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An emission-free society

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Coal to decline despite Trump's proposal

The Trump administration has prepared a new proposal aimed at reviving the flagging coal mining industry. But even if it is implemented, it will only slow coal's demise at best.

Junior Isles

Electricity generation from coal fired plants is likely to decline despite US President Donald Trump's recent announcement of his latest proposal aimed at reviving the coal sector.

Last month the Environmental Protection Agency (EPA) set out proposals for replacing the Obama administration's Clean Power Plan (CPP) with what it calls the Affordable Clean Energy rule. The new rule would abandon the limits for states' emissions that were set under the CPP, and focuses on improving the efficiency of individual coal fired plants instead of looking at the electricity system as a whole.

The Environmental Protection Agency (EPA) published projections for the outlook depending on how its rules were implemented, which showed that coal fired generation could be up to 13.1 per cent higher in 2030 than if the CPP was in place. But even this scenario would see a 19 per cent fall in coal fired power generation compared with 2017 levels, as plummeting costs of cleaner energy sources including natural gas, wind and solar blunt the proposal's ultimate effect.

Although the CPP never came into effect, having been blocked by the Supreme Court in 2016, it was expected to accelerate the closure of coal fired power plants. If the CPP had stayed in place, the drop in coal fired generation by 2030 was projected to be 29 per cent.

EPA officials argued that their plan was in compliance with the Clean Air Act's requirements on controlling pollution, whereas the Obama administration's more ambitious strategy had been a regulatory over-reach.

"However much people may want EPA to demand new renewable energy [plants] be built instead of fossil fuels plants, we do not have that authority," said Bill Wehrum, who heads the EPA's air and radiation division. "We are bringing the agency back to its core function."

Michelle Bloodworth, President of the American Coalition for Clean Coal

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US corporations lead clean energy purchases

Corporations are playing an increasingly important role in tackling climate change, especially those in the United States. According to Bloomberg NEF's 2H *Corporate Energy Market Outlook*, corporations have purchased 7.2 GW of clean energy so far in 2018, already surpassing last year's record 5.4 GW.

Notably 4.2 GW, or 60 per cent, of global corporate energy procurement has come from the US. Facebook is the largest corporate buyer thus far in 2018, purchasing over 1.1 GW of clean energy. AT&T is the second largest buyer with 820 MW, with aluminium manufacturers Norsk Hydro and Alcoa following with 667 MW and 524 MW, respectively.

The current 140 RE100 signatories consume an estimated 184 TWh of electricity cumulatively. In order to meet their renewable energy targets by 2030, Bloomberg NEF estimates they will need to purchase an additional 197 TWh of clean energy. If this were to be met entirely with PPAs, it could catalyze an additional 100 GW of solar and wind build globally.

While good corporate branding is an important factor in the increasing purchase of clean renewables energy, it is the improving economics of wind and solar in particular that has been the main driving force.

In 2010, using solar power to boil a kettle in the UK would have cost about £0.03. By 2020, according to recent estimates by a research team at UBS, the cost will have fallen to half a penny. By 2030, the cost could be so near to zero it will effectively be free.

In an article published in the *Financial Times*, Sam Athrie, a research analyst at UBS, said that renewables could soon be cheaper than all the alternatives, contributing to a wave of corporate action in the energy sector.

In the UK, tendering has cut the cost of offshore wind by more than half in just three years. In Germany it has helped to shrink the premium for renewable energy by roughly half since 2015.

Based on its own database of over 100 000 projects around the world, Bloomberg NEF recently estimated that the world has now installed more than 1000 GW of wind and solar power.

As of June 30, 2018, analysis shows there is now 1013 GW of wind and solar PV, evenly balanced between the two: 54 per cent wind and 46 per cent solar. Since 2000, wind and solar capacity has increased 65-fold. Previous research from BNEF has forecast that by 2050, 50 per cent of all global electricity generation will come from these two renewable sources.

And whereas the first 1000 GW of wind and solar required an estimated $2.3 trillion of capital spend, the next milestone will be much cheaper. To reach 2000 GW will only cost $1.23 trillion, according to BNEF, set to take place over the next four years.

Separately, the World Bank revealed that its clean energy financing in developing nations has exceeded its financing target by $7.7 billion. According to the bank, in fiscal year 2018, 32.1 per cent of its financing had climate co-benefits already exceeding the target set in 2015 that 28 per cent of its lending volume would be climate-related by 2020.

■ The Lloyd's Banking Group has announced a new policy to stop funding coal-related projects. The show of support for the low-carbon economy will see the bank refuse to finance new clients whose revenues predominantly come from coal power plants and mines. The decision follows its Clean Growth Finance initiative, announced earlier this year, in which the bank pledged £2 billion ($2.6 billion) in discounted lending to help businesses invest in reducing their environmental impact.

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Electricity, which represents coal fired generators and mining companies, said the proposed rule was "a big step in the right direction".

She said: "The regulations would provide the flexibility to states to develop emissions guidelines that recognise the important role that our nation's coal fleet plays."

Some utility executives hailed the administration's proposal as one that adheres to the law and would ease the financial crunch they would have faced under a more sweeping rule.

Jim Matheson, Chief Executive of the National Rural Electric Cooperative Association, said in a statement that it appears the measure will "provide electric co-ops the certainty and flexibility they need to meet their consumer-members' energy needs".

The new proposal has also, however, been met by wide-ranging criticism.

California Gov. Jerry Brown called the Trump administration plan "a declaration of war against America and all of humanity". He wrote on Twitter: "It will not stand. Truth and common sense will triumph over Trump's insanity."

In any event the proposal is likely to face an intense battle in court. The federal government is obligated under the Clean Air Act to regulate power sector greenhouse gas emissions, and to hold the industry to using the best available technology to contain them. States like California and environmental groups argue that the best available technology is cleaner burning fuels, particularly at a time when it is typically priced more competitively than coal.

"In regulating greenhouse gas pollution, the EPA is legally required to use the 'best system of emission reduction,' not a mediocre or downright counterproductive system of emission reduction," said Richard Revesz, dean emeritus at NYU School of Law and director of its Institute for Policy Integrity. "This proposal is an enormous step backwards, and it will have severe repercussions for public health and the climate."

Even the EPA acknowledges that the new rule could result in thousands of premature deaths. According to its own analysis, the Trump plan could lead to 1400 premature deaths annually by 2030 as a result of the air pollution that is released along with the greenhouse gases the CPP targeted.

By 2030, according to administration officials, the proposal would cut CO_2 emissions from 2005 levels by between 0.7 per cent and 1.5 per cent, compared with a business-as-usual approach. By comparison, the CPP would have reduced carbon dioxide emissions by roughly 19 per cent during that same time frame.

Senator Edward J. Markey (D-Mass.), a member of the Environment and Public Works Committee and Chair of the Senate Climate Change Task Force said: "The price of renewables is plummeting and clean energy jobs are increasing, while black lung cases in coal miners are resurgent… This Dirty Power Plan is an abdication of US leadership on climate change and a betrayal of the public's health, our environment, and the planet's future… A clean energy revolution is happening across the globe, but President Trump wants to hand over countless American clean energy jobs and the development of new technologies to China, Germany, India, and other nations. America's energy future won't be found in the dark of a mine but in the light of the sun."

Energy and climate change policy brings political turmoil

The importance of solid energy policy has been highlighted in stark fashion with the resignation of Malcolm Turnbull as Australia's Prime Minister.

Junior Isles

Failure to tackle energy and climate issues has proven to be the downfall of Australia's Prime Minister Malcolm Turnbull.

In late August Turnbull announced he would resign from the position after losing support from the Liberals. Turnbull has spent the last two years crafting a bipartisan energy policy, which has ultimately been his downfall.

Although the country exports billions of dollars of coal and liquefied natural gas every year to Asia's fast-growing economies, the government has struggled to keep the lights on. Gas shortages, lack of infrastructure investment and spiralling energy costs have been a burden on the economy and South Australia suffered a statewide blackout in 2016.

Australia has long struggled to come up with a widely accepted policy that tackles climate change and shifts from a coal-dependent energy sector towards cleaner power. With no policy capable of attracting support from both the ruling Liberal-National coalition or opposition centre-left Labor party, and a three-year election cycle, power companies say they cannot justify long-term investment in new generation or storage.

Turnbull proposed the National Energy Guarantee, a package of policies aimed at tackling problems of reliability, high prices and the need to cut carbon emissions. Businesses backed the package, and Labor said it supported it in principle.

The coalition had planned to pass the National Energy Guarantee in parliament within weeks to end the long-running war over energy and climate policy but in mid-August conservative backbenchers objected to plans to legislate emission reduction targets agreed to in the Paris Agreement.

In a bid to stave off a leadership challenge from disgruntled conservatives within his own party, Turnbull shelved his government's flagship energy policy, threatened to break up power companies and abandoned national emissions targets.

Conservative rival, Peter Dutton, has not ruled out pulling Australia out of the Paris Agreement. He has also threatened a public inquiry into power producers and to remove sales taxes from electricity bills of families and pensioners.

Removal of price barriers on modules could stimulate EU solar sector

- Decision will create additional 40 000 jobs
- Germany to reduce subsidies

The EU-Commission has decided to remove the minimum price barriers for Chinese solar modules that have been in place since December 2013. The minimum prices will be removed as of September 3, 2018 – a move that could deliver cheaper solar energy and stimulate job growth.

Danish solar and wind farm developer European Energy welcomed the decision. CEO of European Energy, Knud Erik Andersen, said: "The result of this decision is that solar parks in EU countries will become cheaper to construct. That is good news for the green transition in Europe.

"This decision will generate substantial growth across the solar industry in Europe while at the same time making solar energy cheaper than all existing fossil fuel-based energy generation. This is a very positive development for the environment, for European taxpayers and for European businesses."

He added: "Previously Europe was the centre of the global solar industry. After the minimum pricing scheme was implemented we have fallen behind and now makeup a small fraction of the industry. Over the past four years China has seen the bulk of Solar PV development while the European market continued to struggle. In the coming years, Europe can again become an interesting proposition for utility scale solar, both in terms new projects and job creation."

China installed approximately 50 GW of new solar capacity in 2017 in a global market of 100 GW, while EU member states installed 5.6 GW. According to calculations from Ernst & Young the removal of the minimum import pricing will create a further 40 000 new jobs in Europe, adding to the existing 80 000 jobs in the European solar business.

Removing the minimum price is also likely to accelerate the drive towards subsidy-free solar power in the bloc.

At the end of July, the German Federal Network Agency, or BNetzA, said subsidy rates for newly commissioned small-scale solar systems in Germany will be falling by 1 per cent per month between August 1 and October 31.

The decrease concerns projects of up to 750 kW, which still receive fixed levels of support. Bigger solar photovoltaic (PV) arrays in the country are competing in tenders for long-term contracts.

The rates received by new solar systems are adjusted monthly, depending on capacity additions in the last six months. BNetzA said that between January and June, solar installations were above the level set by the government, which triggers a reduction of the support rate.

For systems commissioned by the end of July the subsidy rate per kWh was between €0.126 ($ 0.15) and €0.0884, depending on its size and other factors. After the 1 per cent cut in each of the next three months, the rates will fall to between €0.1223 and €0.0858 in October.

UK nuclear plan suffers further setback

The UK's plan for a new generation of nuclear power plants is under threat as projects planned for Wylfa and Moorside suffered setbacks last month.

In another blow to the UK's nuclear power programme to construct as many as six new plants, US construction firm Bechtel has pulled out of building the £20 billion reactor at Wylfa, in Anglesey, due to its belief that the build cost estimate is too low. Bechtel made the decision based on its assessment that the drastic rise in construction costs would make it hard to make money on the project.

Hitachi, through its subsidiary Horizon Nuclear Power Ltd., plans to build a nuclear power plant equipped with two reactors on the island of Anglesey in Wales. Overall costs are expected to reach about Yen3 trillion ($27 billion), mainly due to measures to meet safety standards strengthened globally after the 2011 accident at the Fukushima No. 1 nuclear power plant in Japan.

According to sources, however, the overall costs estimated by Bechtel are higher than Hitachi's, making it impossible for Bechtel and Hitachi to agree on the price tag.

The withdrawal deals a blow to Tokyo-based Hitachi, which lacks experience in nuclear power plant construction. The conglomerate could now face further difficulties in financing the project.

The Japanese government supports the construction project as an "export of nuclear power generation technologies," but even so, its future is becoming increasingly uncertain.

Doubts have also been raised over the fate of the Moorside nuclear power station planned for Cumbria after it emerged that most of the project's 100 UK staff had been laid off.

Toshiba has been trying to sell the NuGen consortium behind the Moorside plant since it had to write off billions of dollars because of problems with its US nuclear business last year.

Korean state-owned firm Kepco threw the project a lifeline last December by agreeing to buy Toshiba-owned NuGen but the sale, which was meant to complete this January, was delayed until the spring. The transaction has still not closed, and uncertainty has been created by a change of government in Seoul and the appointment of a new Kepco chief executive.

The delay has forced Toshiba to look again at the consortium's running costs, leading to a decision on July 27 to cut many of the venture's 100 jobs across Manchester and Cumbria. The job losses will be subject to consultations.

With the difficulties facing large nuclear projects, some experts are hailing small modular or mini reactors as the future of the industry. Last month an independent group of experts recommended developers of "mini" nuclear reactors in the UK should be offered the same subsidies as those provided to offshore wind to help commercialise the budding industry.

The proposal is among several contained in a report by an expert finance working group appointed by the government last year to advise on how small nuclear reactors, which would typically range from tens of MW to 600 MW, could raise private investment. Large reactors are typically more than 1000 MW.

In June the UK government committed up to £56 million ($73 million) to kick-start research and development into the most advanced types of small reactor technologies, most of which will not be commercially available until the late 2020s.

We are signing for Cybersecurity

The digital world is changing everything. It's improving our lives and economies; at the same time, the risk of exposure to cyberattacks is growing dramatically. That's why we are joining forces and have established the Charter of Trust.

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AIRBUS
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DAIMLER
DELL Technologies
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NXP
SGS
SIEMENS
T
TOTAL
TÜV SÜD

Our principles

1 Ownership of cyber and IT security | Anchor the responsibility for cybersecurity at the highest governmental and business levels by designating specific ministries and CISOs. Establish clear measures and targets as well as the right mindset throughout organizations – "It is everyone's task."

2 Responsibility throughout the digital supply chain | Companies – and if necessary – governments must establish risk-based rules that ensure adequate protection across all IoT layers with clearly defined and mandatory requirements. Ensure confidentiality, authenticity, integrity, and availability by setting baseline standards, such as

- **Identity and access management:** Connected devices must have secure identities and safeguarding measures that only allow authorized users and devices to use them.
- **Encryption:** Connected devices must ensure confidentiality for data storage and transmission purposes wherever appropriate.
- **Continuous protection:** Companies must offer updates, upgrades, and patches throughout a reasonable lifecycle for their products, systems, and services via a secure update mechanism.

3 Security by default | Adopt the highest appropriate level of security and data protection and ensure that it is preconfigured into the design of products, functionalities, processes, technologies, operations, architectures, and business models.

4 User-centricity | Serve as a trusted partner throughout a reasonable lifecycle, providing products, systems, and services as well as guidance based on the customer's cybersecurity needs, impacts, and risks.

5 Innovation and co-creation | Combine domain know-how and deepen a joint understanding between firms and policymakers of cybersecurity requirements and rules in order to continuously innovate and adapt cybersecurity measures to new threats; drive and encourage i.a. contractual Public Private Partnerships.

6 Education | Include dedicated cybersecurity courses in school curricula – as degree courses in universities, professional education, and trainings – in order to lead the transformation of skills and job profiles needed for the future.

7 Certification for critical infrastructure and solutions | Companies – and if necessary – governments establish mandatory independent third-party certifications (based on futureproof definitions, where life and limb is at risk in particular) for critical infrastructure as well as critical IoT solutions.

8 Transparency and response | Participate in an industrial cybersecurity network in order to share new insights, information on incidents et al.; report incidents beyond today's practice which is focusing on critical infrastructure.

9 Regulatory framework | Promote multilateral collaborations in regulation and standardization to set a level playing field matching the global reach of the WTO; inclusion of rules for cybersecurity into Free Trade Agreements (FTAs).

10 Joint initiatives | Drive joint initiatives, including all relevant stakeholders, in order to implement the above principles in the various parts of the digital world without undue delay.

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Ørsted buys onshore wind pipeline

■ US offshore pipeline grows ■ NY agencies study European T&D models

Siân Crampsie

Ørsted is branching out into the US onshore wind energy sector in a bid to reinforce its position in the global renewable energy market.

The Danish renewable energy giant has announced an agreement with global infrastructure investment manager I Squared Capital and management shareholders to acquire a 100 per cent equity interest in Lincoln Clean Energy, a USA-based onshore wind energy developer.

The deal has an enterprise value of £580 million and will give Ørsted "a strong growth platform in the USA", said Henrik Poulsen, CEO of Ørsted. Lincoln's portfolio of projects include 513 MW of operating assets, 300 MW under construction and a pipeline of over 1500 MW in development due to be completed by 2022.

Ørsted has made the USA a key target market and it says that the onshore wind sector is especially attractive because of a strong and established supply chain, good wind conditions and a booming market for corporate PPAs.

In the US offshore wind sector, Ørsted is developing the Bay State wind project off the coast of Massachusetts with a potential capacity of up to 2000 MW, and the Ocean wind power project off the coast of New Jersey, with a capacity of up to 1000 MW.

In all, the US offshore wind power pipeline has reached 25.46 GW, according to the US Department of Energy (DOE).

The DOE says that the overall project pipeline consists of 3.92 GW of project-specific capacity and 21.54 GW of undeveloped lease area potential capacity. The capacity comes from projects in 13 states and also includes the 30 MW Block Island wind farm, which was commissioned in 2016.

A total of 1.91 GW of capacity is expected to be deployed by 2023, the DOE said in its *Offshore Wind Technologies Market Update*. Offshore solicitations have awarded 800 MW in Massachusetts, 400 MW in Rhode Island and 200 MW in Connecticut to Vineyard Wind and Deepwater Wind. Other states having projects in the development pipeline are Maryland, New York and New Jersey.

Overall, most of the projects are still in the planning and site control phase, the DOE said, while four schemes have initiated procurement. Contracts have already been awarded for Deepwater Wind's 90 MW South Fork wind project off Long Island and its 120 MW Skipjack development off Maryland, as well as for a 248 MW scheme by US Wind off Maryland.

Last month power agencies in New York signed a memorandum of understanding to conduct a study of successful offshore wind transmission models with a specific focus on large scale European projects.

The findings of the study are expected to help guide the state's development of 2400 MW of offshore wind in waters off the Atlantic Coast by 2030.

Naturgy closes in on approval for Chilean solar farm

Naturgy is set to get the go-ahead for the construction of a 144 MWp solar power plant in Chile after the country's environmental regulator recommended approval.

Naturgy subsidiary Global Power Generation is developing the Inca de Varas II solar plant in the Atacama region of Chile and says that the project is at a very advanced stage of development.

The company is also responsible for the development of the 50 MWp Inca de Varas I solar power plant, and is currently building the 204 MW Cabo Leones II wind farm in Chile.

A regional evaluation commission was scheduled to review Inca de Varas II late last month.

The project will be an important addition to Chile's power generation mix as well as its drive to reduce dependence on energy imports.

Chile aims to source 60 per cent of its electricity from renewable energy by 2035, and 70 per cent by 2050, up from the current level of 40 per cent.

Earlier this year the International Energy Agency praised Chile's efforts to boost sustainable energy growth and capitalise on its large renewable energy resources with forward-looking policies.

Thumbs up for Canyon Creek

Construction of a new pumped storage hydro project in Canada is set to go ahead after the Alberta Utilities Commission gave the project the green light.

The 75 MW Canyon Creek pumped storage hydro project in Alberta is being developed by Turning Point Generation, a subsidiary of WindRiver Power Corp. The plant will play a critical role in Alberta's energy system as more renewable energy resources are connected to the grid, the developer said.

The Canyon Creek project will use existing site infrastructure from a decommissioned open pit coal mine near Hinton. Turning Point said that once operational, the energy storage facility will be able to supply power for up to 37 hours at full output. The closed-loop, off-stream design will also limit the adverse environmental impacts to Alberta's natural river courses, it added.

The province of Alberta is in the process of introducing a capacity market, in which Canyon Creek could participate. Earlier this summer the Alberta Electric System Operator (AESO) presented the final design of the capacity market, the first auction of which is planned for 2019 with first delivery of capacity in 2021.

Brazil utilities sell wind and transmission assets

Eletrobras is aiming to raise at least BRL3.1 billion ($794 million) from the sale of wind and transmission assets this autumn.

The state-owned Brazilian electric utility last month released details of the assets that it wants to sell and the minimum price it wants to achieve for each sale. It is executing the sale via an auction scheduled for the end of September.

The company will be selling its interests in 71 special purpose entities (SPE) in 18 lots. This includes eight wind power generation lots for a total capacity of 1605 MW and ten lots for power transmission lines totalling 2910 km.

With a minimum price set at BRL635.6 million, the most expensive lot is that for Santa Vitoria do Palmar Holding SA, which includes 17 different wind energy SPEs.

Electricity and transmission company Eletrosul last month started the sales process for three power transmission concessions in Mato Grosso do Sul state.

The concessions relate to two 230 kV transmission lines and an electricity substation and were awarded in 2014 to a consortium led by Eletrosul. They were due to come online in March 2018 but works have not yet started due to Eletrobras' decision to divest.

■ Brazil's Agencia Nacional de Energia Eletrica (ANEEL) has approved the rules and prices of power generation auction A-6. The auction will contract electricity from new generation schemes and was due to be held at the end of August. Contracts will be awarded for power supplies starting on January 1, 2024.

Energy companies push on with renewable plans

US utilities are pushing ahead with plans for renewable energy capacity in spite of efforts by the federal government to support the coal sector.

Berkshire Hathaway-owned PacifiCorp has secured approvals from Idaho and Utah regulators for the construction of 1.15 GW of wind farms, while Dominion Energy Virginia has filed its first set of plans under Virginia's Grid Transformation & Security Act (GTSA) committing it to build 3 GW of renewable energy capacity by 2022.

The plans are being pushed forward in spite of proposals by US President Donald Trump to roll back Obama-era rules on carbon dioxide emissions and replace them with measures to support coal fired plants.

PacifiCorp's plans are part of the company's Energy Vision 2020 initiative and will see it add three wind power projects to the grid, as well as build 225 km of high voltage transmission line and repower 900 MW of existing wind energy capacity.

PacifiCorp's division Rocky Mountain Power CEO Cindy A. Crane said: "As this exciting initiative receives these approvals, we look forward to the benefits the projects will bring to all our customers in the form of low-cost renewable energy and a more robust transmission system."

In Virginia, Dominion Energy's plans include an initial 240 MW of solar energy capacity and a ten-year grid transformation plan. It said that the GTSA would enable it to expand investments in renewable energy, smart grid technology and energy efficiency, and therefore allow it to meet the increasingly complex demands and expectations of its customers.

Dominion is also expected to file plans for the development of a 12 MW offshore wind farm in the coming weeks.

PacifiCorp said its plans would cost just over $3 billion.

Safeguard duties on solar modules will hit sector investment

■ Duties imposed on China and Malaysia ■ Imports from China slump 67 per cent

Syed Ali

Investment into India's solar sector is expected to be lower over the next few quarters. According to Mercom Captial Group, investments into the solar sector are likely to slow down as project installation levels are expected to be subdued due to an anticipated rise in solar component prices as a result of the safeguard duty (SGD) imposed by the government.

At the end of July India's Ministry of Commerce, through the Directorate General of Trade Remedies (DGTR), imposed a SGD of 25 per cent on solar cells and modules imported from China and Malaysia for the next two years.

"A slowdown in solar installations and the uncertainty around the safeguard duty case correlate with the lower procurement of cells and modules, thus negatively affecting import activity," said Raj Prabhu, CEO of Mercom Capital. He added that the downward trend is likely to continue for a few more quarters.

Second quarter solar imports from China slumped by 67 per cent quarter-on-quarter to $331 million, but the country remains the single largest exporter of solar cells and modules into India. Chinese companies accounted for nearly 75.9 per cent of the total imports, while in the previous quarter that share was over 90 per cent. Taiwan was responsible for 8.3 per cent of all solar imports into India, valued at $36 million, followed by Vietnam with a 3.8 per cent share and Canada with 3.6 per cent.

The imposition of SGD is also expected to impact solar tariffs and have far reaching consequences on India's commitment to the Paris Agreement and the National Solar Mission.

Mohit Prasad, Power Analyst at GlobalData, said: "With the major solar PV installations driven by imports from China, imposition of SGD would be detrimental to indigenous manufacturers due to escalation in the deployment cost of solar projects. The upcoming bids for solar PV plants are expected to witness higher bid tariffs, which ultimately will impact India's commitments under the Paris Agreement."

In 2015, India committed to the Paris Agreement whereby reduction of CO_2 emissions by 33-35 per cent from 2005 levels was targeted. In line with the commitment, the country established a target of achieving 100 GW of solar power generation by the year 2022. As a result, the demand for solar cells and modules increased from 1476 MW in FY2015 to 10 573 MW in FY2018, while the production of the domestic industry increased from 170 MW to 842 MW.

Vietnam faces power shortage

Vietnam is facing a potential electricity shortage during 2020-2030, according to the Ministry of Industry and Trade.

Deputy Minister of Industry and Trade Hoang Quoc Vuong stressed that power shortages may start in the beginning years of the period, with severe deficiency predicted in 2022. In addition, load growth could be higher than forecast.

Forecasts by Electricity of Vietnam (EVN), presented at the Vietnam Energy Forum last month, showed that to meet the quick increase in electricity demand from now to 2030, the power sector needs to ensure an output of 265-278 TWh of electricity in 2020 and 572-632 TWh in the following ten years.

Electricity demand expands between 10.3-11.3 per cent during 2016-2020 but slows down to 8-8.5 per cent during 2021-2030. However, it is still a tough task for the sector to ensure sufficient electricity, especially when many power projects have been delayed.

According to former Minister of Science and Technology Nguyen Quan, ensuring energy security is hard, particularly when the country has suspended nuclear power projects but the development of other sources of energy, especially renewable energy, is hindered by the many unsolved problems.

The low feed-in tariff for wind power is causing a delay in wind power projects all across the country, as investors wait for prices to increase so their plants can become profitable. Some are now turning to developing solar power projects instead, but it remains unclear whether the country will be able to fulfil its potential.

The solar boom began when the Vietnamese government's Decree No.11/2017/QD-TTg on mechanisms for encouraging the development of solar power in Vietnam was released. Since then, the list of solar power projects registered by foreign investors in Vietnam has been growing consistently.

The ministry has approved more than 70 new projects to be put into operation before June 2019, with a total capacity of over 3000 MW. This amount far exceeds the estimated installed solar power capacity of 1000 MW until 2020 in the original master plan.

Under the Prime Minister's Decision 11, solar power installations that reach their commercial operation date (COD) by June 30, 2019 are entitled to a feed-in tariff of 9.35 cents/kWh for a period of 20 years.

South Australia embraces energy storage

South Australia is looking to increase its energy storage capacity following the startup of the world's largest lithium-ion battery last year.

Three huge projects integrating battery storage with utility-scale renewable energy installations are in the pipeline in New South Wales, to be set up through Australian developer CWP Renewables.

The three projects, one of which has just been given local government approval and the other two still at the proposal stage, are part of the Grassroots Renewable Energy Platform, a portfolio of investments by CWP and private investment management company Partners Group to deliver 1.3 GW of renewables to Australia's market.

In August, CWP announced that the New South Wales Department of Planning and Environment approved an approximately 200 MW solar-plus-storage project, to be co-located with the 270 MW Sapphire Wind Farm to create a hybrid wind-solar-storage facility. Construction of the wind farm began in January 2017, while the rest of the project should be completed in about 14 months, with an anticipated start early next year.

The company has also prepared an outline of two other projects along with preliminary environmental assessment, and will now lodge its proposals with the New South Wales Department of Planning and Environment. Environmental Impact Statements for the solar-plus-storage schemes, with respective capacities of around 600 MW and 200 MW.

The 600 MW solar plus storage plant, to be located at Parkesbourne, near Goulburn, New South Wales (NSW), will be sited on freehold land covering an area of about 2000 ha (20 km^2). Meanwhile, the 200 MW Glenellen solar and storage park would be built on cleared land northeast of Jundera, within the Greater Hume Shire, close to an existing substation.

In a separate development, Sanjeev Gupta's global GFG Alliance unveiled details of the first part of his $1 billion, 1 GW dispatchable renewable energy programme. The Cultana solar project in South Australia's Upper Spencer Gulf will include 780 000 solar panels capable of generating 600 GWh of electricity per year, enough to power 96 000 homes while offsetting 492 000 tonnes of carbon dioxide every year. Construction is expected to begin in early 2019.

The announcement strengthens Gupta's position in South Australia, which began last year when the British billionaire's company, Liberty House, purchased the struggling Whyalla Steelworks from Arrium. GFG Alliance then purchased a 50.1 per cent stake in South Australian renewable energy company ZEN Energy to form SIMEC ZEN Energy before launching its 1 GW bid in October 2017.

■ Planning approval has been granted for the 300 MW Rodds Bay solar farm. The project, which will be located near the coast in Queensland, is set to become Australia's largest solar power plant to date. According to energy developers Renew Estate, the installation will be able to power around 88 000 homes. Construction will take place later this year and it is expected to be up and running by the start of 2020.

Onshore wind growth stalls in Germany

A lack of clarity over future auctions, a slow permitting process and stalled grid expansion are delaying new wind installations in Germany.

Siân Crampsie

Policy uncertainty in Germany's onshore wind sector is causing a slowdown in installations, the industry has warned.

Following strong growth in 2017, additions of onshore wind turbines in 2018 has dropped substantially in 2018, leading to calls from industry groups for the government to clarify its plans for renewables auctions in the coming years.

Germany added just over 1.6 GW of onshore wind capacity in the first half of 2018, a 29 per cent drop over the 2.2 GW added in the first half of 2017.

While a slight slowdown in additions was expected because of the switch from feed-in tariffs to auctions for renewables support in 2016, there are concerns about uncertainty over future auctions and tender volumes.

In the latest onshore wind energy auction – the third this year in Germany – winning prices rose in comparison with the previous auction. The rise in prices was caused by reduced investor interest as a result of policy uncertainty, industry group WindEurope said.

"Prices are slightly up again in this latest German onshore wind auction. This is mainly due to the lengthy permitting procedures that deterred some investors and reduced the competition," said Giles Dickson, WindEurope CEO. "But it's also because of the continued lack of clarity over the design of future auctions which is undermining investor certainty in the sector. It is essential the German government gives early clarity on annual wind energy volumes, permitting rules and auction design as part of their 2030 National Energy Plan."

One more onshore wind auction is due to take place in October 2018. In addition, Chancellor Angela Merkel's government has pledged to auction 4 GW of new onshore wind in 2019-2020.

However, there is now debate surrounding these tenders because of an apparent lack of sites and concerns that the electricity grid is not ready for the rapid pace of renewable energy expansion.

According to the German Wind Energy Association (BWE), projects are also being held up in the environmental permitting system, which is further delaying installations. A much as 10 GW of wind farms are in the permitting system, causing further stagnation of Germany's wind market, BWE says. The stagnation is threatening to derail the country's environmental goals.

The government has set a target of increasing renewables' share in power consumption to 65 per cent by 2030. The country also has a binding EU target of reducing greenhouse gas emissions by 40 per cent over 1990 levels by 2020.

According to Moody's, Germany is on track to meet its renewables target, but will likely miss its carbon emissions target.

In addition, statistics from Germany's network agency, Bundesnetzagentur, show that the expansion of the country's grid is making slow progress and lagging behind renewable energy expansion.

In August Germany's Economy and Energy Minister Peter Altmaier presented an action plan for faster grid expansion.

The action plan includes installing new cables that are designed to withstand higher currents as well as a nationwide digitalisation of the power grid.

Danish support scheme wins EU backing

Denmark is to implement a new multi-technology tender scheme to support renewable energy production after securing approval from the European Commission.

The government will hold tenders for onshore and offshore wind energy, as well as solar power, in 2018 and 2019. The budget for the tenders is DKK 842 million ($132 million).

Projects successful in the tenders will offer electricity on the market and receive support in the form of a premium on top of the market price. The aid for the schemes, financed from the state budget, will be granted for a period of 20 years starting from the connection to the grid.

The scheme will help Denmark to achieve its goal of meeting 50 per cent of its energy consumption from renewable energy sources by 2030 and becoming independent from fossil fuels by 2050. It added that the scheme would also minimise any distortion of competition caused by state aid. Denmark has also dedicated an aid scheme for onshore wind test and demonstration projects outside the two national test centres for large wind turbines

Japan makes first major move into UK offshore wind sector

■ Innogy sells 41 per cent stake ■ Next CFD round confirmed

Two Japanese firms have agreed to invest close to £1 billion ($1.3 billion) in Innogy's Triton Knoll offshore wind farm project. The deal represents the first major move by Japanese energy companies into the UK's offshore wind power market – a sector that is set for continued expansion over the next decade.

Last month Innogy sold a 25 per cent stake in the 860 MW wind farm project to J-Power and a 16 per cent stake to Kansai Electric Power, and will retain a 59 per cent stake.

Triton Knoll will cost £2 billion to build and is due to start operating in 2021. Last year it won a 15-year contract for subsidy support from the government, securing a strike price of £74.75/MWh.

In July, the government announced plans for its next auction for renewable energy support contracts.

It said that the May 2019 auction would provide £557 million annually in support and would be open to offshore wind projects, onshore wind farm projects on remote Scottish islands, and other less established technologies.

The auctions are part of the UK government's Clean Growth Strategy and are designed to support renewables as well as grow the UK manufacturing base. Auctions will take place every two years.

At the same time, the UK's Crown Estate unveiled proposals for a new seabed leasing round that could result in up to 6 GW of offshore wind energy development.

It said that the leasing round could take place in 2019 and would maintain a pipeline of offshore wind projects through to the late 2020s.

The UK already has just over 7 GW of operational offshore wind capacity – the largest amount of any country – and a further 7 GW under construction or with contracts secured. The government's announcement of support for an additional 2 GW of offshore wind per year in the 2020s could deliver up to 16 GW of new capacity, which would generate approximately 20 per cent of UK power. In 2017, offshore wind generated six per cent of UK power.

Construction of Triton Knoll is due to start in 2019.

■ The 588 MW Beatrice offshore wind farm in Scotland has exported power to the National Grid for the first time. The project is the largest offshore wind farm in Scotland and is expected to be fully operational by spring 2019.

EIB backs NordLink

Tennet has successfully secured funding for its NordLink interconnector after the European Investment Bank (EIB) purchased €100 million of the utility's hybrid bonds.

The 623 km, 1.4 GW high voltage direct current (HVDC) link between Norway and Germany is under construction and is a key part of Europe's plans to build an interconnected grid.

EIB's bond purchase was backed under the European Fund for Strategic Investments (EFSI), launched by the EIB Group and the European Commission to boost the competitiveness of the European economy, and marks the bank's first participation in a market hybrid bond issuance.

According to EIB, the hybrid securities will be consolidated and will form single series with TenneT's hybrid securities programme launched in March 2017.

Otto Jager, TenneT's Chief Financial Officer, said: "In addition to the senior commitments of €1.5 billion, the EIB today supports one of the most challenging projects for the establishment of an interconnected renewable energy market in Europe. We are proud that we are the first issuer of a market hybrid bond with the EIB as participant and we are looking forward to further extend our relationship with the EIB in the near future."

In 2017, EIB agreed a €350 million loan with TenneT and a €300 million loan with Norwegian transmission system operator (TSO) Statnett for the NordLink project.

"This interconnector is a major project in a world where renewable energy is of such importance. This last step completes the EIB support for this project, which is exactly the type of project the EIB was set up to do 60 years ago," said EIB Vice-President Ambroise Fayolle. "The security of supply and effective use of renewable energy remain high on the agenda for EIB financing and we are glad that this aligns completely with the objectives of the EFSI.

"We are excited that we are able to support this project while participating in TenneT's hybrid bond tap, alongside other investors."

NordLink is scheduled to start commissioning in 2019 and will enter commercial operation in 2020.

Enel moves forward on SA wind projects

■ 700 MW on-line by 2021 ■ Eskom seals $2.5 billion finance deal

Siân Crampsie

Enel is set to build five new wind farms in South Africa after sealing a financing deal for the projects.

The Italian firm has agreed €950 million ($1.11 billion) of finance with Absa and Nedbank to support development of 700 MW of capacity.

The deal brings the five wind farms to financial close and will enable Enel to bring them on-line by 2021. Enel is putting €230 million of its own money into the projects, located in Eastern and Northern Cape provinces.

Antonio Cammisecra, head of Enel's global renewable energy section, said the decision was an important milestone for Enel in South Africa, where it already operates 520 MW of renewable energy capacity.

The projects in question are Garob, Karusa and Soetwater in the Northern Cape province, as well as Oyster Bay and Nxuba in the Eastern Cape province. Each scheme has a capacity of around 140 MW and is minority owned by a local investor.

They were all awarded contracts in the fourth round of the South African government's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Construction of Nxuba is expected to start later this year, followed by Oyster Bay and Garobin the first half of 2019 and Soetwater and Karusa in the second half of 2019.

Enel's finance deal indicates that projects are once again starting to move forward in South Africa following delays caused by Eskom's refusal to sign contracts with developers. In June, Mainstream Renewable Power announced it had reached financial close on two wind power projects in South Africa.

In August, local renewable energy investor, Vantage GreenX Fund Managers, announced it had provided R2.05 billion ($140.4 million) of funding to a combination of six solar and wind energy projects with a combined capacity of 433 MW. Globeleq in July signed an agreement with Brookfield Asset Management to acquire majority stakes in the six projects, which have a combined capacity of 178 MW.

The REIPPP programme is designed to bring 7000 MW of clean energy capacity on line in South Africa by 2020. Eskom, however, is also continuing to pursue fossil fuel power plant projects such as Kusile and Medupi.

In July Eskom secured a $2.5 billion loan from the China Development Bank to help it complete the Kusile power plant project in Mpumalanga.

The 4764 MW Medupi power plant will be completed in two years, followed in 2023 by the 4800 MW Kusile plant. They will be among the largest coal fired power plants in the world.

Egypt drives wind sector forward

■ More wind capacity for Gulf of Suez ■ Nuclear plant on track

ACWA Power will develop a 500 MW wind farm in Egypt after the country's cabinet economic policy committee approved the project.

The agreement in August came just a month after a consortium of Japan's Toyota Tsusho, France's Engie and Egypt's Orascom Construction announced that it had signed an agreement to begin development work on a 500 MW wind farm in the same region, and indicates a continuing drive in Egypt to bolster power generating capacity.

The award to ACWA Power was based on a proposed tariff of ¢3.12/kWh, according to local media reports. ACWA Power will now negotiate with the New and Renewable Energy Agency (NREA) over contracts to allow it to commence work, including the allocation of land.

The NREA has been allocated 1420 km^2 in the Gulf of Suez region for the development of new wind farms.

The Toyota Tsusho-Engie-Orascom consortium said in July that it had concluded agreements with the NREA and the Egyptian Electricity Transmission Company for its 500 MW project. The consortium said that it expects to conclude the documentation and financing by the third or fourth quarter of 2019.

The same consortium is also building a 250 MW wind farm in the Gulf of Suez that is due on-line in 2019.

In August, Egypt's Energy and Electricity Ministry said that construction of the country's first nuclear power plant would begin in the next 2-3 years, and that the 4800 MW plant would start operating by 2026.

Moscow and Cairo signed an agreement in 2015 for Russia to build a nuclear power plant in Dabaa along the northwestern coast of Egypt. The project will be financed by a $25 billion Russian loan – representing 85 per cent of the total project cost – with Egypt funding the remaining 15 per cent.

Russian engineers are currently performing site investigations and developing the final design for the four 1200 MW reactors.

■ Egyptian President Abdel Fattah al-Sisi has inaugurated the 'mega' power plants in Egypt built by Orascom and Siemens. The New Capital, Beni Suef and Burullus combined cycle plants have a total capacity of 14 400 MW and were completed in just 27.5 months. "The completion of the power plants is a significant milestone in the government's strategy to modernise energy infrastructure in Egypt to drive industrial growth and economic progress," said H.E. Dr. Mohamed Shaker, the Egyptian Minister of Electricity and Renewable Energy.

Morocco 900 MW wind farm to power blockchain facility

Blockchain firm Soluna says that a proposed 900 MW wind farm in Morocco will be used to power a blockchain computing facility.

Soluna, a unit of New York private equity firm Brookstone Partners, has announced that the wind farm will be built across an area of 15 000 hectares in southern Morocco. The site has Class I wind conditions, where wind speeds reach over 35 km/h, making it one of the highest quality wind sites in the world.

"Our vision is to power the blockchain with clean, renewable energy that we own and control," said John Belizaire, CEO of Soluna. "Soluna will address the growing demand for energy to power today's growing blockchain networks, and will create the world's first "service node," providing high-density computing for future blockchain networks."

Brookstone founded Soluna in 2018 to power the blockchain economy with clean, low-cost renewable energy. Its strategy is to develop renewable energy power plants dedicated to on-site, high-density computing.

Brookstone announced it will finance the flagship wind-blockchain project, investing $100 million in a first phase of 36 MW. The 900 MW project will cost a total of $3 billion.

The managing director of Brookstone, Michael Toporek, said that the company has exclusive rights to the area for the wind farm, "but the issue was there's no real place to put the electricity".

He added: "These days, what you can do with stranded power is set up a computing center, develop this as an off-grid project."

Blockchain – the technology underpinning Bitcoin and other cryptocurrencies – consumes large amounts of energy because transactions have to be verified by 'miners' running specialised software.

According to Digiconimist, Bitcoin mining now uses 71 TWh per year – equivalent to ten per cent of China's annual power usage.

Gabon ready for solar-hybrid fleet

Engie is set to begin construction of a fleet of eight hybrid solar power plants in Gabon.

The energy giant has signed an agreement with Gabonese financial institution Caisse des Dépôts et Consignations (CDC), to deploy the eight plants, which have a combined total capacity of 2.2 MW.

Ausar Energy, a subsidiary of Engie, developed the hybrid solution in collaboration with CDC, the Gabonese Ministry of Energy, and the Gabonese energy and water company Société d'Énergie et d'Eau du Gabon (SEEG). The solar-hybrid plants will be used in locations that currently rely on oil-fired thermal generation.

The solar-hybrid project will contribute to the Gabonese Republic's policy of using renewable energy – solar and hydropower – to increase the country's power generating capacity. The project will save the country 1 million litres of fuel oil per year, or 2600 tonnes of CO_2, and reduce generation costs by 30 per cent.

OpenHydro looks for survival plan after Naval Energies cuts ties

- Naval Energies shifts focus
- OpenHydro looks for new investment

Siân Crampsie

OpenHydro is seeking new investors to revive its tidal turbine business after entering liquidation proceedings.

Liquidators acting for the Ireland-based technology firm believe that the company has a reasonable prospect of survival, while the firm's founders are reported to be working with creditors to save the business.

The Irish High Court last month appointed an interim examiner to OpenHydro and its subsidiary, OpenHydro Technologies, giving the two companies some time to implement a survival strategy.

Possible routes forward for OpenHydro include securing new investment, restructuring, and negotiations with creditors to enable it to survive as a going concern.

France-based Naval Energies, OpenHydro's parent company, announced at the end of July that it would no longer continue to invest in tidal turbine technology, forcing OpenHydro into liquidation.

The move came just days after the successful deployment of a 2 MW instream tidal turbine in Canada's Bay of Fundy. At the same time, the European Commission announced support for the development of the Normandie Hydro tidal array in France, a project for which OpenHydro was to supply seven turbines.

Naval Energies said it wants to focus its efforts on floating wind turbines and marine thermal energy conversion. "Naval Energies has developed the technology of tidal-turbine energy to the industrial launch stage," the company said in a statement. "Nevertheless, the fact remains that the market for tidal-turbine energy is closing."

According to Naval Energies, only 100-150 MW of tidal capacity will be installed in France over the next ten years. In the UK, tidal energy has to compete with offshore wind in renewable energy tenders, while in Canada, there is "great sensitivity" to the cost of tidal energy, Naval Energies said. "This gap between the technology and the demand on the market, and the lack of commercial prospects over the long term, are forcing Naval Energies to bring its developments in tidal energy to an end."

The announcement forced Emera, OpenHydro's partner in the Cape Sharp project in the Bay of Fundy, to withdraw from the joint venture.

In a statement, Emera said that Naval Energies' "surprise" application to liquidate OpenHydro left it "with no practical choice but to withdraw from Cape Sharp Tidal". The firm has invested over C$12 million in OpenHydro and the Cape Sharp project, but said there was no "further value" in pursuing this project for its business".

OpenHydro's debts amount to around €280 million, according to reports. In June, the company opened an assembly plant for tidal turbines in Cherbourg, France.

Industry association Ocean Energy Europe said that OpenHydro's liquidation was "disappointing", but stressed the increasing role of the technology in Europe. "The liquidation of OpenHydro is disappointing news, yet closures are part of pioneering and innovating in a brand new industrial sector, on the road to commercialisation," said Rémi Gruet, CEO of Ocean Energy Europe. "Today, numerous tidal stream projects are consistently producing power around Europe. Costs are coming down fast with every new project, and the EU has set targets for tidal to reach €0.10/kWh by 2030, well below offshore wind costs only five years ago."

E.On proposes UK cuts

E.On says that job cuts in its UK business will help it to achieve savings of around £100 million in the medium term.

The company has announced plans to reduce its workforce at E.On UK by 500 as part of its ongoing transformation and in response to the rapid pace and challenges of the UK energy market.

E.On UK CEO Michael Lewis said that the decision comes after a rigorous review of the company's options. It employs 9400 people in the UK.

"Clearly there are numerous challenges across the energy market and we're dealing with all of them, not least the forthcoming price cap," said Michael Lewis, Chief Executive of E.On UK, referring to plans by the UK government to impose a price cap on standard variable tariffs.

The price cap is expected to squeeze utility profits and has prompted a number of the 'Big Six' UK energy suppliers to raise tariffs.

"Our proposals are part of a wider range of measures to reinvent our core business for the new energy world; where self-reading smart meters give customers more accurate bills and greater knowledge about their energy, and a wide range of solutions such as solar, storage and e-mobility put customers more in control of their energy," Lewis added.

Last month E.On launched a 100 per cent renewable electricity tariff tailor-made for electric vehicle (EV) owners. The new tariff offers customers who sign-up 850 free driving miles per year.

The 'Fix and Drive' tariff guarantees a fixed unit price for energy and is aimed at EV drivers who charge their vehicles at home. It has been created in response to the rapidly increasing sales of EVs in the UK, Lewis said.

Power market woes force GE job cuts

GE is reducing its workforce in Schenectady, NY, USA, in response to declining demand for its power products.

Local media reported in August that the company is laying off 200 hourly workers at its Schenectady works. The company said the move was due to ongoing challenges in the power sector and a 45 per cent decline in volume at the manufacturing site.

The layoffs would affect manufacturing and assembly employees, GE said. The firm employs a total of around 4000 personnel at Schenectady, one of its main global manufacturing, service and repair centres. In January, it cut 130 hourly workers from the Schenectady and Niskayuna sites.

GE Power is under pressure to cut costs and improve profitability to prevent its performance impacting GE's balance sheet. CEO John Flannery has launched a programme to trim the global conglomerate down to three core businesses – aviation, power and health – and has ordered GE Power to cut costs by $1 billion and eliminate 12 000 jobs.

In April, GE said its Power business had cut $354 million in the first quarter, closed 17 sites, and made progress in the workforce reductions. It also said it expected orders for new products to continue to be soft a while longer.

According to McCoy *Power Reports*, the market for gas turbines is shrinking. In 2018 it is expected to reach 30 GW globally, compared with 34 GW in 2017. In 2011, the market stood at 72 GW. Siemens has predicted a 12 per cent annual decline in GW additions of fossil fuel capacity globally for the next four years.

Envision buys Nissan battery technology

- Integration with IoT systems will drive EV uptake
- Plans for investment in battery R&D

Envision says it will drive the development of battery storage technology with the acquisition of a controlling stake in Automotive Energy Supply Corporation (AESC), the electric battery operations and production facilities of Nissan Motor Co., Ltd.

The clean energy company says that it will promote the research and development of AESC's lithium ion batteries as well as integrate its energy Internet of Things (IoT) technology into the business to make intelligent batteries.

"From an energy perspective, electric vehicles are mobile intelligent power stations, and the growing number of electric vehicles will have a huge impact on the electricity grid," said Lei Zhang, Envision's Founder and CEO.

Nissan will retain a minority interest in AESC after the transaction has closed, according to Envision, which owns EnOS, a leading intelligent IoT operating system. The deal will enable Nissan to concentrate on developing and producing market-leading electric vehicles.

Envision intends to upgrade AESC's existing production facilities in Japan, UK, and the USA to enable the production of higher density, long-range electric batteries. Envision also intends to open new production facilities in Wuxi, China, to serve the fast-growing Chinese market for electric vehicle batteries and stationary lithium-ion batteries.

It said that integrating AESC's battery technology with its IoT expertise would help the electric vehicle sector to address barriers to market development such as range anxiety.

"Envision's smart IoT technology will make both the batteries and the charging process more intelligent," said Zhang. "This will enable electric vehicles to be integrated into an energy eco-system, and facilitate the intelligent, dynamic balancing of energy usage and generation in a world powered by fragmented renewable energy systems."

AESC's lithium-ion batteries already power more than 340 000 Nissan LEAF vehicles, the best-selling electric vehicle in the world, with over 7 billion km driven without a single critical incident since its introduction in 2010.

Americas

Senvion signs TG East wind turbine contract

Germany-based Senvion has signed a contract to supply and commission 275 MW of wind turbines for the TG East Wind Project in the USA.

Senvion will supply 58 of its 4.2M140 turbines with a hub height of 110 m and ten Senvion 3.2M114 turbines with a 93 m hub height. It said that the project would be an opportunity to showcase its 4.2M140 hardware.

Located in Knox County, Texas, TG East Wind Project is owned by Taaleri Energia and is being co-developed by NorthRenew.

Senvion will also provide 25-year full-service operations and maintenance for the project, which is slated to begin its commercial operations in 2020.

RES wins San Antonio solar-storage bid

Renewable Energy Systems (RES) has been awarded the engineering, procurement, construction and maintenance contract for an innovative solar and energy storage project in San Antonio, Texas, USA.

The firm was selected through a competitive request for proposal by CPS Energy and will start building the project in October 2018.

The CPS Energy solar and storage project will consist of 5 MW ac of distributed solar capacity co-located with a 10 MW/10 MWh RESolve lithium-ion Battery Energy Storage System (BESS). RES said in a statement that the project "takes an innovative approach in combining distributed solar generation with strategically sized and configured electrochemical energy storage, with both technologies interconnected at distribution voltage on a common feeder".

Commercial operation of the site is expected in May 2019. The project is among the first co-located solar and storage projects interconnected at the distribution level within the Electric Reliability Council of Texas (ERCOT), RES added.

Wärtsilä secures Schofield O&M deal

Wärtsilä has signed a maintenance and operational advisory agreement for the Schofield generating station in Hawaii, USA.

Under the 10-year agreement Wärtsilä will provide advisory and maintenance services to help ensure reliable power generation at the 50 MW plant, which is primarily used to meet peak loads. It includes operational support, maintenance planning, major maintenance, quarterly site audits, ICS (Industrial Control Systems) cyber security patching services, and scheduled OEM spare parts.

SGRE and Ørsted sign US offshore wind contract

Siemens Gamesa Renewable Energy (SGRE) and Ørsted have signed a contract to supply wind turbines for Dominion Energy's Coastal Virginia offshore wind project.

The Coastal Virginia project will be the first offshore wind project to be built in federal waters, marking a significant achievement for the offshore wind industry in the United States.

Ørsted will construct the wind project using two units of Siemens Gamesa's 6 MW SWT-6.0-154 wind turbines, totalling 12 MW of potential generated power.

Asia-Pacific

REC to supply solar PV modules in India

Norway-based REC Group has announced orders to supply solar photovoltaic (PV) modules for 45 MW of projects in India.

REC said it secured the contracts in June and July from engineering, procurement and construction companies Cleanmax Solar, Fourth Partner Energy and SunSource, which are building rooftop PV projects in India.

About 40 MW of the ordered equipment is for REC's TwinPeak technology based modules featuring half-cut Passivated Emitter Rear Contact (PERC) cells, REC said.

ABB supports 2018 Asian Games

ABB says it will support Perusahaan Listrik Negara (PLN), Indonesia's main electricity utility, to ensure reliable power supply for the 2018 Asian Games.

The technology company has engineered packages and products for substations feeding the area around the city of Palembang, the second largest on Sumatra Island.

Key products supplied include gas- and air-insulated switchgear, protection equipment and telecommunication systems. ABB's substation automation will help control and monitor the substations and ensure full integration between system devices. ABB will also provide standby service specialists to support PLN during the games.

SFW to supply Daesan biomass boiler

Sumitomo SHI FW (SFW) has been awarded a contract by Hyundai Engineering & Construction Co. (HDEC) for design and supply of the Daesan biomass power plant boiler island in South Korea.

SFW will design and supply the 109 MWe CFB steam generator and auxiliary equipment for the boiler island. The CFB boiler will be designed to burn wood pellets. Commercial operation is scheduled for the end of 2020.

Doosan to maintain KOWP offshore wind

South Korea's Doosan Heavy Industries & Construction (DHIC) has signed a maintenance service contract with Korea Offshore Wind Power (KOWP) for the 60 MW Southwest Offshore Demonstration wind farm.

The contract will be for 15 years, and Doosan will be responsible for guaranteeing the operation rate of the wind farm's 20 turbines, as well as providing routine maintenance and offshore maintenance services starting in 2019.

As Korea's largest offshore wind farm development project, the 2.5 GW Southwest offshore wind power project will be carried out in three phases along the southeast coast of Wido in Buan-gun, North Jeolla Province. This maintenance contract covers Phase 1 of the project, which involves building 20 wind turbines for a total capacity of 60 MW. The construction is scheduled to be completed by the end of 2019.

MHPS upgrades Boryeong coal fired project

Mitsubishi Hitachi Power Systems, Ltd., (MHPS) has received an order for environmental systems upgrade work at Unit 3 of the Boryeong power station in South Korea.

The upgrade is targeted at reducing emissions of sulphur oxide (SOx), nitrogen oxide (NOx) and particulates in line with the Korean government's drive to curb air pollution caused by the nation's coal fired power plants.

Under the order, MHPS will supply the core parts for upgrading the FGD equipment, deliver a denitration catalyst, revamp the electrostatic precipitator, and perform engineering of a non-leak gas-gas heater.

The new systems are scheduled to go into operation in August 2019.

Pöyry assigned Malaysia PV contract

UITM Solar Power Dua Sdn Bhd, a subsidiary of the largest university in Malaysia, has awarded Pöyry the owner's engineering (OE) services contract for a 25 MW ac solar photovoltaic power plant project.

The contract will be Pöyry's second solar OE assignment in Malaysia, further strengthening the company's commitment to the Malaysian energy market. The PV plant will be located in Johor, Malaysia.

Pöyry's range of services include assistance with procurement for the EPC contract, engineering review, project management and construction monitoring which includes defects notifications up to a period of 24 months after the solar power plant's target commercial operation date.

Europe

Moray East confirms Vestas order

MHI Vestas has signed a conditional agreement to supply the wind turbines for the 950 MW Moray East offshore wind energy project in the UK.

Developer Moray Offshore Windfarm (East) Ltd has confirmed that it will use the V164-9.5 MW wind turbine for the project, located in the Outer Moray Firth off the east coast of Scotland. It announced in October 2017 that MHI Vestas was its preferred supplier for the wind farm.

Moray East, a joint venture between EDP Renewables and Engie, has yet to make a final investment decision on the project. In 2017 it was awarded a contract for difference with a strike price of £57.5/MWh.

Balfour Beatty to build Hornsea 2 substation

Balfour Beatty has been awarded a multi-million pound contract to build the onshore substation for Ørsted's latest offshore wind farm, Hornsea Project Two on the East coast of England.

Hornsea Project Two won a Contract for Difference in September 2017, and will be built at the lowest ever price for offshore wind seen in the UK - £57.40/MWh.

The 1.4 GW project will be located 89 km off the Yorkshire Coast. When operational in 2022, the wind farm will supply clean electricity to over 1.3 million homes.

Wärtsilä delivers its first storage hybrid

Wärtsilä has delivered its first engine plus storage hybrid installation worldwide, it has announced.

The company has added an energy storage solution to an existing power plant owned by Sinergy Kft, a subsidiary of Alteo Group, in Budapest, Hungary. The project is also Wärtsilä's first engineering, procurement and construction (EPC) contract for an energy storage project in Europe.

Sinergy's existing power plant comprises three Wärtsilä W34SG engines.

The addition of a battery-based energy storage unit will enable the company to participate in the electricity market by providing frequency and secondary regulation to the national grid operating in virtual power plant mode.

SSEN reinforces network

Scottish and Southern Electricity Networks (SSEN) has awarded Amey and GE Power a four-year extension to an existing contract to design, build and commission new 400 kV, 275 kV and 132 kV substations in Scotland.

The contract will help SSEN to reinforce its existing network to enable load related growth associated with various onshore and offshore renewable energy and subsea cable projects.

Four-fold success for Capstone

Capstone Turbine Corporation has secured an order for six C65 microturbines for four different projects in Germany.

The natural gas-fuelled microturbines will be installed in industrial combined heat and power (CHP) applications at each of the four facilities. One facility will receive three C65s while the remaining three facilities will each receive one unit.

E-Quad Power Systems GmbH, Capstone's distributor in Germany, secured the order and the microturbines are expected to be commissioned over the next several months, Capstone said.

BSR unveils industrial solar park

WolfeWare has selected BSR EPC to deliver a fully-wrapped engineering, procurement and construction (EPC) solution for the UK's first unsubsidised industrial solar park.

The 15 MWp site will be built at Westcott Venture Park, with construction starting in the summer of 2018. The project will make Westcott the UK's first carbon-negative business park and demonstrate that solar power "continues to close in on grid parity", even in the UK, said Philip Wolfe of WolfeWare.

Siemens Gamesa to supply Tonstad

Siemens Gamesa Renewable Energy (SGRE) says it will supply the Tonstad wind farm in with 51 of its SWT-DD-142 onshore wind turbines. The Engie-backed project will have a total capacity of 208 MW and will be located in the municipalities of Sirdal and Flekkefjord, southern Norway.

Tonstad will be one of the largest wind farms in Norway. Siemens Gamesa has secured a long-term performance contract. Installation of the wind farm will begin in 2019.

International

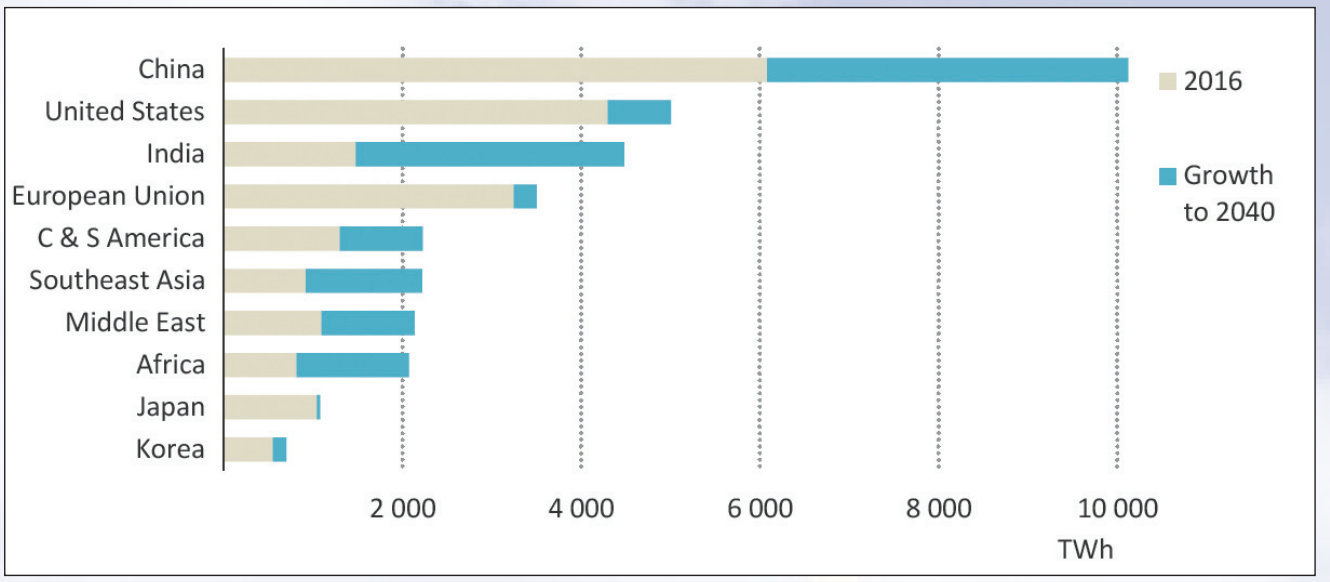
Siemens to upgrade Al-Sadder gas fired plant

Siemens is to provide inspection and upgrade services for two generating units at the 600 MW Al-Sadder power plant in Baghdad, Iraq.

Al-Sadder has a capacity of 600 MW. Under the agreement, Siemens will overhaul two SGT5-2000E gas turbines and perform its advanced 3-dimensional turbine blades and vanes (Si3D) upgrade.

In addition to increasing output, the upgrade will improve the efficiency of the turbines by up to 2 per cent. The agreement also includes the plant's SPPA-T3000 control system.

Total electricity generation by region in 2016 and growth to 2040 in the New Policies Scenario



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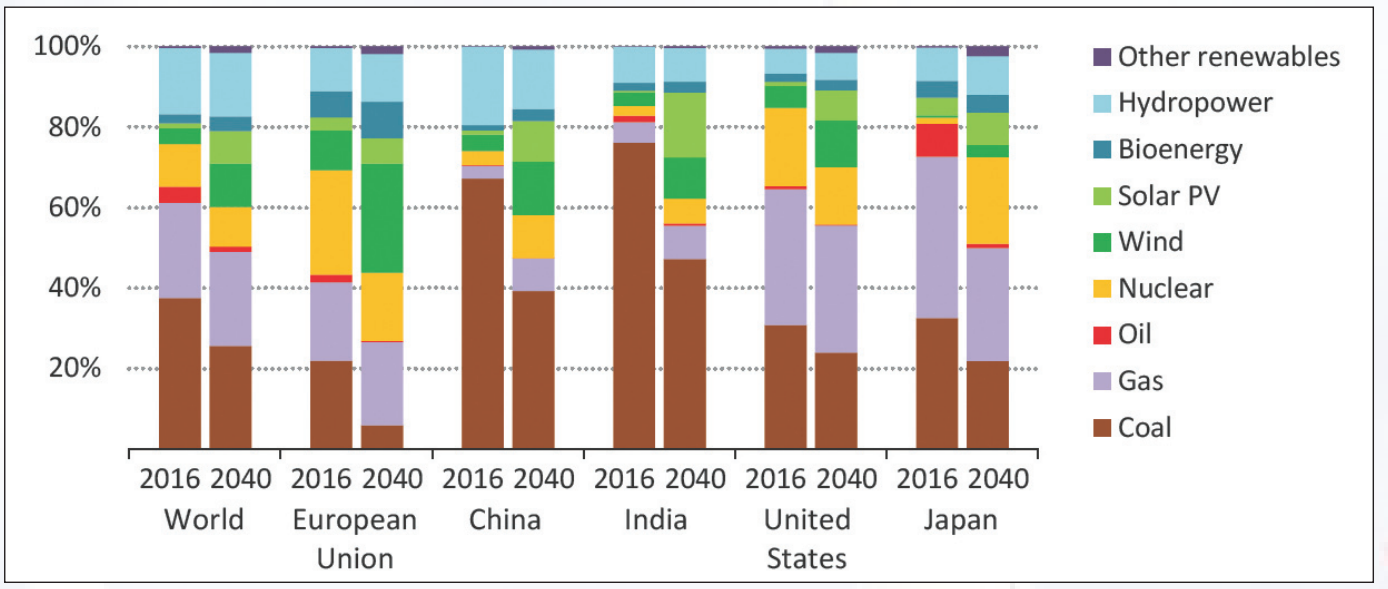
website: www.iea.org

Share of total generation by type worldwide and in selected regions in the New Policies Scenario



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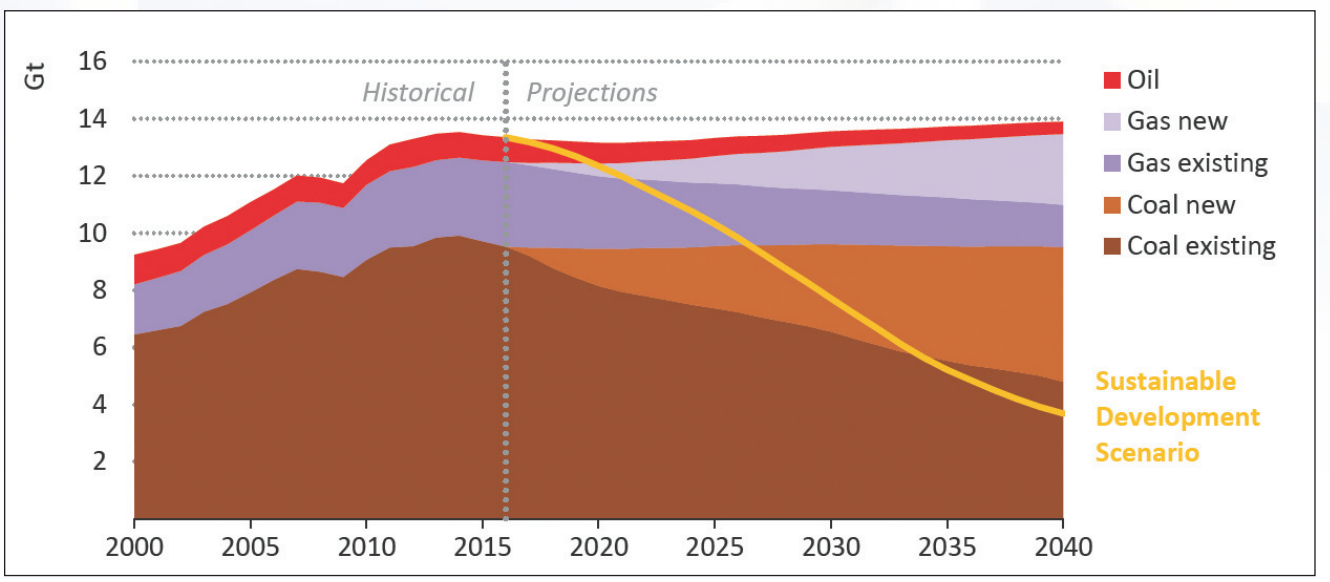
Global power sector CO_2 emissions by fuel in the New Policies Scenario



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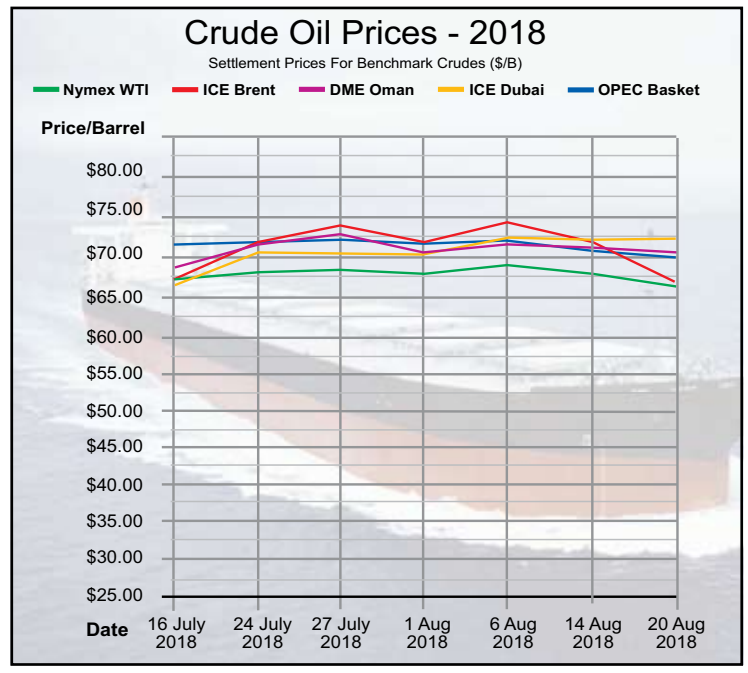
Source: World Energy Outlook 2017

Oil

China, Russia and Iran oil sectors in US crosshairs



- Washington prepared drive Iranian oil exports down to zero
- Beijing imposes tariff on US oil products as trade war escalates

Mark Goetz

The administration of US President Donald Trump is using sanctions against Russia and Iran, and in the case of China, tariffs, to make political points to the governments of those countries. While the measures are meant to push those countries towards goals desired by the White House, they could have a wider impact that affects the global energy market.

Last month the US Senate heard Treasury officials testify that sanctions against Russia have curtailed investment in that country's oil and gas industry. US National Security Advisor John Bolton stated that Washington is prepared to use sanctions to drive Iranian oil exports down to zero. And in the case of the US-China trade war, on August 23rd Beijing imposed a 25 per cent tariff on US oil products in its second round of retaliation for tariffs imposed by the US on Chinese imports.

China in July imposed its first round of retaliatory tariffs against $34 billion worth of US goods that concentrated on agriculture goods, foods and motor vehicles. In its second round of tariffs, China placed 25 per cent tariffs on other US products that included propane, butane, naphtha, jet fuel and coal. While US crude oil and LNG have been left off Beijing's list of tariffed US items for now, there is a chance that a duty will be placed on them in the next round, which was expected to come at the end of August. Such a move would force both countries to adapt.

China is a solid and promising market for US oil and LNG, but if those commodities are taxed, China would need to find new sources of supply and US firms would have to find different markets. Chinese companies have already altered their buying in anticipation of US oil and gas being priced out of the Chinese market.

Most of the slack would be taken up by suppliers in the Middle East, and Beijing has already informed Washington that it will not halt its imports of Iranian crude. The US insists that all buyers of Iranian oil halt their purchases to keep themselves falling afoul of US sanctions that were reinstated after Trump announced in May that the US was pulling out of the internationally-backed Iran nuclear deal. China receives about 25 per cent, or some 760 000 b/d of Iran's crude oil exports.

John Bolton said in late August that the US is determined to apply maximum pressure on Iran, not for the sake of regime change, but for a renegotiation of the nuclear accord and for a halt to Iran's interventions in Syria, Yemen and Lebanon.

European countries involved in the deal continue to support it, but many European companies are finding that they will not be able to do business with Iran and avoid the consequences that would befall them if they do not. Trump has said that any company doing business with Iran will not be doing business with the US. Sanctions are due to take full effect on November 5.

France's energy giant Total has pulled out of a $4.8 billion investment for the development of Phase 11 of Iran's South Pars gas field under pressure from the US. Danish shipping company Maersk has also stopped doing business with Iran.

The US State Department has set up an action group that will monitor whether companies significantly cut their trade with Iran. Besides China, Russia and Turkey have said they will ignore the US ban on Iranian oil sales, while countries like Japan and South Korea are expected to seek waivers, although Washington has said waivers will not be issued.

Iran produces nearly 4 million b/d of crude and exports in July averaged 2.32 million b/d, but data released recently by S&P Platts Global showed that exports slipped 640 000 b/d during the first half of August to 1.68 million b/d. India, a big importer of Iranian oil, is reported to be under US pressure to cut back on Iranian oil purchases, and South Korea has also reduced the volume of condensate it regularly buys.

Meanwhile, US sanctions are creating numerous problems for Russia's energy industry, according to reports from Washington. The annexation of Crimea and involvement in Ukraine, meddling in the 2016 US election and ship-to-ship transfers of oil between Russian and North Korea tankers are the reasons behind US sanctions against Moscow.

"In the energy sector, our sanctions have limited important investment in exploratory energy projects needed to grow Russia's oil and gas production capacity," Sigal Mandelker, Under Secretary of the Treasury for Terrorism and Financial Intelligence said in August while testifying before a US Senate committee.

Gas

Egypt gears up for return as gas exporter

Egypt is on the verge of returning to the role of natural gas exporter.

David Gregory

Egypt's Minister of Petroleum Tarek El Molla announced in mid-August that Egypt would cease to import LNG this autumn and begin exporting natural gas in January 2019. In July Egypt pledged to resume gas exports to Jordan in the new year, and things are taking shape for LNG exports to resume as well. It appears that Cairo's expressed desire to become a regional gas hub may very well materialise.

Egypt has been down a hard energy road this decade, and for it now to return as not only a gas exporter but establish itself also as a regional hub has required significant reform of its energy sector, new discoveries of gas in the East Mediterranean, and lengthy negotiations with its neighbours, Israel and Cyprus.

Egypt once exported LNG and natural gas by pipeline to Israel through the East Mediterranean Gas (EMG) pipeline and to Jordan through the Arab Gas Pipeline (AGP). There were plans to extend the AGP to Turkey (it stopped in northern Syria just a few miles south of the Turkish border) and connect with the Turkish grid through which Egyptian gas might reach Europe. But the Egyptian morass that was described as an economy finally began to unravel, and the huge fuel subsidies, corrupt deals, and billions of dollars in arrears to foreign energy companies that were part of it all added momentum to the January 2011 revolution.

Since officially becoming President of Egypt in 2014, Abdel Fattah El Sisi has worked to put the country's economy on a steady track. In the energy sector, reforms have been introduced to free it up, including a new law that allows private companies to import gas, some $6 billion in arrears to foreign companies has been nearly paid off, contracts were renegotiated with foreign firms agreeing to pay them more for the gas they delivered to the Egyptian grid, and perhaps most importantly, the government began to reduce the subsidies that it paid to keep the cost of liquid fuels and gas low.

Subsidies cost Egypt some $15 billion annually. A $12 billion assistance plan arranged with the International Monetary Fund (IMF) in 2016 insisted that Cairo bite the bullet and make the reforms. A recent review of Egypt by the IMF says Cairo still has a way to go.

Then in August 2015 came the game changer. The discovery by Italy's Eni of the giant offshore Zohr gas field, where the gas resource is estimated at 30 trillion cubic feet (850 billion m^3), really did change the game for Egypt and made the entire region perk up after several years of stupor.

Seeing salvation for its energy problems, Cairo convinced Eni to fast track development. The field is now producing some 2 billion feet per day of gas and by the end of 2019, output will reach 2.7 bn cfd. BP has also boosted its offshore gas production. Exploration and development in the Egyptian offshore is busy. By 2020, Egypt expects to be producing 7 bcf/d, enough to allocate gas for export. Furthermore, it appears that Cyprus and Israel will be getting involved, using Egyptian LNG facilities to re-export their gas.

Zohr prompted Cyprus to launch a new bidding round, which proved to be a success, and Israel finally got serious about its gas sector, which despite discovered reserves of its own amounting to 30 tcf, had succumbed to bureaucratic inertia. The Israelis launched a new licensing round, but got a lukewarm response; and Lebanon, where the political quagmire had prevented a licensing round launched in 2013 from happening, finally managed to award offshore blocks last year. The East Mediterranean upstream can expect a lot of activity in the coming years.

In recent months, the two main companies in Israel's upstream, Noble Energy of Houston and Israel's Delek Drilling, have signed a deal to export gas to Egypt through the revamped EMG to Egyptian firm Dolphinus Holdings for further sale to Egyptian industry.

Meanwhile, Cyprus and Egypt are on the verge of finalising an intergovernmental accord that will allow gas from the Aphrodite field, where Noble, Delek and Shell are partners, to be exported to Egypt's Idku LNG plant, which is run by Shell, for re-export. Gas from Aphrodite to Idku will begin to flow in 2022 and that link may eventually serve as a route for Israel's Leviathan gas to Egypt.

Electrification: the path to an emission-free society

Eurelectric's 'Decarbonisation pathways' is an extensive two-part study that concludes that a major shift to electricity in transport, buildings and industry is needed to meet the goals set by the Paris Agreement. **Kristian Ruby**

December 2017 represented a milestone for the European power sector. Back then, the industry launched its new vision to power the EU economy with carbon-neutral energy and pursue all efforts to decarbonise the electricity mix well before mid-century.

That vision is now supported by 'Decarbonisation pathways', an extensive two-part study conducted with analytical support from McKinsey & Company. The first part, published in June this year, concludes that a major shift to electricity in transport, buildings and industry is needed to meet the goals set by the Paris Agreement. The analysis covers 100 per cent of the EU and European Economic Area final energy consumption, and reveals a close connection between electrification and deep decarbonisation.

In November this year we will publish the second part of the study, which examines a set of detailed pathways, including associated costs, to reach full carbon neutrality of the power sector within one generation.

The study is based on bottom-up inputs from national energy associations – and their members – Eurelectric committees and working groups, as well as from external stakeholders, including NGOs and industry associations. The approach used is:

- *Comprehensive*: input from Eurelectric's 34 members (28 EU + EEA states);
- *Granular*: multi-factor analysis of +50 sectors and subsectors of the economy;
- *Realistic*: iterative benchmarking with other leading studies and research institutions.

'Decarbonisation pathways' delves into three distinct scenarios of decarbonisation and highlights the acute need for a radical shift driven by four factors: level of ambition, technology development, consumer behaviour and regulation.

The first scenario is aligned with the EU's current commitment under the Paris climate agreement, namely to cut carbon emissions by 80 per cent by 2050 compared to 1990. It relies on accelerated technology development, customer take-up and the implementation of policies needed to deliver on Paris.

The second scenario assumes increased reduction efforts to 90 per cent. This would require a strong shift in policies, tariffs and taxes to remove barriers and promote decarbonisation and electrification.

Lastly, the third and most ambitious scenario explores moving towards a full decarbonisation of the EU economy with reductions of up to 95 per cent, which could result from early technology breakthroughs in a context of concerted efforts on decarbonisation policies around the world. For the EU to reach full decarbonisation by 2050, electricity needs to cover at least 60 per cent of final energy consumption. This is achievable with a 1.5 per cent year-on-year growth of EU electricity use whilst at the same time reducing the EU's energy consumption by 1.3 per cent per year.

The conclusion of the three scenarios is unequivocal: electrification is the key to unlocking deep decarbonisation and opening the door towards that economically and environmentally healthier society we are striving for. The truth is that no matter which 2050 decarbonisation pathway we choose, urgent action must be taken to a more electrified energy sector. In addition to climate protection, increased electrification will also bring other environmental benefits such as noise reduction or better air quality.

Today a quarter of the total EU emissions stems from the use of traditional transport methods. The findings presented in the 'Decarbonisation pathways' indicate the need for immediate action to increase the electrification rates in transportation. Despite high levels of electrification of the rail lines, only 1 per cent of the overall energy use in this sector comes from electricity. A massive shift in the transport sector is required to deliver on the Paris objectives.

E-mobility is a crucial area, and one that is skyrocketing. Electric transport is still a dwarf, but it will soon turn into a giant. There are numerous indicators that electromobility is on the verge of a massive take-off. In the past year, European automakers have announced €34 billion investments in electrification. In leading countries such as Norway more than half of new passenger cars are hybrid or full-electric. Meanwhile, the European Commission has proposed legislation, which will bring 35-40 million electric cars on the road by 2030.

Depending on the level of ambition, 75-95 per cent of all passenger cars need to become electric. Today, the deployment of electric cars is limited. But a few years from now, the pace of change will be enhanced by economic fundamentals as the total cost of ownership tips in favour of electric cars.

We now need a political push and a well-calibrated regulatory framework that removes barriers in order to promote decarbonisation through electrification. Eurelectric believes that European policy makers should step up their game and aim at having 50 per cent of new car sales electric by 2030. Also, a robust carrot-and-stick approach should be applied to ensure delivery of the targets. Moreover, public-private partnerships are essential for the build-up of the necessary infrastructure. As almost 90 per cent of charging is done at home, it is crucial to provide consumers with the ability to charge an electric car at home, regardless of whether they live in the suburbs or in high-rise buildings in city centres.

The electrification rates in buildings, both residential and commercial, are more advanced. Here, more than one third of the total energy consumption comes from electric sources. However, reaching the goals already agreed by policy makers would require an electrification rate of 45 per cent. As there is still room for improvement, our study explores the potential for electrification in cooking, as well as in space and water heating systems.

Encouragingly, there is some pioneering change under way in the sector. Notable developments include:

- In the Netherlands, Nerdalize is heating residential water using heat generated from their cloud computing services;
- 85 per cent of hot water used in In Drammen (Norway) comes from the district heating that is powered with low-cost hydro-based electricity;
- By blending up to 20 per cent hydrogen with gas, Hydeploy Consortium (UK) is moving towards further indirect electrification.

Yet while numerous solutions already exist, they need time before taking precedence over outdated technologies such as domestic oil furnaces. Our study foresees that heat pump economics will be a major trigger for electrification in space heating.

As electricity increasingly becomes a flexible and ubiquitous source of energy, different sectors are gradually electrifying their activities. Our study shows that in 2015 already one third of the overall industrial activity was electrified. By 2050 we can reach a direct electrification rate of 50 per cent. The relative competitiveness of electricity against other carbon-neutral fuels will be the critical driver for this shift. Moreover, indirect electrification, such as hydrogen made with carbon-free electricity, has a significant potential to decarbonise heavy industrial processes.

Today, only a little over a fifth of the total energy consumption is electric, but to reach the decarbonisation levels that correspond with the Paris Agreement, electricity must represent 40-60 per cent. This does not mean that overall energy consumption will increase. On the contrary, significant energy savings will also be needed in order to reach the targets. Here it is important to stress that electrification and efficiency are a winning combination, as, in many cases, electrification actually yields energy savings.

Numerous examples from each of the three analysed sectors illustrate how deploying electric solutions contribute to the energy efficiency gains. E-trucks consume approximately 50 per cent of their diesel equivalents' own energy consumption, whereas, in cooking, the energy intensity of electric solutions represents one fifth of the ones using coal or wood.

Across the three scenarios studied, electrification delivers a third or more of the energy savings needed to reach the agreed emissions targets.

A last important finding is the different starting points for the transition. It is important to recognise regional particularities when driving a deep decarbonisation of our economies. Our study shows that we are facing different starting points in the energy transition. Thus, the decarbonisation pathways will continue to be influenced by a number of factors, including the availability of resources, geographical position of the country, industrial specialisations and the commercial availability of key transition technologies. The bottom line remains that any ambitious decarbonisation strategy will require a strong push of electrification. By betting on electrification, Europe has a unique opportunity to foster economic growth while at the same time delivering on the Paris goals.

Kristian Ruby is Secretary General, Eurelectric.

Ruby: by betting on electrification, Europe has a unique opportunity to foster economic growth while at the same time delivering on the Paris goals

Data access and ownership: the new challenge in asset intensive industries

The transition toward new business models such as 'power as a service' is commendable, but when companies start thinking about accessing the data their assets are generating, in order to derive insight to enhance their operation, they still face the same challenges.

David Ryder

There is a new perspective emerging on the perennial question of asset operational performance data. Specifically, it's about the ownership of and access to data between the owner-operators of assets and the manufacturers who provide the equipment.

As sensor technology develops, and control and monitoring systems become more sophisticated, the owners of assets – from drilling rigs to power stations and wind farms – have increasing quantities of data at their disposal, but have very little capacity or ability to make it work for them. Why? Because the manufacturers who build and provide the equipment that reside within these facilities presently remain protective of the data that underlines their ability to provide lifetime warranty and maintenance services. In some sectors, the offering from engine and turbine manufacturers of 'power as a service' rather than a simple equipment supply contract is proving more attractive to operators, but in others this approach is still in its infancy.

Ryder: there might be five different equipment manufacturers who are all gathering data to provide their own maintenance services

This transition toward new business models is commendable, but when companies start thinking about accessing the data their assets are generating, in order to derive insight to enhance their operation, they still face the same challenges: firstly, getting their hands on the additional data available; and secondly once they get access to the data understanding its potential 'added-value' and how to make the best use of it.

An operator will typically be engaged with many vendors, not just for different types of equipment, but also within each category. For example, there might be five different equipment manufacturers who are all gathering data to provide their own maintenance services. Also, when manufacturers and automation providers are not joined up from a data perspective, the owner is only able to get a view of the actual asset or assets provided by that particular manufacturer. So, in order to get an end-to-end view of their operation of an asset, or a number of assets, data will need to be acquired from a number of sources, potentially involving a number of different equipment types from different manufacturers.

When asset owners do get data, they need to find somewhere to store it as well as having the capability and capacity to analyse the data to help them gain the insight they need. While this is generally within the capability of larger enterprises, many small to medium enterprises will find this a struggle to do themselves.

Key to this is first to understand what data you have and then what it is telling you. While vast amounts of data are being produced, connecting data sources and analysing that data to provide valuable insight can be a huge challenge. Companies are not facing this challenge alone. It is an industry-wide issue. Often data sources are unconnected and as such only a fraction of that data is ever used. For example, an oil rig uses only around 1 per cent of the 1.4 TB of data that is generated on a daily basis, and cruise ships typically have 1.2 billion data points, but because this is generated from equipment installed by different manufacturers these typically do not interact. But there is change on the horizon.

> "Harnessing the value of data can, and will, incrementally change industry's approach – and their supply chains – to operational performance including inspection, reporting and analysis."

What customers need is an environment where all data sources can co-exist and be made available to them as the asset owner to interrogate. Data is now able to be located in any environment, including secure public cloud, private cloud or indeed on-site, depending on a customer's requirements. This means the customer can benefit from an end-to-end system view of their asset or group of assets, rather than a siloed component or single asset view, enabling them to create insight that is of direct benefit to their commercial and performance goals.

Take wind farms as an example. Often managed by small teams, operating priorities are typically set to fire fighting to keep a wind farm up and running to maximise power output and revenue. In this context, limited access to comprehensive operational and contextual information on turbine operation has hampered the ability of wind farm owners to improve performance, plan maintenance and generate the most revenue from their assets.

Recently Lloyd's Register (LR) worked with a wind farm operator to help it address this very issue. By taking high frequency data from all its turbines and applying analytics and machine learning, the operator was able to gain a common view of how the wind farm is operating across its aggregated portfolio, even down to a single turbine level. Additionally, this expertise by LR was used to provide data to identify anomalies in how the turbines on the wind farm are performing – from measuring wind direction impact and identifying pitch system issues, to predicting potential problems that may arise due to incorrect settings.

Perhaps one of the most important benefits of being able to access aggregated data is the ability to optimise maintenance strategies. By having real-time information at their fingertips, operators can optimise decision making and improve performance, resulting in the commercial benefits of increased revenue from electricity power supply along with reduced operational costs from site interventions and shut downs for example.

Harnessing the value of data can, and will, incrementally change industry's approach – and their supply chains – to operational performance including inspection, reporting and analysis. This approach can unlock solutions at scale, recognising changes in asset condition and identifying defects, across multiple assets, and in diverse geographies. Previously unfeasible for a human to achieve at the speed and reduced cost that cloud computing processing and data storage now affords us.

The latest technology and software being developed by leading assurance providers like LR, provides a platform to help industry consume, aggregate and manage data from multiple sources to form the "single version of data truth" - and from this position, companies can apply analytics to deep dive into real decision making.

This data platform and analytics capability is establishing the new Industry 4.0 reality (the fourth industrial revolution), adding real commercial value for owner-operators, equipment manufacturers, and industrial automation providers alike.

David Ryder is VP of Data Digital Commercialisation, Lloyd's Register.

Disrupting the balance

Energy aggregator Limejump has developed a platform that allows aggregated distributed generation sources such as wind, solar and batteries to participate in the UK's balancing market. **Junior Isles** reports.

Further evidence of the dramatic change taking place in the energy sector was illustrated in mid-August with the announcement that UK renewable and distributed energy generators can for the first time compete with the 'Big Six' and other large power plants in the National Grid (NG) Balancing Mechanism, thanks to energy technology innovator Limejump.

Limejump is a UK-based energy supplier that has a licence to buy and sell electricity much like any of the Big Six UK energy companies. It can buy electricity from, for example, renewable generators or sell electricity to businesses.

In addition to this, however, it provides flexibility services to a range of different types of customers. Essentially, the company is a new breed of energy supplier. It manages a large battery portfolio (150 MW) as well as a significant amount of renewable and distributed generation assets, which can all operate as a Virtual Power Plant (VPP), to provide a range of energy services such as Power Purchase Agreements and Dynamic Frequency Response (DFR), supporting access to a variety of markets including wholesale and ancillary markets.

The company's entry into the Balancing Mechanism, however, marks a significant step that brings further opportunities to its customers. Advances in battery technology, from companies such as Tesla, are allowing smaller generators and companies with excess energy, to store it and resell it through market operators like Limejump.

According to Limejump, distribution network operators (DNOs), investors, developers and other suppliers such as Anesco, Eelpower and ESB are among its customers that will benefit from the entry of the VPP into the Balancing Mechanism.

Erik Nygard, CEO of Limejump, said: "The old school aggregation is just part of the puzzle of the value stream. It's not just about offering demand response or core National Grid products. It's about offering everything you can find in the market to deliver best value to the customer.

"For example if we look at a battery customer, we would put these batteries in dynamic frequency response. But we would also trade them in the Balancing Mechanism on the wholesale market."

National Grid spends around £1 billion each year across all of its balancing services, with around £350-400 million of that sitting within the Balancing Mechanism. The Balancing Mechanism is where big power plants sell flexibility to National Grid. It is a liquid market that can be accessed 24/7 but to date, aggregated units have not been able to participate and compete against big power plants.

"This means a distributed battery or a large commercial industrial customer with a flexible chiller, or this type of equipment, has not been able to participate in this market. You are now opening up this market for everybody, which is great for other aggregators," said Nygard.

He notes that it is "also very good for consumers", since all of these other flexible energy sources will be competitively priced against the large power plants. "Having pricing at a more competitive level should, in time, filter its way down to consumers."

Nygard added: "For flexibility owners, it's also really good because even if they are pricing themselves lower than the big power plants, they still have access to a brand new revenue stream that is far more liquid than waiting on STOR (short term operating reserve), which is tendered three times a year, or frequency response, which is currently monthly."

Limejump is the first company to breakdown the barrier that has prevented aggregators from competing in the balancing market but its success is as much down to regulation as technology.

"You can't enter the [UK] Balancing Mechanism without having an electricity supply licence," said Nygard. "The rules are changing but they are not fully set up to allow it, so we had to get a derogation from the regulator Ofgem, to allow us to do this so quickly. But it is also the technology – the ability for us to connect and aggregate all our energy sources and manage them effectively as a single unit."

Limejump says it uses data analytics and machine learning to support the delivery of aggregated units of flexibility. Nygard added: "Then you have other factors such as forecasting price and looking at the market as a whole. The system needs to determine things such as whether you even want to be in the Balancing Mechanism, or is it perhaps better to deliver frequency response. These are decisions that have to be made to try to deliver the best value for an asset at any point in time."

The company has developed a fully integrated energy platform that covers all the transactions across the electricity value chain – whether it is, for example, trading electricity, Green Certificates or frequency response on the national grid – and all the real-time optimisation that is possible across all the distributed assets. The system is connected to a communication platform developed by Siemens, which acts as the interface to the National Grid control room.

Nygard says the key part of the system is the ability to manage assets in real-time and the full integration across the electricity system.

"We have an ETRM (Energy Trade and Risk Management) system, which is one of the core building blocks. We built our own billing engine and we have our own IoT (Internet of Things) infrastructure that was built in-house. Our technology covers every single piece of the market puzzle to maximise value for our customer," said Nygard. "But the most important thing is that if your system cannot do all the transactions it needs to in real-time, you unfortunately leave a lot of value at the table. So we've built from that point out."

Generally, minimal installation is required at the customer site. If Limejump is "taking control" of the asset, e.g. for dispatching in the Balancing Mechanism, a smart box, or control box, is connected into the asset's control system so that the Limejump platform can dispatch when required. The platform is entirely Cloud-based.

Currently, Limejump plans to only install its technology at commercial and industrial sites. "At the moment, we could not install at the household level because the cost of getting into that customer today would be too expensive. But it is something we are working towards," explained Nygard.

For the most sophisticated services it offers, Limejump is targeting customers of a certain size but says size is not a constraint when it comes to simple offerings such as buying or selling of energy.

Sign-up of customers is straightforward. They simply have to sign a set of contracts on an agreed pricing. Nygard said: "In the Balancing Mechanism, you are paid per when you're called. You can bid in a price for when you are for example willing to turn up production and a price at which you are willing to turn down your production. Once the National Grid accepts those prices, you are committed to deliver against it."

While Limejump operates on the market in much the same way as a Big Six energy company, it believes its economic model is different in terms of profitability.

Nygard commented: "The more we can automate customer acquisition, service, invoicing, billing and transactions, the lower our costs will be to serve the customer as a whole. This would allow us to be more competitive than the larger companies are today because they don't have the automation systems in that sense.

"Also, they don't offer all the bells and whistles in terms of value to customers – they don't run real-time systems to help customers drive value from flexibility – but they're coming. All these big guys are looking at it but they're not there today."

Limejump's entry into the Balancing Mechanism is an important milestone in opening up the UK energy market. And while the company's focus is the UK, the international market is something it it will look at in time. This entry into the Balancing Mechanism also supports the transition to TERRE (Trans European Replacement Reserves Exchange), which will further lead toward establishing a pan-European market for balancing energy in 2019.

Nygard commented: "Right now the UK is an exceptionally exciting place for us but beyond that, we will ultimately look at other [geographic] markets."

As renewable subsidies are phased out governments will have to become more innovative for a sustainable energy future and developments such as Limejump's entry into the Balancing Mechanism are the exact sort of thing that needs to happen.

Nygard concluded: "It offers an equal footing for every single piece of kit that sits in the market place and provides new opportunities for all the generation fleets to maximise the value they get from the market.

"Now the door is open, everybody has a chance to get in. It's an industry change that has never been there before for generators, so it's a big deal."

Nygard: The old school aggregation is just part of the puzzle of the value stream

A distributed pathway?

Junior Isles

There has been much talk about the move towards distributed energy but where is the evidence? A recent report by the Distributed Energy and Power segment of Centrica Business revealed a few interesting findings.

According to the report, 80 per cent of businesses will take control of their own energy use by generating a quarter of their electricity on-site by 2025, with 77 per cent of businesses in the UK and Ireland predicting this change will take place in just seven years.

In a study of over 1000 businesses, Centrica Business Solutions has been working to identify the key drivers and barriers to adopting new energy approaches including battery storage, on-site generation and demand side response.

The survey found that around a quarter (26 per cent) of businesses have already invested in on-site generation in the form of solar and/or combined heat and power (CHP), with a third considering investing in these technologies. The increase in demand for flexibility that sees businesses rewarded for increasing, decreasing or shifting their energy use has been identified as an opportunity by 44 per cent of businesses planning to feed energy into the grid in future.

The survey also revealed, however, that while 29 per cent of businesses in the UK and Ireland claim to have a formalised energy strategy in place, far fewer have specific targets or budgets in place to support their ambitions. For example, despite half (52 per cent) of respondents citing having back-up in the event of a power outage as very important, just 18 per cent have specific targets in place to address this. In a similar vein, only 16 per cent of businesses have set targets to support the link between sustainable energy use and brand image despite being identified by almost half (49 per cent) as very important.

The study of businesses from the US, Canada, Germany, Italy, the UK and Ireland identified that 'energy leaders', defined as those businesses that have adopted strategies to use energy efficiently and effectively, were more than twice as likely to unlock competitive advantage from their energy.

Ian Hopkins, Distributed Energy Sales Director, UK & Ireland at Centrica, commented: "There is a lot of evident change going on in the energy market, which all began with the various stages of deregulation in the different territories. For example, you could contrast the US with the UK in terms of how deregulation is handled but there is a common theme across the territories. And that common theme is under-investment in infrastructure and disillusionment with the centralised model. This is multiplied by the sustainability view and rising cost."

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Essentially, drivers are aligning to create a growing feeling that the centralised system and associated infrastructure is not as efficient or reliable as it could be. At the same time, in many regions, the cost of buying energy is going up faster than inflation.

This has led Centrica to ask questions about how its customer-base and other energy users are thinking about things going forward.

"If all of these things are going on, you can't just let it happen around you. You have to take control of it and position yourself better through an energy strategy. It's fascinating to see how different – even within the same sector – two companies can be," said Hopkins. "That has been the revelation for me in this study – the difference between the most strategic, forward-thinking, and the least within any given sector."

Certainly the falling prices of wind and solar in particular – which in many cases is now viable without the need for subsidies – is causing behavioural changes.

"Where there would have been hesitance to install something where you were reliant on an incentive that could be taken away, now the fundamentals are saying that you can generate for yourself from the sun more cheaply than you can buy from the grid and it will pay for itself in a certain amount of time. This is causing people to take action."

The same thing is happening with gas fired or biogas cogeneration. The fundamentals of relatively stable gas prices and a more rapidly increasing electricity price means that businesses can in many instances generate at lower cost, and more cleanly, on-site than from conventional centralised plant on the grid.

"This is leading businesses to realise that they don't need to depend on the grid. And in certain locations or geographies within a country, there is the whole resilience argument. If they can do it more cheaply, then what's the downside? Not only are you getting energy at a lower cost and benefit from the carbon footprint perspective, you may also end up with a more resilient supply than you were getting from the grid," said Hopkins.

Traditionally, businesses have largely not taken a long term, 10-15 years, strategic view on their energy supply. But they are starting to have to, as a business horizon is generally longer than a political horizon, which might be four years.

"While politicians keep changing their mind every four years, businesses need to know that if they are building a new factory, they can get reliable heat, power, cooling to that factory, or investment, for 15 years," said Hopkins.

Businesses are key to driving, or at least facilitating, any transition to a distributed energy system. New-look utilities, or startups and entrepreneurs will need to work with companies whose core business is not energy but have large energy requirements, e.g. a car manufacturer, to shape and deliver the energy strategy they need.

Certainly the opportunity for distributed energy is huge, especially with the rapidly falling cost of renewable energy.

A report by Grand View Research published earlier this year valued the global distributed energy generation (DEG) market in 2016 at $168.1 billion. It said the market size is expected to reach $573.7 billion by 2025, registering a Compound Annual Growth Rate (CAGR) of 15.0 per cent during the forecast period.

Separately, in April, Technavio analysts forecast the global DEG market to grow at a CAGR of 9.04 per cent during the period 2018-2022.

It said the spiralling use of solar photovoltaic (PV) rooftop systems for residential and commercial applications is predicted to be one of the key trends stimulating market growth. In addition, it noted, module production costs of solar PV and PV modules have fallen by more than 50 per cent in the past few years.

Yet, not all businesses are convinced that renewables are here to stay. New research from Haven Power, one of the UK's largest business electricity suppliers, reveals over a quarter (27 per cent) of British businesses think renewable energy is just a passing trend. This perception is even higher in the Financial Services sector.

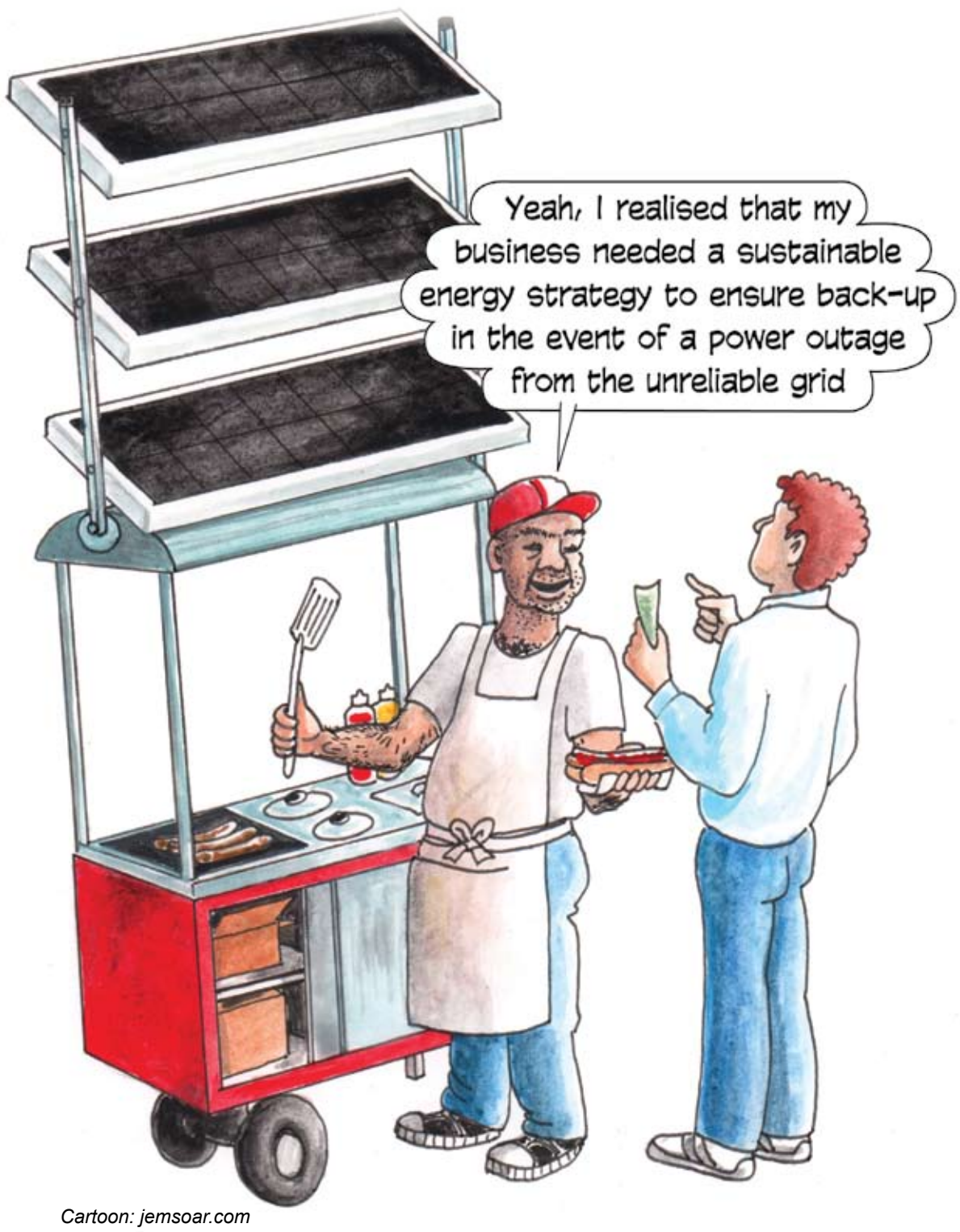
The survey of utility decision makers showed the biggest barrier preventing them from implementing sustainable change was cost (37 per cent), followed by lack of government support (24 per cent) and uncertainty by energy decision makers on how to discuss with senior management (23 per cent).

Paul Sheffield, Chief Operating Officer at Haven Power, commented: "It's concerning to see the proportion of businesses that still view renewable energy as a passing trend, despite evidence showing that a move to cleaner energy is essential for the environment. It's clear more needs to be done to demonstrate the wider opportunities and benefits of renewable energy for businesses."

Hopkins commented: "I find it staggering that they should think renewables is a passing trend but I think perhaps it lines up with the percentage of businesses we found that don't have an energy strategy. Perhaps they haven't had time to consider what it all really means."

With the way the prices are falling, it seems impossible that renewables could be a passing trend. In many regions they make economic sense even without subsidies. And it should not be forgotten that in developing countries, they are the most cost effective and cleanest way to bring energy to off-grid communities.

Even if renewables are not the main driver in achieving 25 per cent of on-site generation by 2025, they are certainly not a passing trend.



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