concession rights to the German city of Berlin for a period of 20 years.

From our study on DSO flexibility, it seems clear that DSOs are on board to embark on the innovative journey of delivering DSF solutions commercially, and have unique opportunities to develop new flexibility markets, ensure better margins, and secure concession renewals.

Coming back to LES, it is a term that encompasses many types of local systems, including, for example, systems with energy generation owned and managed by energy communities, systems functioning under specific models such as the Collective Self-Consumption model in France, Belgium or Spain, the Mieterstrom model in Germany, but as well including some smart-grids systems, local energy market systems, and microgrids with islanding capacity, to name some of the varied local systems developing in Europe.

The soaring number of DERs connected on networks is accompanied by a growth in LES creation with several drivers: lower capex with improved performance and falling costs of assets; innovative platforms for balancing and optimising LES; innovating trading platforms; multiplication of investment sources such as crowdfunding platforms; the 'Clean Energy Package' providing a positive legal framework for energy communities, which is being translated into national regulation.

Depending on the nature of the projects, other factors may influence the creation of a LES. For instance, some industrial players may struggle with high electricity grid connection costs and mitigate it by requesting a lower capacity grid connection and integrate DERs onsite, and some developers may mitigate the time it takes to get grid connection approval by creating a microgrid.

The term 'local energy systems' covers a wide diversity of local systems in terms of architectures, ownership and business models, at both local and national levels. This holistic approach allows us to draw comparisons and provide analysis on market dynamics. From our research across different types of LES, we see three general trends in Europe:

- a rise in energy communities and their influence as European stakeholders;
- a race amongst industry stakeholders to find profitable and replicable LES business models. This comes after the withdrawal of support mechanisms in Europe such as the Feed-in-Tariffs;
- and a rise of industry stakeholders seeking to shift their business models to new paradigms involving energy communities.

Navigating and succeeding in the complex world of LES requires an understanding of the many challenges and opportunities paving the way. These include the relationship with network operators, the legal aspects, such as in France with the overly complex creation of an entity (Personne Morale Organisatrice – PMO) to create a Collective Self-Consumption project, but also the different stakeholders' motivations.

Regarding the latter, industry stakeholders should not underestimate the importance of grasping and adapting new driver types, not necessarily based on what might seem like 'logical thinking'. Energy communities can be composed of individuals, SMEs and local authorities including municipalities. Within one community, conflicting motivations may be found. While the point of one participant could be to internalise environmental and climate change costs, for another the motive would be to source their energy locally and hence retain the benefits locally.

The fragmented nature of LES and their stakeholders explains why finding replicable and profitable business models proves to be such a difficult task. However, this represents a fantastic field of opportunities, for example energy communities procuring flexibility at the DSO level, but moreover for all stakeholders including DSOs, utilities, aggregators and communities to create un-siloed approaches for effective and fair business models.

Rita Desmyter is Research Analyst, Local Energy Systems at Delta-EE.

A year in WtE and what lies ahead

It has once again been a year of change for the waste-to-energy sector, but it would be naïve to think that – when it comes to alternative fuel production – there has been unified progress across the globe. Here, UNTHA's **Bernhard Martinz** and **Gary Moore** reflect on the evolving WtE landscape in the USA and further afield, before predicting what 2020 may have in store.

The utilisation of waste as an energy source is not a new concept. Think about wood for example – as one of the world's oldest materials, it has been used to generate heat for thousands of years. But, as environmental thinking has evolved, so too have efforts to prioritise the re-use and recycling of wood, before it is burned. And when it *does* come to incineration, refined processing methods mean that a specified biomass fuel can now be created for maximum heat efficiency and therefore optimum environmental gain.

However, even the use of wood – a widely acknowledged energy source – varies from country to country. In places like Kenya and Nigeria, it remains a primary source of raw domestic energy, and the simplest of scraps can help generate much needed heat. In European nations such as Germany, Sweden and Latvia, market demand centres upon the consumption of a comparatively sophisticated biomass fuel, with these countries reported to be consuming around 74 per cent of the world's pellets.

There's a mixed picture back in North America. Pre-consumer wood waste has been virtually eliminated, but the level of wood debris in MSW (Municipal Solid Waste) and C&D (construction and demolition) streams, shows there's still room for improvement, with millions of tons of such recoverable material still available, per year.

Some people – perhaps those outside of the industry – will be surprised to read this of such a developed country. But here lies a key point. The global waste landscape is extremely fragmented, particularly when it comes to waste-to-energy. This doesn't just apply to the USA and Canada. And it can't just be said for wood.

Martinz: The global waste landscape is extremely fragmented, particularly when it comes to waste-to-energy

European countries like Germany, Denmark and Austria have been harnessing the potential of alternative fuels such as Refuse Derived Fuel (RDF) and Solid Recovered Fuel (SRF), for decades. Their waste infrastructures are therefore unsurprisingly advanced. Investment has been significant and WtE plants are often even considered something for the community to be proud of. Elsewhere in Europe there is a very different picture entirely, with countries such as Romania, Bulgaria and areas within the Baltic states having a long way to go.

In Asia, Singapore has arguably led the way in waste being recognised as a national resource. Conversely in other developing economies such as Vietnam – where a waste collection system barely exists – there is much more work to be done.

This goes to show that it isn't possible to paint a generic WtE picture for one continent – or even a nation.

In the USA, attitudes towards WtE are equally divided.

To a certain degree, legislation – or the lack of it – has a part to play in this. The EU Waste Directive – and more specifically the waste hierarchy – guides environmental conscience in much of Europe and encourages everyone to think about the prioritised actions for 'waste' handling.

In parts of the same continent, the ban of certain high-calorific 'wastes' from landfill, has also driven significant environmental progress. The fear of regulatory non-compliance – and the fiscal penalties associated with this – has almost forced those in the waste industry to think differently about what to do with materials that still contain a vast amount of resource value.

In North America, on the other hand, standpoints vary from state to state due to the absence of a federal law. Some momentum is gathering in Canada and certain US states, but waste contractors – and businesses in general – are not *obligated* to do anything, which remains a fundamental reason why much depends on the initiative and commitment of individual organisations.

This is not to say legislation is the only factor that drives innovation, although it undeniably plays a crucial part, certainly in motivating the masses.

Commercial factors naturally come into play too. Linked to the above point, the introduction of a landfill tax was a huge catalyst for the UK better committing to the aforementioned waste hierarchy. The hike in the levy – which rose to £80 per ton in 2013 and now stands in excess of £90 – meant that disposing of waste wasn't financially feasible anymore.

In the USA, landfill charges are typically low. An UNTHA client in Texas, for example, could dispose of trash for as little as $30-35 per ton. The incentive to invest in waste treatment technologies that would enable landfill to be avoided, is therefore limited – irrespective of environmental gain.

Moore: There is definitely untapped potential and 2020 could be the year this starts to be unlocked

But this client identified rising global demand for WtE fuels, not to mention mounting societal pressures to be kinder to the planet. They've therefore worked hard to design an intelligent yet economical SRF production plant able to manufacture a renewable energy source for a limited cost per ton.

The commercial viability of an RDF or SRF manufacturing plant is heightened when there is a guaranteed off-taker of the fuel. This goes some way to explaining why co-processing facilities are growing in number in parts of the world, including the USA.

Energy-intensive operations such as cement kilns are increasingly moving towards the production of their own SRF for example, to reduce their reliance on the world's depleting fossil fuels, secure their energy feedstock, lower the clinker factor in their finished cement and contribute to a more circular economy. This therefore sees them source, process and transform waste themselves – sometimes with the help of a local partner – to produce their own RDF/SRF either on site or at an adjacent facility.

The global nature of many such operations then promotes more widespread deployment of this co-processing approach, almost irrespective of local WtE attitudes.

It is perhaps inevitable that co-processing facilities will become increasingly popular in 2020 and beyond, regardless of environmental legislation in the countries concerned. Larger organisations often have more defined 'green' agendas and are commonly looked to as the pioneers for change within industries such as WtE.

Their appreciation for the WtE potential of different input materials is also inspiring. While MSW and C&I waste is probably still the most common RDF/SRF application – on the whole – the potential doesn't end there. The transformation of 'waste' textiles, carpets and mattresses into an energy source, is becoming increasingly common, for instance. And not just in the Western world. In Vietnam, UNTHA has been involved in a project to convert footwear production waste into an SRF.

Co-processing facilities are not the only innovators of course, nor are all innovators large in size. But they do often attract a significant share of the spotlight. And awareness plays an important part in inspiring others to think differently when it comes to WtE.

External factors will continue to encourage further WtE change across the globe too. China's ban on plastic waste imports has rocked the waste industry – not just in the USA but worldwide – so many operators are going back to the drawing board when it comes to their preferred treatment methods and routes to market. This will see progress accelerate in 2020.

Public perception is another extraneous variable that requires careful management. While consumers are generally becoming more vocal about their passion for the planet, many still don't want to live in close proximity to a WtE plant. In the USA, this is perhaps because some mass burn facilities built in the 1980s don't really represent what modern WtE technologies are truly capable of. They haven't always taken advantage of the latest pre-treatment methodologies, which ensure that WtE operations are scientific, sophisticated and incredibly clean. This has left communities worrying about the atmospheric implications of RDF/SRF sites, so there's a huge educational task to tackle, in banishing present-day misconceptions.

Armed with incentives such as a carbon credit – as is being offered in Canada – more businesses in the USA may sit up and pay attention to the potential that exists surrounding fuels such as RDF, SRF and biomass. There is definitely untapped potential and 2020 could be the year this starts to be unlocked. We're bolstering our team with the addition of more RDF/SRF specialists to reflect our confidence in the market.

Bernhard Martinz is President of waste shredding specialist, UNTHA America; Gary Moore is Director of Global Business Development.

Net zero: building a future

With more and more companies pledging ambitious emissions reduction targets to support climate change goals, energy management in buildings has become a key focus of operations. **Siân Crampsie**

Tricoire says "there is a new attitude" towards climate and sustainability

In July 2019, 28 companies from around the world with a combined market capitalisation of $1.3 trillion stepped up to a new level of climate ambition in response to a call-to-action campaign led by the UN.

Just two months later, at the UN Climate Summit in New York, that number had grown to 87 companies with a combined market capitalisation of over $2.3 trillion and annual direct emissions equivalent to 73 coal fired power plants.

The initiative – known as Business Ambition for 1.5°C – is backed by the United Nations Global Compact, the Science Based Targets initiative (SBTi) and the We Mean Business coalition, and commits signatories to setting climate targets across their operations aligned with limiting global temperature rise to 1.5°C above pre-industrial levels and reaching net-zero emissions by no later than 2050.

The initiative is a sign of the growing movement towards socially responsible corporate culture and the realisation that sustainable practises make good business sense – providing opportunities to both save money and grow revenues.

"There is a new attitude towards climate and sustainability," said Jean-Pascal Tricoire, Chairman and CEO of Schneider Electric, one of the initiative's signatories, speaking at the company's own Innovation Summit in Spain in October. "We will look for efficiencies throughout our value chain… It will make us more competitive by reducing waste."

Like other signatories to the pact, which include Deutsche Telekom, EDP, Ørsted, Suez, Enel and Acciona, Schneider will work to ensure that all parts of its business value chain – and those of its suppliers – are aligned with the 1.5°C target.

The company has already achieved net zero status in 13 of its own buildings, and says that digital technologies will make the transformation needed possible. "Our sites deliver energy efficiency year on year; a number of them enjoy on-site production of renewable electricity, and in some cases microgrids and energy storage. Net-zero carbon innovation is technologically possible today and makes economic sense," said Xavier Houot, Schneider Electric's Senior Vice President Global Safety, Environment, Real Estate.

According to the World Green Building Council (WorldGBC), the building and construction sector is responsible for around 30 per cent of global energy consumption and GHG emissions. Meanwhile Architecture 2030, a non-profit group, states that approximately two-thirds of the building area that exists today will still exist in 2050, but building renovations affect only 0.5-1 per cent of the building stock annually.

This means that to meet Paris climate targets, existing buildings must be renovated at an accelerated rate and to net zero carbon standards, so that all buildings operate at net zero carbon by 2050.

Schneider itself has calculated that 50 per cent of global CO_2 emissions could be eliminated by 2040 if digitally enabled energy saving measures were implemented in just half of existing buildings. Achieving net zero in 13 of its own sites – including a factory in Wuhan, China, and a logistics centre in Spain – helped the company to a 22 per cent reduction in CO_2 emissions in 2018 over 2017. Overall, Schneider has achieved over 30 per cent energy savings globally in its operations over the last ten years. Some 45 per cent of its operations are powered by renewable energy.

Digital energy management systems are well-placed to enable the energy transformation in the buildings sector, Schneider says. Platforms with open, interoperable architectures and internet-of-things (IoT) ability can deliver safe, reliable and sustainable solutions for companies seeking energy savings measures.

Schneider's EcoStruxure platform uses advancements in IoT, sensing, cloud, analytics and cybersecurity to connect devices including meters, drives and PV systems with software, apps and analytics to make buildings 'smarter' and greener.

Schneider Electric has deployed its EcoStruxure digital energy management solutions to help it achieve emission reductions in its buildings, and can point to other examples of success stories in the buildings sector. At Swansea University in Wales, digital energy management solutions have reduced energy consumption as well as given operators improved insight into carbon footprints, cybersecurity and costs.

Swansea University began its transformation in 2013 with plans for a £500 million campus transformation programme. The programme involved the renovation of the existing Singleton Park Campus, alongside development of the new Bay Campus, with work scheduled to be completed in 2020.

With a mix of old and new assets, Swansea University faced the challenge of tying together the operations of the two campuses, while modernising its existing systems. It identified Schneider's EcoStruxure Building architecture as an ideal solution.

EcoStruxure Building combines Schneider Electric's building management software and connected hardware to connect everything in a facility, from sensors to services, through a single smart building IoT platform. By facilitating data exchange between energy, HVAC and fire safety systems, the system serves as a comprehensive solution for building automation, control and optimisation.

Other capabilities identified by the team at Swansea University include EcoStruxure's open integration across buildings, systems and technologies. The data, outputs, and insights provided fed directly into plans for the next phase of development. This gradual upgrade saved the University the cost of having to perform a complete upgrade, avoiding the disruption caused by switching from one integrated solution to another. This ensured the new system's compatibility with the existing Singleton Campus and allowed for the development of the Bay Campus.

The project gave the University greater visibility over its carbon footprint, building and third-party system performance. By ensuring that the new EcoStruxure Building Operation system continued to communicate with the legacy infrastructure, building managers can see and control all their systems and information through a single interface. With the integration of EcoStruxure Energy Expert and EcoStruxure Building Operation, the University has also been able to use its existing network architecture to collect power monitoring information without causing disruption or major replacement works.

EcoStruxure Energy Expert also provided the team with a better overall view of the University's energy usage and electrical network health, whilst providing basic power quality information. "The wealth of information obtained from EcoStruxure Energy Expert helped us recognise the need for more granularity in our critical power applications," said Christopher Lewis, BMS Manager at Swansea University. "Therefore, we are now investing in Schneider Electric's EcoStruxure Power Monitoring Expert solution for our datacentres."

Schneider Electric's EcoStruxure Building solution is currently being used to oversee the University's BMS and to control district heating systems, ensuring energy efficiency. It is enabling the monitoring of system alerts ranging from critical fire and safety alarms through to pump failures. It is also playing a pivotal role in reducing energy consumption, and will enable departments to better understand their energy costs and carbon footprint through onsite dashboards.

The EcoStruxure Building solution has facilitated the combined operations of the two campuses. The legacy Schneider Vista system, which continues to be a crucial part of the older Singleton Campus, is fully integrated with the upgraded EcoStruxure Building Operation platform on the Singleton and Bay Campuses. Given the high levels of compatibility and the bespoke, modular nature of EcoStruxure, the upgrade or complete replacement of the Vista infrastructure can be done incrementally, whilst aligned with budget and planning cycles, as opposed to a one-off, costly investment.

Lewis continued: "The EcoStruxure architecture has been very successful in bringing the campuses together into one front end. It has dramatically improved on-site engineering efficiency, ensured point-to-point cybersecurity and opened the door to the Internet of Things."

Swansea University is now expanding the EcoStruxure Building system to monitor additional room conditions, including HVAC and lighting. The upgrade of the Singleton Campus will continue for the next two years to bring its smaller metering-only installations onto the central system.

Junior Isles

Living on the edge

As the move towards renewables and decentralisation gathers momentum in an increasingly decarbonised world, there is a real focus around flexibility and how it can be facilitated. That much was clear at this year's European Utility Week.

Speaking on the sidelines of the conference, Andy Bradley, Director of the global energy research and consultancy services organisation, Delta-EE, said: "The hot topics we are seeing around flexibility include demand response – both for energy companies and network system operators. We are also seeing a lot of activity around energy communities and e-mobility."

The need for flexibility, he says, provides threats and opportunities. "The network operators see the threat of a less stable energy system in future because of the increasing amount of renewables on the system and rapid change in demand profiles through electrification of heat or transport. But the energy suppliers and commercial companies see the opportunity of commercialising new technologies for their customers, and maybe therefore creating the problem, but also solving the problem by creating platforms such as aggregation platforms, and peer-to-peer trading models that actually provide service to the energy system to keep it in balance."

And the opportunities are there not just for energy companies but also for those outside of the sector. Car companies are a good example. EVs are likely to play a big role in providing flexibility in the future. Being the company that has control over those assets, and having access to cars that are parked for most of the day, is potentially a big prize. This could see car companies become a different type of company in the future if they choose to.

"If you're going to sell an EV, then why not be the company that controls that EV and provides flexibility services to the energy system?" said Bradley. "It's what makes this such a fascinating space right now. There's this convergence of industries, in a way. There are organisations that have never been in energy, and never wanted to be in energy, that now have the option of engaging in the energy sector because of connectivity and digitalisation."

There was one such move earlier this year when Japanese car manufacturer Honda announced that it would build a portfolio of energy management products and services to offer a comprehensive solution for EV customers and service operators throughout Europe, starting with agreements with two companies in particular; battery storage firm Moixa and EV charging solutions provider Ubitricity.

Moixa's GridShare software enables aggregation and smart charging of batteries in response to grid signals. This provides additional value from aggregating battery fleets to provide GWh scale virtual power plants to help balance the grid.

Simon Daniel, CEO of Moixa said: "Japan is growing at 10 MWh per month and will probably get to about 0.25 GWh in the next 18 months, and that's before we start working with additional EVs and other types of technology in the market. Honda has asked us to be its smart charging partner for Europe and we will be doing a lot more projects with EV charging. "

The need for flexibility and grid balancing also brings opportunities for everyday household consumers who are now able to take part in community energy schemes. Energy communities could help to enable the flexibility potential of customers and therefore more effectively integrate renewables and technologies such as EVs into the grid. With its "Clean Energy for all Europeans" package (CEP) initially published on 30 November 2016, the European Commission proposed for the first time to formally recognise community energy projects in European legislation.

Denmark and Germany probably provide the two best practice examples for community energy generation. Denmark focuses on wind power plants, while Germany also invests in solar projects.

The most recent of these projects is the Brunnthal scheme near Munich currently being executed by GreenCom Networks. GreenCom says it expects to signup its first customers before the end of this year. "The long term goal of the project is to have the whole community CO_2 neutral," said Klaus Müller, GreenCom's Marketing Manager. "In order to push that, we want to motivate people to use electricity that is generated in the community, so we will incentivise local production and consumption."

Residents of Brunnthal will get a bonus of 1 eurocent/kWh on top of the feed-in tariff if they consume less than they produce, and a discount of 3 eurocents/kWh for what they consume during periods of oversupply.

"The goal of this project is not to make money but to show that a community [energy scheme] can actually work," explained Müller. "Going forward we will license the connectivity, optimisation, visualisation and billing of our product. We hope to help other utilities, communities and municipalities to establish such communities."

Community energy schemes, where consumers can take advantage of rooftop solar PV and smart meter technology, could be a real contributor to a decarbonised future, especially in developing countries.

Linda Jackman, Vice President of Strategy EMEA, Oracle Utilities, noted: "They are doing a lot of this, especially in Africa and India, where they are looking at this idea of doing distributed grids and the whole concept of microgrids. It means you're not building massive transmission towers. Transmission losses in India are as much as 50 per cent; so you are building twice as much generation as you actually need.

"So if there's one single investment the rest of the world needs to make, it's to help developing nations build networks where you are not reliant on massive transmission and centralised generation. You then have greater control over that localised generation, where the fuel mix could solar PV, run-of-river hydro, batteries or a number of technologies that ensure a lower carbon future."

Siemens sees the decentralisation space as an interesting one. Speaking at the *EUW* keynote and later at a media roundtable, Cedrik Neike Member of the Management Board of Siemens AG and responsible for the Smart Infrastructure business, noted that the company was restructuring to focus on the energy transition.

"We think that most of the innovation will be in the decentralised energy space… there will be much more electricity, that will be much more intermittent, and needs to be balanced. This means the grids will need to be much more intelligent," he said. "The prosumer also has to be much more intelligent, and these two meet at what we call the grid edge."

Neike was speaking as the company unveiled a new Grid Diagnostic Suite, which includes cloud-based applications that collect data from new or existing field devices for protection, distribution automation and power quality. This data is then stored and analysed in the cloud.

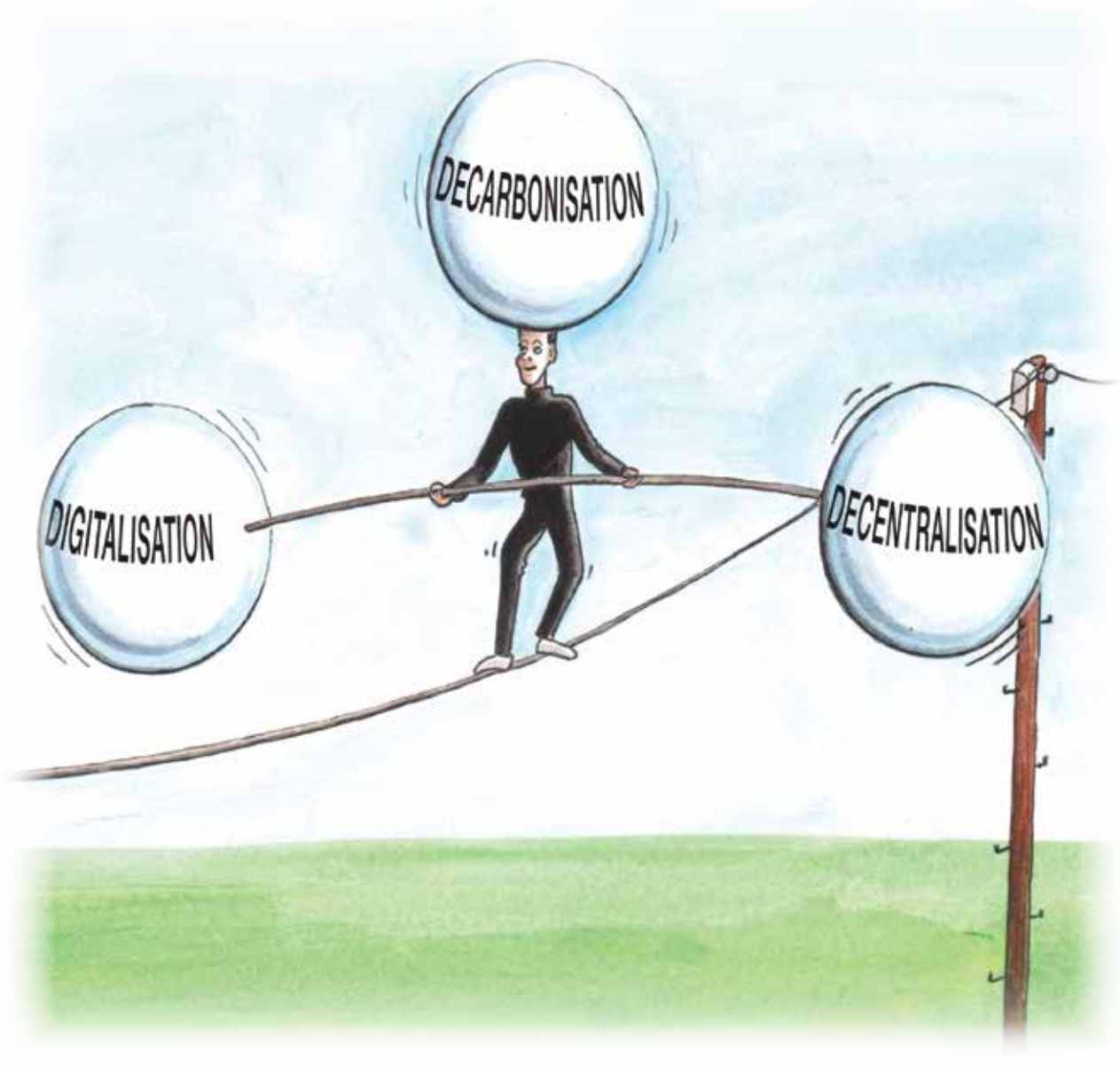
Dr Michael Weinhold, Chief Technology Officer (CTO) of Siemens Smart Infrastructure commented: "The load side, or grid edge is becoming more and more active. It's not like in former days where, like in Germany for example, there were a couple hundred centralised power stations and the load was passive. Today in Germany there are more than 1 million solar PV rooftops that interact with the grid."

This increasing activity at the grid edge is seeing a proliferation of solutions aimed at unlocking new value for utilities. *EUW 2019* saw Landis+Gyr introduce its Gridstream Connect IoT platform to help utilities "master their present and future challenges in providing grid flexibility resiliency and security".

Landis+Gyr says the platform leverages intelligence at the grid edge and across distribution systems for more efficient management of energy capacity, the integration of renewables and enhanced consumer engagement.

Ifigeneia Stefanidou Head of Product Management Grid Edge at Landis+Gyr, said: "With decarbonisation we see the production shift from higher voltage levels to lower voltage levels as solar panels are connected to low voltage grids. This creates the need for more digitalisation – utilities need to digitalise their low voltage systems in the same way they have for their high voltage systems."

Digitalisation will not only be a facilitator of the energy transition but will be an accelerator. And as the energy sector is on the edge of massive change, all eyes will be focused on what is happening at the grid edge.



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