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Special Supplement

There is an urgent need to move to a carbon-neutral energy future. *TEI Times* discusses why this transition has to be done sustainably, and in a way that improves system resilience.



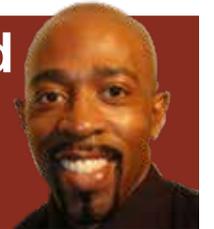
Time to lead

In the countdown to COP26, Asia energy expert and author, Joseph Jacobelli, argues that Australia must be a decarbonisation leader, not a laggard. *Page 14*



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Iraq's electricity sector must bring in long-term reforms and solutions to fix its power crisis, an International Energy Agency official has said. *Page 8*

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EU moves to align legislation with 2030 emissions target

The EU's 'Fit for 55' package revises more than 10 pieces of legislation to bring them in line with the new ambitions of the European Union's Green Deal, the increased targets for 2030, and a climate-neutral Europe by 2050. But although broadly welcomed, some still have concerns about the package. **Junior Isles**

The European Union's raft of proposals detailing how it will cut the bloc's emissions by 55 per cent compared to 1990 levels by 2030 has been broadly welcomed but may still require further policy and regulation changes.

In its 'Fit for 55 package', the European Commission last month laid out 13 legislative proposals aimed at cutting carbon emissions across all the major energy consuming sectors on the road to reaching net zero by 2050. By targeting a 55 per cent emissions reduction the EU could save as much as 8 billion t CO₂ cumulative emissions.

Notably, the proposals include a revised Renewable Energy Directive (RED III); an extended Emissions Trading Scheme (ETS) that now also

covers aviation and maritime; a revised Energy Taxation Directive; support for biofuels, hydrogen and carbon capture and storage; as well as a Carbon Border Adjustment Mechanism (CBAM).

According to Wood Mackenzie data, the EU would need 472 GW of additional wind and solar by 2030 to secure its new renewables target. The global energy and commodities consultancy said, however, the task of installing the required amounts of wind and solar would be "unnecessarily challenging" unless further policy and regulation changes are made.

In a press statement, it said the planning, connection and permitting process will need to be streamlined, distribution network investment will

need to be in place, and regulators will need to adopt a new net zero mindset. "On top of this, system flexibility build-out will need to be supported, and market reforms will need to be in place to ensure it is fit for operating in a zero marginal cost producers' environment," it added.

The lack of adequate provision for system flexibility in an energy landscape that is being increasingly dominated by intermittent renewables was also a concern to energy storage proponents.

The European Association for Storage of Energy (EASE) said that the revised RED III does not offer sufficient support for the energy storage that will be needed to integrate renewables into the energy system.

EASE Secretary General Patrick Clerens noted: "EASE supports that the revised directive increases the overall Union target for renewable energy in 2030 to 40 per cent, which is a positive step. The RED III proposals, however, fall short in terms of supporting energy storage deployment to facilitate renewable energy sources (RES) integration. This is a mistake because focusing only on deploying more RES is insufficient... Energy storage is a key enabler of a RES-dominated system, as it can ensure security of supply, efficient energy system operation, and the competitiveness of EU industries."

The proposals to strengthen carbon pricing have also been welcomed, as

Continued on Page 2

Rapid scaling of clean energy investment needed

Achieving net zero carbon emissions by 2050 will require as much as \$173 trillion in investments in the energy transition, according to BloombergNEF's (BNEF) 'New Energy Outlook 2021' (NEO), the latest edition of its annual long-term scenario analysis on the future of the energy economy.

With the route to net zero being uncertain, BNEF's NEO outlines three distinct scenarios (Green, Red and Gray) that each achieve net zero while relying on a different mix of technologies.

It notes that the energy transition requires substantial investments in infrastructure, with capital flowing away from fossil fuels and toward clean power and other climate solutions. Despite uncertainty around the overall cost of each NEO scenario set out, BNEF estimates investment in energy supply and infrastructure amounts to between \$92 trillion and \$173 trillion over the next 30 years. Annual investment will need to more than double to

achieve this, rising from around \$1.7 trillion per year today, to somewhere between \$3.1 trillion and \$5.8 trillion per year on average over the next three decades.

A core part of the BNEF analysis is constructing sector-by-sector emissions budgets to achieve net zero in 2050 with an orderly transition. Together these show that global energy-related emissions need to drop 30 per cent below 2019 levels by 2030, and 75 per cent by 2040, to reach net zero in 2050. This is a 1.75°C equivalent budget that implies a 3.2 per cent reduction each year to 2030 and a swift reversal of recent trends: emissions rose 0.9 per cent a year from 2015 to 2020.

The power sector needs to make the greatest progress over the next decade, reducing emissions by 57 per cent from 2019 levels by 2030, and then 89 per cent by 2040.

"There is no time to waste. If the world is to achieve or get close to meeting net zero by mid-century,

then we need to accelerate deployment of the low-carbon solutions we have this decade – that means even more wind, solar, batteries, and electric vehicles, as well as heat pumps for buildings, recycling and greater electricity use in industry, and redirecting biofuels to shipping and aviation," said BNEF Chief Economist Seb Henbest.

Last month the International Energy Agency also said the sums of money, both public and private, being mobilised worldwide by recovery plans fall well short of what is needed to reach international climate goals.

New analysis from the Paris-based agency said that governments worldwide are deploying an unprecedented amount of fiscal support aimed at stabilising and rebuilding their economies, but only about 2 per cent of this spending has been allocated to clean energy measures. It noted that shortfalls are particularly pronounced in emerging and developing economies, many of which face

particular financing challenges.

Under governments' current recovery spending plans, global carbon dioxide emissions are set to climb to record levels in 2023 and continue rising in the following years. This would leave the world far from the pathway to net zero emissions by 2050 that the IEA set out in its Global Roadmap to Net Zero.

These findings come from the new Sustainable Recovery Tracker that the IEA launched in July to help policy makers assess how far recovery plans are moving the needle on climate.

"Since the Covid-19 crisis erupted, many governments may have talked about the importance of building back better for a cleaner future, but many of them are yet to put their money where their mouth is. Despite increased climate ambitions, the amount of economic recovery funds being spent on clean energy is just a small sliver of the total," said Fatih Birol, the IEA Executive Director.

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they should begin to incentivise industrial decarbonisation through the use of technologies like high temperature heat pumps or carbon capture.

“Reforming the carbon market will be critical, especially for the hard-to-decarbonise industrial sectors, such as cement and steel,” said the Wood Mackenzie statement. “Though the EU ETS covers sectors that generate half of the bloc’s emissions – power, industry and aviation – these sectors will only deliver a third of the cuts needed by 2030.”

With the ETS, the EU has tried to push companies to gradually reduce their emissions to minimise their cost of emissions allowances, which have risen from €8/t of emissions at the start of 2018 to over €50/t in early May.

In the absence of any changes to the proposed package, ICIS (Independent Commodity Intelligence Services) expects EU ETS prices to reach around €90/tCO₂ by 2030, with a price increase expected in particular in the second half of the decade when the proposed reforms to free allocation would take effect.

The EU is also acting to ensure its efforts to increase carbon prices do not put its economy at a disadvantage. The CBAM aims to prevent carbon leakage and ultimately encourage the rest of the world to reduce emissions. The mechanism will create a level playing field on emissions costs for companies exporting goods to the EU and EU producers already subject to the ETS.

The CBAM proposed in Fit for 55 will cover the steel, aluminium, cement, electricity, and fertilisers sectors. ICIS estimates that around 200 million t of embedded emissions would initially be covered by the measure.

Commenting on the proposal, Sebastian Rilling, Analyst EU Power & Carbon Markets, ICIS, said: “It remains to be seen, however, to what



Whiteside: implementation of the CBAM could be a “logistical nightmare”

extent domestic carbon pricing schemes in the countries of origin as well as a potential resource shuffling will limit the impact for importers on the ground especially in the first years of operation.”

James Whiteside, Global Head of multi-commodity research at Wood Mackenzie, warned that implementation “could prove to be a logistical nightmare”. He said: “There is little transparency around carbon emissions associated with products. Determining the country of origin of products can also be problematic. Robust certification schemes must be adopted – and adhered to – to effectively administer border taxes.”

Continued fossil fuel support will put Paris goal beyond reach

- G20 gives more than \$3.3 trillion to fossil sector over four-year period
- Oil and gas companies to consume sector’s carbon budget by 2037

Junior Isles

Fossil fuel subsidies and continued exploration by oil and gas majors are at levels that put the Paris climate goal beyond reach.

In July a report by BloombergNEF (BNEF) and Bloomberg Philanthropies revealed that governments of all 19 individual country members of the G20 have given more than \$3.3 trillion in subsidies for coal, oil, gas, and fossil fuel production and consumption from 2015-2019. At today’s prices, that sum could fund 4232 GW in new solar power plants – over 3.5 times the size of the current US electricity grid, said the report.

Phasing out support for fossil fuels, particularly coal, and shifting funding to renewables is a crucial step to accelerating the clean energy transition and is core to the upcoming Glasgow COP26 climate conference goals.

The ‘Climate Policy Factbook’ highlights three concrete areas in which immediate government action is needed to limit global warming to 1.5 °C: first, phasing out support for fossil

fuels; second, putting a price on emissions; and third, encouraging climate risk disclosure. In each of these areas, the report found that the policies of many G20 countries were significantly off course.

G20 nations collectively cut fossil fuel funding by 10 per cent from 2015 to 2019, with eight member nations making notable progress in reducing their fossil fuel subsidies by 10 per cent or more (Argentina, Germany, Italy, Saudi Arabia, South Africa, South Korea, Turkey, and the UK).

However, to remain in line with the Paris Agreement goals in the lead-up to COP26, the G20 cannot rely on the actions of a few nations, said the report. “Every G20 country must take immediate action to end support of fossil fuel projects and accelerate their coal phase-outs,” it said.

During the same timeframe (2015-19), eight members increased their support – notably Australia, Canada, and the US – encouraging the use and production of fossil fuels, distorting prices, and risking carbon ‘lock-in’ – where assets funded today continue to

emit high levels of emissions for decades ahead.

According to BNEF, to effectively lead the phase-out of coal and other fossil fuels ahead of COP26, G20 countries must also implement emission pricing mechanisms to hold polluters accountable for the true social cost of their actions.

In a separate study, the oil and gas sectors came under scrutiny. A comprehensive benchmarking analysis of the oil and gas industry’s performance against the Paris climate goals today shows that, without immediate and decisive action, the sector would prevent the world from meeting the IPCC’s 1.5°C global warming scenario by 2050.

The benchmark created by the World Benchmarking Alliance (WBA), alongside partners CDP and ADEME, scores private, state-owned and publicly listed companies using CDP’s and ADEME’s Assessing Low Carbon Transmission (ACT) methodology. This is the first time the industry has been judged against a 1.5°C scenario – the most ambitious

emissions reduction plan proposed by the Paris Agreement – and the first study to assess oil and gas companies using the International Energy Agency’s (IEA) ‘Net Zero Emissions by 2050’ scenario.

Assessing 100 of the world’s biggest oil and gas firms against this scenario, it shows that based on current rates of production these companies are set to consume the sector’s allocated carbon budget (from 2019 to 2050) by 2037 – 13 years too early. Despite this trajectory, researchers found that none of the 100 companies have committed to stopping exploration.

Other key findings include: from 2014-2019 the majors and National Oil Companies (NOCs) all increased either their oil or gas production; only 13 companies have low carbon transition plans that extend at least 20 years into the future.

“Opaque, unambitious or non-existent targets and strategies from the greatest contributors to climate change show that the oil and gas sector is not accepting its share of responsibility for global emissions,” said the report.

bp Statistical Review highlights “dramatic impact” of pandemic on energy markets

bp’s ‘Statistical Review of World Energy 2021’ has captured the “dramatic impact” the global pandemic had on energy markets and how the “year of Covid” may shape future global energy trends.

The data collected in this year’s edition includes energy data for 2020 – one of the most turbulent years the world has ever seen. The report showed primary energy consumption fell by 4.5 per cent in 2020 – the largest annual decline since 1945 – largely driven by a 75 per cent decline in oil consumption. Even electricity generation fell by 0.9 per cent – more than the decline in 2009 (-0.5 per cent), the only previous year in bp’s data series (which starts in 1985) that had seen a decline in electricity demand.

Wind, solar and hydroelectricity generation, however, all grew despite the fall in overall energy demand. Wind and solar capacity increased by 238 GW in 2020 – 50 per cent larger than at any time in history.

US, India and Russia saw the largest declines in energy consumption. China saw the largest increase (2.1 per cent), one of only a handful of countries where energy demand grew last year.

Spencer Dale, bp’s Chief Economist, said: “For the Review – as for so many of us – 2020 will go down as one of the most surprising and challenging years in its life. The global lockdowns had a dramatic impact on energy markets, particularly on oil, whose transport-related demand was crushed.

“Encouragingly, 2020 was also the

year the share of renewables in global power generation recorded its fastest ever increase – a growth that came largely at the expense of coal fired generation. These trends are exactly what the world needs to see as it transitions to net zero – strong growth in renewables crowding out coal.”

Additional highlights from the publication showed the share of gas in primary energy continued to rise, reaching a record high of 24.7 per cent, as gas prices fell to multi-year lows.

Coal consumption fell by 6.2 EJ, or 4.2 per cent, led by declines in the US (-2.1 EJ) and India (-1.1 EJ). OECD coal consumption fell to its lowest level in bp’s data series back to 1965. China and Malaysia were notable exceptions, with consumption by 0.5 EJ

and 0.2 EJ, respectively.

Renewable energy (including biofuels but excluding hydro) rose by 9.7 per cent, slower than the 10-year average (13.4 per cent p.a.) but the absolute increment in energy terms (2.9 EJ) was similar to increases seen in 2017, 2018 and 2019.

Solar electricity rose by a record 1.3 EJ (20 per cent) but wind (1.5 EJ) provided the largest contribution to renewables growth. Solar capacity expanded by 127 GW, while installed wind capacity grew 111 GW – almost double its previous highest annual increase.

China was the largest contributor to renewables growth (1.0 EJ), followed by the US (0.4 EJ). Europe, as a region, contributed 0.7 EJ to the rise.

UK gets smart on delivering a flexible energy network

The British government together with energy regulator Ofgem, has published its Smart Systems and Flexibility Plan and Energy Digitalisation Strategy in an effort to deliver on the commitments made by the government in the Energy White Paper. The plan updates the previous plan launched in 2017 and represents a significant step forward on the path to providing flexibility for the country’s energy network.

According to the government, full deployment of smart systems and flexibility in the energy sector could create up to 24 000 UK jobs and boost exports while enabling the UK to create a net

zero energy system by 2050.

Jonathan Brearley, Chief Executive of Ofgem, commented: “This plan is essential to hitting the UK’s net zero climate goal while keeping energy bills affordable for everyone. It requires a revolution in how and when we use electricity and will allow millions of electric cars, smart appliances and other new green technologies to digitally connect to the energy system.”

The government also published a call for evidence on the deployment of technologies that allow electric vehicles to export electricity from their batteries back on to the grid or to homes

during times of higher demand. A separate call for evidence will look at enabling large-scale and long-duration electricity storage so that availability can be maintained during periods when renewables generate less energy.

Two government consultations were also launched on proposed reforms to the energy system that will ensure frameworks are in place to drive the UK’s decarbonisation plans, while minimising costs to consumers and industry and maintaining resilience in the system.

The Future System Operator consultation is on proposals to create a new

energy system operator separate from National Grid plc, with roles in both the electricity and gas systems. According to the government, the challenges of meeting commitments to tackle climate change are creating the need for new technical roles and responsibilities in electricity and gas systems.

The other consultation assesses proposals to reform the codes that govern gas and electricity markets. This consultation will ensure that governance of the energy system is fit for purpose in a low-carbon future and builds on a previous consultation from 2019.

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US infrastructure operators must update risk mitigation strategies

- Solar PV operators face insurance exclusions over wildfires
- Department of Homeland Security redoubles messages on cyber security

Janet Wood

US infrastructure operators are being hit by changing risks that require them to re-evaluate their risk management and mitigation regimes. Changing weather and cyber attacks are among the growing risks that have to be addressed.

For example, half of all weather-related claims for solar PV damage relate to wild fires, according to renewables underwriter GCube Underwriting. Following a high incidence of wildfires in the USA, GCube's recent 'Hail or High Water' report, analysed a decade

of industry claims data and found that around 50 per cent of all claims for solar asset damage due to extreme weather were caused by wildfire.

GCube said wildfires have cost the solar industry tens of millions of dollars in losses over the course of the last decade and the risk is increasing as wildfires grow in size and severity. That was especially the case in the western USA, where wildfires had been driven by high temperatures and drought.

Fraser McLachlan, Chief Executive of GCube, said solar projects are all at high risk of damage during a wildfire event, with consequences including

liability exposure to third parties, as well as site damage. He said: "As wildfires continue to grow in frequency and magnitude, exposing owners to much greater risk, better planning with regard to fire fighting and vegetation management must be taken into account." The company warned some insurance companies have started to add wildfire exclusions to mitigate their exposure to this risk.

Meanwhile the US Department of Homeland Security has announced new requirements for pipeline operators to bolster cyber security. The measures follow a 'ransomware'

attack in May on Georgia's Colonial Pipeline and a series of ransomware attacks and intrusions hitting critical US infrastructure.

DHS said it would require operators of federally designated critical pipelines to implement 'specific mitigation measures' to prevent ransomware attacks and other cyber intrusions. Operators must also implement contingency plans and conduct a cybersecurity architecture design review.

Commenting on the directive, Michael Fabian, principal security consultant, Synopsys Software Integrity

Group, warned that operational technology (OT) as well as IT presented points of weakness. He said: "I have observed many violations of basic security concepts."

"Security hygiene practices around incident response and disaster response are key when it comes to ransomware attack potential in terms of business continuity and damage control. If a system is impacted by an attack, with a strategy in place, organisations are better positioned to minimise the effects of finding themselves helpless to the demands of the ransomware attackers."

Brazil's flagship power company prepares for sell-off



The Chamber of Deputies of Brazil has approved further privatisation of Eletrobras, the largest electricity company in Latin America. The sell-off is a priority project of the government headed by President Jair Bolsonaro.

Under the decision, passed by 258 votes to 136, the government's holding in the company, will be reduced from 60 per cent to 45 per cent. However, amendments agreed by Congress would limit each shareholder or group of shareholders to a voting power of 10 per cent, while the

government will preferential shares of a special class, which grant veto power over some decisions about the future of Eletrobras. For example, companies that are part of the Eletrobras system, including the Itaipu and Eletronuclear power plants, will remain in the hands of the Executive and any merger or closure will depend on a vote in each.

Bolsonaro's government has been keen to promote the sell-off and it wants to complete the process by February 2022.

Chile set to close coal fired plants

Chile's President Pinera has announced plans to close four coal fired power plants by 2025, as the country moves to clean energy.

The four plants totalling 1097 MW – Angamos 1 and 2, Nueva Ventanas and Campiche – all belong to US company AES Corp and were scheduled to cease operations in 2040. The measure means only 10 of Chile's 28 coal fired plants – 20 per cent of the current installed capacity – will remain in operation after 2026, down from 5526 MW in 2018.

Meanwhile, Mainstream Renewable Power recently announced plans to expand its clean generation in Chile via Nazca Renovables – a new 1 GW hybrid renewable energy platform.

The platform comprises three wind farms and three solar PV generation

assets and is divided into three portfolios. Humboldt, the first of these, will include the 255 MW Tata Inti solar farm and the Entre Ríos wind farm, where construction is expected to begin in mid-2022.

The new platform will double Mainstream's current Chilean investment, the 1.35 GW Andes Renovables platform, which recently saw its first portfolio began supplying electricity from the Condor group of wind and solar farms. Francisco López, Chile's Undersecretary for Energy said: "Renewable energies are making a decisive advance in our country, thus helping to comply with the schedule of the decarbonisation plan."

By 2022, Mainstream expects to provide 20 per cent of the electricity required by Chilean consumers.

New York expands clean energy initiatives to hydrogen

- Power plant conversions investigated
- HVDC link supported with local investment

GE and Cricket Valley Energy Center (CVEC) have signed a memorandum of understanding to develop a green hydrogen technology roadmap and a demonstration project to reduce carbon emissions at CVEC's gas fired power plant in Dover Plains, New York – the first step toward converting the plant to "100 per cent hydrogen fuel capable". The project is planned to begin in late 2022.

The agreement comes shortly after Governor Andrew M. Cuomo announced that New York plans to explore the potential role of green hydrogen as part of the state's decarbonisation strategy. The state's Climate Leadership and Community Protection Act (CLCPA), requires New York's electricity supply to be 70 per cent carbon-free by 2030 and zero carbon by 2040.

On hydrogen, the state is collaborating with the National Renewable

Energy Laboratory, joining two hydrogen-focused organisations to inform decision-making and making \$12.5 million in funding available for long duration energy storage technologies and demonstration projects that may include green hydrogen.

Alongside, the New York Power Authority (NYPA) will join the Electric Power Research Institute, General Electric and hydrogen supplier Airgas, in a green hydrogen demonstration project at NYPA's Brentwood natural gas plant on Long Island.

Governor Cuomo said: "As we transition to a clean energy economy, we are exploring every resource available as a potential tool to address climate change and documenting what we find to share as part of broader national and global conversations so we can build a brighter, greener future for all."

The State's green hydrogen programme includes a hydrogen strategy

study in conjunction with the National Renewable Energy Laboratory. It will join the Center for Hydrogen Safety and the HyBlend Collaborative Research Partnership to assess the use of existing infrastructure for hydrogen and hydrogen for long-duration energy storage.

The Clean Path New York link, which will eventually be owned by NYPA, is said to be critical in delivering the CLCPA as it will connect clean energy generated in the state to load centres in New York City.

Recently Clean Path New York announced a \$270 million fund to serve communities both near generation facilities and located along the 175-mile, 1300 MW HVDC link. "As we build the clean energy economy for the future, we need to ensure that our communities have the opportunity to participate," said Gil C Quinones, NYPA President and Chief Executive.

Coal switched for gas and renewables in the Midwest

US utility Consumers Energy has sought regulatory approval for a plan to cease the use of coal as a fuel source for electricity generation by 2025 and to build almost 8 GW of solar plants by 2040. The new plan, which is pending regulatory approval, would mean that Consumers Energy will be coal-free 15 years faster than currently expected, and it also includes plans to shut down some of the company's ageing oil and gas plant.

The proposal calls for the early retirement of three coal fired units at Camp-

bell, totalling more than 1440 MW. It also wants to bring forward closure of Karn 3 and 4, which run on natural gas and fuel oil and total 1100 MW, to 2023.

By 2040, the utility, owned by CMS, wants renewables to account for over 60 per cent of its electric capacity and said it expects that advances in energy storage and customer efficiency will allow the company to meet customers' needs with 90 per cent clean energy resources by that year.

However, it also announced plans to buy four existing natural gas fired

power plants in Michigan in order to ensure continued energy supply for the state and the Midwest.

According to Consumers Energy, the use of natural gas as a fuel source to generate baseload power will save customers some \$650 million through 2040 compared to its current plan.

■ According to new reports, US President Joe Biden is seeking to include a clean electricity standard that would decarbonise the US power sector in new legislation. Republicans, however, have so far excluded the measure.



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Five countries mainly responsible for coal fired generation

- Five countries plan 300 GW
- Over 90 per cent new plants will be uneconomic, says Carbon Tracker

Syed Ali

According to a study, just five countries – China, India, Indonesia, Japan, and Vietnam – are producing around 80 per cent of all Asian coal fired generation, with plans to develop over 600 coal power units with a combined capacity of around 300 GW. The same five countries also operate nearly three quarters of the current global coal fleet, with 55 per cent in China and 12 per cent in India.

Carbon Tracker, which produced the report, says the continuing reliance on

coal is surprising when looking at the economics compared to renewables and considering the global aims to reduce reliance on coal.

Out of these planned units, 92 per cent of them will be uneconomic, even under normal business, and up to \$150 billion could be wasted, the report stated. It warns that around 27 per cent of existing capacity is already unprofitable and another 30 per cent is close to break-even, generating a nominal profit of no more than \$5 per MWh. Worldwide, \$220 billion of operating coal plants are deemed at risk of

becoming stranded if the world meets the Paris climate targets.

Carbon Tracker's Head of Power and Utilities, Catharina Hillenbrand Von Der Neyen said: "These last bastions of coal power are swimming against the tide, when renewables offer a cheaper solution that supports global climate targets. Investors should steer clear of new coal projects, many of which are likely to generate negative returns from the outset."

The analysis further highlighted that at the corporate level, just ten companies account for around 40 per cent of

the stranding risk, of which NTPC and the Adani Group in India, and PLN in Indonesia are by far the most exposed. "Of the ten most exposed companies, seven are head-quartered in India," the researchers claimed.

The report stated that in India, new renewables can already generate energy at lower cost than 84 per cent of operating coal and will outcompete everywhere by 2024. "It has a target of 450 GW of renewables by 2030 – more than five times its 2020 capacity, which would meet 60 per cent of energy demand," the report stated.

■ Bangladesh and Philippines are to abandon plans to build significant amounts of new coal fired capacity. Bangladesh has scrapped at least 10 major coal fired power plants totalling 8451 MW, as it seeks to scale up power generation from renewable energy sources. The government says it now plans to generate 40 per cent of power from renewables by 2041. Meanwhile SMC Global Power Holdings Corporation, the power generating arm of San Miguel Corporation (SMC), says it will not build three planned coal fired projects with a total capacity of 1.5 GW.

Japan draft energy policy focuses on renewables

Japan is looking to boost the share of renewables in a draft plan of the country's basic energy policy. The plan compiled by the country's industry ministry last month aims to achieve a goal for 2030 of reducing carbon emissions by 46 per cent compared to the levels in fiscal 2013.

The ministry, which presented the draft to a government panel of experts, says renewables should account for 36-38 per cent of total energy sources in fiscal 2030 – up from 22-24 per cent in the current plan set out three years ago.

The draft plan maintains the share of nuclear power at 20-22 per cent, stating that it will be necessary to keep using it as an energy source. It does not, however, include any construction of new nuclear plants or rebuilding existing facilities. This is in line with the present plan.

Meanwhile, fossil fuelled power will be reduced to 41 per cent from the current 56 per cent.

Japan is already gearing up for the planned growth in renewables. In late July, Vestas Wind Systems A/S said it plans to set up a manufacturing

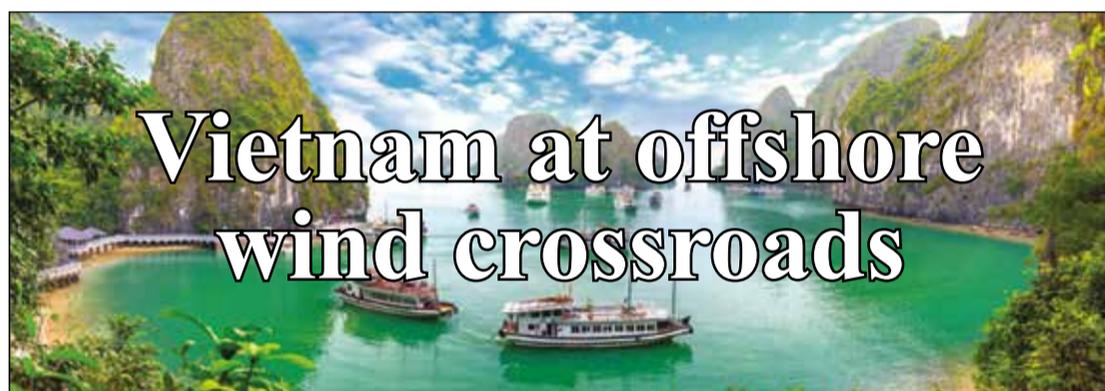
assembly facility for offshore wind turbine nacelles in the country after securing a government subsidy.

The Danish wind turbine maker announced that it is among the successful applicants in the second call of a national subsidy programme aimed at strengthening Japan's supply chain networks.

The subsidy scheme supports the development of essential products, parts, and materials, including offshore wind turbine components, with total funding of Yen209.5 billion (\$1.89 billion).

Vestas says it will set up the facility provided that it is selected by successful clients bidding in the upcoming annual auction, and if there are sufficient volumes. Depending on demand, Vestas will also consider establishing other parts of its regional supply chain in the country.

A total of 151 proposals were selected in the so-called Program for Promoting Investment in Japan to Strengthen Supply Chains. A total of seven applications were chosen for offshore wind energy solutions in the second round.



A new report by the Global Wind Energy Council, in cooperation with The Renewables Consulting Group, finds that Vietnam is at a crucial crossroads in its energy system planning, but has the opportunity to act now to accelerate deployment of offshore wind in this decade.

Vietnam's draft PDP8 energy plan contains offshore wind targets of 2 GW by 2030, however, high industry and investor interest indicates that Vietnam could raise its ambition to 10 GW by 2030. The first large-scale offshore wind projects, however, are not likely to be connected to the grid until 2026 or later. For these initial projects, policy clarity and transparency on procurement mechanisms are urgently needed, as the current Feed-in Tariff mechanism for offshore wind is due to expire by November 2021.

The report makes several recommendations on long-term growth and sustainability of the offshore wind sector

to meet the higher ambition.

"GWEC is calling on the Vietnamese government to urgently adopt a transition stage for offshore wind, and incorporate a systematic and open consultation process on future procurement and auction design," said Liming Qiao, GWEC Head of Asia. "With less than 10 years to meet PDP8 targets for 2030, the time is now to begin wider consultation and consider raising ambitions to 10 GW by 2030. We hope this report will support Vietnam in this vital period of making offshore wind a pillar of the future energy mix."

The report came as Zarubezhneft and DEME Concessions Wind signed a memorandum of understanding for the execution of the 1 GW Vinh Phong offshore wind farm. The first phase of 600 MW is planned to be commissioned by 2026 with second phase to follow by 2030, according to Zarubezhneft.

Also in July, Philippines' AC Energy Corp. (ACEN) said it will set up four wind farms in the country with a combined capacity of 440 MW this year.

Meanwhile, Wind power imports are also on the agenda. Impact Energy Asia Development Co. (IEAD) recently announced that it has secured a 25-year power purchase agreement (PPA) to sell electricity from a wind farm under development in Laos to state-owned Vietnam Electricity.

The 600 MW wind farm, located by the Mekong River opposite Thailand's northeastern province of Ubon Ratchathani, will supply electricity through a 500 kV transmission line to central Vietnam.

In addition to reducing greenhouse gas emissions, the project will also enhance Vietnam's grid stability, as electricity will be mostly produced in the dry season to complement hydro-power, which is generated during the rainy season.

Asia Pacific solar PV capacity could triple to 1500 GW by 2030

Asia Pacific solar photovoltaic (PV) capacity could triple to 1500 GW by 2030, says Wood Mackenzie.

According to the global energy and commodities consultancy, China will remain leader in the region and globally, adding 619 GW of solar PV capacity over this decade to 2030. The country's strong policy push and ambitious solar targets mean it will contribute

over 60 per cent of Asia Pacific's solar PV capacity by 2030.

In second spot, India is expected to add 138 GW by 2030 after rebounding from an installation decline due to the coronavirus pandemic in 2020-21. As a result, the country is not expected to meet its 100 GW by 2022 target. While solar tenders have been rolled out consistently, the Indian market sees low

completion rates.

Japan and South Korea will follow in third and fourth to install 63 GW and 58 GW, respectively, in the next 10 years, followed by Vietnam with 45 GW.

Notably, Wood Mackenzie expects Indonesia to become the fastest growing solar PV market in Asia Pacific over this decade. Growing from a low

base of 0.3 GW, the country's solar PV capacity could expand over 28-fold to 8.5 GW by 2030.

In a separate report, the OECD said improving investment conditions could make Indonesia a world leader in clean energy.

The OECD Clean Energy Finance and Investment Policy Review of Indonesia says the country has abundant

untapped potential for finance and investment in renewable energy and energy efficiency, areas that are key to accelerating the country's green energy transition and supporting a sustainable recovery from the Covid-19 crisis.

The OECD said the clean energy sector will play a crucial role in supporting Indonesia's green recovery.

Europe News

UK, France, Spain vie for pole position in floating wind

- Scotwind leasing round prompts consortia to form
- France and Spain signal ambitious leasing programmes

Janet Wood

Scotland's 'Scotwind' seabed auction has included bids for floating offshore wind, according to recent comments from participating companies. But the UK's leading position in the developing technology is under pressure from its European neighbours.

Bids in the Scotwind leasing round, which closed on July 16, are now being assessed with the outcome expected in early 2022.

Among them, Shell has joined forces with ScottishPower and the partnership has submitted several proposals for large-scale floating offshore

installations. ScottishPower Chief Executive Keith Anderson, said: "Scotland is the windiest country in Europe and has the biggest and most experienced offshore sector. Bringing ScottishPower and Shell's collective knowledge, experience and expertise together means we're perfectly placed to lead the way in developing large-scale offshore floating windfarms and creating a new green industry with massive potential for exporting our skills and experience globally and helping the UK decarbonise its energy generation."

Ørsted is participating in partnership with Falck Renewables and floating

wind expert BlueFloat Energy. Martin Neubert, Chief Commercial Officer at Ørsted said: "We recently announced our strategic decision to pursue floating wind opportunities and to drive the commercialisation of this technology. Today's announcement reaffirms Ørsted's commitment to this exciting and rapidly developing new technology."

Partnerships have also been forming elsewhere in Europe.

In France, Equinor – which operates the UK's first floating wind farm, Hywind Scotland (30 MW) – has joined with RES and Green Giraffe to form Océole, a partnership dedicated to

developing floating offshore wind. Océole wants to be ready to submit bids in a dedicated floating offshore wind tender signalled by the French government.

Equinor's Senior Vice President for Business Development in Renewables, Jens Økland, said: "France has set an ambition of becoming among the top markets for floating offshore wind in the next decade. Together with RES and Green Giraffe, we are ready to contribute long term to the country's ambitious offshore wind plans and develop what could potentially be the first commercial floating offshore wind farm in France."

Spain has also joined the race, recently announcing plans to develop up to 3 GW of floating offshore wind capacity by 2030, in a 'Roadmap for the Development of Offshore Wind and Marine Energies in Spain', now open for consultation. That would be over 40 per cent of Europe's entire floating wind capacity in 2030, currently expected to be 7 GW.

Currently, several floating wind projects are in the development stage. Spain's energy giant Iberdrola said earlier this year that the company is planning to invest over €1 billion to develop a 300 MW floating wind farm in Spanish waters.

Green hydrogen projects move off the drawing board

- Shell pursues green and blue options
- Electrolysis used in a suite of German projects

European hydrogen projects have recently begun the move from drawing board to realisation, as oil and gas companies join the market independently or with electricity utilities. Recent project developments have been split between 'green' hydrogen produced by electrolysis using renewables, or steam methane reforming that will be accompanied by carbon capture and storage.

Royal Dutch Shell has signed a memorandum of understanding (MoU) with Aker Clean Hydrogen and CapeOmega to explore a large facility on the west coast of Norway that will produce blue hydrogen from natural gas. The natural gas will be supplied from Shell's Nyhamna gas processing. But Shell has also announced plans for Europe's largest green hydrogen plant in Germany, at the Energy and Chemicals Park Rheinland. Plans are under way to expand

capacity of an electrolyser at the site from 10 MW to 100 MW at the site, near Cologne. The Rheinland electrolyser will use renewable electricity to produce up to 1300 t of green hydrogen a year.

Germany is also the home for a project in Wunsiedel, Bavaria, backed and operated by Siemens, to build one of Germany's largest carbon-free hydrogen generation plants. The 8.75 MW H₂ lighthouse project will produce up to 1350 t of hydrogen per year using renewable energy. Siemens Smart Infrastructure is the general contractor for the plant, with Siemens Financial Services participating in the equity financing and holding 45 per cent of the operating company WUN H₂ GmbH. The electrolyser will be supplied by Siemens Energy.

Germany's green hydrogen initiatives have also proved attractive to utilities from further afield. Japan's

Electric Power Development Co, known as J-Power, recently announced that it has joined a third German initiative, the offshore green hydrogen consortium AquaVentus.

The initiative plans to produce green hydrogen at sea utilising 10 GW of offshore wind power generated in the North Sea by 2035.

Elsewhere electrolysis is central in a joint project by Portugal's EDP and TechnipFMC, to develop a conceptual engineering and economic feasibility study for a new offshore system for green hydrogen production from offshore wind power intended to create a concept that can be standardised and implemented worldwide.

In the UK, BP and German offshore wind developer EnBW recently detailed plans for a 2.9 GW offshore wind development that would power a green hydrogen production plant and EV charging network on land.

Ireland set to step up offshore wind

Ireland has responded to a recent jump in site investigation applications for offshore wind with proposals for a new permitting regime, while its network operator is investigating smart grid options that would accommodate more renewables.

With more than 50 site investigation applications for offshore wind over the last two years, nearly half in the eight months to April this year, the Irish government has launched a national framework for managing marine activities that will be the key decision-making tool for the government's departments, state agencies, regulatory authorities and policy makers. A new bill will establish in law a new planning regime

for the maritime area. It will replace complex consenting regimes with a single consent principle.

Meanwhile EirGrid is joining Smart Wire Grid Europe and the US Electric Power Research Institute in a project that aims to develop software tools that will enable EirGrid to increase capacity for wind and solar to 70 per cent by 2030, up from 40 per cent now. Mark Foley, EirGrid Chief Executive, said: "By participating in this project, EirGrid is not only helping to future proof its network but contributing to the global energy transition by supporting the development of tools that can be rolled out to grid operators across the world."

Italian organisations want faster action on renewables rollout

Six green energy organisations have called on the Italian government to speed up deployment of renewables.

SolarPower Europe, WindEurope, ANEV, ANIE Rinnovabili, Elettricità Futura and Italia Solare warned recently that Italy needs to add at least 7 GW of renewable capacity every year to meet its targets. But it achieves less than 1 GW per year, the groups say: 50 per cent of all renewables projects are abandoned and the other 50 per cent are

subject to six years of delay before obtaining permits. The companies have now called for a 'Simplification Decree', which was published on May 31.

The groups complain that in Italy the permitting procedure for repowered wind farms is the same as for greenfield ones – a measure it says breaches EU directives. Italy must also remove other barriers and especially tariff disadvantages for repowering projects, the group says.

Malgosia Bartosik, WindEurope Deputy Chief Executive, said: "Half of Italy's capacity will reach the end of its operational life by 2030. In its current form, the Simplification Decree doesn't do enough to ease permitting for repowered windfarms. It still contains restrictions that prevent the use of the latest available technology, which will make it difficult, if not impossible, for Italy to meet its 2030 targets."

New nuclear wins favour in Eastern Europe

The Ministry of Infrastructure of Slovenia has granted the permit for construction of a 1.1 GW second unit at the Krško nuclear power plant in Slovenia. Krško was built as a joint venture by Slovenia and Croatia when both were part of the former Yugoslavia. Now operating company Nuklearna elektrarna Krško (NEK) is owned by the Slovenian state-owned company Gen-Energija and the Croatian state-owned company Hrvatska Elektroprivreda (HEP). It provides more than 25 per cent Slovenia's and 15 per cent of Croatia's power.

Meanwhile Romania's parliament has ratified an agreement between the governments of Romania and the

USA to expand the Cernavoda nuclear power plant.

The \$8 billion agreement, signed in 2020, allows for the USA to help Romania in the construction of two new reactors at the Cernavoda plant, with plans to commission Unit 3 in 2030 and Unit 4 in 2031. The partners will also refurbish Unit 1. A feasibility study for the new plants began in July 2020.

The utilities examined had a combination of generation, retail, distribution, transmission and other operations. CTA scores that considered both generation and non-generation operations were usually stronger than generation-only CTA scores.



Iraq needs electricity sector overhaul, says IEA

Iraq's gap between supply and demand must be overcome to avoid chronic blackouts, writes **Nadia Weekes**

Iraq's electricity sector must bring in long-term reforms and solutions to fix its power crisis, an International Energy Agency (IEA) official has said.

A widespread power cut hit Iraq in early summer amid scorching hot temperatures, affecting millions of people including residents of capital city Baghdad, with the grid at times carrying only a quarter of the electricity it normally supplies.

"Iraq's electricity problem requires a short, medium and long-term plan, yet governments have tended to look at short-term fixes. But you can't go on with short-term fixes if you want a sustainable system in the long run,"

said Ali Al Saffar, IEA's Middle East and North Africa programme manager.

The power cuts are likely to have been caused by glitches in the transmission network and distribution, with high temperatures also playing a role. "The heat is intense, which can cause issues. Iraq's imports of natural gas and electricity were also massively curtailed," Al Saffar said.

Iraq's war-battered grid provides only a few hours of power each day, and chronic shortages were at the heart of anti-government protests in October 2019.

The gap between electricity supply and demand is the root cause of the

blackouts, calling for a push for investment in transmission and distribution as well as better maintenance of plants and generators, according to Al Saffar.

Iraq's theoretical generating capacity is around 20 GW but actual capacity, depending on technical losses, security and maintenance problems, averages between 12 GW and 17 GW during the summer months.

Iraq is one of the largest gas-flaring countries in the world. It burns enough energy to satisfy its demands and to counter this lack of electricity supplies, Al Saffar said.

The problem is not only technical. A wave of attacks by unknown groups

on power transmission lines in the north of the country has also flagged up security concerns.

Iraq is set to host nationwide elections in October. The government of Prime Minister Mustafa Al Kadhimi has said it aims to attract private sector and international investments to the country.

If a new government is formed "with a stable mandate" and is able to prioritise electricity, "then Iraq's energy problems can be solved", Al Saffar said.

He said it was encouraging that Baghdad had recently signed a deal with UAE energy company Masdar to develop at least 2 GW of new solar

projects in Iraq.

Meanwhile, Egypt has agreed to supply 700 MW of electricity to Iraq through expanding its power interconnection with Jordan in a project that will cost \$2.2 billion.

Egyptian Electricity Minister Mohammed Shaker said that 500 MW of capacity would be added to a common grid linking Egypt and Jordan, boosting its total capacity to 2 GW.

The project will be developed in two phases, with the first phase expanding Egypt's connection with Jordan and the second phase developing 300 km of transmission lines from Jordan to Iraq, Shaker said.

Hydropower 'crucial' to achieving climate ambitions

- IEA urges governments to reverse slowdown
- Seven priority areas for policymakers

Hydropower has a key role to play in the transition to clean energy, but its growth is set to slow significantly this decade, putting at risk net-zero targets worldwide, according to a new report by the Paris-based International Energy Agency (IEA).

In 2020, hydropower supplied one sixth of global electricity generation, more than all other renewables combined. Its output has increased 70 per cent over the past two decades, but its share of global electricity supply has held steady because of the increases in wind, solar PV, natural gas and coal.

As well as producing large quantities of low-carbon electricity, hydropower can provide flexibility and storage as plants can ramp their electricity generation up and down very rapidly compared with nuclear or fossil-fuel power plants. This makes hydropower an attractive foundation for integrating greater amounts of variable wind and solar power.

Global hydropower capacity is expected to increase by 17 per cent between 2021 and 2030 – led by China, India, Turkey and Ethiopia – according to the IEA's 'Hydropower Special Market Report'. However, the projected growth for the 2020s is nearly 25 per cent slower than hydropower's expansion in the previous decade.

The IEA urges governments to reverse the slowdown by addressing the major obstacles to faster hydropower deployment.

"Hydropower is the forgotten giant

of clean electricity, and it needs to be put squarely back on the energy and climate agenda if countries are serious about meeting their net zero goals," said Fatih Birol, the IEA Executive Director.

The IEA report estimates that around half of hydropower's economically viable potential worldwide is untapped, and that this potential reaches almost 60 per cent in emerging and developing economies.

Based on existing policies, China is set to remain the single largest hydropower market through 2030, accounting for 40 per cent of global expansion, followed by India.

Between now and 2030, \$127 billion – or almost one-quarter of global hydropower investment – is set to be spent on modernising ageing plants, mostly in North America and Europe, where the average age of a hydropower plant is 50 and 45 years, respectively. The projected investment is less than half of what the report estimates is necessary to modernise all ageing hydropower plants worldwide.

New hydropower projects face a number of significant obstacles, the report finds, including long lead times, lengthy permitting processes, high costs and risks from environmental assessments, and opposition from local communities. These pressures result in higher investment risks and financing costs compared with other power generation and storage technologies, thereby discouraging investors.

To support the development of sustainable hydropower, the IEA report sets out "seven priority areas" for policymakers. They are:

1. Move hydropower up the energy and climate policy agenda
2. Enforce robust sustainability standards with streamlined rules
3. The introduction of remuneration mechanisms
4. Support the modernisation of existing hydropower plants
5. Support the expansion of pumped storage hydropower
6. Mobilise affordable financing in developing economies
7. Price in the value of hydropower's public benefits

Responding to the report, Eddie Rich, Chief Executive of the International Hydropower Association (IHA), said: "The world is facing a crisis in energy flexibility and storage. If we are to get the most from wind and solar, governments need to incentivise investment in sustainable hydropower to balance up the system when the wind doesn't blow and the sun doesn't shine."

He said policymakers had a "huge opportunity" to develop holistic post-Covid development plans, and urged the hydropower sector to step up and ensure that their projects are aligned with international good practice.

The report follows IEA's publication of the 'Global Roadmap to Net Zero by 2050', which models a doubling of global hydropower generating capacity to 2600 GW.

Egypt signs hydrogen deal with Eni

The Egyptian Electricity Holding Company (EEHC) and Egyptian Natural Gas Holding Company (EGAS) have signed an initial agreement with Italian energy company Eni to cooperate on plans for green and blue hydrogen production in Egypt.

A joint study will assess the technical and commercial feasibility of targeted projects to produce green hydrogen, using electricity generated from renewables, and blue hydrogen, through

the storage of carbon dioxide (CO₂) in depleted natural gas fields.

The energy companies say they will also analyse the potential local market consumption of hydrogen and export opportunities.

More than 7000 km² of land has been allocated for clean energy projects in Egypt, which has an ambitious target for 42 per cent of its energy production to come from renewable energy sources by 2035.

First floating wind project mooted for Azerbaijan



Azerbaijan's state-owned national oil and gas company SOCAR and engineering company Technip Energies have agreed to collaborate on a joint pilot project to power upstream operations in the Caspian Sea with electricity produced by a floating wind turbine.

The pilot project aims to reduce natural gas consumption in Azerbaijan's upstream sector by replacing it with renewable energy. If it goes ahead, the project will install the country's first offshore wind turbine.

Under the agreement, SOCAR and Technip Energies will jointly study sustainability measures in the offshore upstream activities, including CO₂ emission reduction and power efficiency improvement.

Azerbaijan put offshore wind on the map in April, when the country's Ministry of Energy signed a Memorandum of Understanding (MoU) with the International Finance Corporation (IFC) to cooperate on offshore wind development.

The aim of the cooperation is to assess the potential of offshore wind in the country and the development of a roadmap, leading to tenders for projects, partnerships with the private sector, and additional investments.

Preliminary analysis provided by the World Bank estimates the technical potential of offshore wind energy in Azerbaijan at 157 GW, of which 35 GW for fixed-bottom projects and 122 GW for floating wind.

Companies News

Oil and gas majors explore hydrogen alliances

■ Chevron signs MoU with Cummins ■ Shell and Uniper to grow hydrogen use across Europe

Both Chevron and Shell have announced alliances that will see the two oil and gas majors speed their transition to cleaner energy.

In the most recent tie-up, Chevron U.S.A. Inc. and global power equipment company Cummins Inc., announced a memorandum of understanding to explore a strategic alliance to develop commercially viable business opportunities in hydrogen and other alternative energy sources.

The memorandum provides the framework for Chevron and Cummins to initially collaborate on four main objectives: advancing public policy that promotes hydrogen as a decarbonising solution for transportation and industry; building market demand for commercial vehicles and industrial applications powered by hydrogen; developing infrastructure to support the use of hydrogen for industry and fuel

cell vehicles; and exploring opportunities to leverage Cummins' electrolyzers and fuel cell technologies at one or more of Chevron's domestic refineries.

"Chevron is committed to developing and delivering affordable, reliable, ever-cleaner energy, and collaborating with Cummins is a positive step toward our goal of building a large-scale business in a lower-carbon area that is complementary to our current offerings," said Andy Walz, President of Chevron's Americas Fuels & Lubricants. "Hydrogen is just one lower-carbon solution we are investing in that will position our customers to reduce the carbon intensity of their businesses and everyday lives. We've also invested in developing and supplying renewable natural gas, blending renewables into our fuels, co-processing biofeedstocks in our refineries, and abatement projects that will reduce the

carbon intensity of our operations."

Amy Davis, Vice President and President of New Power at Cummins, added: "The energy transition is happening, and we recognise the critical role hydrogen will play in our energy mix. We've deployed more than 2000 fuel cells and 600 electrolyzers around the world and are exploring other hydrogen alternatives including a hydrogen-fuelled internal combustion engine as we continue to accelerate and harness hydrogen's powerful potential."

Earlier in July, Dutch energy giant Shell also moved to increase hydrogen use, when Shell Gas & Power Developments B.V. and Uniper Hydrogen GmbH signed a memorandum of understanding to explore accelerating the development of a hydrogen economy in Europe.

Under the MoU, the companies intend to find joint opportunities to

couple industrial and mobility demand with hydrogen supply, production, and storage.

Shell and Uniper will begin by assessing the opportunity to develop potential synergies to accelerate existing projects in Germany, the Netherlands, and potentially other European countries. Taking a full value chain approach, Shell and Uniper will work backwards from customer demand to identify key opportunities to develop the foundation of a new hydrogen economy in Europe.

Exploring future options including the necessary infrastructure for large-scale transport of hydrogen and CO₂ from the ports of Rotterdam and Wilhelmshaven to North Rhine Westphalia (NRW) – the industrial heartland of Germany – will be at the centre of the collaboration.

Among the projects considered will

be Shell's Rheinland transformation where Shell recently opened a 10 MW PEM electrolyser, the largest of its kind in Europe, and is working with partners to expand the capacity to 100 MW.

Uniper will further explore the supply of hydrogen from the existing Uniper production sites at Rotterdam and Wilhelmshaven to the Shell Energy and Chemicals Park Rheinland locations at Wesseling and Godorf. In addition, Uniper intends to connect its power plant in Gelsenkirchen Scholven as well as some large-scale customers with its coastal hydrogen production plants.

"Our mission is to connect Uniper's large-scale hydrogen projects – e.g. in the Netherlands and in Northern Germany – with industrial customers to enable a decarbonisation of our economy," said Dr. Axel Wietfeld, CEO, Uniper Hydrogen.



OEMs step-up SMR involvement

Recent agreements signed by Rolls-Royce in the UK and Doosan Heavy Industries & Construction in the US are demonstrating the growing belief that small modular reactors (SMRs) will play a significant role in the future of nuclear power.

In July Rolls-Royce and Cavendish Nuclear signed a Memorandum of Understanding (MoU) to explore opportunities to deepen the relationship between the parties through cooperation on the Rolls-Royce SMR programme. Rolls-Royce is leading a consortium that has been working on the design of a SMR power station for the last two years with support from the UK government through UK Research and Innovation.

Under this latest agreement Rolls-Royce and Cavendish Nuclear commit to working together to develop the roles that Cavendish Nuclear can perform in the design, licensing, manufacturing and delivery aspects of the Rolls-Royce factory-fabricated SMR power plant.

Commenting on the agreement, Tom Samson, CEO of the Rolls-Royce SMR Consortium, said: "Our SMR programme has been designed to deliver clean affordable energy for all and does so with a revolutionary new approach aimed at commoditising the delivery of nuclear power through a factory build modularisation

programme.

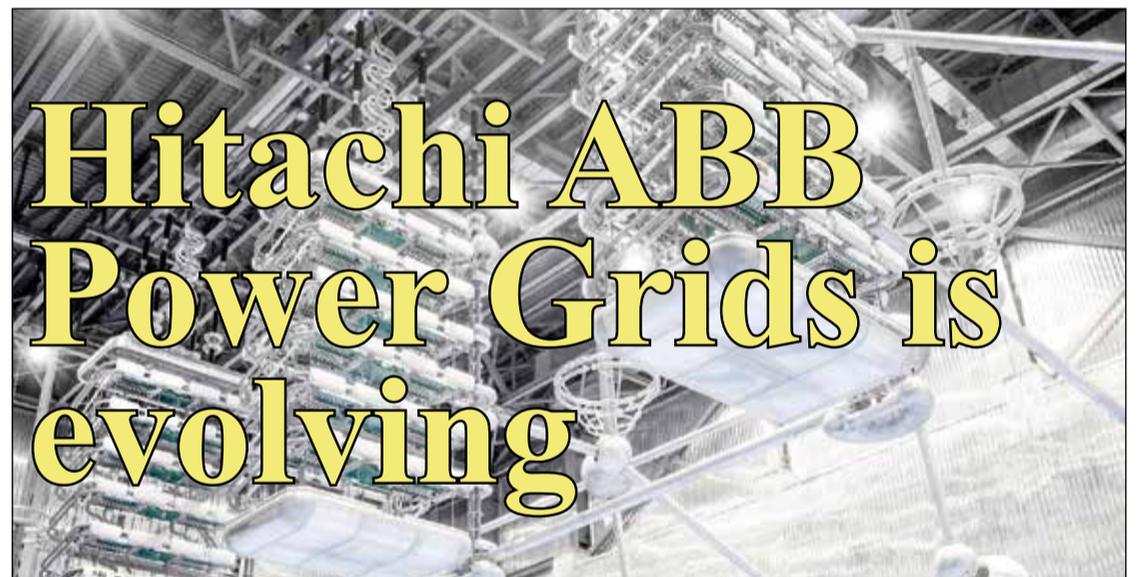
"Cavendish Nuclear, and its parent Babcock International Group, have unique capabilities within the UK industry with their world-class manufacturing and modularisation capabilities at their facilities at Rosyth, as well as their wider nuclear skill set delivering engineering and manufacturing solutions across the new-build and decommissioning landscape."

SMR power plants are also being developed in the US. In a more recent move South Korea's power plant builder Doosan Heavy Industries & Construction Co. said it will invest \$60 million to expand its stake in US-based SMR developer NuScale Power LLC.

Doosan Heavy already invested \$44 million in the unlisted SMR developer in 2019, along with other local investors, and signed a deal to provide core parts to be used for the construction of SMRs.

The two companies also agreed to join forces for the hydrogen and freshwater production business using SMRs.

NuScale Power plans to provide its SMRs to Utah Associated Municipal Power Systems (UAMPS), a US electricity provider that has been pushing ahead with a project to build a power plant in Idaho, with 2029 eyed for commercial operation.



Hitachi ABB Power Grids is evolving

Hitachi ABB Power Power Grids has announced that it will be evolving to become Hitachi Energy from October 2021, in a move that reflects the rapidly evolving energy landscape.

The decision coincides with the business' first-year anniversary since it started operations on July 1, 2020. Hitachi Ltd. has an 80.1 per-cent stake in the joint venture and ABB Ltd. holds the remainder.

Explaining the name change, Toshiaki Higashihara, Executive Chairman and CEO of Hitachi, said: "With climate change and increasing natural disasters, there is a need to solve three

social issues worldwide: environment, resilience, and security and safety." He continued: "Hitachi ABB Power Grids provides a variety of solutions that solve these social issues, and by changing the company name to Hitachi Energy, we are further strengthening our commitment to the realisation of a sustainable society."

Claudio Facchin, CEO of Hitachi ABB Power Grids, added: "The energy landscape continues to evolve and so do we."

On changing its name, the company says it will at the same time change its corporate brand to the Hitachi brand.

The business formally registered Hitachi Energy Ltd. on June 30, 2021 and is now undertaking the formal process for the change of names globally.

The news came as the company announced that it was extending its global base of engineering and service centres through the opening of Collaborative Operations Centres (COC) for grid automation solutions at key regional centres around the world. In addition, Hitachi ABB Power Grids announced its new lifecycle management programme, which enables customers to map and track their installed assets.

Valmet and Neles to merge

Finnish companies Valmet and Neles are to merge in a move aimed at strengthening their position in the process and energy industries.

The proposed combination will be implemented as a statutory absorption merger whereby Neles will be merged into Valmet.

The combined company, which will have combined net sales for 2020 of approximately €4.3 billion and about 17 000 employees, says it stands to

benefit from megatrends such as the energy transition and increasing demand for renewables.

Valmet President and CEO Pasi Laine will continue to act as the President and CEO of the combined company after the completion of the merger. Completion is expected to occur on or about January 1, 2022, subject to all conditions for completion being fulfilled.

■ Valmet also recently completed the

acquisition of EWK Umwelttechnik GmbH and ECP Group Oy following the agreements originally announced on June 10. EWK Umwelttechnik is a German company manufacturing and supplying air emission control systems and after-installation services. ECP Group is a manufacturer and maintainer of electrostatic precipitators (ESPs), focusing on power plants and pulp and paper industry, in Finland.

The need to speed towards a resilient, carbon-neutral future

The urgent need to make the transition towards a carbon-neutral energy future is becoming increasingly clear. Hitachi ABB Power Grids' Dr. Gerhard Salge, explains why this transition has to be done sustainably, and in a way that improves system resilience. **Junior Isles**

Climate change is one of the greatest challenges of our time. The rise in extreme weather conditions such as the recent floods in Europe and China, the blizzards and heatwaves in the US, and the growing frequency of hurricanes around the world are all signs that the climate emergency is clear and present.

With the urgency now obvious, country and company strategies to drive the energy transition in order to achieve a carbon-neutral economy are a top priority.

Last year's formation of Hitachi ABB Power Grids was a highly publicised example of how companies are positioning themselves to help address the challenges facing the energy sector. Carbon-neutral energy and sustainability are at the core of the new company's strategy and will continue to be so as it prepares to change its name to Hitachi Energy from this October. As part of its recently released Sustainability 2030 Strategy, the company is pioneering digital and energy platforms, which help its customers to overcome complexity, increase efficiency and accelerate the shift towards a carbon-neutral energy future.

Commenting on how he sees the evolving energy sector and the role

his company will play in its transformation, Dr. Gerhard Salge, Chief Technology Officer, Hitachi ABB Power Grids, said: "With all the commitments and pledges made by countries and regions within the last 12 months, it's clear that the urgency is becoming much more prominent. This is highlighted in the International Energy Agency's 'Net Zero by 2050' report; there really is a need for speed. The first key milestone on the way to 2050, is 2030 and there are only about 3000 days to reach this target. This is not that far off for infrastructure build-up, so all efforts are needed from everyone to accelerate – and starting today."

Dr. Salge reinforces Hitachi ABB Power Grids' perspective, "that electricity will be the backbone of the entire energy system". He emphasizes that three key building blocks are stacking up to deliver this carbon-neutral electric future: connecting larger volumes of wind, solar and hydro to the grids; electrifying the world's transportation, buildings and industry sectors; and where direct electrification is either not efficient or impossible, introducing complementary and sustainable energy carriers, such as green hydrogen.

Basing the entire energy system as



Carbon-neutral energy and sustainability are at the core of the Sustainability 2030 Strategy

much as possible on electricity generated from renewables not only minimises carbon emissions, it also improves the total energy efficiency of the energy system. Dr. Salge explained: "For example, when you go from a solar panel or a wind turbine to an electric vehicle, you have average losses across the chain of about 30 per cent. By comparison, there are about 80 per cent losses in going from an oil source to a combustion engine."

Increased electrification, however, not only means largely increasing power system capacity. It will also require greater power system complexity due to more complex in-feeds from fluctuating renewable sources, as well as more complex consumption patterns.

Renewables should be installed in the best locations. For wind, this means installing in regions that have the best wind conditions; this sometimes means offshore or on land far away from load centres. These wind farms then have to be connected to the load centres and to the existing grids. It is a similar story for solar. It is also important that all of these distributed energy resources are aligned and work together.

"Harvesting these renewables means that we have to flexibly exchange energy across time zones and different climates, achieved electrically by interconnection and also through storage, which is another key element – batteries for short-term

storage, batteries and other energy carriers for mid-term, and other carriers like green hydrogen, for long-term storage. Especially on long-term, or so-called seasonal storage technologies, there is still a lot of research to be done towards cost-effective and energy efficient solutions."

He stresses, however, that storage and electrical interconnections need to go hand-in-hand in order to optimise system efficiency with respect to excess fuels and generation capacity, while improving resilience. "We need a different kind of thinking," he said.

One element that needs to be reinvented is how to drive energy system resilience. And this is a key element of the transition. The new power/energy landscape must not compromise reliability and availability.

"We need to move towards a more resilient power system," said Dr. Salge. "There has to be a certain change in philosophy in how to build and operate a power system. In the past, a power system was typically built to be as robust as possible to avoid outages by making things robust and including safety buffers. But a resilient system is one that is so flexible it can handle foreseen and unforeseen situations so that the impact on the end customer is minimal."

Handling unforeseen circumstances such as the outages caused by extreme weather in Texas, USA, a few months ago, is a case in point. Designing resilience concepts for such events



Battery energy storage is a key element for integrating renewables

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might include connecting to more systems so energy can be imported from across longer distances and time zones.

Dr. Salge adds that whatever equipment is installed, it should be the most modern and most flexible. “You have to think differently when creating a new system or adding new equipment to an existing one, so you get the flexibility that creates resilience in the total system.

“If for example, you install a number of houses with electrical heating on a long unidirectional feeder, you are creating a critical situation for this feeder. Here the resilience strategy would not just mean installing a larger overhead line or cable into that feeder, or even a second one into the same route. It might be that you change to e.g. flexible ring structures where you can alternatively feed those houses from another geographical site. Another option is to insert controllable DC connections in between AC-feeders or ring structures to optimize the energy flows. This means you can feed from another direction if something happens to a portion of that supply of the feed. This creates more redundancy and back-up options.”

Efficient load management should also be part of the resilience equation, as there may be situations where spare generating capacity is not available.

Dr. Salge explained: “Here a utility could switch specific loads on and off flexibly in a way that does not affect the customers required functionality. For example, if customers use electricity for heating water, they don’t need permanent access to electricity for that application; it’s good enough if they do that every few hours. If utilities have more information on their loads, they can have a flexible demand response so the impact [on their customers] is minimised and you therefore have more degrees of freedom for a very resilient system. In the future it might be that a utility could use the energy from a fully charged EV in an extreme thunderstorm, for example, and then charge the EV the next day.”

This is all possible if a system is resilient enough and smart enough to consider and factor in these degrees of freedom.

Notably, much can be done with today’s infrastructure by, for example, introducing intelligence, storage and new types of upgraded network devices.

Hitachi ABB Power Grids says it is therefore building much more intelligent, flexible systems that are safer and more secure – also in terms of cyber security. This is being achieved through a combination of digitalisation and power electronics.

“With a lot of projects being brown-field, it’s often about embedding new DC and HVDC technology into existing AC grids and controlling it digitally,” said Dr. Salge. “For example HVDC interconnectors can provide really flexible energy exchange across short, mid and long distances – up to a world record of more than 3000 km and 12 GW.

“At the same time HVDC technology can also improve power quality, which is needed in grids that have less inertia. Converters can provide synthetic inertia. Or you can provide real inertia when you connect, for example, synchronous generators next to the power electronic valves. You could also put storage next to the converters to inject energy into the system. In our HVDC valve controls, there’s also the option to have black-start capabilities.”

While driving resilience is key, Dr. Salge also stresses the importance of making equipment sustainable with low environmental impact. This is a

central part of the Sustainability 2030 strategy. “We have looked at the total lifecycle, and re-use of materials,” he said.

Notably, in April Hitachi ABB Power Grids launched EconiQ™ – its eco-efficient portfolio of products, services and solutions which are sustainability-oriented in design to deliver superior environmental performance compared to conventional solutions.

It kicked off with a new range of high voltage switchgear, which uses a fluoronitrile-based gas mixture in place of sulphur hexafluoride (SF₆) – state of the art today but with a very high global warming potential if released – as insulation and current interruption medium, optimising the total switchgear on its total life-cycle impact.

This focus on reducing environmental impact while increasing sustainability is now embedded in everything the company does. “We have also launched a range of semiconductors that are enabling significantly lower losses in HVDC valves,” said Dr. Salge. “Together with the introduction of renewables, this all contributes to a system that is overall more sustainable.”

In fact the move to a more sustainable, interconnected energy system, where electricity will be the backbone, is seen as the reasoning behind the adoption of the new company name.

Dr. Salge explained: “The power system is expanding its role in the total energy system. We also see new digital capabilities, with improved control through machine learning, artificial intelligence, prognostics and predictive maintenance; sector coupling with the gas networks; energy trading and forecasting; etc. It’s about taking a more holistic view of the energy system. The logical consequence of this is that we are no longer just thinking ‘Power Grids’ but also beyond; so we are now making it clear in our name. That’s why we are becoming Hitachi Energy.”

Becoming part of the Hitachi company brings significant opportunities. In January Hitachi ABB Power Grids and Hitachi Vantara announced the integration of Hitachi ABB Power Grids’ Digital Enterprise solutions within the Lumada portfolio of advanced digital solutions and services for turning data into insights. This saw the launch of the Lumada Asset Performance Management, Lumada Enterprise Asset Management and Lumada Field Service Management solutions.

“We are already leveraging the one year of experience, i.e. the excellent know-how and competence of Hitachi, in the IT space,” said Dr. Salge. “The Hitachi Lumada platform has, for many years, been among the top IoT platforms in the Gartner Magic Quadrant. That complements our competence when it comes to OT [operational technology], components, and our large installed base. We are now able to combine our competence across all technologies within the energy domain, from the physical component via the OT to the world-class IoT/IT competence of Hitachi in order to offer something unique. Applying this competence scope in our domain is really exciting.”

He notes that digitalisation is enabling companies to achieve much more, providing deeper collaboration with customers when planning, designing, operating and maintaining components and systems through the use of technologies such as digital twins and virtual reality. Such advances enable the evaluation of equipment and systems that may not even yet exist, for example; or for personnel to be trained remotely anywhere in the world.

“When you dream what’s possible in the future, it’s not the technology that is the limitation but more your imagination,” said Dr. Salge.

Technologies such as artificial intelligence could, for example, enable systems to become more autonomous. Today, it is needed to make sense of the flood of information coming from sensors in the field, but Dr. Salge says it will go way beyond that, again pointing out the need to drive flexibility and resilience.

“In the background you will have algorithms that are always running and learning in order to simulate ‘what if?’ scenarios for what could happen in the power system. They will also enable the system to understand what is happening and react by automatically changing some settings, for example. We call it adaptive protection. It learns from a particular fault situation. It may have been that the system protection logic reacted in a certain way to a storm but the response was not optimised. AI would see that, simulate a better response and automatically change the protection schemes of the protection devices.

“Further in the future, it may be that the system gives the operator proposals on what devices to invest in next in order to be more flexible and resilient in the future. It’s identifying the next step for improvement.”

Dr. Salge, stressed that such a scenario requires the buy-in of stakeholders across different technical disciplines to collaborate and co-create. “You need the customer to provide all the data for the learning cycle of the AI and machine learning technologies. This has to be done in different configurations; so you have to look at various networks across the world, under different boundary conditions and translate that from one region to the other.”

Looking at the main technologies the company will be working on over the next years, Dr. Salge summarises the focus areas with three keywords: sustainability, digitalisation and power electronics.

“It’s about providing flexibility by means of products, systems and solutions which are optimised to enable sustainable systems,” said Dr. Salge. “When looking at power electronics, it’s about having flexible, energy efficient converters across all the power ranges. You need them at small scale



Dr. Salge: a resilient system is one that is so flexible it can handle foreseen and unforeseen situations

to e.g. integrate battery storage. You need filter functionality at low and medium voltage to ensure power quality. We need to be able to upgrade the large, older HVDC converters, which are typically based on thyristor technology, with today’s IGBTs [insulated-gate bipolar transistors] or our BIGTs [bi-mode insulated-gate bipolar transistors]. Expanding and upgrading these large configurations and substations will allow more power transmission and greater flexibility. And behind that are the control systems, which would then be based on the most modern software architectures.”

He notes that there is already a global move away from large, monolithic software blocks to more flexible software architectures based on micro-services and related technologies. Explaining the trend Dr. Salge noted: “Here you ‘flexibilize’ and standardise the interfaces in the software modules, and then you build large software solutions out of many of those connected and interacting modules. This can for example bring technologies such as machine learning and artificial intelligence into the system in a flexible way; as well as to ensure cyber-secure

The EconiQ 145 kV gas insulated switchgear is part of a new portfolio designed to deliver superior environmental performance compared to conventional solutions



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HVDC Light valve of the type for the world's first four-station meshed HVDC voltage sourced converter grid in China

communication.”

Existing HVDC technologies are also expected to become more widespread. For example, point-to-point HVDC connections will evolve to multi-terminal connections. “We have done this in India but it is not state-of-the-art, in so far as it’s not used frequently. We can do it but it’s not used everywhere,” said Dr. Salge. “It should be done in many more places.”

Overlaying DC grids is another technology that is expected to gain prominence. It has already been demonstrated in China at the Zhangbei project. The Zhangbei DC-grid designed by State Grid Corporation of China (SGCC), is the world’s first four-station meshed HVDC voltage sourced converter grid, operating at 500 kV and up to 4500 MW. Hitachi ABB Power Grids has supplied several critical elements including an HVDC Light valve, wall bushings, transformer components, high-voltage capacitors and power semiconductor devices.

The system, set up to meet higher demand during the Beijing 2022 Winter Olympics, represents a break-

through in power capacity and is seen as a milestone in the potential capacity of future grids to integrate massive amounts of renewable power. “The same technology will be extended to offshore grids and possibly onshore applications,” said Dr. Salge. “These are the next steps that need to be done.

“There are also good discussions in Europe for improving interoperability between systems. It is not just about achieving the highest power and voltages, or the longest distances. It is very important that we make short connections between grids that are not interconnected today.”

This is crucial for neighbouring countries that might have grids operating at different frequencies or do not want to fully synchronise their grids. “Short back-to-back interconnections could bring grid partners together to start to develop their collaborations in a step-wise approach,” said Dr. Salge. “It is key that we start to do this as much as possible and as quickly as possible. Building such trustful collaborations is key for the energy transition to happen.”

Indeed, partnerships is one of the four pillars of Hitachi ABB Power

Grid’s Sustainability 2030 Strategy. Dr. Salge stresses that the urgency needed in addressing the energy transition is something that requires action from all stakeholders – governments, regulators, investors, operators, etc.

Governments need to create the right framework and incentives, which are needed to attract investment and promote collaboration.

“You can see in regions of the world such as Europe, that there is a good level of trust between partners across countries. Our recently installed interconnector between Norway and Germany is a good example of how much these TSOs trust each other; it goes far beyond financial incentives. It’s about setting the rules and building the trust,” said Dr. Salge.

Regulators have to build the flexibility into the grid code requirements to enable TSOs to work together, while setting the boundary conditions to also enable investors and operators to work together.

“All of this would stimulate electrification of the applications in the various sectors and accelerate the transition,” noted Dr. Salge. “But the

industries need to re-invent themselves as leaders of the energy transition; they need to look at their processes – especially when they are energy intensive – and re-invent them so they electrify and also change processes to eliminate the carbon emissions.

“Oil and gas companies are also key players, and are already starting to convert. One of our partners, Equinor, for example, is using its competence, know-how and financial power to go offshore. We are working with them to help make their transition happen in their specific way – it’s not a one size fits all approach. Each company, country or region is different; industries are different.”

He summed up: “As the energy system evolves, we are looking at how we can contribute with our scope, global reach and the value proposition we can bring with our technologies, to work with our partners in building a sustainable, resilient and affordable energy system. Being able to anticipate future needs and then contribute to social, environmental and economic value creation is something that makes me proud.”





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10 | Tenders, Bids & Contracts

Americas

First GT26 HE upgrade in Latin America

GE has won an order to upgrade its GT26 HE, the first such upgrade for the GT26 fleet in Latin America. The upgrade is for the Central Dock Sud plant in Buenos Aires, Argentina, owned by Enel Argentina.

The work is due to be completed by the end of 2022 and will increase efficiency and raise output by over 100 MW from the current 755 MW capacity. The modernisation will extend the operational life of the plant by 15-20 years.

Juan José Marcet, General Manager, Central Dock Sud, said: "Thanks to this significant power increase we will fully decommission our high-fogging system, leading to substantial cost savings. In addition, we will benefit from the HE's dual fuel capability, allowing us to burn diesel backup fuel in winter in case of a natural gas shortage."

Both the gas and steam turbine rotors will be replaced during the upgrade, as well as combustor casings and structural parts. The plant will have extended maintenance intervals, raised from 24 000 to 32 000 operating hours.

Amit Kulkarni, Head of Product Management for Heavy Duty Gas Turbines for GE Gas Power, said: "With the world shifting towards a lower carbon future, improving energy efficiency while increasing power output from installed power plants is a key way to generate more energy per unit of fuel with lower carbon emissions."

Voith to modernise Niagara Power Project

The New York Power Authority (NYPA) has approved the award of a \$275 million contract to Voith Hydro for mechanical and electrical upgrades to the Authority's 15-year modernisation and digitalisation programme Next Generation Niagara (NGN). This programme will extend the operating life of NYPA's Niagara Power Project in Lewiston. NGN focuses primarily on the 13 units in the project's Robert Moses Niagara Power Plant.

The scope of work includes the design, delivery, and installation of major mechanical components, including headcovers and servomotors as well as the refurbishment of operating mechanisms including the generator rotors, runners, and other turbine components.

The first turbine outage to update the plant's mechanical components is scheduled to begin in April 2023. An outage to allow for the digital overhaul of the first unit began late last year and is scheduled to conclude this summer.

Westinghouse Electric to supply Surry nuclear I&C

Westinghouse Electric Company has signed an I&C contract with Dominion Energy to implement a Digital Modernisation Programme at the Surry nuclear power station, Virginia, USA. The contract will support Dominion's programme to renew the licenses for Surry Units 1 and 2.

Westinghouse and Dominion will upgrade 23 systems over a nine-year period. The comprehensive programme will include digital I&C hardware, software, design, engineering, manufacture, delivery, and engineering support.

Each unit will be fitted with Westinghouse's Common-Q safety-grade platform, as well as the Ovation I&C platform. These technologies reduce or eliminate the need

for surveillances.

Dan Stoddard, Senior Vice President and Chief Nuclear Officer at Dominion Energy, said: "Extending Surry's operations is critical to meeting the Virginia Clean Economy Act's requirements for zero-carbon electricity by 2045. Partnering with Westinghouse will enable us to continue to provide reliable, affordable, and carbon-free energy to the community for years to come."

Bruce Power to replace steam generators

Bruce Power has awarded a \$284 million contract to replace the steam generators at Units 3 and 4 of the Bruce Nuclear Generating Station in Ontario, Canada to the Steam Generator Replacement Team (SGRT), a partnership between Framatome and United Engineers & Constructors (United). The work will be carried out by the Steam Generator Replacement Team (SGRT), a joint venture between SGT and Aecon.

SGRT's scope of work includes engineering and planning activities, the removal of existing and the installation of new steam generators, construction management and procurement of materials, and construction activities. SGRT is currently executing steam generator replacement work on Unit 6, with the majority of work expected to be completed by the end of 2021.

Robert J. LoCurto, President of SGT, said: "The Major Component Replacement Project is an important investment in the Bruce plant and its ability to provide dependable, carbon-free energy for years to come."

Asia-Pacific

GE wins Indian transformer orders

GE Renewable Energy's Grid Solutions has won several orders to supply 12 units of 765 kV transformers and 32 units of 765 kV reactors to Power Grid Corporation of India Limited (PGCIL).

The transformers and reactors will be installed in new substations in the state of Rajasthan to evacuate 8.1 GW from solar energy zones: 1.05 GW from Bhadla, 2.2 GW for Fatehgarh, 1.9 GW from Ramgarh, and 2.95 GW from Bikaner.

India's government has set a target of establishing 175 GW renewable capacity by 2022. This includes 100 GW from solar and 60 GW from wind. Rajasthan has a solar generation potential of around 20 GW.

Siemens Gamesa secures Indian wind project

ReNew Power, building the Tondehal 322 MW wind power project and the 301 MW Hombal project, both in Karnataka, India, has ordered 3.X platform turbines from Siemens Gamesa. Siemens Gamesa will supply 180 SG 3.4-145 wind turbines for both projects (93 units for Tondehal and 87 units for Hombal).

These turbines will be manufactured at the Siemens Gamesa facilities in India.

Turbine supply for this project is scheduled to commence during financial year 2022.

Europe

Pivot Power orders 100 MW energy storage

Wärtsilä has won an order from Pivot Power, part of EDF Renewables, to supply 100 MW/200 MWh of energy storage systems for two projects in the West Midlands, England. This will support Pivot Power's Superhub

model. Wärtsilä will install batteries at two sites in Coventry and in Sandwell on the outskirts of Birmingham. Construction is due to commence at Sandwell in Q4 2021 and at Coventry in Q1 2022.

Wärtsilä will supply energy storage technology for both projects based on its GEMS Digital Energy Platform. This dynamically optimises energy systems, providing feedback across asset owner, operation, and trading value chains.

Wärtsilä has previously supplied 100 MW of energy storage for two Pivot Power projects – 50 MW at the Energy Superhub Oxford and 50 MW in Kemsley, Kent.

EnBW selects Vestas 15 MW offshore turbine

EnBW has selected Vestas to supply its V23615.0 MW offshore wind turbines for the 900 MW He Dreiht project in the German North Sea. If a firm order is signed, this will be the world's first commercial deployment of the new V236-15.0 MW offshore wind turbine, Vestas said.

Vestas was pre-selected through a EU tender process to provide V236-15.0 MW turbines for installation at the project in 2025.

The He Dreiht project is located in the German North Sea within 85 kilometres of the island of Borkum and 104 km west of the island of Helgoland.

The V236-15.0 MW wind turbine has 115.5 m blades and a capacity factor of over 60 per cent. Vestas says that turbine has the industry's largest swept area of 43 742 m². Depending on the site conditions, a single machine can generate up to 80 GWh per year.

Turbines are expected to begin being installed in the second quarter of 2025, with full project commissioning anticipated for the fourth quarter of the same year.

Skavica hydropower project contract signed

Albania's Power Corporation (KESH) and Bechtel have signed an agreement to begin the early works for the 210 MW Skavica hydropower plant on the Drin River.

Work will start with a technical investigation, preliminary construction roads, and environmental and social impact assessments.

KESH said that the development of Skavica will reduce Albania's annual electricity imports by around 55 per cent annually, increasing security of the country's electricity supply.

Andrew Patterson, Bechtel's Infrastructure Global M&BD and Major Project Development Manager, said: "Skavica will be located upstream of the Drin cascade, which is home to four hydropower plants. These existing projects currently produce the largest energy production in the Balkans, with a combined power output of 1350 MW.

Skavica will increase the cascade's output and bring significant additional safety and environmental benefits. As a regulating dam, it will give greater protection against the devastating floods which impact the downstream communities annually."

GE to supply turbines for European Energy

European Energy has selected GE Renewable Energy to supply wind turbines for three wind farms in Lithuania, two in Talsiai and one in Rokiskis. GE will supply 34 of its Cypress onshore wind turbine units, with a combined output across the three wind

farms of 187 MW. The deal also includes a 25-year full-service contract.

The Cypress turbines will have a rotor diameter of 158 m, erected on a 151 m tower. The blades will be provided by LM Wind Power. European Energy will operate the turbines at 5.5 MW. The turbines will be installed in 2022.

Knud Erik Andersen, CEO of European Energy, said: "The expansion of renewable energy in Lithuania is something that we are honoured to be a part of. Renewable energy provides Lithuania with affordable and green energy that can bolster Lithuania's energy security, and we are happy to partner with GE on several of our windfarms in Lithuania. Lithuania is aiming to have 100 per cent of its electricity come from renewable sources in 2050, and we will do ours to make that ambition come true."

OX2 places order for Huszlew wind turbines

Swedish wind farm developer OX2 has placed an order with the Nordex Group to supply 15 N117/3000 turbines for the Huszlew wind farm in Poland. The contract also includes a 30-year service agreement for the turbines.

The 45 MW Huszlew wind farm will be built in the Mazowieckie province in East Poland.

The Nordex Group will supply the N117/3000 turbines on tubular steel towers with hub heights of 120 m. Commissioning of the wind farm is scheduled for 2023.

International

RINA to conduct Tunisia interconnection feasibility

RINA, working as part of a joint venture with the Tunisian firm Comete Engineering, has won a contract to provide the marine feasibility study for the 600 MW Italy-Tunisia Interconnection. The contract was awarded by ELMED ÉTUDES SARL, a joint venture between Terna and Société Tunisienne de l'Électricité et du Gaz (STEG), which manage respectively the Italian and Tunisian transmission grids.

The Italy-Tunisia Interconnection will be over 200 km long, laid at depths of up to 800 m, and will enable two-way electricity transfer. The project will help create a Mediterranean grid connecting North Africa with Europe.

The submarine survey project started in April 2021 and will last for one year. It will identify two possible landfalls at either end of the interconnection and also establish possible routes for the underwater section. RINA said that the fieldwork to establish routes should take around 3-4 months.

Framatome signs Barakah maintenance agreement

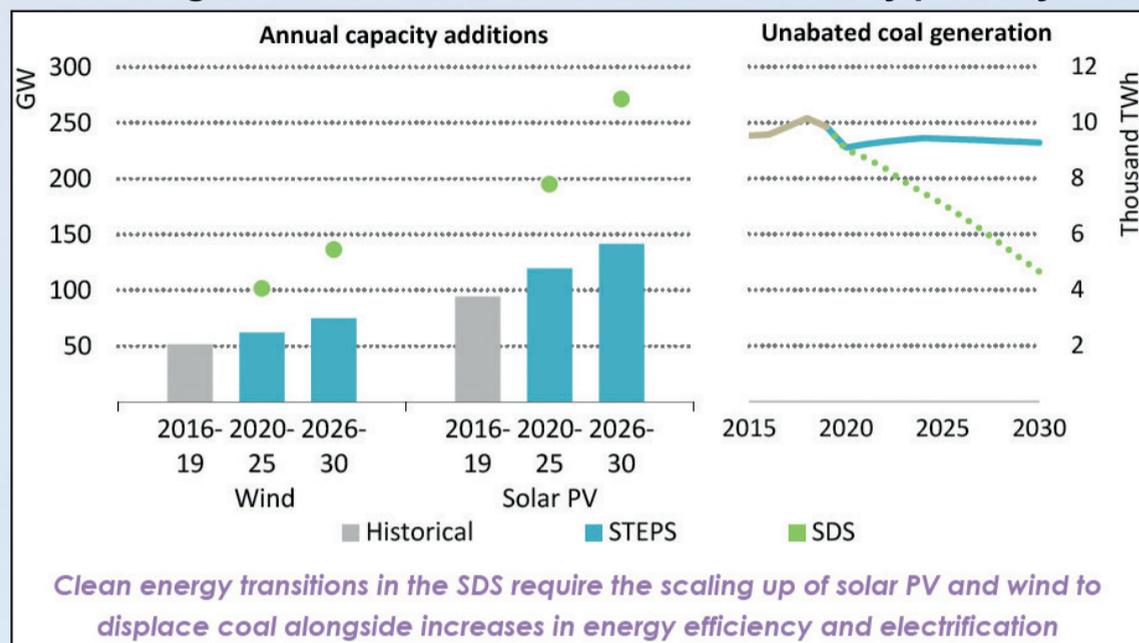
Nawah Energy Company (Nawah), operators of the Barakah Nuclear Energy Plant in UAE, has signed a Maintenance and Engineering Services Agreement (MESA) with Framatome.

In addition to maintenance and engineering services, Framatome will also provide training, technical and operational support, and fuel services for the four APR1400 units of the Barakah plant.

Ali Al Hammadi, Chief Executive Officer of Nawah, said: "We are committed to working with experienced international partners to operate and maintain the Barakah plant to the highest international safety and quality standards."



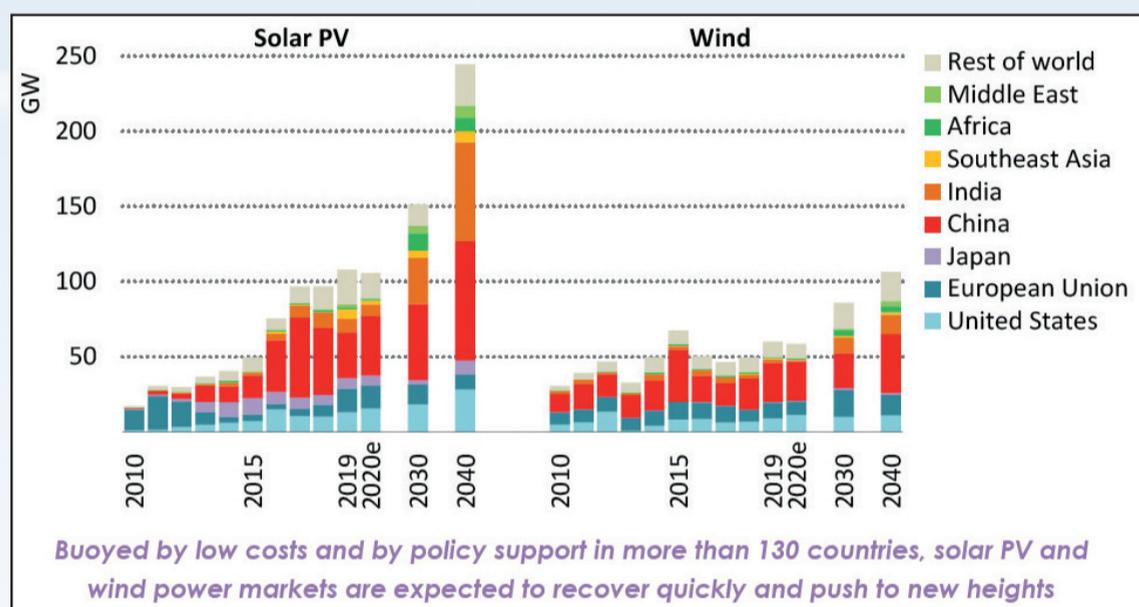
Redoubling efforts to shift to a sustainable electricity pathway



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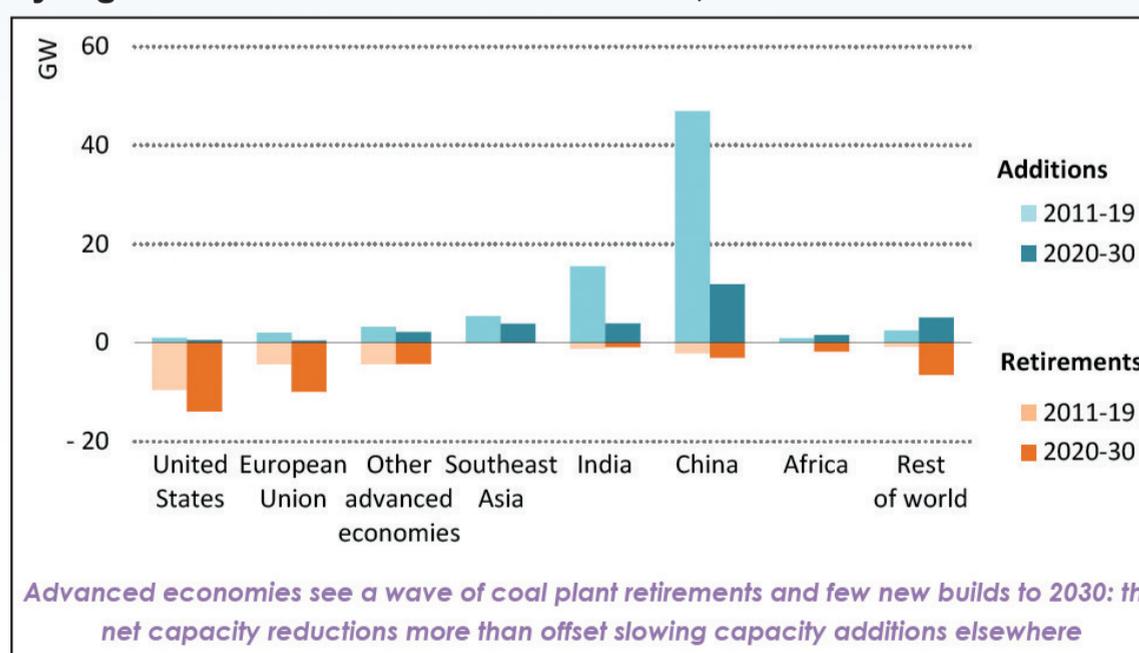
World Energy Outlook 2020, © IEA/OECD, Figure 6.10, page 226

Solar PV and wind power capacity additions in the Stated Policies Scenario



World Energy Outlook 2020, © IEA/OECD, Figure 6.11, page 228

Average annual coal-fired power capacity additions and retirements by region in the Stated Policies Scenario, 2011-2030



World Energy Outlook 2020, © IEA/OECD, Figure 6.13, page 230

Hydrogen

US DOE funds Hydrogen Energy Earthshot projects

- Next-generation hydrogen projects to receive \$52.5 million
- La Porte liquid hydrogen plant begins operation

Gary Lakes

The US Department of Energy last month announced that it would provide \$52.5 million in funding for 31 projects designed to advance next-generation clean hydrogen technologies and support the DOE's Hydrogen Energy Earthshot initiative. The funds are meant to reduce costs and accelerate breakthroughs in the burgeoning clean hydrogen sector.

"Part of our path to a net zero future means investing in innovation to make clean energy sources like hydrogen more affordable and widely adopted so we can reach our goal of net zero emissions by 2050," Secretary of Energy Jennifer Granholm said in a statement. "These projects will put us one step closer to unlocking the scientific advancements needed to create a strong domestic supply chain and good-paying jobs in the emerging clean hydrogen industry," she said.

Several members of the Senate and House of Representatives endorsed the

funding, \$36 million of which will go to the DOE's Office of Energy Efficiency and Renewable Energy (EERE) and \$16.5 million for the Office of Fossil Energy and Carbon Management (FECM). At EERE, 19 projects will receive support, including those researching electrolysis, clean hydrogen production, fuel cell subsystems and components, a domestic hydrogen supply chain, and analysis on cost and performance of fuel cell systems, hydrogen production pathways, and hydrogen storage technologies. Funding for FECM will test a number of technical systems and cover engineering design for carbon capture, utilisation and storage (CCUS) and the development of a gas turbine combustion system for 100 per cent hydrogen-fired and mixtures of hydrogen and natural gas.

But a much greater investment in alternative energies is going to be needed before the world will be able to end its dependence on fossil fuels. Up to \$1 trillion will need to be invested globally in renewable energy

systems if the world is to reach the Paris Accord's net zero targets by 2050, according to a Sustainable Recovery Plan proposed by the International Energy Agency (IEA).

Earlier this year, as the world health and the global economy began to show signs of improvement, the organisation released its Global Roadmap to Net Zero – its advisory on how the world can reach net zero emissions by 2050. That plan received criticism from those immersed in the oil and gas industry, due to its strident support for investment in renewables.

Economic improvement prompted an increase in demand for oil and subsequently a rise in oil prices, giving Opec and its allies reason to believe that the oil and gas industry will eventually return to its pre-Covid norm. This they demonstrated with an agreement to end production cuts beginning in September 2022.

The economic pick-up has seen governments boost spending to aid economic recovery. But the IEA in late

July said not enough government spending is going towards clean energy transitions.

Yet advances in the hydrogen sector are reported every day and many private companies clearly see it as a way forward for sustainable energy.

For example, the global industrial gas and engineering company Linde announced in mid-July that its fifth liquid hydrogen plant in the US had come into operation in La Porte, Texas. It already operates such facilities in California, Indiana, Alabama and New York.

The liquefying plant will produce more than 30 tons per day of hydrogen to Linde's customers. It receives hydrogen from Linde's 600 km US Gulf Coast pipeline, which has over 15 independent hydrogen production sources, giving it the most reliable feed supply of any hydrogen liquefier in the US today.

The plant will purify and liquefy the hydrogen before supplying it to end markets including material handling, mobility, aerospace, manufacturing,

metals, energy and electronics.

"This plant will not only boost the reliability of our existing network but will also make the supply chain more efficient and increase our ability to serve the rising demand for existing and new customers, for both conventional and clean hydrogen," Jeff Barnhard, Vice President South Region, said in a statement.

Meanwhile, the New York Power Authority announced last month that it would introduce a green hydrogen demonstration project at its Brentwood power plant on Long Island. The project will begin construction in the autumn and cost \$8.5 million. It will replace up to 30 per cent of the power produced by the gas fired turbine operating there since 2001. The green hydrogen will be produced from a hydroelectric plant in Canada.

In line with global targets, the State of New York is implementing plans to decarbonise its power sector, aiming to cut carbon emissions 85 per cent below 1990 levels by 2050.

Gas

Gas deal will help Iraq meet summer power demand

Efforts to assist Iraq with harnessing its flared gas are being made by international companies and institutions, but the job is expected to take several more years. With the summer peak power demand looming, the country has therefore signed a deal with TotalEnergies to use gas from the Ratawi field to fuel its power stations.

Gary Lakes

Soaring summer temperatures in Mesopotamia are again forcing the Iraqi government to confront its serious lack of power generation capacity, the direct result of its failure to capture its associated gas production, which it normally flares at a rate of 18 billion cubic metres (bcm) annually – an amount second only to Russia.

With work to harness flared gas expected to take years, for now the country is using what gas of its own that it can direct to power stations and importing gas from neighbouring Iran.

In its latest attempt to reduce flaring, the Iraqi government last month approved a deal with French company Total, which has recently changed its name to TotalEnergies, to capture and process some 600 million cubic feet per day from the Ratawi field, which would amount to around 7.7 bcm/year. TotalEnergies will also begin work

on a seawater injection project designed to pump water into the oil fields of southern Iraq in order to boost pressure and increase oil and gas production. Iraq has a current capacity to produce some 4.5 million b/d oil but Baghdad is looking to increase this to at least 6 million b/d in the coming years. The French major will also proceed to build a 1000 MW solar power plant. Details of the agreement were not released.

Since the mid-2000s, following the invasion of Iraq by US forces in 2003, the Iraqi government and international partners have been planning to get the country's energy sector better organised and make it efficient. However, continual fighting with Al Qaeda and Islamic State (ISIS), internal political disputes, differences over contracts, money and budget problems and a seemingly continuous state of crisis has prevented Iraq from making real advances in building energy

infrastructure that could make a difference. Flaring is a particular problem in that burning the gas contributes to global warming and climate change, it is also impacting the health of Iraqis living in the regions where gas is flared.

The situation is further complicated by acts of sabotage being carried out by ISIS militants against power lines and pylons.

Furthermore, Iraqis are forced to deal with power shortages, leaving them to cope with temperatures that can reach 50°C. Rioting in southern Iraq has erupted in previous years when Iraqis were left without power during summer temperature extremes.

In late June, the Basrah Gas Consortium, comprised of Shell, Mitsubishi and state-owned South Gas, announced it would receive a loan of \$360 million from the World Bank's International Finance Corporation (IFC) that will be used to harness gas that is normally

flared and channel it to a new gas-processing station, the Basrah Natural Gas Liquid Extraction Plant. BGC is already gathering gas from the Rumaila, West Qurna 1 and Zubair oil fields and using it to produce some 3.4 GW of power. The firm also produces about 80 per cent of the country's liquid petroleum gas (LPG).

The BGC project calls for gas processing capacity to be increased by 40 per cent to 1.4 billion cubic feet per day, around 14 bcm/year.

It is estimated that Iraq is consuming around 12 bcm/year but supplies only about 4.6 bcm/year of that. Real demand is estimated at close to 16 bcm/year.

Iraq is planning to reach 90 per cent self-sufficiency in natural gas production by 2025. Recently the government called for investment of \$3 billion over the next five years and as much as \$15 billion in investment may be needed to reach self-sufficiency. It hopes to end

flaring by 2025.

Iraq is gradually turning to renewables as a source of energy and recently signed a deal with Abu Dhabi's state-owned Masdar for the development of a solar generation facility that will produce up to 2 GW of power from locations in central and southern Iraq.

Currently Iraq depends on Iran to supply it with the bulk of its gas requirements, but in recent weeks Iran has reduced the gas and electricity that it is sending to Iraq because of a drought and heightened demand from Iranian consumers. Iraq continues to be pressured by the US to reduce its reliance on Iranian gas and power, as Iran remains under strict sanctions imposed by the US in late 2018. Iraq's financial problems have stopped it from paying Tehran billions of dollars in areas for gas and electricity delivered over the last couple years. Still, to maintain its influence in Iraq, Iran continues to supply.

Digital infrastructure is key to a renewable future

Many are convinced that greater use of renewables will lead to more blackouts. To convince these doubters, green energy will need to prove it can form the backbone of the grid. Digital infrastructure will play a vital part in this, reliably transmitting the data renewable providers need to keep the lights on.

Sarah Mills

Mills: there's a natural synergy between the digital infrastructure and the renewable energy industries doing the decarbonising



Powered by public demand and government targets striving for net zero, the rise of renewable energy is irresistible. Nations around the world are working towards ambitious green energy targets and the UK's own objectives include generating enough wind energy to run every home in the country by 2030, just nine years away.

Of course, a driving factor behind the rise of green energy is its relatively new viability as the cost of production steadily falls. As the sector grows, we must ensure the infrastructure behind it not only keeps pace, but also offers the support required while ensuring costs are kept in check. In today's interconnected world, robust digital infrastructure is critical.

Green energy providers obviously need reliable network connections to manage output and monitor demand. But beyond this, the possibilities for digital infrastructure and renewable energy working together are huge. For instance, sensors on wind turbines and solar arrays can capture performance data, informing energy providers where best to position them for the greatest returns. In the future, 5G-connected drones and robots might be used not just to inspect wind turbines, but also to repair them. And the spread of internet of things (IoT) technology will also open up opportunities to conduct more operations remotely.

As the renewables sector gains more and more of the energy market share, its reliance upon data centres will also grow. Responsible for emitting as much CO₂ as the commercial airline industry, many data centres are now making greater efforts to decarbonise. Therefore they'll generate a considerable amount of renewable energy demand themselves, becoming consumers as well as suppliers.

With the expansion of the sector,

intersections between digital infrastructure and renewables will become more common.

So what does the current landscape look like? Right now, the energy sector is full of talk about the three Ds: decarbonisation, digitisation and decentralisation.

There's a very natural synergy between the digital infrastructure and the renewable energy industries doing the decarbonising. Both are reliant upon emerging technologies because they're both concerned with improving upon the status quo and shaping a different future.

Even so, some green energy companies are more attuned to the importance of sound digital infrastructure than others. In a 2019 ORE Catapult survey, 94 per cent of respondents (comprising wind farm owners or operators, wind-related consultancies and digital service providers) said the offshore wind industry was not getting the most from data and digital technologies.

By contrast, the Seagreen offshore wind farm (due for completion in 2022/23) will be underpinned by an advanced communications infrastructure and use data extensively. A wide area network (WAN) will directly connect engineers at its operations centre with the supervisory control and data acquisition (SCADA) equipment required to manage the distribution of power to the substation. The flow of data between sites will maximise operational efficiency and provide vital insights into power, temperature and energy patterns.

Once completed, Seagreen will become Scotland's largest offshore wind farm, capable of producing enough energy for 40 per cent of all Scottish homes.

It's just one example of the crucial role now played by renewables in the UK's energy mix. The sector represented 45 per cent of power generation in the second quarter of 2020. Remarkably, this figure stood at 35 per cent a year previously, meaning a 10 per cent gain of the energy mix in just 12 months.

On mainland Europe too, there is great emphasis on making the move to renewables. Take the example of the Clean Energy Transition sub-programme, which has a budget of just under €1 billion for the period 2021-2027 and devotes significant funds to 'accelerating technology roll-out and digitalisation'.

But what more can be done to help the growth of green energy? And where are the opportunities to enhance operations using digital solutions?

For one, with high-quality digital infrastructure in place, green energy companies can benefit from greater flexibility. Demand and performance can be tracked, with fibre connections transmitting real-time data to warn of impending power surges. From operations centres, engineers can then connect to IoT-enabled substations and adjust the energy flow.

They also have the ability to analyse faults remotely. HD cameras

fixed to wind turbines, solar arrays and other sites can reveal issues in fine detail – before an engineer visits the site. Dark Fibre affixed to power lines, meanwhile, can be used in a condition-monitoring capacity, registering unusual changes in temperature and acoustics.

But deploying high-quality infrastructure can do much more than just chart demand, adjust energy flow and identify faults.

With the advent of smart grids and the DNO-DSO transition, the decentralisation of the grid is already under way. Companies like software and hardware makers SolarEdge are an indicator of new directions being taken. SolarEdge offers cloud-based control over resources such as solar PV, battery storage and electric vehicles, making up 'virtual power plants'.

There's also the Manchester-based UrbanChain, a peer-to-peer marketplace for locally generated, renewable energy. Their energy exchange system uses AI to analyse consumption patterns and find the most appropriate energy providers for users. Thanks to advanced connectivity, they can perform green energy transactions almost in real-time.

Big energy firms and governments are preparing for digitalisation. US giant General Electric (GE) is setting a high bar in its use of digital infrastructure. They have three companies in the GE group (GE Renewable Energy, GE Power and GE Digital) supporting the green energy transition for customers, with digital playing a key role.

Brian Case, Chief Digital Officer at GE Renewable Energy, said recently: "GE Renewables is focusing on bringing down the cost of wind, solar and energy storage technologies and then, in my portfolio specifically, really helping those assets to be optimised to their peak performance throughout their lifecycles."

"We're looking at artificial intelligence to process high-frequency data and use images from different inspection capability to really hone in on specific anomalies that may be occurring, several months in advance. The more that you can do that trouble-shooting from a remote operating centre versus having to go to sea (to wind turbines), the more you benefit from a reduced levelised cost of electricity."

The possibilities for maintaining green energy facilities remotely are impressive. However, this all requires advanced, reliable networks, once more reinforcing how central digital infrastructure is to the green energy sector's future.

The UK, it would seem, is acutely aware of the need to digitise and upgrade systems in the renewables sector. In collaboration with Ofgem and Innovate UK, the UK Department for Business Energy and Industrial Strategy (BEIS) has launched an Energy Digitalisation Taskforce (EDiT). As EDiT was announced, Minister of State for Business, Energy and Clean Growth Anne-Marie

Trevelyan said: "Digitalisation is vital to reaching the UK's ambitious, world-leading climate change target."

"This means technologies – from solar panels and electric vehicles, to heat pumps and batteries – will need to be smarter, sharing information with one another."

GE Renewables' Case also touched upon the out-dated infrastructure issue facing energy providers as they move into using more sophisticated technologies.

"This is a challenge for the energy industry as a whole: a lot of the large-scale generators have been around for decades. Because of that they likely have significant legacy systems or technical debt."

With the rigorous demands placed on infrastructure only set to increase, one of the most obvious systems energy generators should look at will be their network. They would be wise to choose a communications network ticking boxes for high capacity, low latency, reliability and security.

So what does the future hold? As global supplies of fossil fuels diminish and the cost of generating green energy plummets, growth in the sector is burgeoning. The Covid-19 pandemic and its associated lockdowns have accelerated this trend, highlighting the impact of humanity on the natural environment, shifting consumer appetites even further toward renewables.

There are, of course, still sceptics out there, still pushing back against the expansion of renewables. Many are convinced that greater use of renewables will lead to more blackouts, like those seen in Texas in February 2021. They cite the need for substantial investment in battery storage and more load-smoothing tech before renewables can produce sufficient baseload generation.

To convince these doubters, green energy will need to prove it can form the backbone of the grid. Digital infrastructure will play a silent, but vital part in this, reliably transmitting the data renewable providers need to keep the lights on.

And as hackers develop ever more sophisticated methods, digital systems will also have to safeguard green energy companies against cyber attacks. This will be made easier if energy firms move their data to the cloud, which, contrary to much popular opinion, is more secure than traditional data storage.

Cloud computing may also require upgrading of systems. Outdated networks won't be able to handle the constant data demands of an energy company. High-performance, dedicated connections to cloud service providers are the order of the day.

Put simply, advanced digital infrastructure is a prerequisite for continued growth in the renewable energy sector.

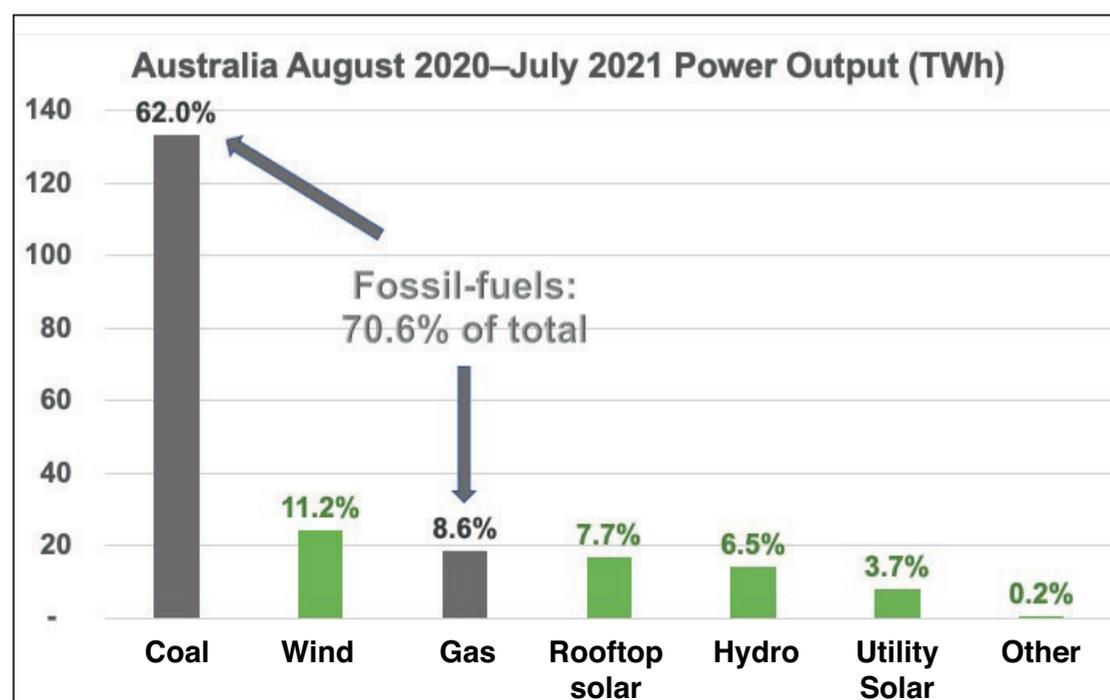
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With the COP26 climate change conference just over three months away, *TEI Times* continues its focus on Asia's plans for decarbonisation. This month, Asian energy expert and author **Joseph Jacobelli** focuses on Australia, arguing that the country could, and should, be doing far more.

Australia August 2020–July 2021 Power Output (TWh)

Source: Author, July 2021, based on data from OpenNEM project (opennem.org.au) which uses information from Australian Energy Market Operator (AEMO), Australian PV Institute, and Australian Government Bureau of Meteorology



Australia should be a leader in clean, green and sustainable energy, not just in Asia but globally. Less fossil fuels and more renewables should be a national priority. Instead, it is a laggard in decarbonisation thanks to hopeless federal government policy.

As highlighted in a section of my book: 'Asia's Energy Revolution', Australia is an extremely energy rich nation but its energy mix shift has a number of dimensions and complexities – something that various Australian governments have struggled with in their policy setting for decades. Factors include the massive amount of fossil fuel resources, the role of these commodities in domestic energy production, and their role in the economy, especially when it comes to exports. In the past it was a blessing but in today's decarbonisation-driven world, that blessing may have become a curse.

There are many reasons as to why Australia should be a decarbonisation leader. The nation is colloquially known as the "Land Down Under", but many also know it as the "Land of Plenty" and the "Lucky Country". It has the sixth largest land mass globally and given the small 24 million population, it has plenty of resources for variable renewable energy (VRE) projects. Of course, relatively speaking, the energy and carbon footprints are relatively small. Just 1 per cent and 1.2 per cent of the world's total, respectively. Still its vast VRE resources could comfortably provide the nation with the bulk of its energy needs.

For example, for solar PV, the country has the best solar radiation per square metre of any continent and

on average annually receives 58 million petajoules (approximately 16 million TWh) of solar radiation according to Geoscience Australia, a public sector organisation.

There are also 600 000 km² of wind resources with average speeds of 7 m/s. The potential for other clean energies, including geothermal and ocean energy, is also massive.

Given all of these attributes why has the Land of Plenty become a laggard in the global race to net zero? It is because the nation has greatly suffered from a virtually complete climate change policy vacuum for almost a decade. The current administration, a coalition led by the liberal party, has been at the helm since 2013 and has not embraced climate change. In the past the coalition repealed a carbon price mechanism in 2014 – making Australia the first country to reverse climate change policy action. Also, in 2015 it announced an emissions target reduction of 26-28 per cent below 2005 levels by 2030, the cut included a carbon accounting loophole, which led to accusations it was "cheating" on the Paris agreement. More recent policies also make its road to decarbonisation much harder. Two examples are a lack of net zero 2050 targets and a pro fossil fuels stance.

The respected Climate Change Performance Index ranked Australia 51 out of 57 jurisdictions. Australia came last among 193 members of the United Nations for climate action in the Sustainable Development Solutions Network report, which is supported the UN. The low rankings are chiefly due to Prime Minister Morrison's consistent refusal to adopt a 2050 net zero target. Notwithstanding pressure from industry, and the

majority of the population according to domestic polls. Local media did report that the administration may announce a target before the COP26 meeting in Glasgow in November 2021, but few are optimistic about the level of the goals to be set.

As an initiative to drive economic growth post-Covid pandemic and as part of an energy transition plan, the federal Coalition government proposed to boost the gas and gas processing sectors in 2020. The proposal generated wide-ranging criticism domestically and internationally. The proposal made little sense given that there is a high risk that gas consumption in Australia will decline over the next two to three decades and also because its price will not be competitive against VRE and other forms of clean energy such as green hydrogen, as the Australian Energy Market Operator (AEMO) noted. In fact, globally many experts view natural gas and LNG as a bridge fuel in the energy transition. Analysis by think-tank the Australia Institute, issued a little bit over a year after the policy was publicised, unequivocally concluded that the gas industry had actually made no contribution to the economic recovery.

Despite the lack of federal policy clarity and consistency, the tremendous clean energy build-up is driven by a vibrant and dynamic private sector and by support from several state governments, which were forced to go it alone in terms of policy and financial support.

Clean energy accounted for 10.4 per cent and 24.4 per cent of total primary energy and of electricity generation, respectively in calendar 2020, based on the bp 'Statistical Review of World Energy 2021'. The growth rate has also been outstanding. Solar capacity reached 17.6 GW in 2020 from just 1.1 GW in 2010. The growth for wind power was a little slower but still impressive, reaching 9.5 GW from just 1.2 GW during the same period.

The latest electric power output statistics show that in the 12 months to 18 July 2021, fossil fuels were still responsible for 70.6 per cent of total generation but also underscored that the VRE contribution is quite significant too. Wind power was responsible for 11.2 per cent of the total, rooftop solar for 7.7 per cent and utility scale solar for 3.7 per cent (see chart). And a lot more is being constructed, including several gigawatt-scale projects.

InterContinental Energy's Asian Renewable Energy Hub (AREH) will take 10 years and approximately A\$36 billion (\$25.2 billion) to develop. It will involve building wind and solar facilities of about 26 GW in Western Australia. It has already received permission for the first 15 GW. About 3 GW would go towards consumption by industry in the region, potentially including mining and

mineral processing. The rest will be for various uses including the production of green hydrogen products, which in turn could be exported to Japan and other countries.

The AREH had received Major Project Status from both the Australian federal government as well as that of the Western Australia state government, as of October 2020. If it goes ahead, construction may start in 2026 with the first exports of green hydrogen ready by 2027 or 2028. In June 2021, the federal Environment Minister found some environmental issues with the project and so the promoters will have to spend some time addressing these.

Surprisingly, InterContinental Energy announced in July that it was envisaging developing another project, the Western Green Energy Hub (WGEH), which would include 30 GW and 20 GW of wind and solar power also in Western Australia. The Sun Cable project, called the Australian-ASEAN Power Link, will take about seven years and will also cost about A\$22 billion (\$15.4 billion) to develop. It aims at building a 10 GW solar farm with energy storage in the Northern Territories. The output would be used domestically and sold to Singapore via a 4500 km subsea cable, and possibly also to Indonesia. As of September 2020, the link had received Major Project Status by the Australian government.

Another notable example is by Spark Infrastructure, which primarily is an investor in electric power transmission distribution infrastructure. In July, it said that it intended to build the Dinawan Energy Hub, a 2.5 GW hybrid wind, solar and energy storage hub in the southwest of the state of New South Wales. It could begin construction in stages in 2024 and start operations in 2025.

Despite the massive clean energy plants, it is difficult to see Australia becoming one of Asia's decarbonisation leaders without a strong federal government policy in place. But there is still hope. The nation will see many federal elections in the coming decades and policy may change. Many high-profile organisations, such as AEMO, have a vision of the Australian energy landscape becoming significantly or totally renewable energy driven. And clean energy will not only create new jobs and revenue streams but projects such as the AREH could turn Australia into a major direct and indirect clean energy exporter.

Giuseppe (Joseph) Jacobelli is a business executive, analyst, and author with over 30 years' experience in energy and sustainability in Asia. He is author of the recently published book 'Asia's Energy Revolution: China's Role and New Opportunities as Markets Transform and Digitalise', De Gruyter 2021.

Biomass use must be sustainable

While bio-resources are in principle renewable, there is growing concern over the sustainability of biomass for applications such as power generation. *TEI Times* reports.

As countries and companies move to reduce their GHG emissions, the use of biomass as an alternative lower-carbon fuel has grown dramatically due to its easy substitution as a 'drop-in' substitute for fossil fuels in power plants. The Drax power plant in Selby, North Yorkshire, United Kingdom, is a well-publicised example. The massive 3906 MW power plant, formerly the biggest coal fired plant in the UK, has over the last decade made the switch from coal to biomass, converting four of its six boilers.

But there has recently been growing concern over such projects, as a growing chorus of industry observers question the sustainability of biomass as a fuel in sectors such as power generation and transport.

In July the Energy Transitions Commission (ETC) – a coalition of more than 45 leaders from global energy companies, energy-intensive industries, financial institutions and environmental advocates – issued a report, which states that while bio-resources are in principle renewable, not all forms of biomass use are beneficial from an environmental perspective, i.e. not all biomass is "good" biomass.

Launching the report, Adair Turner, Chair of the ETC, said: "Biomass can make a really valuable contribution to the world's decarbonisation. But truly sustainable biomass is limited in volume; so its use must be restricted to priority sectors where alternative decarbonisation options don't exist. The good news is that clean electrification and hydrogen often provide a cheaper solution. The challenge for policymakers is to develop those alternatives fast, while supporting targeted use of biomass where it is most needed – in materials, aviation and for carbon removals – with a constant attention to ensuring supply of biomass is truly sustainable."

According to the report, 'Bioresources Within a Net-Zero Emissions Economy: Making a Sustainable

Approach Possible', many sectors and applications currently plan to use biomass as a key decarbonisation route. But potential demands far exceed sustainable supply.

Strategies for biomass use must therefore start with a careful assessment of total sustainable supply. The report identifies three core sources of biomass that can be used for energy and materials: biomass grown on dedicated land (e.g., energy crops, managed forests for materials production), biomass from waste and residues of other uses of land (e.g., forestry and agricultural residues, municipal and separately collected industrial wastes), and biomass from aquatic sources (e.g., seaweed).

In what it calls the 'prudent scenario' the report estimates sustainable supply at around 40-60 EJ/annum globally by 2050, of which about 10 EJ/year is currently used, and should continue to be used, as a material rather than an energy source. This leaves around 30-50 EJ/year available to provide energy or to meet new material demands. In addition, about around 4 EJ/year of demand for biomass used as material could be met by recycling woody biomass.

In its 'maximum potential scenario' an additional approximately 60 EJ/year might become available over time, but about 45 EJ/year of this would only be available if changes in diet or food production technology enabled a dramatic reduction in land use for animal meat production, with the remaining 15 EJ/year realised through further global advances in waste management (c.5 EJ/year) and development of a very large seaweed-for-energy industry (c.10 EJ/year).

Nevertheless, total potential demand for biomass in a net-zero emissions world greatly exceed the 'prudent scenario' estimate of sustainable supply, and significantly exceed even the 'maximum potential', warns the report.

Left unchecked, these trends would heighten the risks of unsustainable

management of the bio resource, including deforestation, biodiversity loss and soil depletion. The report reveals that current policies often fail to consider claims on bio-resources holistically, incentivising uses in sectors where alternatives exist, and jeopardising a sustainable management of the resource.

Alternative zero-carbon solutions, such as clean electrification or hydrogen, must be developed rapidly to lessen the need for bio-based solutions, said the report, noting that "dramatic cost reductions" have already been seen and further reductions are expected in renewable power generation, clean hydrogen production, and grid stability management.

"Industry and policymakers should therefore limit the use of bioresources in applications where cheaper alternatives exist or are within reach," it stated. "These include road transport, bulk power generation without CCS [carbon capture and storage], residential heating and shipping – with the exception of select specialised niches (e.g. local waste-to-energy district heat networks), especially in those locations where bioresources are locally abundant."

It argues that biomass is best used for materials rather than as an energy source, taking advantage of its inherent characteristics and avoiding unnecessary air pollution from combustion. Key uses include as timber, pulp and paper and other wood products or as a bio-feedstock for the plastics industry. Few uses in the form of energy stand the test of resource efficiency and expected long term cost-competitiveness.

In addition, applications will be appropriate where bioenergy use plus CCS (known as BECCS or BiCRS) can deliver carbon removals, which will be needed in addition to rapid in-sector decarbonisation to limit the global temperature to 1.5°C.

This support for BECCS will no doubt be welcomed by Drax, which has been recently criticised for its use of biomass.

In late June Drax Group and Mitsubishi Heavy Industries Engineering, Ltd., part of Mitsubishi Heavy Industries Group (MHI), agreed a new bioenergy with carbon capture and storage (BECCS) pilot project at Drax Power Station which will get underway this autumn. The pilot will test MHI's carbon capture technology – marking another step on Drax's journey towards achieving its world-leading ambition to be a carbon negative company by 2030. MHI's 12-month pilot will capture around 300 kg of CO₂ per day for the purpose of confirming its technology's suitability for use with biomass flue gases at Drax.

Early last month, however, Greenpeace, Friends of the Earth and The Wildlife Trusts were among a coalition of environmental lobbyists urging the UK government to end subsidies for industrial-scale biomass projects, including Drax's power plant at Selby.

In a letter sent to the government, the coalition argued that the burning of biomass would "undermine the UK's net zero target and its desire

to be a climate leader on the global stage". While burning biomass generates some 85 per cent fewer emissions than burning coal, it is not a carbon-neutral method of energy production and the production of pellets often contributes to deforestation, it claimed.

It also cautioned against the use of BECCS as a "silver bullet" and cited a report from Ember, which claimed that Drax's BECCS plant would receive £10 billion in subsidies from the UK government over its lifetime.

In response to the climate campaigners claims that Drax is "the biggest tree burner in the world", a Drax spokesperson said: "We have repeatedly stated that Drax does not burn whole trees or trees harvested solely for bioenergy. Our sustainable biomass pellets are produced from the material left over from when forests are harvested for other sectors – such as construction and furniture. The forests in the US South that we source most of our biomass from have doubled in growth since the 1950s."

After previously stating that the figures used in the Ember report "were based on outdated assumptions and a new-build BECCS power plant rather than a retrofit", and after updating its biomass strategy to strengthen sustainable procurement requirements, Drax defended its continued support of BECCS. The company first began capturing carbon in early 2019 and this latest project is a scale-up of an existing CCS project with MHI.

The UK government's position on BECCS will be made clear when it publishes its new Biomass Strategy early next year. The new strategy comes in response to a Climate Change Committee's (CCC) 2020 progress report to Parliament. Of greater interest, however, is that the new strategy will consider the impact of biomass on forests globally, setting out international governance on sourcing.

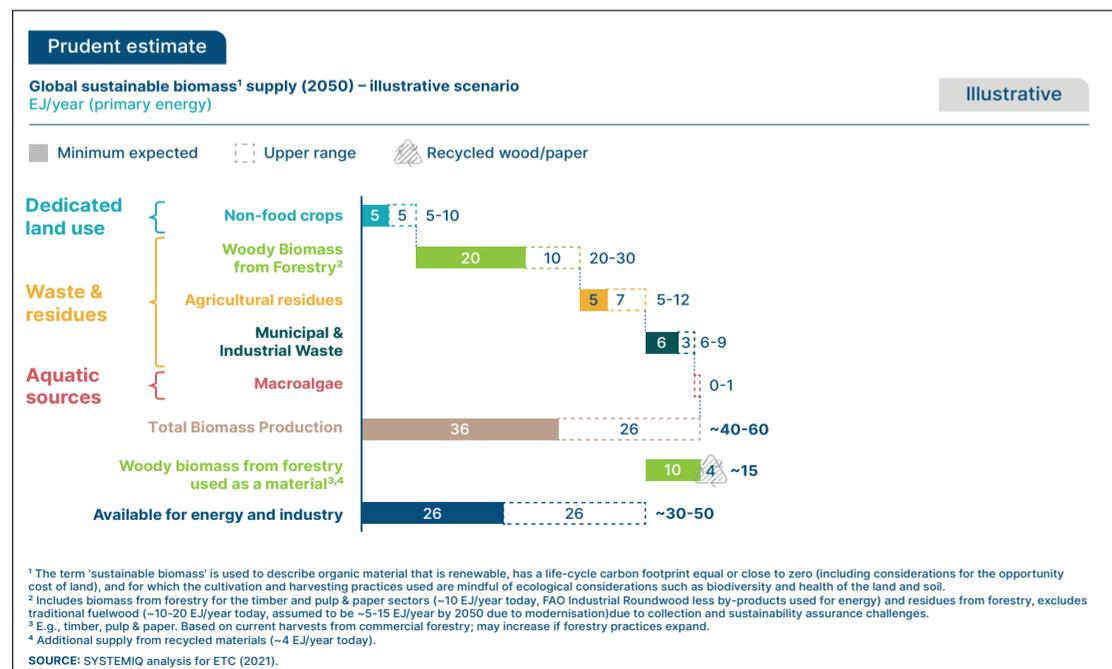
This is an issue that last month was addressed at the EU level when the European Commission proposed to increase renewables' share in the energy mix to 40 per cent by 2030. Under the plan the Commission also proposed tightening rules that determine whether wood-burning energy can be classed as renewable and count towards green goals.

It requires biomass-fuelled power and heat plants with a capacity of 5 MW or above to meet sustainability criteria, and provide substantial emissions cuts compared with burning fossil fuels. Biomass plants with a capacity below 20 MW are currently exempt from those requirements.

Evelien van Roemburg, Oxfam EU head of office, said, however, the renewable energy proposals will do nothing to combat climate change without ruling out the use of crop-based biofuels and the practice of burning down trees.

Such rhetoric is likely to negatively impact the use of the fuel for power generation and plans that generators might have had for replacing coal fired units around the world with biomass boilers will no doubt have to be reconsidered going forward.

Global supply of sustainable biomass could be around 40-60 EJ/year by 2050, of which about 10 EJ/year is currently used, and should continue to be used, as a material rather than an energy source





Junior Isles

Fit for 55 doesn't come with ease

The EU's recently announced 'Fit for 55' package sounds a lot like my regime for maintaining peak health into middle age: ambitious, comprehensive but still with a few flaws.

Last month the bloc of 27 countries tabled a series of legislative proposals to deliver the EU's increased climate target of 55 per cent emissions reduction by 2030.

The overall package looks wide-ranging. It contains changes to more than 10 pieces of legislation, including the Energy Tax Directive, the Alternative Fuels Infrastructure Directive, the EU Emissions Trading System (ETS) and the Renewable Energy Directive.

Like any good fitness programme, first and foremost the 'Fit for 55' package is holistic.

The Energy Tax Directive sets out new rules for the taxation of electricity and energy products used in transport and heating. It removes subsidies for fossil fuels and has helpful provisions to reduce the risk of double taxation for electricity storage. The Directive also proposes that national tax systems should rank fuels according to their energy content and environmental performance, so that the most polluting fuels are taxed the most. WindEurope noted, however, that the new Energy Tax Directive will need unanimous support from national governments.

The organisation called 'Fit for 55' "a good package," noting that it sends a clear message to consumers and investors. WindEurope's CEO, Giles Dickson, said: "The EU wants to accelerate the electrification of those

sectors that have so far relied on fossil fuels. This is good for the climate. And good for the economy. The Fit for 55 package means major new investments. It's a package for jobs and growth."

The changes to the ETS and the Alternative Fuels Infrastructure Directive show that the European Commission recognises the importance of joining the dots when thinking about decarbonisation, and is addressing all sectors and the interplays between them.

The Fit for 55 package adjusts the EU Emission Trading System (ETS) to the new climate ambition by further reducing the number of tradeable allowances. It extends the scope of the ETS by bringing in the shipping and aviation sectors, while establishing a separate ETS for emissions from the buildings and road transport sectors. This will increase the price for carbon emissions and further incentivise investments in renewables-based electrification.

In a press note, global energy and commodities consultancy, Wood Mackenzie stated: "The roadmap acknowledges the critical role electricity will play. Everything that can be electrified, should be electrified. But there are some sectors that don't lend themselves to electrification, and that is why Brussels is choosing to promote low-carbon hydrogen, carbon capture and storage and biofuels, as well as pushing for greater improvements in energy efficiency."

Accelerating the use of hydrogen is certainly seen as crucial. The Fit for 55 package gives a significant boost to the development of Europe's hydrogen sector by setting a 50 per cent target on the share of renewable hydrogen consumption in industry, as well as concrete and ambitious targets for hydrogen and its derivatives in the Fuel EU maritime proposal.

Just ahead of the unveiling of the package, François Paquet, Impact Director of the Renewable Hydrogen Coalition said: "Renewable Hydrogen is the missing link to fully decarbonise hard-to-electrify sectors. The 'Fit for 55' package must prioritise the uptake of renewable hydrogen and preserve renewable hydrogen producers from disproportionate requirements in this early phase to ensure the cost-competitiveness of renewable hydrogen compared to fossil-based hydrogen. Yet this can only work if bold and concrete action is taken to massively deploy new renewable installations in the coming years by improving the regulatory framework and faster permitting."

Electrification from green energy sources obviously calls for a massive boost in renewable generating capacity. National energy and climate plans currently target 53 per cent of electricity supply coming from renewable sources across Europe. The new target will require 65 per cent of electricity supply to come from renewables by 2030.

According to Wood Mackenzie data, the EU would need 472 GW of additional wind and solar power across the European power system by 2030 to

secure this new renewables target. Spread over the nine years to 2030, this amounts to 52 GW of wind and solar additions per year. Over the last decade Europe has averaged a build rate of 20 GW per annum. This equates to a 160 per cent ramp-up on average wind and solar annual build rates in order to hit the new target. While this is achievable, it will require further changes.

"Is this achievable? Optimistically, of course it is," stated Wood Mackenzie. "But it's going to be unnecessarily challenging unless further policy and regulation changes are made. The planning, connection and permitting process will need to be streamlined, distribution networks investment will need to be in place and regulators will need to adopt a new net zero mindset. On top of this, system flexibility build out will need to be supported, and market reforms will need to be in place to ensure it is fit for operating in a zero marginal cost producers' environment.

The point on flexibility is key. Although often overlooked, flexibility should be central a part of any fitness programme.

The European Association for Storage of Energy (EASE) welcomed the publication of the package but said "more ambitious policies" were needed to put energy storage "front and centre" in the EU's decarbonisation strategy.

In particular, EASE views the revised Renewable Energy Directive (RED III), which increases the overall Union target for renewable energy in 2030 to 40 per cent, as a positive step. It notes, however, that the RED III proposals fall short in terms of supporting energy storage deployment to facilitate renewable energy sources (RES) integration.

"This is a mistake because focusing only on deploying more RES is insufficient; RES need to be integrated effectively into the system and their use in the heating and cooling, mobility, and industry sectors must be maximised. Energy storage is a key enabler of a RES-dominated system, as it can ensure security of supply, efficient energy system operation, and the competitiveness of EU industries," said the organisation.

It therefore called on EU policymakers to expand RED III to include "a comprehensive methodology" to assess flexibility needs, which could be used to define an energy storage target to support the cost-effective integration of RES. It also asked for RED III to address barriers to deployment of hybrid RES + storage projects, simplify and speed up administrative procedures and permitting for energy storage facilities, and ramp up support for thermal storage.

The EU is taking the right approach to making its decarbonisation programme being fit for purpose – building the muscles for the task at hand. But let's hope the Commission does not overlook the importance of also making sure those muscles are flexible. It has to get the right combination of strength and flexibility. Think more gymnast than bodybuilder.

Cartoon: jemsoar.com

