

# THE ENERGY INDUSTRY TIMES

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## Powering growth

Innovation to address the industry's megatrends is at the heart of Nexans' strategy. *TEI Times* speaks to the company's new Chief Technology Officer. **Page 13**



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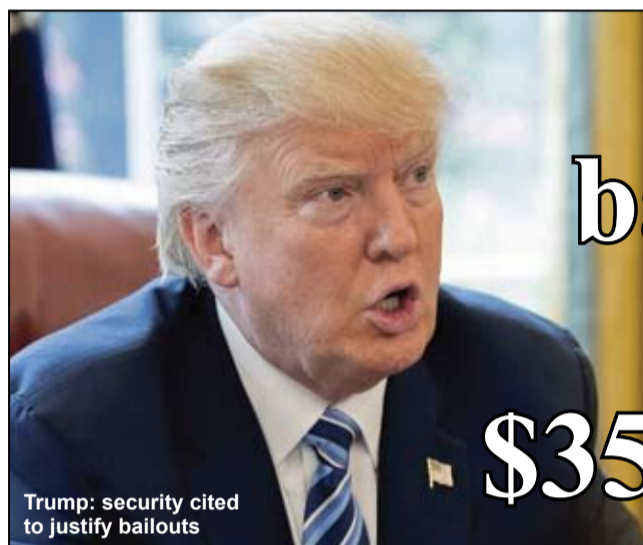
With large gas turbine sales struggling in Europe and other parts of the world, generating revenue by upgrading existing fleet is becoming increasingly important. GE is looking to expand in the market through its Cross Fleet solution. **Page 15**

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Trump: security cited to justify bailouts

# Coal, nuclear bailout could cost US nearly \$35 billion per year

US President Donald Trump's plan to support failing nuclear and coal fired power plants has come under scathing criticism from experts who argue it could cost consumers billions.

## Junior Isles

US President Donald Trump's latest plan to support coal and nuclear fired generation could cost US consumers up to \$34 billion per year in artificially higher electricity bills, according to experts.

A recently leaked memo has outlined potential actions by the US Department of Energy (DOE), including a proposed plan that would require power grid operators to buy electricity from financially burdened coal and nuclear plants over the next two years to prevent the closure of additional capacities.

For several years, the boom in natural gas production and growth in renewable generation has lowered prices and forced coal and nuclear competitors out of business, a trend President Trump has promised to slow. During his presidential campaign he pledged to help coal miners in particular, having received millions of dollars in campaign donations from coal company executives.

The Trump administration has therefore been trying to push for bailouts for several months. At the beginning of June, however, in the leaked 41-

page draft memo circulated before the National Security Council (NSC), it proposed that the bailouts were needed as a matter of national security.

According to the Federal Energy Regulatory Commission (FERC), some 15 864 MW of coal and 4532 MW of nuclear power capacity would retire in the US by April 2021. Meanwhile, the expected coal and nuclear power capacity additions over the period stand at 1687 MW and 6363 MW, respectively.

"Unfortunately, impending retirements of fuel-secure power facilities

are leading to a rapid depletion of a critical part of our nation's energy mix, and impacting the resilience of our power grid," Sarah Sanders, the White House Press Secretary, said in a statement, adding that the President wants US Secretary of Energy Rick Perry "to prepare immediate steps" in response.

Experts argue, however, that such steps will be costly. According to the Nuclear Information & Resource Service (NIRS) estimates, the current

*Continued on Page 2*

## BP Statistical Review shows 2017 was two steps forward, one step back

The recently launched 'BP Statistical Review of World Energy' showed that 2017 was a year of two steps forward and one step back for the energy sector.

Introducing the 2018 edition of the Statistical Review, Bob Dudley, BP Group Chief Executive, said: "2017 was a year where structural forces in the energy market continued to push forward the transition to a lower carbon economy, but where cyclical factors have reversed or slowed some of the gains from prior years. These factors, combined with rising demand for energy, has resulted in a material increase in carbon emissions following three years of little or no growth."

Notably, this year's Review, which looks at the energy mix within the power sector for the first time, shows that the share of coal in the sector is unchanged from 20 years ago.

Dudley commented: "As we have said in our 'Energy Outlook', our

'Technology Outlook' and now our 'Statistical Review', the power system must decarbonise. We continue to believe that gains in the power sector are the most efficient way to drive down carbon emissions in coming decades."

According to the report power generation rose by 2.8 per cent, close to the 10-year average. Practically all growth came from emerging economies (94 per cent). Generation in the OECD has remained relatively flat since 2010.

Most notable was the growth in renewable generation. Renewables accounted for almost half of the growth in power generation (49 per cent), with most of the remainder provided by coal (44 per cent). The share of renewables in global power generation increased from 7.4 per cent to 8.4 per cent.

The report revealed that renewable power grew by 17 per cent – higher

than the 10-year average and the largest increment on record (69 mtoe). Wind provided more than half of renewables growth, while solar contributed more than a third despite accounting for just 21 per cent of the total.

In China, renewable power generation rose by 25 mtoe – a country record, and the second largest contribution to global primary energy growth from any single fuel and country, behind natural gas in China.

Hydroelectric power rose by just 0.9 per cent, compared with the 10-year average of 2.9 per cent. China's growth was the slowest since 2011, while European output declined by 10.5 per cent (-16 mtoe).

Global nuclear generation grew by 1.1 per cent. Growth in China (8 mtoe) and Japan (3 mtoe) was partially offset by declines in South Korea (-3 mtoe) and Taiwan (-2 mtoe).

The report, however, stated that

global coal consumption increased last year for the first time since 2013, led by production from China and the US. Although coal's market share in the global power mix rose and then fell in the past 20 years, coal's percentage share remains unchanged at 38 per cent from 1998.

BP Chief Executive Bob Dudley said it was "astonishing" that more progress has not been made since 1998, "especially when the world is trying to meet the goals of the recent Paris climate accord to combat climate change".

BP Chief Economist Spencer Dale agreed: "To have any chance of getting on a path consistent with meeting the Paris climate goals, there will need to be significant improvements in the power sector."

Carbon emissions from energy rose by 1.6 per cent last year, after remaining nearly flat for the three previous years.

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Trump bailout scheme could cost consumers \$8-\$17 billion for just the nuclear element and as much again for coal subsidies.

Tim Judson, Executive Director at the NIRS, said: "By pushing for a nationwide bailout for nuclear power and coal, the Trump administration is rushing headlong into an energy buzz saw, and they don't even seem to know it. Subsidising the nuclear industry alone is likely to cost American consumers \$8 billion to \$17 billion per year, and subsidies for coal could cost just as much.

"Betting on old, increasingly uneconomical nuclear and coal power plants as a national security strategy is like gold-plating a Studebaker and calling it a tank. And it could destroy the booming renewable energy industry, which is already employing more Americans than coal and nuclear combined."

Peter A. Bradford is a former member of the US Nuclear Regulatory Commission (NRC) and former chair of the Maine and New York utility commissions. Bradford also taught energy policy and law at the Vermont Law School. Commenting on the bail-out scheme, he said: "The Trump administration's desire to tax American consumers to support failing power plants is energy policy-making gone haywire.

"As was said in the run-up to the 2003 invasion of Iraq, the facts are being fixed around the desired end result. We have no military crisis and no threats to our system reliability or resilience that require this drastic and expensive governmental intervention. Claims of such problems are fairy tales, straight out of Mother Goose."

Bradford said that the administration's warnings of dire effects from power shortages caused by shortages of reliable and resilient generation are contradicted by all of the bodies with actual responsibility for assuring adequate supplies.

President Trump's efforts so far have been blocked by FERC and fought by a broad coalition of opponents.

PJM Interconnection LLC, the country's largest grid, which runs the power markets in 13 states across the mid-Atlantic and Midwest, said in a statement: "Our analysis... has determined that there is no immediate threat to system reliability. There is no need for any such drastic action."

Other industry groups opposing the administration's proposed policy included the American Council on Renewable Energy, the American Wind Energy Association, the Natural Gas Supply Association and the Solar Energy Industries Association.

"Energy experts across a range of industries, within the federal government and in academia have agreed that this sort of effort will create a bloated power sector deploying outmoded technologies," said Christopher Mansour, Solar Energy Industries Association's (SEIA's) Vice President for federal affairs.

The American Council on Renewable Energy, a non-profit organisation that represents various groups that want to emphasize renewable energy sources, said in a statement that the administration is intervening to bailout coal and nuclear power plants "that are no longer competitive on their own".

"Arbitrary market interventions of this sort have no place in the electricity structure that has kept American electric power reliable and affordable," the group's President and CEO Gregory Wetstone said in a statement.

# Global clean energy transition is irreversible

- Trillions in fossil fuel wealth will be wiped out
- \$8.4 trillion investment predicted for wind and solar by 2050

Junior Isles

Continuing investment in fossil fuels appears doomed regardless of governments' actions on climate change.

A group of scientists and analysts from the University of Cambridge (UK), Radboud University Nijmegen (Netherlands), the University of Macau and the Open University (UK) have found that \$1-4 trillion of fossil fuel wealth will be wiped out over the next 17 years, even if governments fail to impose binding carbon emission limits on industry to prevent global warming.

The report goes a step beyond previous experts warning of "stranded assets" in listed energy companies as politicians implement policies to reduce the use of coal, oil and gas and argues that regardless of these policies, assets will be stranded due to the rapid development of clean energy technologies.

The scientists modelled the decline in demand for fossil fuels using novel modelling techniques that track the deployment of low-carbon technologies on the basis of empirical data.

Examples are technologies in power generation, cars and households that become more efficient and therefore reduce the use of fossil fuels.

The research raises a real question mark around the strategy of governments that continue to support fossil fuels.

Just last month a new report highlighted how member states of the G7 are failing to cut subsidies to the fossil fuel industry. The study, led by the Overseas Development Institute (ODI), shows the group is still providing an estimated \$100 billion in subsidies to the oil, gas and coal sectors.

Some argue that this undermines climate change efforts and the move to a low carbon energy system—a transition that needs to speed up if catastrophic climate change is to be avoided.

The International Energy Agency's (IEA) recent and most comprehensive analysis of the clean-energy transition – "Tracking Clean Energy Progress (TCEP)" – finds that only four out of 38 energy technologies and sectors were on track to meet long-term climate, energy access and air pollution goals in 2017.

The findings showed a handful of technologies made tremendous progress in 2017, with solar PV seeing record deployment, LEDs quickly becoming the dominant source of lighting in the residential sector, and electric vehicle sales jumping by 54 per cent. Two technologies, onshore wind and energy storage, were downgraded this year, as their progress slowed. This brought the number of technologies "in need of improvement" to a total of 23.

Offshore wind showed strong signs of progress with 23 per cent generation growth in 2017, but needs to accelerate even faster to be in line with the Sustainable Development Scenario (SDS) target, according to the IEA.

A new report by Bloomberg New Energy Finance (BNEF) was more positive regarding the progress with renewables and their outlook.

Its 'New Energy Outlook (NEO) 2018' predicts that wind and solar are set to surge to almost "50 by 50" – 50 per cent of world generation by 2050. This, it says, will be on the back of steep reductions in cost, and the advent of cheaper batteries.

This year's outlook is the first to highlight the huge impact that falling battery costs will have on the electricity mix over the coming decades. BNEF predicts that lithium-ion battery prices, already down by nearly 80 per cent per megawatt-hour since 2010, will continue to tumble as electric vehicle manufacturing builds up through the 2020s.

Seb Henbest, head of Europe, Middle East and Africa for BNEF and lead author of NEO 2018, said: "We see \$548 billion being invested in battery capacity by 2050, two thirds of that at the grid level and one third installed behind-the-meter by households and businesses.

He says the arrival of cheap battery storage will mean that it becomes increasingly possible to "finesse" the delivery of electricity from wind and solar.

NEO 2018 sees \$11.5 trillion being invested globally in new power generation capacity between 2018 and 2050, with \$8.4 trillion of that going to wind and solar and a further \$1.5 trillion to other zero-carbon technologies such as hydro and nuclear.

## New EU renewable target seen as "hard won victory"

While the EU's approval of a 5 per cent increase to its 2030 renewable energy target has been welcomed, some argue that it does not go far enough.

In June, negotiators for the European Commission, Parliament and Council secured a "political agreement" to raise the existing target from 27 per cent to 32 per cent. The provisional deal also includes a clause to revise the target by 2023 if necessary.

While the Commission hailed the increase as a "hard-won victory", it was lower than some states were hoping for. Spain, Lithuania, Sweden, Italy and Portugal were reportedly pushing for a 35 per cent target, as was

the European Parliament.

Miguel Arias Cañete, the EU's energy and climate commissioner said: "This new ambition will help us meet our Paris Agreement goals and will translate into more jobs, lower energy bills for consumers and less energy imports.

"The binding nature of the target will also provide additional certainty to the investors," he added.

Environmentalists, however, said the new goal is inadequate. Friends of the Earth Europe criticised the agreement, saying that the EU's decision-makers had only agreed to a "paltry" target that is "inadequate for a climate-

safe fossil-free future, and shows a failure to grasp a shifting energy landscape, including rapidly falling renewables costs". Cogen Europe also claimed the agreement was a missed opportunity, saying it fell "well short of a comprehensive approach on energy efficiency".

The main achievements of the new EU Renewable Energy Directive include improving the design and stability of support schemes for renewables, delivering real streamlining and reduction of administrative procedures, establishing a clear and stable regulatory framework on self-consumption, increasing the level of ambition for the

transport and heating/cooling sectors, and improving the sustainability of the use of bioenergy.

Following the political agreement on June 14, the text of the Directive will have to be formally approved by the European Parliament and the Council.

Once endorsed by both co-legislators in the coming months, the updated Renewable Energy Directive will be published in the Official Journal of the Union and will enter into force 20 days after publication. Member States will have to transpose the new elements of the Directive into national law 18 months after its entry into force.

## India revises wind and solar ambitions

India's Ministry of New & Renewable Energy (MNRE) has announced the country's medium and long-term targets for offshore wind capacity, aiming for 5 GW by 2022 and as much as 30 GW by 2030.

This significantly raises the country's ambition from the previously announced goal of reaching 5 GW between 2028 and 2032.

The announcement was prompted by a call for Expressions of Interest (EoI) for the first 1 GW of offshore wind which, according to MNRE, triggered a keen response from both Indian and global players.

The government also has signalled its intention to launch the largest tender

for new solar power capacity in the world. Speaking at an event in New Delhi last month, Power Minister R K Singh said the government plans to launch an unprecedented bid for 100 000 MW of new capacity.

"The biggest tender was floated in Spain. We brought out a single tender of 10 000 MW which would be opened in July. Now we will bring out a bid of one lakh MW [One lakh represents 100 000 units] which would also include solar manufacturing and storage."

Singh also said that India has already brought forward 70 GW of renewable energy capacity, and has another 12.5 GW in development. The minister expressed confidence that India would

surpass its target to build 175 GW of renewable energy "well before 2022".

He noted: "In the 48 years before 2014, the pace of capacity addition in generation was about 4800 MW a year. In the 48 months of this government, the pace of capacity addition was 24 000 MW a year."

India has pushed through various measures to promote renewable energy across the country's 29 states. Its current capacity is 69 000 MW, excluding large-scale hydropower. With a high level of promised investment and 40 000 MW of projects out to tender, some officials think the achievable figure could be as high as 227 GW by 2022.

Solar energy capacity alone has gone up from 2.63 GW in 2014 to 22 GW currently, an eight-fold increase. The sector's future also received a boost last month with the announcement that the government would not impose a provisional safeguard duty on solar cell imports into India coming from China and Malaysia, overruling a recommendation for a 70 per cent tariff.

■ Greenko has acquired Orange Renewables for \$1.02 billion. Under the deal, Greenko will take over approximately 907 MW of operational solar and wind projects from Orange Renewables, and over 500 MW of assets under development.



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# US renews focus on cybersecurity

Experts say that solutions are available to improve cyber security in the US electricity sector, but more needs to be done to improve sector skills and collaboration.

Siân Crampsie

The US government has launched a new initiative to improve cyber security in the energy sector following the release of a White House report last month.

The report, written by the US Departments of Homeland Security (DHS) and Energy (DOE), reviews the state of preparedness by the country's electricity sector and its ability to manage cyber security attacks, and raises a number of concerns.

These concerns include gaps in the assets and capabilities of the electricity sector, as well as the impact that a severe attack would have on the economy and on security. It cites a cyber attack on Ukraine's electricity system in 2016 as an example of the risks faced.

The report from the White House has

prompted a new effort by the DOE and DHS to boost the preparedness of the industry and reduce the risks to the wider economy. The DOE has created a new Office of Cybersecurity, Energy Security, and Emergency Response (CESER), and has also drawn up a multi-year plan for energy sector cyber security.

The report highlights the high-risk nature of the electricity sector. Although it notes that the US grid is inherently reliable, there are "capability gaps" in key areas such as supply chain and trusted partners, cyber security workforce and expertise, cyber security integration into planning, and cyber situational awareness.

"Over the last year, we have seen a significant rise in the number of cyber attacks in the energy space, with cyber threats like Triton, Industroyer and WannaCry, so it's not surprising to see

the energy sector as a high-risk target for malicious actors," says Edgard Capdevielle, CEO, Nozomi Networks. "However, due to the critical role that the energy sectors play in the functioning of today's economy and the rise of digitalisation of those sectors leaving them exposed is not an option."

One of the most pressing areas of concern is the digitalisation of industrial control systems (ICS), a move that allows plant operators to improve asset management, but may increase vulnerability to cyber attacks. This is compounded by a lack of cyber security skills in the sector and a reluctance to share information on attacks and strategies.

Recommendations made by the report include collaboration between DOE and DHS to support research into and development of system architectures and components that will "help

minimise cyber attack surfaces, prioritise key elements of electricity generation and delivery to isolate from internal and public networks, and enable system recovery".

DOE also wants to develop a national laboratory testing programme to consider grid components, assess cyber security supply chain posture and examine cyber malware impacts in a simulated environment.

Under its multi-year plan on cyber security, the DOE has pledged to engage with critical infrastructure owners and operators and improve public-private sector partnerships. This will enhance cyber security preparedness as well as incident response and recovery, DOE said. Meanwhile, the new CESER will take on the existing reliability and cyber programmes of the DOE, including the Cybersecurity for Energy Delivery Systems

(CEDS) programme and the Infrastructure Security and Energy Restoration (ISER) programme.

According to cyber experts, solutions are available now that can help organisations reduce the risk of attacks. "As attackers continue to employ innovative tactics and create even more sophisticated cyber attacks, defenders must be equally resourceful," says Edgard Capdevielle, CEO, Nozomi Networks. "Solutions are available now that can help IT and OT teams work effectively to see and secure their industrial networks."

"The key to mitigation is achieving real-time visibility and rich integrations with existing cyber security infrastructure. Critical infrastructure threats are real and for organisations to successfully mitigate the risks they need to speed up the collaboration between IT and OT."

## NY steps up on wind, batteries

■ Storage roadmap released ■ EnBW heads to the West Coast

The US state of New York has made further steps in its ambitious renewable energy goals with the release of a detailed energy storage roadmap and approval of its offshore wind energy plans.

NY Governor Andrew M. Cuomo last month said that the comprehensive energy storage roadmap would jumpstart development of energy storage projects in the state and help it to reach its target of 1500 MW of installed capacity by 2025.

He also announced that the New York State Public Service Commission (PSC) had accepted an environmental

review of policy options for the state's offshore wind programme.

Both technologies are a key part of New York's 'Reforming the Energy Vision', which aims to stimulate investment in clean energy technologies so that renewables meet 50 per cent of New York state's electricity demand by 2030.

The storage roadmap provides a set of specific recommended actions to accelerate the deployment of energy storage projects in New York state and position the state as a leading national market for advanced energy storage projects.

The recommended actions include \$350 million to speed up development in the state, regulatory changes to utility rates to reflect benefits of energy storage and adding incentives to the New York State Energy Research and Development's NY-Sun programme for solar plus storage projects.

The NY Green Bank will look to invest at least \$200 million in storage projects, Cuomo said.

"This roadmap is the next step to not only grow our clean energy economy and create jobs, but to improve the resiliency of the grid to keep our power running in the face of extreme weather and other emergency situations," Cuomo said.

Earlier in June Cuomo announced that New York's PSC had found a number of positive outcomes associated with the development of offshore wind, including public health benefits, climate change benefits, and economic development benefits. The environmental review also raised potential impacts, such as the need to consider sensitive biological resources, and mitigation measures to lessen these impacts.

New York has set a goal of procuring at least 800 MW of offshore wind power through competitive solicitations in 2018 and 2019, and 2.4 GW by 2030.

New York is one of several states in the US that are actively developing

an offshore wind industry.

Last month German group EnBW announced the creation of a joint venture with Trident Winds Inc. to develop an offshore wind project off the coast of central California.

The move is EnBW's first step into the North American offshore wind market. The new joint venture is aiming to develop a floating offshore wind farm with a capacity of 650-1000 MW at Morro Bay.

The initial focus of the joint venture will be to obtain the site lease from the Bureau of Ocean Energy Management and to secure the grid connection, which became available following the shutdown of an existing conventional power plant at Morro Bay.

## Peru plans energy reforms

Peru's government will implement a series of reforms in the energy sector to boost investment, it has said.

The country's Ministry of Energy and Mines says that renewables penetration, electrification and investment in the hydrocarbons sector are top priorities for the government, which is keen to stoke economic growth through infrastructure investment.

According to the Energy and Mines Minister, Francisco Ismodes, the reforms would help renewable energy to compete in the national market. Investments of almost \$600 million in grid expansion projects are also planned to bring electricity to around 420 000

customers not connected to the grid.

The rural electrification plan will also involve the construction of solar photovoltaic (PV) capacity in remote rural areas, Ismodes said. There are also plans for policies that would boost PV uptake and attract \$12 billion in hydrocarbons investment by 2022.

In June, Italian energy firm Enel said it had commissioned its 132 MW Wayra 1 wind farm.

The project's completion follows the completion of Enel's 180 MW Rubi solar PV plant in Peru in March 2018, and brings Enel's renewable generating capacity in Peru to 1.1 GW.

Both facilities are the largest of their

type in Peru.

Antonio Cammiserca, head of Enel Green Power (EGP), said that the company "has now completed and connected to the grid around 94 per cent of the capacity awarded in Peru's fourth public renewables tender".

The 42-turbine Wayra I wind farm, located in Marcona, in the Ica Region, has a 20-year energy supply contract with the Ministry of Energy and Mines. It was built in about one year.

In addition to the Rubi solar plant and Wayra I wind farm, Enel operates seven hydro plants totalling about 790 MW in Peru. Its overall installed capacity in the country is 2.3 GW.

## Enel wins in Brazil race

Enel has gained control of a major Brazilian power distributor after raising its offer to beat that of rival bidder Neoenergia.

The Italian firm agreed to pay around \$2 billion (BRL45.22 per share) for a 100 per cent stake in Eletropaulo Metropolitana Eletricidade de São Paulo

SA, enabling it to emerge as the winner in the final round of bidding for the firm.

Acquisition of Eletropaulo will give Enel an additional 7 million customers in Brazil, adding to its existing 10 million and making it Brazil's largest electricity distributor.

Enel has pledged to inject BRL1.5 billion (\$388 million) of capital into Eletropaulo. The company's final price for the Brazilian company represents a 164 per cent premium over the value of its shares in March, when the Italian company first expressed interest.

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# 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.

## 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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- Carbon emissions on track to rise at fastest pace in more than seven years

Syed Ali

China's new solar photovoltaic (PV) policy, aimed at rationalising capacity growth, might not only slow the country's solar PV market but could also jeopardise efforts to stem rising carbon emissions.

The policy, which comes as a shock to the industry, suspends approving new, subsidised utility-scale PV power stations in 2018. It also caps the amount of distributed projects at 10 GW. In addition, all utility-scale projects are mandated to set power prices through competitive auctions with regional authorities ordered to suspend arrangements for plants that require any state subsidies.

The notice published by the National Development and Reform

Commission, the Ministry of Finance and the National Energy Administration, also reduces feed-in tariffs (FITs) for new distributed solar PV projects by CNY0.05/kWh (\$0.008/kWh) to CNY0.32/kWh.

Commenting on the new policy, Wood Mackenzie Principal Consultant, Frank Yu said: "Our initial analysis shows that China can now add only around 30 GW of capacity in 2018 under the policy, some 20 GW less compared with our existing view. The slower pace of capacity builds is likely to reduce curtailment and improve cash flows with faster subsidy payment clearance."

It said, however, that despite the turmoil, the unexpectedly tough policy does have its merits, noting that it will allow the government to ease the

growing fiscal burden of renewable energy subsidies.

The government also announced that future wind tariffs will be determined by a bidding process, with a gradual elimination of government subsidies.

S&P Global Ratings believes the reform would be negative for wind farm operators but says most major players should be able to absorb the impact.

"We're not surprised that the government has taken this action. The steps encourage industry-wide cost efficiency, address the ever-widening funding shortfall for subsidies, and guide the sector to grow in a more sustainable way," said S&P Global Ratings credit analyst Apple Li.

The cuts in renewable subsidies come as a Greenpeace analysis, based on

Beijing's own data, reported China's carbon emissions are on track to rise at their fastest pace in more than seven years.

Although China has invested heavily in renewable energy such as wind and solar, a key reason for its emissions growth is rising demand for oil and gas due to increased car ownership and electricity demand.

Pointing to Chinese planning data that indicated the country's consumption of coal, oil and gas would grow this year, Niklas Höhne, a partner at the New Climate Institute and one of the scientists who contributes to the Intergovernmental Panel on Climate Change report said: "The outlook for 2018 is actually bad."

Glen Peters, research director at Cicero, the Norwegian climate research

institute, predicted that China's emissions would see "low positive growth" this year of up to 3 per cent. "If the economy is going to grow at 6, 7 or 8 per cent, then it is pretty hard for emissions to go down," he said.

The country's ongoing nuclear programme should, however, go some way to reversing the growth in emissions. According to reports, the Taishan reactor, which will be the first EPR to enter commercial operation, reached first criticality on June 6th.

Further, in June Russian and Chinese nuclear executives signed the biggest package of contracts in the history of the two countries' nuclear partnership. The package consists of four deals including the construction of four Gen 3+ VVER-1200 units (at the Xudabao and Tianwan sites).

## Spotlight on solar as Vietnam Master Plan questioned

Vietnam's Ministry of Industry and Trade (MoIT) has been asked to report the list of approved solar power plants to Prime Minister Nguyen Xuan Phuc before July 15, 2018.

The request follows the government's admission that its Power Development Master Plan VII currently has many shortcomings, which prompted the ministry to propose to

Deputy PM Trinh Dinh Dung a supplementation of some solar power projects into the plan.

The development of thermal power plants has faced difficulties due to stricter requirements on environment protection as well as infrastructure and coal supply to plants. Many projects in the plan have been delayed, especially those in the southern region, including Long Phu I, Long Phu II, Song Hau I, Song Hau II and Vinh Tan III.

Solar projects have been identified as

clean and quick to build. Deputy PM Dung has asked the ministry to report the specific list of approved solar projects to be supplemented into electricity planning in localities while improving the management of the projects. In addition, the ministry has been asked to quickly complete the national solar power development plan to submit to the Prime Minister.

The MoIT has approved more than 70 projects, with a total capacity of over 3000 MW, to be operational

before June 2019.

Notably, last month B Grimm Power said it had signed a collaboration agreement for the development of a solar power plant with 420 MW installed capacity in Tay Ninh. This would be the largest solar plant in Southeast Asia.

Meanwhile construction of Vietnam's biggest solar power plant, with a capacity of 168 MWp, kicked off in the south central province of Ninh Thuan on June 8th.

## ADB supports renewables expansions

Support from the Asian Development Bank (ADB) is enabling the advancement of significant renewables programmes in Pakistan and Indonesia.

Last month the bank announced that it will contribute to Pakistan's national goal of enhanced energy security through a \$325 million loan. The money will help Pakistan install 5204 MW of new capacity through hundreds of micro-hydropower plants in off-grid areas of Khyber Pakhtunkhwa (KPK), and 2330 MW of solar capacity in Punjab by 2026 under its project Access to Clean Energy Investment Programme.

In its 2018 Sustainability Report, the ADB said that the Access to Clean Energy Investment Programme, approved in 2016, is anticipated to benefit about 240 000 households.

The programme will be implemented over a period of 5-10 years and will support the provincial governments of KPK and Punjab to achieve increased access to sustainable and more reliable electricity services for vulnerable

communities.

It will see the establishment of renewable power plants including the construction of 1000 micro-hydropower plants and rooftop solar panels for 23 000 schools and over 2500 primary healthcare facilities in two provinces and a university in Bahawalpur, Punjab.

The loan is part of ADB's commitment announced last year to double its annual climate financing to \$6 billion for Asia-Pacific by 2020.

Pakistan also received a \$500 million loan from the World Bank in June to support two projects to support renewable energy in Sindh and expand economic activity between Pakistan and Afghanistan through the development of an economic corridor along the Khyber Pass.

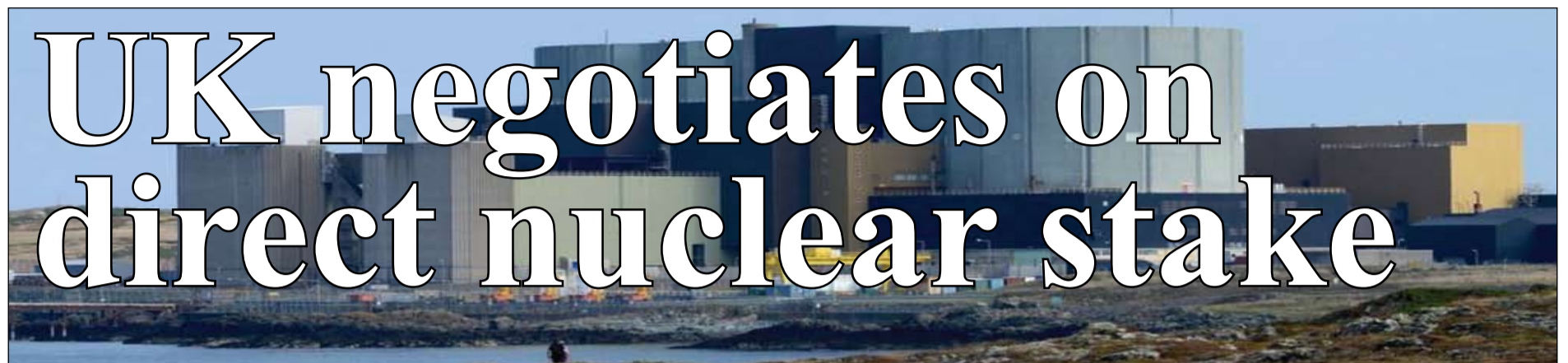
It will support independent power producers to develop 400 MW of new solar power capacity (starting with an initial 50 MW pilot project) and provide partial grants to private sector firms for the commercial provision of

Solar Home Systems to about 200 000 households.

"The projects will address Sindh's energy needs through the generation of solar power, benefitting the entire province and support trade between Pakistan and Afghanistan through regional connectivity and private sector development along the Khyber Pass corridor," said World Bank Country Director for Pakistan, Illango Patchamuthu.

Meanwhile, the ADB has also announced loans to support projects in Indonesia. The bank recently extended \$40.2 million in financing to Singapore-based renewable power producer Vena Energy, formerly Equis Energy. Four of Vena's subsidiaries will use the funds to build two PV plants with a combined capacity of 42 MW.

The ADB said the loan is part of a portfolio of financing totalling approximately \$160 million, of which \$120.8 million was granted to a 72 MW wind power project in Jeneponto, South Sulawesi.



# UK negotiates on direct nuclear stake

Plans for a direct investment in Wylfa have drawn criticism but could help to stimulate the UK nuclear supply chain and skills growth.

Siân Crampsie

The UK government's plans to take a direct stake in a new nuclear power plant will help the civil nuclear industry to reduce costs and build a reliable supply chain, experts say.

Minister for Business, Energy and Industrial Strategy (BEIS), Greg Clark, announced in June that the government had reached an initial agreement with Japanese conglomerate Hitachi to back the Wylfa nuclear plant in North Wales.

The plan for a direct stake in the first two reactors at the proposed 5.4 GW plant is a departure from government policy and will help Horizon Nuclear Power to get the project off the ground. Clarke gave no details about the nature of the proposed deal, but reiterated the

importance of nuclear energy as a low-carbon energy source for the UK.

Media reports indicate that the UK will take at least a £5 billion stake in the project, construction of which is due to start in 2020.

Tom Greatrex, CEO of the Nuclear Industry Association (NIA), said that the announcement was "good news" for decarbonisation targets. "This will also stimulate the UK industrial supply chain, its partnerships with Japanese counterparts, and provide highly skilled jobs and growth in North Wales," Greatrex added.

Sue Ferns, senior deputy general secretary at engineering union Prospect, said that the plans signalled a change in strategy for the government. "By taking a share in this project the costs can be lowered, work can be directed

to UK companies and the UK's skills base can be developed," commented Ferns. "In order to capitalise on this the government must take a similar approach to other sites such as Moorside in Cumbria.

"This decision cannot be viewed as a one-off and needed to be seen as a wider deal. There are many challenges ahead: Brexit, our climate targets and the need to renew our energy infrastructure. The energy sector needs to see this latest change as the start of a new approach."

Critics of the nuclear sector highlighted the costs of the project at Wylfa and other new nuclear sites in the UK. The government has agreed EDF a minimum price for electricity from Hinkley Point C of £92.50/MWh – almost double the current wholesale

electricity price.

It is unlikely to offer such a high strike price at Wylfa, especially if it takes a direct investment in the site's first two 1380 MW reactors, but Hitachi has intimated that it will cancel or postpone the project if it does not get the deal it wants.

Greenpeace labelled the plans "a terrible deal" because of the high costs of nuclear compared with renewables. "The economics are so weak that private investors have refused any involvement and the government is having to bail out this disastrous project before construction has even begun," said Kate Blagojevic, head of Energy at Greenpeace UK.

Last month the planned Wylfa project received environmental approval from the European Commission. The

government says that in addition to negotiations with Horizon, it will also "continue to engage with the other developers in the UK new nuclear market on their proposals for further projects".

These projects include EDF on its plans for a follow-on EPR project at Sizewell C, CGN on its proposal for an HPR1000 reactor at Bradwell, and Toshiba regarding the future of the NuGen project at Moorside.

Chinese firm Ocean Nuclear said in June that it hoped to promote Sino-British cooperation in the nuclear sector through a roadshow in London. The event is part of a global roadshow aimed at raising funds of \$5 billion. The firm specialises in providing capital market services to nuclear energy projects worldwide.

## UK boosts storage capacity

Enel has commissioned its first stand-alone battery energy storage facility in the UK, adding to the UK's growing battery storage capacity. The company says it has invested €20 million in the 25 MW/12.5 MWh Tynemouth plant, which uses lithium-ion batteries.

"The commissioning of Tynemouth is an important milestone for Enel since it is the group's first utility-scale, stand-alone battery energy storage system,

showing the potential of this promising solution in addressing the challenges of the energy transition," Enrico Viale, Enel's global thermal generation's head said.

"Battery energy storage systems provide a solution for flexible and fast services to ensure the stability of electricity power systems, while, when coupled to existing power plants, allow for optimisation of performance and

an increase in plant flexibility. The utility-scale BESS market shows great potential for growth, which is why Enel is developing a portfolio of such projects in some of the sector's most promising countries worldwide."

Earlier in June, Highview Power officially launched operations at a 5 MW/15 MWh liquid air energy storage (LAES) plant in the UK. It is the first grid-scale facility of its kind in the

world and will demonstrate the ability of the technology to provide a number of reserve, grid balancing and regulation services. Demand aggregator KiWi Power will draw energy from the LAES plant to fulfil its demand response obligations.

KiWi Power recently announced the completion of a 2 MW, behind-the-meter (BTM) battery storage solution in southwest England. This project is

part of an extensive roll-out of BTM projects at large energy use sites in the UK by KiWi.

Elsewhere in the UK, UK Power Networks has created London's first virtual power plant, consisting of solar panels and batteries at domestic residences. Thrive Renewables and Aura Power have also announced a joint venture to install and operate batteries for medium and large energy users.

## French offshore projects reach FiT deal

Offshore wind developers in France have welcomed the successful renegotiation of feed-in tariffs for their projects.

The developers were selected in France's first two offshore wind tender rounds, held in 2012 and 2014, and between them will develop six wind farms with a total capacity of 3 GW.

Jean-Bernard Lévy, Chairman and Chief Executive Officer of EDF, said: "At the end of this period of negotiations with the State, we are delighted with the confirmation of our three projects under conditions that allow the creation of a national industrial sector for offshore wind power of nearly 7000 direct jobs and indirect."

A consortium of EDF Energies Nouvelles, Enbridge Inc. and wpd are developing three of the offshore projects awarded in 2012: Saint-Nazaire, Courseulles-sur-Mer, and Fécamp.

The fourth project selected in Round 1 is Saint Brieuc, being developed by the Ailes Marines consortium comprising Iberdrola and French companies RES and Caisse Des Dépôts.

France selected two projects in the tender Round 2, Dieppe-Le Tréport and Yeu-Noirmoutier, both being developed by a consortium of Engie, EDP Renewables (EDPR) and Caisse Des Dépôts.

Engie and EDPR said that the latest decision "puts an end to a period of uncertainty for an industrial sector that will create jobs.

"Engie and EDPR made every effort to bring the negotiations to a successful conclusion while defending the industrial plans associated with the projects. This is therefore very good news for France and for the territories that have invested considerably in this sector."

The French government sought to reduce the feed-in tariffs that they were awarded because the cost of offshore wind energy has fallen drastically over the last few years.

The projects will now receive a feed-in tariff of €150/MWh for 20 years instead of €200/MWh.

"We will bring about renewable energy more quickly and less expensive-

ly: the projects are confirmed, their public subsidy is reduced by 40 percent," French President Emmanuel Macron said on Twitter in June.

French regulator CRE had earlier said that the projects had become too costly and would require subsidies of nearly €41 billion. The government submitted a proposal to renegotiate the terms of the six offshore wind projects to the Senate in March 2018. The Senate subsequently rejected the proposal.

The projects had already been considerably delayed, however, largely due to public opposition.

■ MHI Vestas Offshore Wind has secured final certification for the V164-9.5 MW offshore wind turbine model. The first 23 units of the 9.5 MW model are scheduled to be installed on the Northwester 2 offshore wind farm in the Belgian North Sea in 2019. Two offshore wind farms in the UK, the 860 MW Triton Knoll and the 950 MW Moray East, will also feature the 9.5 MW turbines, with installation expected to start in 2021 and 2022.

## Bulgaria revives Belene

Plans for a nuclear power plant in Bulgaria have been revived five years after it was scrapped due to financing problems and concerns over Russia's role.

The Bulgarian National Assembly has approved a proposal to lift a ban on developing a 2000 MW nuclear plant at Belene, on the River Danube, and has given the government a mandate to find an investor.

It will not, however, be allowed to offer any state credit guarantees or preferential electricity contracts to participants in the project.

Media reports indicate that China's National Nuclear Corporation, Atomstroyexport's parent corporation

Rosatom, and a third anonymous bidder have already expressed an interest in the revived project.

In 2012, Bulgaria scrapped a deal to build the plant with Russia's nuclear company Atomstroyexport after failing to find any foreign investors prepared to shoulder the costs, estimated at the time at about €10 billion (\$11.8 billion).

That decision served to scupper Moscow's plans to use the project as a showcase for its new generation of pressurised water reactors in Europe. Atomstroyexport took Bulgaria to international arbitration over the decision and was awarded €601 million in compensation.



Bulgaria: lifting ban on Belene

# Kazakhstan attracts international renewables developers

Eni says it will move forward with the construction of a 50 MW wind farm in Kazakhstan as the country moves forward with its ambitious renewable energy development goals.

The Italian energy company took the investment decision on the Badamsha wind farm in northwest Kazakhstan in mid-June and said that construction of the project would

start in the next few months.

The wind farm will be one of the first commercial scale wind farm projects in Kazakhstan, which recently held its first renewable energy auction as part of plans to attract international investors to its nascent renewables sector.

During late May and early June, Kazakhstan held its first series of auctions, in which bidders were invited

to bid for 140 MW of onshore wind, 80 MW of solar photovoltaic (PV), and 5 MW of bioenergy capacity.

It awarded around 100 MW of onshore wind energy capacity and 68 MW of solar PV capacity.

In all, Kazakhstan's Ministry of Energy held four wind energy auctions, awarding capacity to ten projects ranging in size from 2 MW to 50 MW.

The largest wind energy project was Gel Elektic's 50 MW scheme in Kostanay region, which placed a bid of KZT21.5/kWh (\$0.063/kWh).

In the solar sector, at least four projects won contracts, including a proposed 50 MW development by Mistral Energy, which placed a bid of KZT25.8/kWh.

The government is aiming to auction 1 GW of renewable capacity this

year, of which 620 MW is to be allocated to wind projects, 290 MW to solar PV projects, 75 MW to hydro-power and 15 MW to bioenergy plants. Further auctions will be held on 3-18 October.

Eni said that the Badamsha wind farm will be its first large-scale wind farm investment overseas. It plans to reach commercial operations by the end of 2019.

## Eskom supplies struggle amid labour row

- Workforce rejects 0 per cent pay offer
- Mainstream moves forward on wind farms

South African utility Eskom has once again warned customers of the possibility of load shedding because of a tight supply margin caused by industrial action in its workforce.

Eskom announced in mid-June that it wanted customers to reduce their energy usage and said it was "working with other national structures and stakeholders to keep its plant operating". It added that it would "implement its power system contingencies, including controlled load shedding" as a last resort to avoid blackouts or a shutdown of the national power system.

Workers at Eskom are striking because of a reported 0 per cent pay deal offer made by the utility; workers at the cash-strapped firm are demanding 15 per cent, according to media reports.

The two sides appear to have reached an impasse and the strikes eventually forced the utility to implement load shedding on several occasions in the last two weeks of June. Eskom has accused some workers of deliberately switching off distribution networks.

Eskom is hoping to boost its cash flow by increasing tariffs and regaining customers that it lost several years ago during its last supply margin crisis. The company is continuing to boost its installed capacity of 48 GW with the addition of new renewable and coal-fired power plants.

The 4764 MW Medupi power plant

will be completed in two years, followed in 2023 by the 4800 MW Kusile plant.

Eskom recently signed 27 renewable energy agreements with independent power producers representing 2.3 GW of generating capacity that will be added to the grid over the next five years.

Last month, Mainstream Renewable Power said it had reached financial close on two wind power projects in Northern and Western Cape provinces. The Kangas wind farm in the Northern Cape will produce 140 MW and the Perdekraal East wind farm in the Western Cape will produce 110 MW.

Construction of the two projects were due to start in June thanks to the signing of the PPA with Eskom in April, Mainstream said.

Mainstream has been awarded a total of 848 MW of wind and solar projects under South Africa's renewable energy IPP programme (REIPPPP) since the first round in 2011, making it the country's most successful independent renewable energy developer. The company has already delivered five wind and solar PV plants into commercial operation under the programme, with a combined generation capacity of almost 600 MW, and has bid a number of additional wind and solar PV projects under the expedited Round Four, the results of which are expected to be announced shortly.

## French Guiana pioneers solar storage hybrid technology

The territory of French Guiana is to host an innovative solar storage hybrid power plant that will boost the generating capacity and reliability of its electricity system.

Energy storage specialist HDF Energy has signed a deal to install a 55 MW solar farm and 140 MWh hydrogen-based energy storage solution in Mana municipality. It says that the storage solution is the largest of its kind in the world.

The so-called CEOG project will deliver renewable energy to over 10 000 households in French Guiana that are "beset" with energy delivery issues, HDF said in a statement. The project will be backed by a €90 million investment from HDR as well as private investment partners and banks.

"The dramatic fall in the price of

solar and wind energy, combined with the emergence of suitable solutions supporting mass storage of energy, makes it possible to implement projects of this type in a competitive economic environment," said Damien Havard, CEO of HDF Energy.

The CEOG plant will comprise a solar array as well as an electrolyser, hydrogen storage facility and fuel cells. Excess energy from the solar array will be used to convert water to hydrogen, which can be stored and then used in the fuel cell to generate energy during periods of peak demand.

The plant will provide a reliable energy source at a lower price than the current real cost of production in Western Guiana, and without subsidies. It will generate a fixed output every day of 10 MW a day until evening and of

3 MW during the night, HDR said.

The President of the Regional Council of French Guiana, Rodolphe Alexandre, welcomed the project. "By offering to provide clean electricity as guaranteed to the inhabitants of French Western Guiana, the CEOG project will meet the objectives for producing renewable energy set out in our Multi-Annual Energy Programme," said Alexandre. "It highlights that French Guiana can aspire to energy independence, which can actually be achieved with the installation of plants of this kind. It also proves that energy transition can be instrumental in creating permanent jobs as part of a healthy economic activity."

The project is scheduled to start in summer 2019, with commissioning planned for autumn 2020.

## World Bank supports Noor-Midelt I and II

Morocco is to develop a second concentrated solar power (CSP) project under its Noor Solar Plan thanks to additional funding agreed with the World Bank.

The World Bank says it will provide \$125 million in additional support for the development and construction of the Noor-Midelt I and II plants, which will have a total capacity of 600-800 MW. Some \$25 million will be sourced from the Clean Technology Fund.

The Noor-Midelt complex will be Morocco's second CSP complex built under the Noor Solar Plan, which forms a critical component of the country's goal of producing 52 per cent of its electricity through renewable energy by 2030.

"This is yet another step toward a promising clean energy future for Morocco," said Marie Françoise Marie-Nelly, World Bank Country Director for the Maghreb. "The Noor-Midelt power complex seals Morocco's position as the region's pioneer in renewable energy."

The Noor-Midelt complex will be based on a new design that combines CSP and solar photovoltaic (PV) technologies. While less expensive, PV does not have the same storage capacity as CSP, which can generate power even when the sun is not shining.

"The design of Noor-Midelt relies on proven technologies that will be operated in a pioneering way to take advantage of the benefits of both CSP and PV technologies on a single site,"

said Moez Cherif, World Bank Lead Energy Economist for the Maghreb.

The design and construction of the new solar complex will be led by the Moroccan Agency for Sustainable Energy (Masen), which will use a similar public-private partnership model at Noor-Midelt as it used at Noor-Ouarzazate.

The 580 MW Noor-Ouarzazate complex is due for completion this year and will be the world's largest CSP complex. Along with providing power to over one million people, Noor-Ouarzazate will decrease Morocco's dependence on oil by about 2.5 million tons per year and reduce carbon emissions by 760 000 tons per year.

Once complete, the Noor-Midelt complex will be even larger.



## Companies News

# EU approves Fortum's Uniper deal

Fortum and Uniper have pledged to begin rebuilding their relationship after the conclusion of an acrimonious takeover deal.

Siân Crampsie

Fortum has become the largest shareholder in Uniper after Europe's anti-trust authorities approved a €3.7 billion purchase deal by the Finnish energy giant.

The move gives Fortum access to Uniper's large portfolio of conventional generating plant and other business operations, including gas storage and commodity trading. It said in a statement that in its public takeover offer, it acquired 47.12 per cent of Uniper's shares.

It also said that it planned to "reset" its relationship with Uniper, whose management board had opposed the deal.

Fortum launched its takeover bid for Uniper in November 2017, agreeing to purchase E.On's 46.65 per cent stake in the company. The European Commission said that the deal would not have an adverse impact on competition.

"Fortum and Uniper are important players in the generation of electricity in the Nordic countries, in particular in Sweden," said Margrethe Vestager, European Competition Commissioner. "We can approve their proposed merger, in particular because of the high level of interconnectivity between different countries in the Nordic area and because there is significant spare generation capacity in Sweden."

E.On said that the deal marked "the

end of a chapter in E.On's history". Shareholders received €21.31 per share.

"We are very pleased to have closed the transaction and to have become Uniper's largest shareholder," commented Pekka Lundmark, President and CEO of Fortum. "The investment delivers on Fortum's vision and strategy as well as our investment criteria."

"Uniper's businesses are well aligned with Fortum's core competencies, are close to our home markets and are highly cash generative. Now it is time to reset the relationship between Uniper and Fortum as its largest shareholder in the interest of both companies."

Uniper operates 36 GW of generating

capacity and is active in more than 40 countries, with 12 000 employees. Its portfolio has a high proportion of hydroelectric and gas plants, and in Russia provides around five per cent of the country's electricity needs.

Uniper said in 2017 that Fortum's offer did not reflect the company's value and recommended that its shareholders reject the offer. It was later accused by Fortum of actively trying to disrupt the progress of the deal.

"As expected, Uniper now has a new major shareholder in Fortum, whom we welcome among our shareholders," said Uniper CEO Klaus Schäfer. "Following the conclusion of the public takeover offer, our aim is to continue the thread of discussion with Fortum

and to protect the interests of Uniper, our employees and all shareholders in the best possible way.

"It is particularly important to me now to lay the foundation for a constructive cooperation between Fortum and Uniper while at the same time to ensure the implementation of the entrepreneurial path we have chosen."

■ E.On has closed the syndication of €5 billion of acquisition financing for the public takeover offer of Innogy SE. The newly arranged financing will consist of a €3 billion bridge loan and a term loan of €2 billion, maturing in five years. The syndication was substantially oversubscribed and included E.On's core relationship banks, E.On said.

## BP builds EV business

Oil giant BP has furthered its operations in climate-friendly technologies with an investment in StoreDot, a developer of ultra-fast charging battery technology.

BP Ventures has announced a \$20 million investment in StoreDot, which is aiming to commercialise its flash battery technology for mobile communication devices by 2019. It is also targeting electric vehicle (EV) charging in five minutes.

According to BP, the number of EVs worldwide is growing rapidly and ultra-fast charging will be key in accelerating their continued adoption. Its investment in StoreDot is in line with its strategy of working across the supply chain to support the development of technologies and infrastructure needed for market growth.

"Ultra-fast charging is at the heart of BP's electrification strategy," said Tufan Erginbilgic, Chief Executive, BP downstream. "StoreDot's technology shows real potential for car batteries that can charge in the same time it takes to fill a gas tank."

"With our growing portfolio of

charging infrastructure and technologies, we're excited by our opportunities to develop truly innovative EV customer offers. We are committed to be the fuel provider of choice – no matter what car our customers drive."

StoreDot has developed a lithium ion-based battery technology that enables ultra-fast charging for the mobile and industrial markets. StoreDot is also developing a new type of electric car battery that can charge in a time comparable to the time taken to refuel a traditional car.

Earlier this year, BP invested \$5 million in FreeWire Technologies, a manufacturer of mobile EV rapid charging systems. It has also recently signed a deal with China's NIO Capital to explore opportunities in advanced mobility.

David Gilmour, Vice President of business development at BP Ventures said that StoreDot has shown "significant progress in the development of ultra-fast charging, both in mobile phone and vehicle applications".

StoreDot currently expects first sales of its flash batteries for mobile devices as early as 2019.

## Aggreko launches microgrid service

- Firms combine solar, diesel and storage
- Eritrea mine demonstrates benefits

Battery supplier Younicos and its parent company, Aggreko, say that their customers around the world will benefit from a new, flexible, microgrid solution.

The two companies are bundling their solar, diesel and storage technologies into a single microgrid offering available for customers in one single rental contract with flexible conditions. An initial project at a copper and zinc mine in Eritrea will showcase the solution.

According to Aggreko, combining solar photovoltaics with diesel generation and energy storage will reduce fuel costs while providing flexibility

and reliability.

In Eritrea, the mine will be powered by a 22 MW diesel plant and a 7.5 MW solar power plant under a ten-year rental agreement.

"We already offer plug-and-play battery solutions for rental periods of only a few months," said Karim Wazni, Managing Director of Aggreko. "Integrating storage capability with Aggreko's existing hybrid solar-diesel offering doesn't just combine two types of savings – it allows us to really leverage the different technologies, with each component being used more efficiently, while increasing overall resilience."



Trina Solar says it has accelerated its strategic transformation with the acquisition of Nclave Renewable S.L., a Spain-based manufacturer of solar tracking systems.

The acquisition is the first time that a Chinese solar company has bought a solar tracker outside of its home market and marks "another solid step" in Trina's transformation, the firm said.

Trina is altering its business strategy to create a company focused on the development of renewable energy solutions that work in concert with the

Internet of Things (IOT) solutions. It said in a statement that it will be able to integrate its latest solar photovoltaic (PV) technologies directly into Nclave's tracker products and engineering designs to create smart solutions for clients.

Nclave was the world's eighth largest tracker firm with a four per cent global market share in 2017, according to GTM Research. Financial details of the purchase were not disclosed.

Earlier this year Trina launched TrinaPro, a 'smart' PV solution designed

for utility scale ground-mounted PV systems. TrinaPro is an optimised combination of PV panels, inverters and solar tracking systems, and includes smart operations and maintenance interconnections.

TrinaPro can improve system stability thanks to the use of algorithm integration, Trina said.

Nclave was created in March 2017 when Spanish companies Grupo Clavijo and MFV Solar merged. Its production facilities are located in Navarra, Spain.

## Prysmian integrates with General Cable

Cable firm Prysmian says it will start integrating its business with that of General Cable following approval of its takeover by regulatory authorities.

Italy-based Prysmian said that the newly merged organisation will be a "world leader" in the energy and telecom cable systems industries with sales of over €11 billion and 30 000 employees. Its takeover of the USA-

based company will ensure the further expansion of its technology and product range, CEO Valerio Battista said.

"We are proud to have established our second home region in the United States. Today, we begin to operate as a single team with shared objectives, combining the best of both companies," Battista commented.

The new combined group will be

headquartered in Milan, Italy, although North America will now account for approximately one third of the Group's sales. In June the deal gained clearance from the Committee on Foreign Investment in the United States (CFIUS).

General Cable shareholders approved the acquisition earlier this year after Prysmian offered \$30/share.

## 10 | Tenders, Bids & Contracts

### Americas

#### Pöyry supports Verde Vale 3

Vientos Solutions LLC has awarded Pöyry a contract to provide project management and engineering consulting services to support the construction of the Verde Vale 3 photovoltaic (PV) power plant in Brazil.

The Verde Vale 3 power plant will have an installed capacity of 16 MW. The construction phase has already begun and the goal is to provide energy to the grid by the end of July 2018.

#### BHEL bags solar projects

India's BHEL has won two orders worth \$19 million for the development of two solar photovoltaic (PV) farms in Gujarat, India.

Under the contract, BHEL will be responsible for the engineering, procurement and construction (EPC) of the two solar farms, which form part of the Gujarat Solar Park.

The first order, for the development of a 20 MW solar project, was placed by Gujarat Alkalies and Chemicals Limited (GACL) while the second order, for 10 MW, was placed by Gujarat State Fertilizers and Chemicals Limited (GSFC).

#### Pöyry on Cuba assignment

Inter RAO Export LLC has awarded Pöyry a contract for technical audit services provision for the construction of four power units in Cuba.

Russia-based Inter RAO is acting as the EPCM contractor in the thermal power projects, which will each have a capacity of 200 MW.

One of the projects will be located close to the Maximo Gomez power plant and the other three at the East Havana power plant. Pöyry will provide technical audit services for survey and design works in the power plant project, including review of adopted technical solutions for their compliance with the best world design practices, and recommendations and suggestions for their improvement.

#### Vestas bags 100 MW order

Vestas has received an order for 100 MW of V136-3.45 MW turbines from Southern Power, a leading US wholesale energy provider.

The turbines will be delivered to the Wildhorse Mountain wind project in Oklahoma, which has been developed by Roaring Fork Wind, a joint venture partnership between RES Americas Developments, and Steelhead Americas, Vestas' development arm in North America.

The order includes supply and commissioning of the turbines as well as a 20-year Active Output Management 5000 (AOM 5000) service agreement. Turbine delivery will begin in the second quarter of 2019.

#### Jamaica orders smart grid solution

Itron has signed a contract with Jamaica Public Service Company (JPS) for the deployment of a nationwide smart grid.

The deal builds on an existing relationship between JPS and Itron, which included 51 000 electric meters on Itron's smart grid network deployed in 2016 and 2017, and the rollout of 35 000 smart streetlights in 2017.

JPS says that it will extend its existing Itron Gen 5 network to be able to support up to 670 000 electric meters, which will help the utility improve customer service, drive

grid reliability and enable revenue realisation.

The Jamaican utility will manage the system through Itron's cloud-based SaaS solution. "Over the last few years, JPS has been transforming our lighting and electricity services by modernising and connecting our infrastructure. We are pleased to continue collaborating with Itron in this process," said Gary Barrow, chief technology officer at JPS. "With Itron's open, standards-based platform, we can ensure efficient delivery of electricity to the island and unify all of our devices on one network."

### Asia-Pacific

#### Jan De Nul selects JDR

Jan De Nul Group has chosen JDR Cable Systems to manufacture and supply the inter-array, export and land transmission cables for Phase 2 of Taiwan's Formosa 1 offshore wind farm project.

JDR will deliver 21 km of inter-array cable, 13 km of export cable and a further 16 km of land cable to transmit power from the shore to the local substation. Production of the cables will start in the fourth quarter of 2018.

Phase 2 of Formosa 1 will add 120 MW to the existing 20 MW Phase 1 of the wind farm. Jan De Nul is in charge of the design, procurement and installation of the wind turbine foundations, scour protection and cable installation on Formosa 1 Phase 2.

The project is owned by Formosa Wind Power, a partnership of Macquarie Capital Group Limited, Ørsted AS and Swancor Renewable Energy Co. Ltd.

The partner companies recently announced that they have reached financial close on the project.

Installation of the 20 Siemens SWT-6.0-154 Direct Drive wind turbines will take place in 2019.

#### First TrinaPro project on its way

Trina Solar says it has won a bid for a 250 MW 'Top Runner' PV power plant project in Tongchuan, Shaanxi, China.

The project will be the first in the world to use Trina's TrinaPro design solution, which aims to integrate photovoltaics, agriculture and tourism and lift communities out of poverty.

The 'Top Runner' project is a dedicated PV support programme initiated by China's National Energy Administration (NEA) in 2015. It is designed to facilitate the deployment of advanced PV technologies and the upgrading of manufacturing for the entire industry in China.

#### Boryeong reduces emissions

Korea Midland Power Co. Ltd. (Komipo) has placed an order with Mitsubishi Hitachi Power Systems, Ltd. (MHPS) and Mitsubishi Hitachi Power Systems Environmental Solutions (MHPS-ES) for environmental systems upgrade work at Unit 3 of the Boryeong power station.

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 coal fired power plants.

The Boryeong power station is located in the city of Boryeong, South Chungcheong Province. The plant was launched in 1983 and has a rated output of 4800 MW.

Unit 3 at the plant is to be upgraded.

MHPS's work will include the supply of core parts for upgrading the FGD equipment, delivery of a denitration catalyst, and the revamp of the electrostatic precipitator.

### Europe

#### Innogy awards Triton Knoll contract

Innogy SE has awarded UK construction firm J Murphy and Sons a £100 million contract for the onshore portion of the 860 MW Triton Knoll offshore wind farm.

The deal is Triton Knoll's first major construction contract. Initial works to prepare for the onshore main construction started in June.

J Murphy will install the onshore cable circuits, part of the Triton Knoll Electrical System (TKES), which runs from the landfall point near Anderby Creek to a new substation for the wind farm at Bicker Fen.

#### Siemens and Lempäälän Energia to build microgrid

Lempäälän Energia has awarded Siemens a contract to implement a self-sufficient smart grid system in the industrial area of Marjamäki, Finland.

Siemens' scope of supply encompasses the design and engineering of a smart medium-voltage microgrid, the corresponding grid automation system and an electrical storage system.

The project is part of the Lemene initiative, which aims to build a cost-effective and environmentally friendly energy system that also guarantees secure electricity supply. After implementation of the microgrid, industrial businesses in the area will be able to connect to the distributed energy system and flexibly participate in different energy markets.

Energy for the microgrid will be produced by two solar panels as well as fuel cells and combined heat and power plants installed in the energy community.

#### Van Oord awards cable contract

Van Oord Offshore Wind B.V. has awarded Prysmian Group a contract to provide a submarine inter-array cable system for Borssele III & IV offshore wind project in the Dutch North Sea.

Prysmian will be responsible for the design, manufacture, supply and testing of about 175 km of 66 kV three core cables with XLPE insulation of various cross-section and all related accessories for the project.

Located 22 km offshore Zeeland, the Borssele III & IV project consists of two wind farm zones with a combined capacity of 731.5 MW.

The wind farms will feature 77 MHI Vestas 9.5 MW wind turbines installed on monopile foundations.

#### Valmet equips Malmö plant

Valmet has begun phase two delivery of its turnkey automation solution to the Heleneholmsverket (HVK) combined heat and power plant in Malmö, Sweden. E.On has announced.

Valmet's delivery scope includes system software and hardware, field engineering and installation for the steam turbine automation retrofit project.

The HVK cogeneration plant is equipped with four boilers and two steam turbines, G11 and G12, with a capacity of 45 MW and 95 MW of electricity, respectively. Valmet completed phase one of the project

in late 2017. Commissioning of the second phase is scheduled for completion in autumn 2018. The third phase will be implemented during the summer and autumn of 2019.

#### Nordex wins 95 MW in Spain

Nordex says it has won orders from an international utility for the supply of 31 wind turbines for three separate wind farms in Spain.

Nordex will supply its AW132/3300 and AW132/3000 wind turbine series for the wind farms, which are located near Zaragoza and Cuenca. The wind turbines will be installed on towers ranging between 84 and 112.5 m in height.

Installation of the wind turbines will start in March 2019.

### International

#### Turkey invites offshore bids

Turkey's Ministry of Energy and Natural Resources has invited bids for the construction of 1200 MW of offshore wind energy capacity.

In a notice in the country's *Official Gazette*, the government said that joint venture partnerships and consortia would be eligible to complete for the right to build the project, which would be the country's first offshore project.

Interested offshore wind developers have until 23 October to submit their bids. The government has identified zones in Saros and Gallipoli in the Marmara region and Kiyıköy in the Thrace as potential sites for the wind farm.

#### Seraphim wins 246 MW Ukrainian project

DTEK has awarded Jiangsu Seraphim Solar System Co., Ltd. a contract for the supply of solar modules for a 246 MW project in Ukraine.

The solar farm will be built in Dnepropetrovsk, central Ukraine, and will be the country's largest solar project to date. Seraphim will supply its high efficiency 330W poly modules to the site by the end of August 2018.

The solar farm will be a key part of Ukraine's plans to increase its renewable energy capacity.

The government has set a target for renewables to account for 11 per cent of power consumption by 2020.

#### Contracts inked for Oman power plant

Oman LNG has signed two key contracts to establish a new gas engine-based power plant at its facilities in Qalhat, Sur.

The contracts are an important step in the delivery of Oman's first LNG fuelled power plant, Oman LNG said. It has signed one contract with MAN Diesel & Turbo, and another with KBR.

MAN Diesel & Turbo will design, manufacture and supply the gas engines for the project. KBR will provide project management consultancy services, helping to manage the overall execution of the project and ensure all areas of compliance and safety are adhered to.

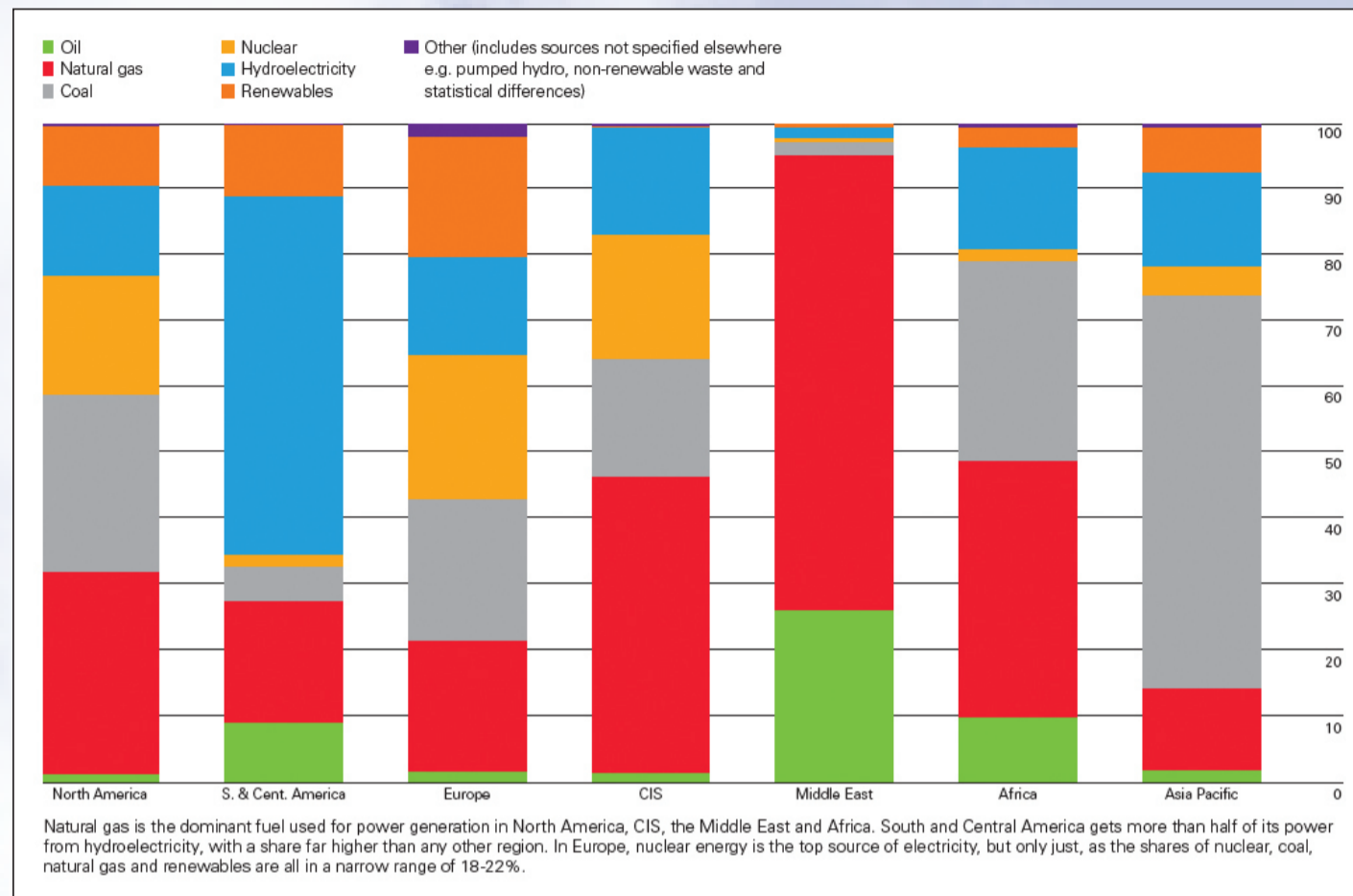
#### Israel plans solar tender

Israel's energy ministry has announced plans to launch a tender for a 500 MW solar energy project.

The solar farm would be built near the southern Israeli town of Dimona, and have been approved by the government's National Infrastructure Committee.



Regional electricity generation by fuel 2017 (percentage)



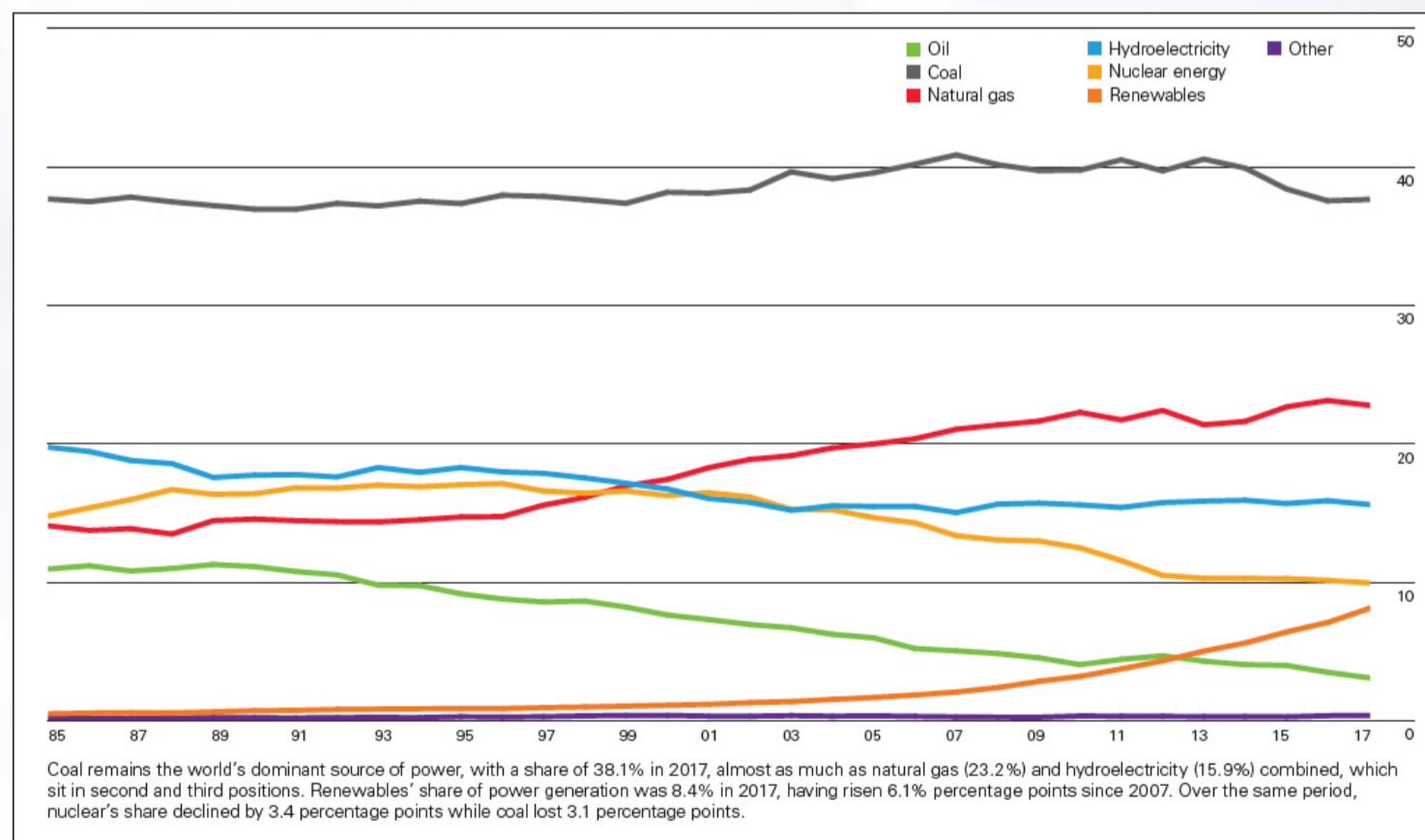
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Share of global electricity generation by fuel (percentage)



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World Energy Outlook 2017, © IEA/OECD, Table 6.6, page 257



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## Oil

# Opec/non-Opec move to maintain market balance

- Agreement to boost production
- Opec ministers agree to 1 million b/d increase

David Gregory

Having accomplished what it initially set out to achieve – bring the oil market into balance and boost crude prices – the Opec/non-Opec alliance led by Saudi Arabia and Russia, respectively, in late June agreed to increase crude production, a move that will put more oil on the market and prevent prices at the pump rising above a level that could jeopardise economic well-being – especially in Donald Trump's America.

Brent crude reached \$70/b in early April and in recent weeks has come very close to hitting \$80/b. US West Texas Intermediate has been in the \$60/b range for all of the year and has in recent times spilled over the \$70/b mark. All good news for oil producers and traders but on track to that precarious territory that the oil industry has come to know so well. If the market is to stay in balance, Opec/non-Opec realised, the time to take steps is now, before that summer driving

surge takes place and rising crude prices moves deeper into kicking up the price of everything, thus jeopardising the global economy.

Opec and non-Opec on June 23 agreed to ease restrictions on production and increase oil output. Saudi Arabia had been under increasing pressure from the US to boost output, an act that would help to cool rising retail prices in the US that were drawing dangerously close to \$3.00/gallon.

At a pre-ministerial meeting in Vienna, on the day before the official gathering, Saudi Arabian Oil Minister Khalid al-Falih said Riyadh would recommend an increase in Opec quotas amounting to 1 million b/d. Its ally in the effort for market rebalance, Russia, had urged quotas to be lifted by 1.5 million b/d. Together, Opec and non-Opec participants in the production cutbacks had committed to remove 1.8 million b/d from the market. Over-compliance with that target has put cuts at 2.8 million b/d.

Falih justified his recommendation by citing data indicating that global

markets would face a large supply deficit during the second half of this year and that a substantial production increase would be needed to prevent a supply squeeze – and the higher retail prices that would accompany that. “We will release supply. One million [b/d] sounds like a good target to work with,” he said. Falih warned that rising prices would eventually put a damper on crude oil demand.

If anything, the November 2016 agreement between oil producers resulted in more oil being removed from the market than was originally sought. Production disruptions in Opec members Libya, Nigeria, Angola and Venezuela have seen total output from the so-called Vienna Alliance (the Opec/non-Opec group) fall by 2.8 million b/d.

On June 23, a day after Opec ministers agreed to the 1 million b/d production increase recommended by Saudi Arabia, the Opec/non-Opec group met to confirm Opec's decision of the day before. For Opec, the production increase will translate into its

over-compliant members to return to the quotas established two years ago.

The group gave no clear target on oil production because it looks likely that market share will continue to be a contentious issue.

Some Opec members lack the spare capacity to produce at their quota, which could see actual Opec production rising by about 600 000-800 000 b/d in the months ahead. Iran and Venezuela, both of which are facing US sanctions, stand to lose share in the global market. These gaps will likely be taken up by Saudi Arabia, Kuwait and the UAE, which all have extra capacity.

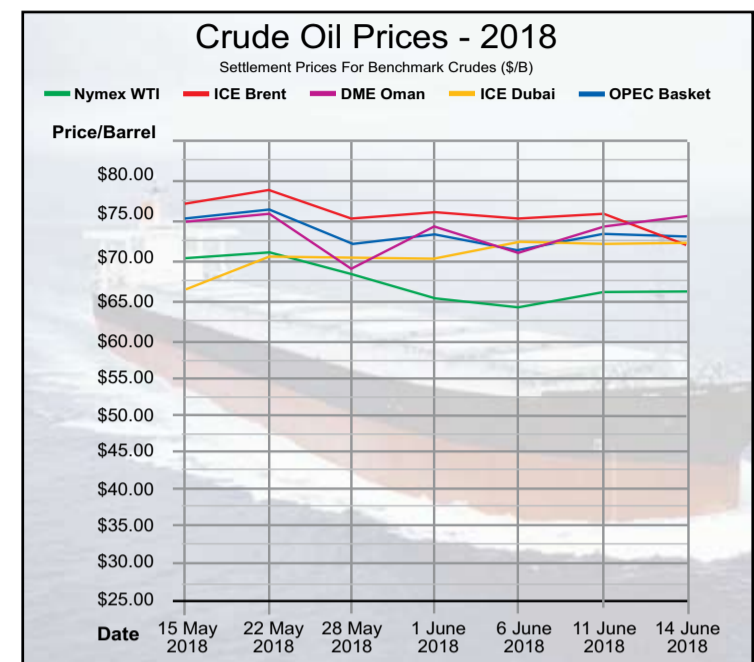
Analysts suggest that US sanctions against Iran and the aggressive position that Washington is taking with its allies to halt Iranian imports could see Iran's production falling by 1 million b/d by the end of the year. Venezuela's output is careening to around 1 million b/d, helped not just by US sanctions, but by domestic economic policies that are ravaging the country. For its

part, Iran has strongly disagreed with Saudi Arabia about increasing output but expressed satisfaction with the Opec meeting outcome, as it continues to target existing quotas.

Non-Opec agreed to support the Opec decision taken the day before, but the joint agreement offered no target figures. Saudi Arabia's Falih said the agreement with non-Opec will see Saudi Arabia boost production by hundreds of thousands of barrels and that together Opec and non-Opec supply should increase by 1 million b/d in coming months.

The news was good for world consumers; not only had the US pressed Opec for more crude but big users India and China had also urged more oil on the market, citing the consequences on global economic growth if high prices and short supply come back into play.

Forecasters continue to see increasing growth in demand for oil in the months and years ahead and manipulating the balance will be the challenge facing oil producers.



## Gas

# China spares US LNG imports from oil tariffs

With a need for reliable sources of supply, China has exempted US LNG from import tariffs – even as a trade war looms.

Mark Goetz

As the prospect of a trade war between the US and China looms, Beijing has left US LNG off a list of American items that will be taxed in retaliation to an order issued by US President Donald Trump in mid-June to impose tariffs on \$50 billion worth of Chinese goods. Following an announcement by China that it would impose tariffs of its own, Trump threatened to place an additional \$200 billion tariff on Chinese products, further ratcheting up concern among international traders.

By late June there were reports that Chinese refiners had begun steering away from US crudes, but a 25 per cent tariff levelled by China on US crude imports will not be so hard on either country, analysts have stated. China will find other sources of crude, most likely from the North Sea, West Africa and the Middle East, and very possibly from Iran, which is facing renewed US sanctions, while the US

will be able to expand the market for its growing oil exports to other regions of the globe, probably in Europe.

But LNG is a different matter for both countries. As demand in China grows, it will need reliable sources of supply and the US, with large volumes of gas available for exports, will need markets.

China's list of US goods saddled with a 25 per cent tariff includes crude oil, petroleum products and LPG. But Beijing has not included American LNG on the list, and this is as important to the US as it is to China, which is in the process of switching its power generation system away from coal and towards natural gas, prompting increases in demand for LNG, not only from the US, but other suppliers. During 2017, China's demand for LNG increased by 46 per cent, displacing South Korea as the world's second-largest buyer.

China's increasing demand for LNG is expected to account for a quarter of

global consumption between 2015 and 2040, according to the US Energy Information Administration (EIA). Many LNG suppliers are keen to tap into this growth, such as traditional producers Qatar and Indonesia, but new supply from Australia, the US, Canada and East Africa also have China lined up as a prime market.

China last year purchased 15 per cent of total US LNG exports, which accounted for 4 per cent of China's 2017 demand. Taxing US LNG could have resulted in an important new supply source being priced out of reach for Chinese buyers and left US producers scrambling to find other markets that do not show China's rising level of demand.

Earlier this year, the first US LNG exporter, Cheniere Energy signed an agreement with China National Petroleum Corporation (CNPC) covering the purchase of 1.2 million tons annually until 2043.

So far this year, according to the

Edinburgh-based consultants Wood Mackenzie, China has imported 1.25 million tons of US LNG, up from 1.61 million tons for the whole of 2017. This volume is expected to grow, the consultancy has said.

Venture Global LNG, which is developing two LNG plants in Louisiana, USA, has signed supply contracts with BP, Portugal's Galp, Shell and Italy's Edison. Loadings are scheduled to begin in 2022. Most of this crude could be sold on a spot basis.

Since 2010, China's LNG imports have increased from about 9 million tons to around 37 million tons in 2017.

“LNG is clearly seen as an essential good by the Chinese government,” Nicholas Browne, who heads Wood Mackenzie's Asia-Pacific gas and LNG division, was quoted as saying in the US media: “In the event of an escalation [in the trade war], LNG is likely to remain outside the bounds of any additional tariffs.”

The prolific production of shale gas in the US has led to a complete turnaround of the US gas industry, prompting a rush by US companies to develop LNG export facilities, and attracting the interest of foreign investors in the process.

After an initial wave of licenses for such facilities by the US government, a second wave of plants is expected to begin rolling as investors prepare to make final investment decisions. Indicators suggest that the mid-2020s will see a significant expansion of markets for LNG and of production facilities.

There is currently about 49 million tons/year of LNG projects under consideration for construction in the US, which is seen as eventually becoming a major LNG producer. A serious trade dispute with China that includes LNG will do considerable damage to US companies' plans to expand an industry that holds considerable promise for the US economy.

# Powering growth

For the first time Nexans has appointed a Chief Technology Officer, in charge of the Management of Innovation & Technology and Acceleration, to its Management Board. **Junior Isles** speaks to Dirk Steinbrink about developments in transmission systems and other key areas of technology that will be a key part of the company's 'Paced for Growth' strategy.

Earlier this year, France-based company, Nexans, a specialist in the supply and installation of cables and customised cabling solutions, appointed Dirk Steinbrink to the newly-created role of Chief Technology Officer (CTO) at Management Board Level.

The move, which highlights an emphasis on innovation, demonstrates the growing importance of advanced cabling and connectivity solutions, and the desire of companies to expand into new growth areas triggered by the changing energy landscape. Nexans' thinking is encapsulated in its next five-year plan, which it calls 'Paced for Growth'.

By 2022, Nexans' ambition is to derive from its current scope of activities 25 per cent more revenues, an EBITDA (earnings before interest, taxes, depreciation and amortization) increased by around 50 per cent to approximately €600 million, and a ROCE (Return on Capital Employed) exceeding 15 per cent. According to the company, while maintaining a healthy balance sheet, this should allow for external growth options for up to €1.5-2 billion revenues.

The strategy is to grow by addressing megatrends such as the energy transition and smart grids, electric mobility and data transmission.

Commenting on the plan, Steinbrink, previously Senior Executive Vice President for Nexans' High Voltage and Underwater Cable Business Group, said: "Megatrends is a big word – it's the huge iceberg in

front of us but we were able to slice this iceberg into pieces that we can transform into our company's strategy and real actions that we can communicate to our employees and customers."

Nexans is seeing needs for new cable designs but at the same time will not be re-inventing the wheel.

High voltage cables have long been the bread and butter of the company and Steinbrink says the company will continue its advancement of polymer-insulated cables, which he says is the current trend in the high voltage cable industry.

There are currently three main cable insulation technologies: oil-filled, mass impregnated (MI) paper-based insulation and polymer-insulated, i.e. cross-linked polyethylene (XLPE) insulation. In line with the growing call for long distance interconnectors, Nexans has been pushing the power rating of its MI cables. In 2016 it qualified its first 600 kV MI cable, providing a power transmission capacity of 1900 MW in a bi-pole configuration. There is, however, an increasing focus on advancing the capability of XLPE cables.

"Oil-filled is declining but MI still has quite a high acceptance level for long distance [transmission]. For example, Norway-Germany, Norway-UK [links] all use MI cables. It's a technology that has proven to be reliable for many years," said Steinbrink. "The next step is the plastic or cross-linked polyethylene. Today 320 kV cables are tested and in service. The next level is 525 kV, on which we are doing extensive tests with the TSOs (Transmission System Operators) in Europe."

The company has been running 525 kV tests since the summer of 2017 and expects to complete the final tests during the late summer of this year. The tests are being carried out with the German TSOs, which need to transport power generated from wind power in the north, to the south of the country. It is a need that is becoming increasingly urgent, as the 2022 deadline for closing nuclear plants in the south looms ever closer.

The link has to be direct current (DC) because of the distance and it cannot be MI because it is on land and not subsea and here, a 525 kV XLPE cable would be a good option.

Steinbrink explained: "MI cables are less appropriate on land because its length has to be quite short – it needs a lot of joints, which means it takes longer to install. Polymer-insulated cables bring advantages in terms of length. Because they are lighter, you can produce longer lengths and therefore have less

joints."

Although deployment in the German North-South corridor depends on the outcome of the tests and issues such as permitting, Nexans expects 525 kV XLPE technology to become more prevalent with the proliferation of wind power.

With the growing amount of offshore wind, there will be a need for higher voltage, longer cables, to transport that energy inland from the onshore stations.

"When the energy comes from offshore you could have 600-700 MW onshore, which you don't need immediately at the place it has been generated... there is a long list of interconnector projects currently being talked about by the European Commission," said Steinbrink. He says there is also a growing market in China, which he believes will eventually develop an offshore wind market.

Commenting on some other activities that form the new strategy, Steinbrink notes that there are ideas all across the group that need to be pulled together in order to deliver added value.

"My main job is to see what should be developed next. For example, when we are developing new materials in Lyon, we need to adapt to the market's needs and its readiness to let go of materials used today and move to new ones. Today we are screening to see which of these should be developed."

In the field of e-mobility and EVs, one challenge is the cable between the charging station and the car. The cable has to be lightweight but at the same time sufficiently robust to withstand the power being transmitted through it. Companies like Nexans are therefore thinking of new materials and cooling techniques that can be used in such cables.

One breakthrough, which Steinbrink believes holds significant promise for the more distant future, is the use of materials filled with nano-particles. Steinbrink explained: "Early results show this allows strong material but with thin insulation. What makes a cable heavy is the conductor and the insulation; so here nano-materials can play a role."

With materials being a major focus, Nexans will be looking to streamline its work in the field. "Today we have competences in Korea, Germany and in Lyon, France, which is the HQ of the Nexans research. Here we are putting together all the people that can analyse the materials and think about new material testing, applications, fire testing, etc.," said Steinbrink.

The company has also invested in two start-up companies to boost its position in the e-mobility space. In July last year it increased its stake in G2mobility. In April 2016, Nexans had formed an industrial and commercial partnership with G2mobility to develop integrated solutions for electric mobility and address the energy management challenges of EV infrastructure. And in January this year it announced a capital investment in IES, leader in the production of charging solutions for electric vehicles.

"Building on the two partnerships and our own Agicity brand, we offer both AC and DC charging solutions up to 24 kW as well as rapid charging. One of the start-ups is an expert in rapid charging, whereas the other one is more focused on the billing system and software around it," said Steinbrink. "So here, we are bridging the two with our knowledge of cables and our network of sales people."

Energy companies will need to remain competitive as they continue to adjust to the changing energy sector. This means taking advantage of opportunities presented by developments such as the Internet of Things, digitalisation and the electrification of heat and transport.

Accordingly, companies like Nexans will be continuing to adjust their businesses and technology focus to meet those changing needs.

"With the advent of Industry 4.0 etc., companies will need to bring power and data quickly to devices and machines. For us, this means inventing new materials that can withstand higher temperatures and are lighter," said Steinbrink. "Also, considering the huge demand for power and data, when the submarine cables that are carrying it between countries need repair, this should be performed in record times. We are working with universities to see how this can be done faster."

Nexans is banking on the five-year strategy as a way of meeting its customers' needs now and in the future by putting innovation at the heart of its activities. As Arnaud Poupart-Lafarge, Nexans CEO, stated when launching the plan: "The 'Paced for Growth' strategic plan will allow us to go further in the innovation and differentiation of our activities in markets with high-potential on a global scale. Being a cable leader is the core of our activity but today we have the ability to go beyond that to become a critical link, the one capable of providing women and men around the world with the energy and information they need."



Steinbrink says the advent of Industry 4.0 will require new materials that can withstand higher temperatures and are lighter

# Morocco shows Africa the way on renewables

Sub-Saharan African countries can learn much from Morocco about the opportunities presented by developing renewable energy. Junior Isles

Over 1 billion of the world's population still has no access to electricity – the majority being concentrated in Africa. But although the continent is energy-poor, it is rich in energy resources. Renewable energy resources in particular offer great potential in bringing affordable electricity to the 674 million without power, of which around 600 million are in sub-Saharan Africa.

According to the International Energy Agency (IEA), almost half the growth in electricity generation in Africa to 2040 could come from renewables. In terms of centralised power generation, this would be largely through greater exploitation of hydropower and geothermal resources. Meanwhile, solar photovoltaic (PV), wind and mini hydro have significant potential for decentralised generation.

While realising this potential will have its challenges, countries in sub-Saharan Africa only need to look to some of their North African neighbours to see what is possible, and even draw on relevant expertise.

The Moroccan Agency for Sustainable Energy (Masen), for example, is one organisation that is well placed to support sub-Saharan Africa along the road to 100 per cent electricity access.

Commenting on the region, Obaid Amrane, Member of the Board at Masen said: "It is sad that more than 600 million people in Africa do not have access to electricity – more than any other place worldwide. It is even sadder that in some of these countries, people that do have access, have to pay more for electricity than households in rich countries. This means they cannot create virtuous economic growth. Because energy is at the centre of all economies, finding a solution to electricity is a key to overcoming poverty.

"But when considering the energy

resources that are available, such as solar and hydro, in particular, renewables offer many African countries an opportunity to jump one stage of energy development. They can take a short cut straight to renewable energy and all its benefits, without necessarily having to invest in large grids, etc. This could be both a solution and a driver for the economy."

Developing the decentralised renewable energy sector could also create hundreds of thousands of jobs for young people in the installation, maintenance of these micro-grid systems, while improving basic essentials such as education and healthcare, he added.

Amrane believes the international community has a responsibility to work together to create the conditions for a real take-off of both decentralised and large-scale renewable projects.

Morocco is itself a good example of a country that is embracing renewables to the benefit of its people and its economy. Amrane noted that it has a very successful rural electrification programme, where it has achieved almost 100 per cent electrification using solar systems for remote areas, and is now working on more comprehensive micro-grid projects to extend electricity beyond just lighting.

When created in 2010, Masen was known as the Moroccan Agency for Solar Energy – a privately owned Moroccan company with public funding – set up to lead the Moroccan Solar Plan, a programme to install a minimum capacity of 2000 MW by 2020. In 2016, Masen became the Moroccan Agency for Sustainable Energy, with its remit extended to all renewable energy sources (mainly solar, wind and hydropower).

Electricity consumption in Morocco is growing at around 5-6 per cent annually. Until recently, it was dependent on imports for almost all of its primary energy needs. When oil prices reached nearly \$150 per barrel, the country's economic model was called into question, as high and volatile oil prices, combined with shortages in natural gas, threatened growth.

The government therefore set out to diversify its energy mix and saw that its rich solar and wind resources presented an economic opportunity. It set a goal for renewables to represent 42 per cent of installed capacity by 2020, with Masen's contribution being a minimum installed capacity of 3000 MW. This target has since been increased to 52 per cent by 2030 with Masen installing an additional 6000 MW.

The major portion of the early capacity additions will be solar. It is an obvious choice for the country. Morocco has one of the highest rates of solar insolation in the world – about 3000 hours per year of sunshine but up to 3600 hours in the desert.

Masen's plan to build 2000 MW of solar – with projects consisting of

both solar PV and concentrated solar power (CSP) – is among the most ambitious in the world. Amrane highlighted the importance of both solar PV and CSP, noting that the first is good for mid-scale and decentralised rural projects to meet low intensity applications such as television and lighting, while the second, when incorporating storage, is a highly dispatchable large grid-scale technology.

"The technologies are complementary and can be complementary at a single plant. This is what we are trying to demonstrate at Midelt... We are using both technologies at one large-scale solar power plant to dispatch a very smooth load curve," said Amrane.

The Noor Midelt solar complex is an 800 MW plant, consisting of two 400 MW plants. Each plant will have around 150 MW of CSP and the remainder as PV. Contracts for the project are expected to be awarded by the end of this year, and should be in operation by 2021.

"It will be a new ground breaking trend in solar that demonstrates that we can compete with base load fossil fuel solutions," said Amrane.

Replicating such projects elsewhere on the continent will call for the right legal and regulatory framework to attract the required investment.

According to the IEA's 'Energy for All Case' cumulative investments between 2017 and 2030 under current policies and commitments are less than one-fifth of the level needed to achieve universal electricity access in sub-Saharan Africa. It estimates that the additional cumulative investment required amounts to \$370 billion between 2017 and 2030 in its New Policies Scenario, which is its central scenario.

In addition to the legal and regulatory framework needed to attract such significant sums, Amrane says countries also need "a good investment framework" to reduce capital costs, and the ability to structure and develop "innovative financial and contractual schemes".

Masen says it has signed Memorandums of Understanding with more than 12 African countries to share its experience in the development of renewable energy programmes and to develop some specific projects in solar, wind and hydro.

Amrane said: "For this, we will need dedicated investment tools because renewable energy is highly dependent on financing. The investments are highly capitalistic. Optimisation of the investment of the project in terms of its size and the financial scheme to reduce capital cost to the investor will make the project more affordable to the consumer."

Certainly, financing of renewable projects is becoming easier as lenders around the world turn away from investing in fossil fuelled project and companies that have fossil fuel assets.

But Amrane stresses that dedicated tools are needed to improve credit risk and investment mechanisms for African countries. "They have to be specific," he said.

He highlighted several areas that could help speed up the implementation of renewables projects. These include reducing the cost of lending, improving insurance schemes with insurance against political events and natural disasters.

"We are working with some international financial institutions on regional tools to improve the investment framework in order to accelerate financing and capacity building for these projects, and create some momentum," said Amrane. "We are also working to create a base of developers and industrial companies that can solve the problems that can be related to logistics, etc."

Fostering favourable conditions for the development of renewable projects is crucial; for the economies of African countries, it can be a game-changer. This has certainly been the case in Morocco.

"These projects can be transformative for our country," said Amrane. "Morocco will be one of the few countries to have more renewables capacity than fossil fuel capacity by 2030. At this level, we created the conditions to attract investors, gave more visibility to industrials and succeeded in reaching very competitive prices for renewable energy."

Morocco's renewables programme has made an impressive start and continues to make good progress.

The country is well on its way to completing what will be the world's largest CSP project at Ouarzazate. The first 160 MW phase of the 580 MW facility began operation in 2016 and the final two stages should be fully operational by the end of the year. When complete it will meet the electricity needs of nearly 2.3 million Moroccans.

Construction of more than 850 MW of wind power projects throughout the country is under way and new capacity is under development. Amrane also said that Masen is open to other forms of renewable energy such as wave and tidal and waste-to-energy, as well as what he calls "power-to-x", i.e. the production of green fuels from renewable energy.

He notes: "Morocco will not just stick to power generation but will also develop industrial activities related to the renewable energy sector."

Masen is committed to the spread of renewable energy, not just in Africa but also in the Mediterranean region by improving renewable energy market integration via its transmission link with Spain and potential interconnection with Portugal.

He concluded: "We are working to see how these systems can be improved in the future to contribute to the reduction of CO<sub>2</sub> emissions and help achieve the Paris Climate Agreement targets."



Amrane: Masen has signed MoUs with more than 12 African countries

# At your service

With large gas turbine sales struggling in Europe and other parts of the world, generating revenue through servicing and upgrading existing fleet is becoming more important. GE is looking to expand in the market through its Cross Fleet solution – a range of capabilities to service and advance the performance and reliability of other original equipment manufacturers' gas turbines. **Junior Isles** reports.

As gas turbine manufacturers struggle in a number of geographic markets, some are looking at other ways of generating revenues from the business. In May, GE's Power Services business unveiled what it is calling its 'Cross-Fleet' gas turbine capabilities.

The move comes against a backdrop that has seen global large gas turbine sales fall from 180 units in 2016 to a projected 100 units this year, according to industry estimates.

Speaking during a press call on the market and GE's plans for servicing, Scott Strazik, the recently appointed President and CEO of GE's Power Services business said: "The gas turbine market in Europe has been complicated, to say the least – with economic dynamics and renewables growth – but we are seeing a number of potential opportunities that will play out for us in the next 12-24 months."

"The utilisation of machines over the last five years has been falling... that said, in southern Europe, in places like Spain and Italy, we are actually seeing utilisation rates go up. On average, our fleet in Europe runs for about 5000 hours a year... the grid is changing and demand is changing but it's a market where we still see a lot of opportunity to service our fleet in different ways and service our customers."

GE has a fleet of about 7500 gas turbines, with associated balance-of-plant and, according to the company, the central goal of Cross Fleet is to expand the installed base in which it

installs its technology.

The first two other OEM turbine models being addressed are Siemens' SGT-800 and Mitsubishi's 501F units. GE estimates there are 300 501F units operating worldwide, mostly in the Americas and Asia and believes it can bring significant value to the table in terms of heat rate. The SGT-800 – until now solely serviced by Siemens – also represents a market of about 300 units, predominantly in Europe, Russia and more recently, Thailand.

Explaining the thinking behind Cross Fleet at a later meeting in Baden, Switzerland, for the introduction of the offering, Strazik said: "Cross Fleet is not [just] about servicing other OEM machines; it's about taking those machines and making them our own – adopting those machines and inserting our technology."

Martin O'Neill, General Manager of GE Power's Services division added: "It's about growing the GE fleet, and the way we achieve that is by bringing significant value to the table."

Essentially GE says it will introduce its developments in alloys, thermal barrier coatings, experience with cooling and advances in computational modelling, which allows tweaks in the turbine for better aerodynamic and cooling air flow. This in turn permits higher firing temperatures or the same firing temperature for prolonged periods.

O'Neill points out that GE has some "heritage" on the SGT800

through its acquisition of Alstom. He noted that a lot of the development work around combustion and hot gas path was actually performed in Baden before Alstom sold its industrial gas turbine business to Siemens in 2003. This, he believes, puts GE in a much better position when it comes to implementing improvements that can benefit customers.

"For an operator or customer/user of an SGT800 specifically, which is very strong in the cogen and industrial space, increased performance output can mean additional monetisation if they can sell the additional base load power. It can also be additional process heat and steam," said O'Neill. "We're doing all of this with the improvements in combustion, swirl and blade aerodynamics." He added that improvements were also being made possible through more complete combustion, which translates into a heat rate improvement. "This gives an uptick in the power output," he said.

On the SGT800, GE says its upgrades can lead to about a 6 per cent improvement in power output and 1.5 per cent increase in efficiency, depending on the platform – the SGT800 essentially has three platforms, or evolutions: A, B and C. Platform C was introduced in the late 1980s/early 1990s; Platform B in the mid-2000s and Platform C being the current version. In terms of operability, the Cross Fleet solution can improve flexibility by allowing turn-down to 40 per cent of full load, while staying within NOx emissions limits.

Notably, GE claims the introduction of its technologies to the machine will allow the time between overhauls to be increased from the OEM's published 24 000 effective operating hours (EOH) to 40 000 EOH.

"For someone running an industrial application, that could be the difference between having to take the machine down in winter or in summer. It also gives them flexibility to sequence with balance-of-plant for outages," said O'Neill.

Looking at Mitsubishi's 501F, which was essentially the old Westinghouse machine, GE again has gained knowledge and experience as a result of historical acquisitions. Westinghouse had a technology collaboration with Westinghouse Power Generation before Siemens bought the Westinghouse division in 1998. At this point there was a technology split on the F-class units, resulting in the Mitsubishi 501F and the Siemens SGT6 5000F.

O'Neill therefore pointed out: "Whether it's a Mitsubishi or Siemens machine, in whatever region of the world, we have a Cross Fleet solution for that configuration."

He says the 501F has "a few sticky reliability issues" in terms of blade fatigue, last stage blades and bearing sag in the two-stage exhaust section, which Cross Fleet can address. Again this allows operators to extend outages, etc. And on output and efficiency, he added that the company was trying to "bring value to the table".

O'Neill explained: "On these machines it's more pronounced than on the SGT800 – we think we can achieve about an 8 per cent improvement on performance and about a 2.5 per cent improvement on heat rate. We believe this is significant and sets us apart from other service providers in this space."

As with the SGT800, all of this is achieved through a similar combination of: improved alloys; thicker thermal barrier coatings that are more durable and resistant; improved cooling; combustor DLN (dry low NOx) design; etc.

At the same time, GE says it has also been building its capabilities in supply chain and operations to complement its existing service team around the world.

"Over the last about 18 months, we've really built up our infrastructure and our capability," said Paul Wise, the operations leader for Cross Fleet. "We've been looking at what we can already use from the existing GE and Alstom service platforms. And then developing the repairs technology, extending our field service tooling field service execution capability and bringing in people that have experience on these frames."

The company already appears to be reaping the rewards of its efforts. "We're having a lot of discussions, particularly in Latin America where base load output is an issue and there's strong demand for more power," said O'Neill. "Customers can do a like-for-like outage with an existing OEM, or they can approach GE and we can do an outage in a similar time frame – but at the end of it, give them a significantly improved machine."

This is its third year of significant investment during which GE has been testing, dialoguing, signing and executing orders. Already the company says it has a more than \$200 million backlog in orders – 15 of which have been completed and one that is ongoing.

Looking forward, O'Neill says that Cross Fleet is a "proof-point of scalable technology and service platform". And he is confident of extending it to other machines. He concluded: "The order backlog is a promising start and I'm glad we have penetrated on both platforms but I would like this business to go at least 2x in the next 12 months."

**GE's Birr factory in Baden where development work around combustion and hot gas path was performed**





Junior Isles

# Deciphering fact from fantasy

With the enormous changes being witnessed in the energy sector, there is an understandable preoccupation with the question: “what’s next?” And discussions at recent talk shops did not disappoint when it came to attempting to decipher likely future scenarios from flights of fancy.

For the last 20 years, Goldsmiths, University of London, says that it has been researching the forces of change and transformation and the effects on lives. Speaking at last month’s annual Eurelectric conference in Ljubljana, Slovenia, Dr Chris Brauer, Director of Innovation, Institute of Management Studies at the university described the nature of the challenge that utilities face in predicting and preparing for the future energy landscape.

“The entire adventure of what’s next is like trying to see around corners. How can we anticipate what’s going to come next and be predictive or prescriptive of what the future might hold?”

“These forces of decarbonisation, decentralisation and digitisation are real-life phenomena. It’s very messy, and there’s often a tendency to look

for an easy solution or blueprint for dealing with things... to try to find a theory of everything. In thermodynamics we call this entropy, a measure of disorder. In information science, we call it noise.

“There’s an enormous amount of disorder and noise in the world at the moment. And particularly when you look at the transformation the electricity industry is going through, we can think of it as being akin to going from matter, to liquid, to gas.”

Speaking on the sidelines of the conference, Serge Colle, EY Global Power and Utilities Advisory Leader, gave a less metaphorical view of the major changes that are under way, along with a predicted timeline on when key tipping points would occur. He referenced a report published by EY earlier this year, which stresses that utilities are on a countdown to reinvention.

Utility revenues have been under pressure for some time as a result of the rise in renewables. This, combined with the proliferation of distributed energy resources, the falling cost of battery storage, and more empowered consumer behaviour, is changing how electricity is produced, consumed,

traded and valued.

The pace of change will be defined by three technologies: solar, battery storage and electric vehicles. According to EY, falling solar and battery costs and the rise in EVs – as the cost of electricity from the traditional system continues to rise – will result in three critical tipping points: the first being when self-generation of power becomes affordable for all, i.e. grid parity; the second, when EVs become mainstream mobility options (EV parity); and the third when delivering power via the grid costs more than it does for consumers to produce it themselves.

The timing of the tipping points varies from market to market but in Europe the first will come as early as 2021; in the US it will be much later. The second point comes in 2025 for Europe. The third occurs just after 2040 in Europe and Oceania, slightly later than in North America.

Colle commented: “This shows that whatever happens, if we don’t change anything, the energy system will become economically unsustainable... we will see massive grid defection. If you look at the current payback model, whereby distribution companies recover their money by paying for the network on the basis of consumption, the reality is that if we only have five years, in the regulatory cycle that is only one and a half cycles. That is very, very short.”

Colle also noted that while none of his 60 utility clients have challenged the timings, they are still surprised they are coming so quickly.

In short, utilities have no time to procrastinate, trying to predict the future. According to Dr Brauer, the reality of the changes that are under way means the biggest industrial companies in the world have 15 years to live at the top of their game. “There are many reasons why they vanish but fundamentally, it’s the S-curve. They do one thing, and they do it pretty well, and then they decay and die just like human beings; they are mortal. But the lifespan of businesses, unlike the lifespan of human beings, is shrinking dramatically in the midst of this transformation. It’s already happening in the electricity sector.”

During the conference, Francesco Starace, CEO of Enel and current Eurelectric President, said: “It is not a helpful discussion to say the industry in 2050 will be ‘x’. It is more important to look at innovation as a combination of things that solves problems.” Steven Martin, Chief Digital Officer, GE Power added: “Predicting the future is not difficult, knowing what to do about it is.”

Instead of trying to predict the future of energy innovation, energy companies should focus on building an agile, collaborative business that is ready to quickly pivot to take advantage of new technology and trends. EY’s advice for utilities preparing for the imminent tipping points of their sector is to make smart “no regrets” investments now, while planning for a very different future.

It advises utilities to first, invest in digital grid infrastructure. It notes that however the future energy ecosystem evolves, it will be built on digital

technology – the investments utilities make now will determine how well equipped they are to reap the benefits of digital applications tomorrow.

Secondly, it says they should evaluate new business models. “In the new energy ecosystem, revenue growth will come from enabling self-generation, growing digitally-enabled energy services and the EV ecosystem. Utilities will need to consider potential business models supported by digital grid investment, such as EV infrastructure and microgrids.”

Third and last, EY advises utilities to engage the regulators to shape a future role. In most markets, it says, the regulatory models that shape energy investment are yet to catch up with the sector’s transformation. “Different models of incentivising utilities could encourage more innovation. Now is the time for energy companies to drive the discussion around their future roles to ensure relevancy and remuneration in the long-term.”

Indeed we have already seen some utilities in Europe take their first steps in transforming themselves in line with the changing sector. Colle stresses, however, that “a call to action” is needed in order “to accelerate readiness”.

The electricity sector has to look to solutions through experimentation, agility and ways of thinking of solving problems. And sometimes those solutions are found in the most unexpected places. At the recent Energy Live Future event in London, UK, Bas Lansdorp, Co-Founder & Chief Executive Officer (The Netherlands) of Mars One, a Dutch company who’s aim is to send humans on a one-way trip to Mars, spoke of how interest in funding the mission was coming from companies and sectors that could not have been predicted. He also noted how the business case for technologies such as expensive lightweight solar panels could first see applications in space as a forerunner to terrestrial deployment.

Utilities may not be facing the same level of unknowns as those embarking on the Mars One mission – if it ever sees the light of day. And they may not share Lansdorp’s enthusiasm for the unknown. But the future is coming, whether we like it or not, and cannot be predicted using all the technology in the world.

As Dr Brauer summed up in his speech in Ljubljana: “You’ve heard of the butterfly effect; a butterfly flaps its wings in China and here you get a tornado... we have no idea of what can happen. All the data science and predictive systems in the world cannot tell you what caused the tornado. That’s the main mistake that’s happening with the world of data science and predictive analytics today – mistaking correlation for causation.”

In his summary, he could have just as easily been a school master at Hogwarts, as opposed to a world-renowned researcher at a top London university. His final advice to delegates? “In the electricity marketplace, you need to be able to think magically. Magically thinking about new solutions has to be embedded into your DNA as an operating principle. If all else fails, use magic.”

Are you sure this is the best way to figure out what to do next?

