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Getting charged up

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Next 10 years will be pivotal, says latest WEO

Dr Birol says how governments respond to the pandemic is a key uncertainty

In its latest World Energy Outlook, the International Energy Agency says the next decade is "critical" if the world is to achieve its climate change ambitions and will need to deliver a 40 per cent cut in global carbon emissions during the period. **Junior Isles** reports.

The next 10 years will be pivotal to put the world on track for a resilient energy system that can meet climate goals, according to the International Energy Agency's recently published 'World Energy Outlook (WEO) 2020'.

The Paris-based agency's flagship publication states that the Covid-19 crisis has caused more disruption than any other event in recent history, but whether this upheaval ultimately helps or hinders efforts to accelerate clean energy transitions and reach international energy and climate goals will depend on how governments respond to today's challenges. It stresses that "a surge in well-designed energy policies is needed".

Launching the report, IEA Chief Executive Dr Fatih Birol, said: "In the middle of uncertainty it is important to look at the long term trends – 2040/2050 – but let us focus on the next 10 years, which is critical for reaching our energy and climate goals."

He said the WEO focuses on two key uncertainties: firstly, the duration and severity of the pandemic and how it will affect the energy world; and governments' response to the pandemic in terms of addressing the other challenges the world is facing today, including climate change.

The key findings of the report are that global energy demand is set to drop by 5 per cent in 2020, energy-related CO_2 emissions by 7 per cent, and energy investment by 18 per cent.

In the Stated Policies Scenario, which reflects today's announced policy intentions and targets, global energy demand rebounds to its pre-crisis level in early 2023. However, this does not happen until 2025 in the event of a prolonged pandemic and deeper slump, as shown in the Delayed Recovery Scenario. Slower demand growth lowers the outlook for oil and gas prices compared with pre-crisis trends. But large falls in investment increase the risk of future market volatility.

Assessing the roles that the various energy sources will play in the electricity sector going forward, the IEA sees renewables taking a "starring role" in all scenarios, with solar centre stage. Supportive policies and maturing technologies are enabling very cheap access to capital in leading markets, it said, noting that solar PV is now consistently cheaper than new coal or gas fired power plants in most countries.

"Solar projects now offer some of the lowest cost electricity ever seen," says the IEA. In the Stated Policies Scenario, renewables meet 80 per cent of global electricity demand growth over the next decade. Hydropower

Continued on Page 2

China's carbon neutrality goal could cost $5 trillion

China will need more than $5 trillion of investments to grow power generation capacity if it is to reach its carbon neutrality target by 2060, according to global market researcher Wood Mackenzie.

The ambitious target announced in September would have to translate into boosting solar, wind and storage capacities 11 times over to 5040 GW by mid-century compared to 2020 levels, halving coal fired capacity and keeping gas where it was in 2019, WoodMac estimates.

"It is definitely a colossal task for a country using 90 per cent hydrocarbons in its energy mix and annually producing more than 10 billion tonnes of CO_2-e, and in addition, accounting for 28 per cent of global total emissions", said Prakash Sharma, WoodMac Asia Pacific head of markets and transition.

WoodMac agrees with China's own estimates that emissions will first peak before dropping to net zero after 2050 as transport, heating and industry become more electrified.

China's announcement has been hailed as a major step forward in international negotiations over how to slow global warming but there are questions over how the world's largest emitter can achieve the ambitious target.

The International Energy Agency's Chief Executive Dr Fatih Birol commented: "China's actions are critical in addressing the world's climate challenge. We will be eagerly awaiting its next Five Year Plan. We hope this will convince us that China will reach this target."

There are concerns that the 40-year timeframe to reach near zero emissions leaves open the possibility of delayed action in the short-term, in the hope that technological breakthroughs will deliver rapid gains later.

"The devil will be in the details and China should set more specific near-term targets and an earlier peaking date," said Helen Mountford, Vice-President for climate and economics at the World Resources Institute, a non-governmental organisation, in a statement.

According to WoodMac, China will keep coal in the mix to avoid large job losses in mining provinces. But "to have its carbon-neutral cake and eat it too", it says the government is expected to retrofit coal fired power plants with carbon capture use and storage (CCUS) technologies.

Along with CCUS, hydrogen will also have to become the mainstay of China's industrial green revolution. WoodMac estimates the country's hydrogen production to grow five-fold by 2050, equally distributed between the green and the fossil fuel-based, paired with CCUS, alternatives.

"Given China's large heavy industry and machinery sector, it is crucial that China masters the use of CCS and forest sinks to offset the remaining emissions. Without it, China's pledge to become carbon-neutral is nearly impossible," Sharma said.

Despite President Xi's calls for a "revolution" to speed up "green development", Beijing has this year approved coal fired power plants at the fastest rate since 2015.

At the same time, the government has pledged to end subsidies for new onshore wind installations by 2021 and has halved support for solar power plans this year, a trend that throws into doubt the future pace of adoption.

Much will ride on China's 14th Five Year Plan, due to be released next spring.

Jorrit Gosens, a researcher on China's energy transition at Australian National University, recently told the *Financial Times*: "The big question is whether the 14th five-year plan keeps a cap on coal power capacity at 1100 GW by 2030 or sets something lower or higher."

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remains the largest renewable source, but solar is the main source of growth, followed by onshore and offshore wind.

Laura Cozzi, Chief Energy Modeller at the IEA, in charge of producing the report, said: "Electricity is the most demanded form of energy going forward and we are witnessing a tremendous transformation in the way we are producing electricity… solar and wind will overtake coal within the next five years. Other low carbon sources remain very important. Hydro will be the most important low carbon source for many years to come, and nuclear will remain the backbone of many electricity systems."

At the end of September, SolarPower Europe also confirmed the bright future for solar. Based on EU

Cozzi: solar and wind will overtake coal within the next five years

member states' National Energy and Climate Plans (NECPs), it said 209 GW, or 19 GW per year, of solar PV capacity is set to be added by 2030.

SolarPower Europe warned, however, the full potential for solar in Europe has yet to be reached, and investments are necessary to unleash solar on a larger scale. The total figures from the NECPs are still below SolarPower Europe's estimated market developments under a Medium Scenario in its latest Global Market Outlook, which noted an average of close to 24 GW of solar added annually in Europe by 2024.

The WEO 2020 also noted that strong growth in solar and wind needs to be paired with robust investment in electricity grids. Without enough investment, grids will prove to be a weak link in the transformation of the power sector, with implications for the reliability and security of electricity supply.

Cozzi said grids are "the bedrock" of a clean electricity future. "We will need to lay many more kilometres of grid [networks] than we have done over the last 10 years – 80 per cent more."

Turning to climate change, Cozzi stressed that the next 10 years are "critical". She said: "As the economy rebounds, emissions will go up. We are already seeing this happening in several economies, in particular China. This is the first big country to come out of the crisis, showing some signs of economic growth and emissions as of April were already higher than last year."

To enable net zero by 2050 she noted that global carbon emissions will have to be cut by 40 per cent over the next decade.

According to the IEA, current CO_2 emission trajectories will see global temperatures rise by around 3°C by the end of the century. "This is a far cry away from if we want to meet international climate goals, including the Paris Agreement," said Cozzi.

Global cooperation drives energy transition

- Global Power System Transformation Consortium will "dramatically" accelerate transition
- BRICS countries approve energy cooperation roadmap

Junior Isles

A growing number of countries are coming together to collaborate on ways to accelerate the energy transition.

Last month saw the launch of the Global Power System Transformation Consortium (G-PST), a group whose goal is to dramatically accelerate the transition to low emissions, low cost, secure, and reliable power systems. This, it says, will contribute to more than 50 per cent emission reductions of all pollutants globally over the next 10 years by enabling the efficient integration of substantial clean energy investments into power systems.

Launching the consortium at the London BloombergNEF Summit, Audrey Zibelman, CEO of the Australia Energy Market Operator (AEMO) highlighted the need for a major global collaborative effort in overcoming technical barriers related to the integration of clean energy into power systems at an unprecedented scope and scale.

"Countries around the world are looking to pursue a path to modern, low-emissions energy systems, but face significant challenges in acquiring and applying the technical knowledge needed to operate and plan rapidly transforming power systems," said Zibelman. "This consortium will help meet this need by engaging key power system operators, applied research and educational institutions, governments, businesses, and stakeholders from developed and developing countries to accelerate clean energy transitions at the ambitious scope and scale that is required."

CEOs of six of the world's leading system operators, Australia Energy Market Operator (AEMO), National Grid Electricity System Operator UK, California Independent System Operator (CAISO), Electric Reliability Council of Texas (ERCOT), Ireland's System Operator (EirGrid), and Denmark's System Operator (Energinet) are leading this consortium.

These founding system operators are partnering with more than 25 prominent system operators from Africa, Asia, Latin America, Eastern Europe, and other regions as well as renowned research and educational institutions from around the world to help guide the G-PST vision.

The system operators from emerging and developing countries will engage in technical collaboration, peer learning, and workforce development to support the application of advanced engineering and operational solutions to meet their priorities.

The formation of the new group came just days after energy ministers from the BRICS countries approved a 2025 energy cooperation roadmap.

The document approved by Brazil, Russia, India, China and South Africa is the first comprehensive document setting out agreed plans for development of the energy dialog of the group of countries.

Ministers also confirmed that the energy transition should conform to national conditions and that each country shall determine the optimal policy, preventing imposition of models not suitable to BRICS countries.

They noted noted "the important role" of all kinds of energy, including fossil sources and nuclear power.

- The European Parliament has voted in favour of a climate law that would raise emissions reduction targets and oblige EU member states to be carbon neutral by 2050. While the bloc's current 2030 emissions reduction goal is 40 per cent compared to 1990 levels, lawmakers are now calling for a cut of 60 per cent, raising the bar even further on the 55 per cent ambition put forward by the European Commission last month. They also want an interim target for 2040 to be proposed by the Commission.

Increased UK offshore wind target welcomed, but concerns remain

UK Prime Minister Boris Johnson's intention to see the country's homes powered by wind energy within 10 years has been widely welcomed by the electricity sector but there are significant hurdles to be overcome, experts warn.

In October, Johnson promised to increase the government's 2030 target for offshore wind from 30 GW to 40 GW. To reach the new target, the government is allocating funding for offshore wind ports and infrastructure.

Downing Street said a £160 million investment programme will see around 2000 construction jobs rapidly created and will enable the sector to support up to 60 000 jobs directly and indirectly by 2030 in ports, factories and the supply chains, manufacturing the next generation of offshore wind turbines.

Danielle Lane, UK Country Manager for Swedish energy giant Vattenfall, which is building its Vanguard wind farm off the Norfolk coast, said the "ambition" was a good sign but fears a number of challenges remain.

With UK's offshore wind capacity currently standing at about 10.4 GW, she said: "The ambition signalled by the Prime Minister – to drastically increase the UK's offshore wind generation and boost the infrastructure, skills, and supply chain jobs needed alongside it – shows that this is the industry on which the country's future will be built.

"But for the rhetoric to become reality, it's important that the government doesn't overlook some significant hurdles. Planning decisions still take far too long, meaning renewable energy projects can be left in limbo for years before they know whether they will be approved.

"We also need to see a clear strategy in the forthcoming Energy White Paper that goes beyond just thinking about how to make electricity generation greener, and sets out how low-carbon power – including technologies such as onshore wind and solar – will be used to decarbonise industry and transport."

Although the government says the increased offshore wind target will support tens of thousands of jobs, how many of these wind turbines will be made in the UK is unclear. Some reports claim that 60 per cent will originate in Britain.

Speaking at the recent Bloomberg NEF summit, Michael Liebreich, Chairman and CEO of Liebreich Associates noted there was a "mismatch" between countries that support offshore wind and where turbines are made.

The government's announcement came as Triton Knoll Offshore Wind Farm Ltd, led by RWE Renewables announced a move into new wind turbine assembly facilities at Able Seaton Port in Hartlepool, Teesside.

RWE, which welcomed the Prime Minister's package of measures, said his latest milestone for the 857 MW offshore wind project (RWE share 59 per cent) demonstrates the positive impact of new investment into port facilities, and is part of a transformation of the Able Seaton's 140 000 m^2 facility.

Targetted investment can accelerate climate technology innovation

A new report by Capgemini Invent has revealed how targetted investments can accelerate innovation cycles to help tackle climate change, create jobs and generate billions in gross value added. The study was commissioned by Breakthrough Energy, a network of entities founded by Bill Gates and the world's top tech and business leaders to speed the transition to a clean energy future.

The report, entitled 'Fit for Net-Zero: 55 Tech Quests to Accelerate Europe's Recovery and Pave the Way to Climate Neutrality', highlights 55 clean technology projects that can speed economic recovery and help ensure Europe can meet its greenhouse gas emission goals over the coming years.

The projects and investments, distributed across the innovation cycle and by economic area and maturity, have the potential to create an annual market of net zero goods and services totalling up to €790 billion of gross value added per year, reduce emissions by 871 $MtCO_2$, and create nearly 13 million jobs by 2030 through both new jobs and the transformation of existing ones.

Over time, every €1 invested in this portfolio of clean technologies is expected to generate €9 of future turnover in European markets by 2050. These projects could also help improve air quality, food safety and increased energy independence for Europe.

Climate solutions are presenting attractive opportunities for investment. In October a new climate initiative co-founded by two ex-financiers, was launched to provide funding for the world's most effective not-for-profit climate solutions.

Known as the Global Returns Project, the initiative is calling on pioneering individuals to commit 0.25 per cent of their savings and investments each year to organisations combatting climate change – with the goal of raising a regular annual total of $10 billion within the next decade.

"Funding not-for-profit climate solutions yields returns just like any other investment; the returns are externalised and shared, but they are real, identifiable, and global," said Global Returns Project Trustee and ex-fund manager, Yan Swiderski. "Financial institutions are ready and willing to tackle the Climate Crisis. Individuals can help them make this small change which will have a huge effect."

The news came as JPMorgan Chase & Co. announced its pledge to use its financing weight to urge clients to align with the Paris agreement. The move comes after years of pressure from the climate change activism community.

Dr. Shuli Goodman, Executive Director of LF Energy commented: "It's great for JPMorgan and other big companies to make promises like these, but there's no cost for them if they fail. Until policies exist that also hold these companies accountable to these promises, it will be difficult to enforce any solid action plans."

Chile and Brazil in race for clean energy investment

- Slowdown in Argentina makes for leadership change
- Chile in top spot but for how long?

Janet Wood

Chile and Brazil are competing for the top spot in clean energy development in South America. New announcements are set to reinforce Brazil's rise, which saw it jump up from 19th to 16th place in the most recent (May) publication of EY's regular Renewable Energy Country Attractiveness Index. And although Chile's rank remained unchanged at 13th place, it is now the most attractive South American country: both are now ahead of Argentina, which fell from 11th to 19th place in the index.

Brazil is moving up thanks to some major new wind power investments, including plans for a 624 MW offshore wind farm to be funded by BI Energia and the Rio Grande do Norte state government – part of plans to invest BRL 5 billion ($911 million) in the Rio Grande do Norte's offshore wind sector. The project is expected to take two to three years to start construction.

BI Energia is already working on two offshore wind projects in Ceara state, which expects to reach 5 GW of offshore wind capacity in the next five years. Its Caucaia (598 MW) and Camocim (1200 MW) plants, now in licensing, will be joined by Asa Branca (400 MW) and Amontada (3000 MW, owned by Neoenergia).

Meanwhile onshore, a $100 million agreement signed in October by the Brazilian Development Bank (BNDES) and Japan Bank for International Cooperation (JBIC) will kick-off 12 wind energy projects, totalling 332 MW, in Bahia and Pernambuco. Total investment required for these plants is expected to be more than $368.3 million. In a separate project EDF Renewables has promised $179 million next year for the Serra do Seridó wind farm in Paraiba state.

In Chile, meanwhile, the burgeoning renewables portfolio already includes the 1.3 GW Andes Renovables wind and solar platform, one of the largest renewable energy platforms in Latin America, which moved forward in October with an announcement by Mainstream Renewable Power that it had put in place $280 million in construction finance.

Alongside large wind and solar the Chilean government has also opened the door to a wide range of new energy options. New technologies in the pipeline include a pilot green hydrogen plant using wind to power electrolysers in the Magallanes Region, where Enel Green Power Chile and local power company AME are expecting to recruit other development partners soon. On startup in 2022 it will be Chile's first green hydrogen production plant and one of the largest such facilities in Latin America.

The country is also exploring long duration energy storage solutions, and recently signed a joint venture agreement with Energía Latina-Enlasa, the largest backup power generation provider in Chile, to co-develop Highview Power's giga-scale cryogenic energy storage projects for use in Chile and other Latin American markets.

These storage and hydrogen projects offer new options for optimising the use of large scale wind and solar and Chilean utilities are already moving into combined sites. In October AES Gener began building the 180 MW Andes Solar II B project, which will include a 112 MW lithium-ion battery with five hours of storage capacity.

US interest shifts towards 'post fossil' technologies

Topic of debate: Some operators are committing to low-carbon fossil fuel plant conversions to secure the future of installations

As the future of fossil-fuelled power generation in the USA remains a key topic of debate, some plant operators have pre-empted federal policy with commitments to conversion that could give fossil power plants a low-carbon future.

In Ohio, Long Ridge Energy Terminal (LRET) has joined New Fortress Energy (NFE) and GE to begin providing carbon-free power as early as next year from a new 485 MW CCGT being built at the closed Ormet aluminium smelter site. It will begin by blending hydrogen in the gas stream – the GE 7HA.02 combustion turbine can accommodate up to 20 per cent hydrogen – and transition the plant to be capable of burning 100 per cent green hydrogen over the next decade. Black & Veatch will assist LRET with developing plans for transiting the plant for hydrogen. The facility is expected to begin commercial operations in November 2021.

NFE will focus on investing and deploying emerging hydrogen production technologies through its new Zero division – the site already has access to industrial hydrogen and can access water from the Ohio River for electrolysis. Below ground salt formations can be used for hydrogen storage.

In New Mexico, meanwhile, the San Juan Generating Station, one of the largest coal fired power plants in the US Southwest, is set to undergo a $1.4 billion overhaul to install carbon capture, use and storage technology (CCUS). US Deputy Secretary of Energy Mark Menezes said recently that the DOE had concluded that retrofitting would result in significantly more jobs than replacing the plant with a mix of new natural gas fired generating stations and solar and battery storage systems.

Local Senator Bill Sharer said: "If we make this happen here, all of a sudden we become the world leader in carbon capture, use and sequestration, and I mean world leader."

Menezes too sees CCUS as a potential game changer for fossil-fuel generation and a key to US utilities' ability to make commitments such as that of Entergy, which promised to achieve net carbon neutrality by 2050. Entergy referenced the potential for green hydrogen and carbon capture in meeting that goal. It signed a joint development agreement with Mitsubishi Power in September to focus on decarbonising technologies.

US still seeking key to 'nuclear renaissance'

- New designs win government grants
- Less expensive reactors needed

Janet Wood

The US remains a strong supporter of its nuclear industry, with US Secretary of Energy Dan Brouillette saying recently that new plant designs will strengthen the US's nuclear offering. US Senator Lamar Alexander, chair of the Senate appropriations subcommittee that funds the Department of Energy DOE, has also called for a nuclear renaissance to build more reactors.

Alexander said: "We need to find new and less expensive ways of making nuclear power". That means new reactor types that are more responsive to current needs, and the DOE has announced funding for two new designs aimed to be in operation in less than a decade, as well as for installation of a small modular reactor (SMR) in Idaho.

In October the Advanced Reactor Demonstration Program (ARDP) decided to award TerraPower LLC and X-energy $80 million each in cost-share partnerships to build advanced nuclear reactors that can be operational within seven years.

The Department plans to invest a total of $3.2 billion over seven years, and expects industry partners to provide matching funds. Both designs have a focus on providing flexibility.

TerraPower and its partner GE Hitachi will demonstrate Natrium, a sodium-cooled fast reactor using thermal energy storage to give the plant the flexibility to complement renewable generation. X-energy will deliver the Xe-100, a flexible high temperature gas-cooled reactor, which also provides process heat.

Meanwhile the Carbon Free Power Project will grant $1.355 billion in cost-sharing funds to Portland-based NuScale Power for its SMR. The funds should see twelve 60 MW units sited at the federally-owned Idaho National Laboratory's site west of Idaho Falls and operational in 2029. The project has been promoted by Utah Associated Municipal Power Systems, a project group of over 46 organisations serving six western states – Utah, California, Idaho, Nevada, New Mexico and Wyoming.

"We appreciate this tremendous vote of confidence in (the project) by the Department of Energy," said Douglas Hunter, CEO and General Manager of UAMPS. "It is entirely appropriate for DOE to help de-risk this first-of-a-kind, next-generation nuclear project."

Tennessee Valley Authority was disappointed by DOE's SMR funding decision, as it had an early site permit to potentially build SMRs at its Oak Ridge site. But the DOE award to other projects "certainly does not make or break this project," TVA spokesman Jim Hopson said.

Senator Alexander said TVA's seven nuclear plants helped it maintain its power rates below the national average, but other states tell a different story. New Jersey's Public Service Enterprise Group has filed an application for a second year of public ratepayer subsidies for its nuclear plants, warning that without the so-called zero-emission certificates it would close them. It is now waiting for approval of the second of three annual $300 million subsidy payments.

California wants to spread the benefits of storage

The California Energy Commission (CEC) has decided long term storage is the key to accommodating large volumes of renewable energy production and delivering the state's decarbonisation goals. It wants around 1 GW of new long-duration energy storage and sees it being effective at several levels within the system.

After inviting bids for $20 million in grant funding for storage projects it recently announced plans to award an additional $16 million, bringing the total to $36 million. The funding was split between large (above 400 kW) non-lithium ion storage for 10 hours or longer; smaller scale non-lithium ion storage to support Native American Tribal communities and disadvantaged or low-income communities; and storage for groups of new-build homes.

Among the winners were four energy storage projects incorporating vanadium flow batteries from UK-based Invinity Energy Systems that together total 7.8 MWh. The batteries will perform services including peak shaving and provision of back-up power.

CEC also offered a separate funding pot to model deployment of long term storage and expects to award grants worth $2.7 million to 11 projects.

Vietnam backs wind and solar in new Master Plan

■ Wind and solar to provide 50 GW ■ Gas to increase as coal wound down

Syed Ali

Vietnam is making wind and solar its main focus as it prepares its latest Master Plan for the power sector.

Under the plan for 2021-2030, with a vision to 2045, the country's total power output is expected to increase by nearly 80 000 MW by 2030. Large power sources such as coal, gas and liquefied natural gas (LNG) fired power plants are expected to increase by over 30 000 MW, while onshore and offshore wind and solar power plants will expand by approximately 50 000 MW.

At the end of September Deputy Minister of Industry and Trade Hoang Quoc Vuong said the power development Master Plan 8 had basically been completed and would be submitted to Prime Minister Nguyen Xuan Phuc for approval in November. Final approval is expected in early 2021.

The capacity of the whole system is expected to reach about 138 000 MW by 2030 and 302 000 MW by 2045, of which priority is given to the development of renewable energy sources in accordance with the potential of each region.

Addressing grid bottlenecks is also a key part of the master plan. The annual investment needed for the power and grid development programme will amount to about $13 billion for 2021-30, according to the plan.

While the plan is awaiting approval, the government has stopped licensing wind power plants and is drafting a new national power plan for the next decade. Last month the Ministry of Industry and Trade told provinces and cities to temporarily stop accepting proposals for new projects.

In the last two years Vietnam's incentivised feed-in tariffs have attracted a slew of investors, with the ministry receiving proposals for 50 GW of wind power alone since 2018. It estimates that by 2025 there will be a total of 11.8 GW of wind power capacity.

The feed-in tariff for wind power is currently 8.5 ¢/kWh for onshore projects and 9.8 ¢/kWh for offshore. They apply to projects that begin generating power by no later than 31 October 2021.

As a project typically takes two or three years to go stream, the ministry said it would propose keeping the current feed-in tariffs through 2023 so that more projects could get them. State power distributor Vietnam Electricity (EVN), however, warned against it, saying an extension could cause the national grid to be overloaded.

The news came as UK energy firm Enterprize Energy said it wants to begin operating its 3400 MW ThangLong offshore wind project by the end of 2025.

Company Chairman Ian Hatton proposed the project, located between 20 and 60 km off the coast of Binh Thuan, be included in the 8th Power Development Plan, so that at least part of it can begin operations by the end of 2025 and all of it by 2028. Hatton also proposed the government gives Enterprize Energy licenses to develop transmission lines to handle future output.

Under the master plan, coal fired thermal power will be reduced gradually, with an increase in gas thermal electricity to compensate. Last month a memorandum of understanding (MoU) was signed between representatives of the provincial People's Committee and Singapore's Delta Offshore Energy Pte.Ltd to build a 3200 MW LNG fired power plant in the Mekong Delta province of Bac Lieu.

■ Vietnamese construction company Trungnam Group has announced the inauguration of what is thought to be the nation's biggest solar project – the 450 MW Trung Nam Thuan Nam Solar Plant, in the southeastern province of Ninh Thuan

Australia lays out technology roadmap to cut carbon emissions

Australia plans to invest A$18 billion ($13 billion) over the next 10 years in technologies to cut carbon emissions.

Laying out the country's technology investment roadmap, in late September Energy Minister Angus Taylor attempted to come up with a climate and energy policy after 13 years of wrangling over carbon prices and emissions targets. He stopped short, however, of proposing a net zero emissions target by 2050 or a carbon price.

Taylor said the government will focus on investing in hydrogen, energy storage, low carbon steel and aluminium, carbon capture and storage, and carbon sequestration in soil, with cost targets for those technologies

The country, which is the world's largest coal exporter, is already making significant progress in building its clean energy sector. The government recently dedicated A$4.8 million ($3.4 million) from its 2020-2021 Federal Budget to the development of a regulatory framework related to offshore renewables. Australia currently has only a couple offshore wind projects in development.

Western Australia is in the throes of a massive shift to clean energy. A report published in mid-October noted that more than half of Western Australia's remaining coal fired electricity capacity could be replaced by 2024. Renewable energy is tipped to make up almost 80 per cent of the main grid.

In September the state's government issued a global call for Expressions of Interest for the development of a more than 1.5 GW renewable energy hub for the production and export of green hydrogen.

Just weeks later, Petrofac's Engineering and Production Services (EPS) business secured its first green hydrogen Front End Engineering Design (FEED) contract for the landmark Arrowsmith Hydrogen Project in Western Australia. The project, which will become Australia's largest commercial-scale green hydrogen complex, is expected to commence production by the end of 2022 and will generate 25 t of green hydrogen per day from the zero carbon energy sources of water, solar and wind.

The state also recently announced it could become home to a 100 MW/200 MWh battery storage facility that will help ease the pressure on the states' power grid as more renewables capacity is added. If built, the so-called Synergy Big Battery will become the second largest in the country.

Indonesia gives boost to biomass

A memorandum of understanding (MOU) recently concluded between Indonesia's state-owned electricity provider PLN and two of its subsidiaries, Bandung Institute of Technology (ITB), and Mitsubishi Power Ltd, looks set to boost the adoption of biomass co-firing in the country's coal fired power plants.

With conclusion of the MOU, the focus will now be to make a roadmap for promoting biomass co-firing, including selection of the optimal biomass fuel and a pilot facility from among PLN Group's power plants. This will be based on the results of technical feasibility tests conducted by Mitsubishi Power in Japan, together with policy analysis and market research performed in Indonesia under ITB's leadership.

The Indonesian Government is currently carrying out an energy policy that aims to reduce carbon emissions by raising the nation's use of a renewable energy in the generating mix to 23 per cent by 2025, and decreasing CO_2 emissions by 29 per cent by 2030 through energy conversion assuming reduced use of fossil fuels.

Under this policy – in addition to expanding adoption of wind, solar and geothermal renewables – a central role is accorded to promoting use of biomass fuel at existing coal-fired power plants, and the newly agreed activity aims to support that initiative.

Plans call for a proposal covering technical requirements and preparation of the relevant legal and financial support frameworks to be completed by September 2021. This will be followed by cooperation to promote the adoption of biomass co-firing in Indonesia and the realisation of the pilot project.

India looks to replace coal with renewables in bid to cut pollution

India is planning to replace retiring coal fired power plants with renewable generating capacity in a bid to cut the nation's carbon footprint.

Speaking at a recent industry event, Power Minister R. K. Singh said: "Many of those plants are getting retired. Some plants are already retired, and about 29 more plants are going to retire, and all that space will be occupied by renewable energy."

Delhi made an international commitment five years ago that as much as 40 per cent of its overall generating capacity would be based on cleaner energy sources by 2030, a goal which the country is set to achieve as early as this year. This would give policymakers more scope to keep a lid on the growth of the coal fired fleet in the country. India is already working in the shorter term to expand its total renewable energy capacity to 175 GW by 2022 and aims to raise its renewable energy capacity to 450 GW by 2030, the minister said.

The Central Electricity Authority (CEA) has identified 34 coal power stations with a combined capacity of 5.14 GW that can be retired. A total of 164 coal-based units with a combined capacity of 14.12 GW have been made redundant in the last 18 years, Singh told parliament in September.

Following the minister's announcement, Delhi Environment Minister Gopal Rai said he will write to the Central Pollution Control Board (CPCB) and EPCA requesting them to close down 11 thermal power plants, causing air pollution in the nation's capital.

Rai also stressed that the central government should realise that the pollution problem is not related to boundaries and CPCB should not show any partiality.

"If generators will operate in Gurgaon, Faridabad and other districts of Haryana, then Delhi will face direct consequences," he said.

Investment heads offshore as renewables power forward

- Plans for huge investment in Baltic and North Seas
- Wave and tidal could replicate offshore wind success

Janet Wood

Europe's demand for renewable energy has continued the rising trend it has maintained since 2012 despite the effect of Covid, according to bodies that issue green certificates. Demand for renewables documented with Guarantees of Origin has steadily increased, up 16 per cent every year during the period from 2012 to 2020. Growth remained close to that figure at 15 per cent in 2020, despite the pandemic, according to new figures from the Association of Issuing Bodies (AIB).

"The fact that especially corporate demand for renewables seems unaffected is truly inspiring during these unusual and trying times," said Tom Lindberg, Managing Director at ECOHZ. EU demand for renewables reached 530 TWh at the close of Q2 2020.

Hydropower retained its position as the biggest renewable source, but it has fallen from 90 per cent of supply a decade ago to just 61 per cent in 2019. Wind is the second largest renewables source at 23 per cent in 2019 and looks set to take another leap, with new offshore wind leases up for grabs.

The UK's Crown Estate is nearing the completion of the second of its three tender stages for Offshore Wind Leasing Round 4, which should add 7 GW of projects in UK waters. Long awaited government plans are also expected to support 1 GW of floating offshore wind. Eight countries – Poland, Germany, Denmark, Sweden, Finland, Lithuania, Estonia and Latvia recently committed to expand offshore wind energy in the Baltic Sea, where Poland's PGE alone plans to develop 6.5 GW of capacity as part of a strategy to become climate neutral by 2050. And recently European Energy officially filed for permission to build two wind farms – Omø South and Jammerland Bay – offshore of Denmark.

Knud Erik Andersen, CEO of European Energy, said: "Our offshore wind farms will supply more than 500 000 Danish households with green energy and be key to achieving the ambitious emissions reduction targets in Denmark and the EU."

Tidal stream and wave energy could also replicate the success of offshore wind. A '2030 Vision' report from industry body Ocean Energy released in October unveiled ambitious targets, saying 3 GW of ocean energy could be deployed worldwide by 2030, with costs falling to around €90/MWh for tidal stream and €110/MWh for wave energy. Charlina Vitcheva, Director-General for Maritime Affairs and Fisheries at the European Commission, said: "Ocean energy can be a real 'jewel in the crown' of the Blue Economy. The economic and environmental opportunities it offers EU coastal citizens are exactly what the European Green Deal is all about."

Groundwork laid for responsive distribution networks

ENCS, the European Network for Cyber Security, and E.DSO, the European Distribution System Operators' Association, have launched the third in a series of security guidelines for a smarter and more secure energy network, following on from security requirements for electric vehicle charging points and smart meters.

Roberto Zangrandi, Secretary General of E.DSO, said that these foundations for an industry-wide set of recommendations "would be a huge step forward to ensuring security of critical European energy grids and infrastructure, which can only really be achieved through a collaborative effort between DSOs and cybersecurity experts".

The need for common ground on security was illustrated by four UK distribution network operators (DNOs) who announced in October that they would join forces for the first time to provide flexibility providers with a direct path to participate in flexibility on multiple networks. Western Power Distribution, SP Energy Networks, Scottish and Southern Electricity Networks and Northern Powergrid all said that the 'Flexible Power' collaboration would be used to signpost and operate their flexibility requirements. The DNOs intend to work in partnership to develop the brand.

Jim Cardwell, Northern Powergrid's Head of Policy Development, said: "It will offer customers with assets connected across multiple networks a much simpler and single interface and this will help accelerate the roll out of flexibility across the entire UK energy system."

The system will allow for interface with other flexibility platforms, making the need for collaboration on security still more important.

Kiwi Power will be supporting the project by providing its Kiwi Core Virtual Power Plant software to the four DNOs. Stephan Marty, Chief Commercial Officer, said that the software will allow flexibility providers to declare their assets' availability, receive dispatch signals and view performance and settlement reports. "Flexibility providers will be able to overlook multiple networks using one single platform."

'Green gases' rise as biomass fades

- R&D looking towards and beyond hydrogen
- Ørsted and Yara to generate green hydrogen for ammonia production

Janet Wood

The pace of investment in hydrogen is making a marked step up, as countries vie to become major players and energy companies link up with their counterparts in other sectors to develop what is expected to become an important energy vector.

Recent national announcements suggested the EU's Member States are competing to become hydrogen hubs. Spain has announced plans to attract €8.9 billion ($10.5 billion) of investment into hydrogen – largely from the private sector – over the next 10 years. It plans to install 4 GW of electrolysers to take advantage of growing renewable energy capacity by 2030. Germany has pledged to invest €9 billion in hydrogen by 2030 and France plans investment of €2 billion over the next two years.

The rush to hydrogen comes as an industry group in the UK launched a new bid for government funding for an energy 'innovation hub' to meet the needs of energy intensive industries based around Ellesmere Port in Cheshire. The bid, launched in October, looks towards replacing natural gas with hydrogen or heat networks, along with other energy innovations.

Hydrogen is not the only 'green' fuel of interest. Oil and gas group Repsol is planning to join with Saudi Arabia's Saudi Aramco to produce synthetic fuels from green hydrogen at its refinery in northern Spain.

Offshore wind developer Ørsted has just announced a new joint venture with Yara, a leading global fertiliser company. They will develop a 100 MW wind powered electrolyser plant for renewable hydrogen production and aim to use it to replace fossil-based hydrogen for ammonia production in Yara's Sluiskil plant in the Netherlands. In addition to its current use, ammonia is seen as a potential form to use hydrogen in power applications. "Green ammonia can be essential to enable sustainable food production, in addition it is emerging as the most promising carbon neutral energy carrier for several energy applications," said Martin Neubert, Executive Vice President and CEO of Ørsted Offshore.

Increased interest in alternative gases has coincided with recent decisions to withdraw support from biomass, prompted by continuing questions over its sustainability at large scale. Dutch ministers recently decided to phase out subsidies for power and heat projects using biomass, as Economic Affairs Minister Eric Wiebes told his fellow MPs that there are greener alternatives. Vattenfall decided that it would postpone plans to build a biomass plant on the outskirts of Amsterdam, following sustainability concerns raised by local authorities.

Poland and Romania take nuclear route to lower carbon

Poland will decide next year on which nuclear technology to use for its planned investment in its first nuclear power plant. Recently the programme to build 6-9 GW of nuclear generation took a step forward when it signed a new co-operation agreement with the USA.

"Over the next 18 months, the US and Poland will work together on a report delivering a design for implementing Poland's nuclear power programme as well as potential financing arrangements," the text of the Poland-US agreement stated. "This will be the basis for US long-term involvement and for the Polish government to take final decisions on accelerating the construction of nuclear power plants in the country."

The programme will partially replace Poland's lignite plants, which currently meet 80 per cent of demand, with power from, "large, proven pressurised water reactors", with the first reactor ready to go into operation in 2033.

The Polish programme will take second place in eastern Europe's nuclear expansion to Romania, which recently announced plans to upgrade two operating reactors at its huge Cernavoda nuclear site and complete units 3 and 4. The two plants are due to begin operation by 2030, in a new agreement between Romania and the USA.

Announcing the agreement, Romanian Economy, Energy and Business Minister Virgil Popescu said: "Romania is today taking a huge step in developing its strategic partnership with the United States in terms of the energy component, namely cooperation in the civil nuclear field." A statement released to mark the agreement said: "This partnership will ensure energy security, lead to economic growth and implement the highest safety standards. Nuclear energy will continue to play a prominent role in the country's national energy mix, providing Romania with reliable, emission-free energy to meet the increasing demand."

Meanwhile the UK government, looking for ways to support its own nuclear build programme, has considered taking an ownership stake in future plants.

The UK is considering using a 'regulated asset base' (RAB) approach for Sizewell C, the follow-up to EDF's Hinkley Point C reactor which is now under construction. The RAB model would place the risk of delays or cancellation on consumers, but Energy and Industry Minister Kwasi Kwarteng suggested in October that if the government took part ownership, consumers would also have a share in any upside.

Iran sets out ambition to export energy to Europe

- Synchronisation study to begin "within months"
- Subsea connection with Qatar also being discussed

Nadia Weekes

After setting out plans to become the energy hub for its region, Iran is now planning to upgrade its grid infrastructure so that it can export energy to Europe, energy minister Reza Ardakanian said during a virtual summit on Caspian economic cooperation last month.

The Iranian Energy Ministry has been negotiating with neighbouring countries including Iraq, Russia, Afghanistan, Azerbaijan and Qatar to connect their power networks with Iran to enable electricity transmission to new destination markets through Iran.

So far, Iran's electricity network has been synchronised with Iraq, and in September, Ardakanian announced that the electricity networks of Russia and Azerbaijan would be next in line for linking with the Iranian grid.

"Within the next few months, the study project of synchronisation of the electricity networks of Iran, Azerbaijan and Russia will be completed and then the executive operations will begin," the minister said.

A subsea connection with Qatar is also being discussed, and high-level meetings have confirmed that a proposal to do so "should be worked on".

Iran is now taking the next step as the region's power hub with a suggestion that it becomes a bridge between the East and Europe for transmitting electricity.

"We are ready to connect Iran's electricity network, as the largest power generation power in West Asia, with the European countries, and to provide the ground for the exchange of electricity with Europe," Ardakanian said addressing the Caspian online event.

Ardakian said that Iran's energy infrastructure in the oil, gas, and electricity sectors can be used as a good platform for the transfer of energy from the region to Europe. He also said that Iran's skilled manpower and advanced facilities in the field of energy are well suited to the development of international transport and energy corridors.

"In order to help promote communication between our landlocked neighbours and international markets, we have created a huge transit infrastructure in our country and have demonstrated in practice our commitment to regional development and peace and stability," Ardakanian said.

The Energy Minister said that by investing in energy production in Iran, Europe could meet part of its future energy needs on a sustainable basis.

The country enjoys abundant gas resources, which fuel the majority of its power plants. Iran's installed electricity capacity is 85.5 GW.

Iran recently announced plans to triple its nuclear power generation capacity to 3 GW. Two additional 1 GW units at Bushehr Nuclear Power Plant, on the Persian Gulf coast, are currently under construction. They were originally due online by 2027 but financial difficulties have hindered progress.

Russia's Rosatom energy firm has been contributing to the construction of the plants, but Iran has said it intends to cut its future reliance on Russian engineers for the maintenance of the Bushehr plant.

Germany eyes hydrogen deal with Ukraine and Russia

Germany's energy ministry is looking to strike deals with its Ukrainian and Russian counterparts in a move aimed at opening up channels for hydrogen imports.

Russian Energy Minister, Alexander Novak, said last month that his country was ready to participate in joint projects with other countries and had agreed to sign a memorandum with Germany on conducting joint research in this area.

Meanwhile, Ukraine is also looking for German support to integrate hydrogen technologies into Ukraine's energy system as part of the Green Hydrogen for a European Green Deal.

Following the signing by Ukrainian acting minister Olha Buslavets with the German government of a memorandum of understanding on an energy partnership in late September, Ukraine is now seeking to take further steps toward supplying German companies with hydrogen.

Germany and Ukraine are consulting on a number of priority pilot projects to be developed in the first instance, according to Buslavets. Under the EU programme, the two countries should also discuss implementation mechanisms and possible funding sources, she added.

It is envisaged that Ukraine's gas transmission facilities could be used – subject to the necessary adaptations – to transport renewable hydrogen towards the EU.

Buslavets called on German companies that have prior experience of working with hydrogen to combine efforts with reliable Ukrainian partners and jointly implement pilot projects in Ukraine.

Africa urged to do more to exploit green energy potential

Two recent reports have concluded that Africa is not doing enough to exploit its potential to generate clean energy from the wind and the sun.

The African continent could generate up to 180 000 TWh a year from onshore wind only – enough to satisfy its electricity demand 250 times over – according to analysis by Everoze for IFC, a member of the World Bank Group.

Algeria has the highest resource with a total potential of 7700 GW, and 15 other countries could each potentially install more than 1000 GW. Over one-third of Africa's wind potential is in areas with very strong winds, with capacity factors of up to 46 per cent.

"There is a clear need for governments to enact policies to take advantage of the vast resource that the report identifies and enable large scale investment in wind as a key building block for green economic recovery post Covid-19," said Ben Backwell, CEO of the Global Wind Energy Council (GWEC).

Another report released in October by the Pan African University, however, accused African governments of being too dependent on donor aid to drive solar and wind power deployment.

Egypt's Minister of Electricity and Renewable Energy, Mohamed Shaker also said in October that he is looking to increase the percentage of electricity generated from renewable sources to 60 per cent by 2035, up from the current target of 42 per cent.

Before the end of the year, Egypt is looking to begin developing a 500 MW wind power plant in cooperation with Siemens, and launch 2000 MW of renewable energy capacity following negotiations with foreign investors.

Meanwhile, the US Trade and Development Agency has awarded a grant for a feasibility study to help Lekela Energie Stockage deploy utility-scale battery storage technology in support of its Taiba N'Diaye wind farm, the largest of its kind in Senegal and West Africa.

The project, expected to deploy at least 60 MWh of battery storage capacity, will serve as a model for replication across the region.

Under the Sustainable Energy for All initiative, work has started on improving energy infrastructures across the African continent to help it meet growing demand.

Stantec has been selected to work with the leading African Union continental and regional institutions to develop a generation and transmission master plan that can guide decision-making on the location, size and timing of investments in generation and transmission assets to support intra- and inter-pool interconnections and trading.

Embattled Eskom reviews 10-year grid upgrade plans

Eskom has been forced to dial-down plans for a transmission system upgrade after the government rejected higher tariffs. **Nadia Weekes** reports

South African electricity utility Eskom has revised down plans for a transmission infrastructure boost, days after it suffered a judicial setback in its bid to recoup R69 billion ($4.25 billion) of government equity through higher electricity tariffs.

Eskom spokesperson Sikonathi Mantshantsha said that Eskom had not got the benefit of the equity injection by the National Energy Regulator of South Africa (Nersa), and that the appeal court should clarify how that money will be recovered by Eskom.

Sharing its 10-year Transmission Development Plan (TDP) for the period 2021-30 with stakeholders during an online public forum, Eskom said it would add about 5650 km of high-voltage lines and 41 595 MVA of transformer capacity at a cost of up to R118 billion.

Eskom's plans for new transmission lines fall slightly short of the 6700 km Chief Executive Andre de Ruyter had anticipated the country would need, in a speech earlier in October.

Under transmission licensing requirements issued by South Africa's National Energy Regulator, Eskom must review its TDP annually and subject it to public consultation.

Eskom's Group Executive for Transmission, Segomoco Scheppers, said some adjustments had been made to the TDP since its last publication in 2019, which included the re-phasing of capital investment in transmission projects to align them with the project execution timelines that were associated with servitude acquisitions, and current available funding.

The utility has warned South Africans that the country's electricity system is under severe pressure, urging them last month to "switch off all unnecessary lights, pool pump and non-essential appliances".

SA Reserve Bank (SARB) has blamed Eskom for the country's stagnant economy, claiming that electricity shortages were a major obstacle to economic growth.

SARB Head of Economic Research, Chris Loewald, said electricity prices could rise significantly in the medium term. He said the Monetary Policy Committee forecasts indicated increases, averaging 8.2 per cent for 2021 and 10 per cent for 2022. Price rises could be higher if Eskom's court challenges succeed, Loewald added.

Eskom has defended its demand for higher tariffs, citing a 2016 World Bank study showing that South Africa's electricity prices were the third lowest out of 39 countries in sub-Saharan Africa, leading to an annual revenue shortfall for the utility of about R60 billion.

The utility is faced with a mounting debt of R488 billion and has embarked on an aggressive campaign to recoup monies owed to it by debtors as its ageing infrastructure fails to handle rising demand.

Eskom has warned that load shedding will persist throughout 2021, when it expects its maintenance efforts to start bearing fruit. But the utility says it also needs additional capacity to deal with growing demand. It plans to add 30 GW of capacity, mainly solar and wind, over the next 10 years.

Research by the Council for Scientific and Industrial Research has alerted South Africans to the risk of exponential increases to load shedding until at least 2022.

Fossil fuel majors struggle with low-carbon targets

Oil and gas majors are restructuring to embrace the clean energy revolution but most are still falling short of climate change targets. **Junior Isles**

Despite a number of high profile clean energy plays, companies with their roots in fossil fuels are struggling to align their low-carbon ambitions with the Paris climate agreement.

In October, a partnership between London School of Economics academics and investors that manage $21 trillion in funds, called the Transition Pathway Initiative (TPI), assessed 125 oil and gas producers, coal miners and electricity groups on their preparedness for a lower-carbon economy.

According to the study, only seven of the 59 major oil, gas and coal players assessed are on track to align with the emissions pledges governments made as part of the 2015 Paris Agreement.

TPI said only three oil and gas companies – Shell, Total and Eni – are getting closer to the 2°C scenario although their emissions reduction targets and low-carbon investment plans are still insufficient to bring them into line with that benchmark.

The findings will make uncomfortable reading for the companies, which were assessed on "carbon performance". This factors in the carbon intensity of the products they produce and sell, emissions reduction targets, and how they would fare under three models: should governments meet existing national emissions pledges, a scenario in which temperatures rise by 2°C; and one where they rise by less than 2°C.

In the new report, BP was not named as a leader in action on climate change, despite announcing ambitious plans in August to cut oil and gas production by 40 per cent over the next decade. BP, like a number of European companies, has also been diversifying into clean energy. It has set a target of owning 50 GW of renewable capacity by 2030, up from its current 2.3 GW.

The ongoing change in the energy landscape, which is being accelerated by the pandemic, is forcing fossil fuel companies to make tough decisions. In June BP announced 10 000 job cuts as part of its overhaul.

At the end of September Royal Dutch Shell followed suit saying it will cut up to 9000 jobs. As the pandemic depresses crude prices, Shell's review of its operations is designed to make the group more financially resilient and set it up for a shift towards lower-carbon energy businesses. In April, the company announced a plan to become net zero by 2050.

Shell said it is restructuring its business in Germany, listing offshore wind and hydrogen as some of the key elements of its operations in the country. The company said it plans to participate in the production of electricity from renewable energy sources in Germany through offshore wind, or combined offshore wind-hydrogen projects.

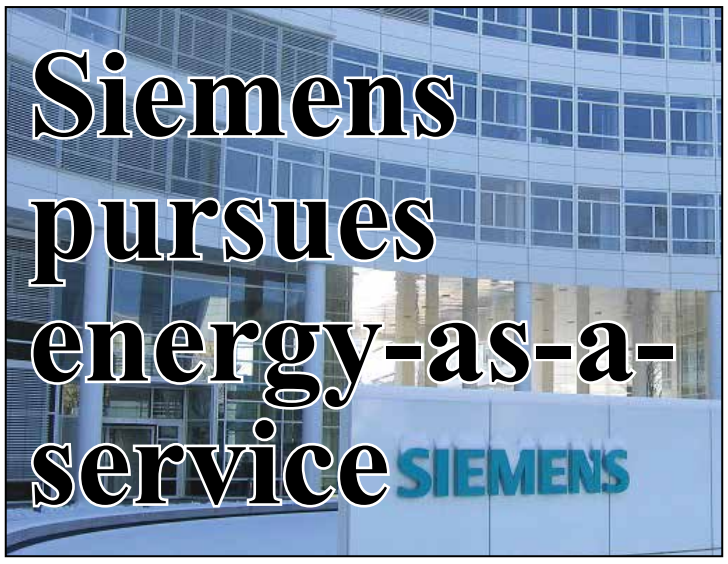
The company is targeting a ten-fold increase in the electrolysis capacity of its Rhineland refinery, and plans to investigate further hydrogen projects. In the next decade, it will also set up around 1000 fast charging stations at its filling stations.

French energy giant Total has been making similar moves. Announcing its strategy at the end of September, it said that in the next decade oil products sales will diminish by almost 30 per cent and Total's sales mix will become 30 per cent oil products, 5 per cent biofuels, 50 per cent gases, and 15 per cent electrons.

Days before the announcement, it signed an agreement with the Spanish developer Ignis to develop 3.3 GW of solar projects located close to Madrid and Andalusia. This operation brings to more than 5 GW its portfolio of solar projects under development in Spain by 2025.

Clean energy investment is proving to be a sound strategy, especially during the pandemic. Total said renewables and electricity are expected to deliver a predictable cash flow of more than $1.5 billion per year by 2025.

In early October NextEra, the world's largest solar and wind power generator, surpassed ExxonMobil in stock market value, reflecting investors' bets on a changing energy system and an uncertain outlook for oil demand.



Siemens pursues energy-as-a-service

Siemens is strengthening its hand in the 'energy-as-a-service' (EaaS), market, having made several recent strategic investments.

In mid-October Siemens Financial Services (SFS), the private equity arm of energy and manufacturing powerhouse Siemens AG, announced that it has acquired a 49 per cent stake in Brazil-based solar developer Brasol Participações e Empreendimentos S.A. ("Brasol"). The investment marks one of the largest foreign capital injections into the Brazilian solar power sector to date.

It is the second Brazilian acquisition SFS has made in the EaaS field. In August 2019, Siemens announced an investment in a company that provides energy storage batteries through performance contracts.

The move underscores Siemens' pivot to energy service and distributed infrastructure. Together, Siemens and Brasol plan to offer a broad suite of EaaS solutions for commercial and industrial energy consumers, leveraging data intelligence to reduce energy costs and risks.

Brasol currently provides turnkey solar-as-a-service solutions to businesses across Brazil through a financial lease model. Brasol's approach for providing solar-as-a-service heralds a growing emphasis on the use of on-site renewable energy sources by commercial and manufacturing enterprise.

The deal was the second such move by Siemens in a matter of days. In early October Siemens Smart Infrastructure (SI), SFS and Macquarie's Green Investment Group (GIG) announced the formation of Calibrant Energy.

Calibrant Energy offers a combination of technical, operating, and risk management expertise that enables customers to access the benefits of on-site energy systems with a new level of simplicity. Using an EaaS model, Calibrant will build onsite energy solutions that seek to deliver immediate cost savings, cost certainty, resilience and low-cost energy grid augmentation.

Calibrant's technologies will include solar, integrated solar-battery solutions, hybrid systems, standalone batteries, microgrids, combined heat and power, and centralised heating and cooling infrastructure upgrades. Customers will include corporate and industrial clients, as well as municipalities, universities, schools and hospitals.

Iberdrola broadens green footprint

Spanish energy company Iberdrola is making good on its pledge to spend €10 billion a year to increase its global influence in renewables and energy networks. In October it expanded its list of acquisitions this year with a more than $8 billion deal to buy PNM Resources in the US. The deal will see its North American business, Avangrid, become one of the largest players in the US utilities sector.

Under the deal, expected to close in 12 months, Iberdrola will pay $4.3 billion in cash to shareholders in a deal worth $8.3 billion including debt.

The acquisition will create the third-largest renewable energy company in the US, with operations in 24 states, according to the Spanish group. The combined company will have 10.9 GW of capacity and assets worth more than $40 billion.

PNM owns significant fossil-fuel generation capacity in addition to its wind and solar assets, although it has pledged to be emissions-free by 2040. Avangrid, has 1.9 GW of renewables in New Mexico and Texas, with 1.4 GW more in the pipeline. Iberdrola has committed to be carbon-neutral by 2050.

Iberdrola's Chairman and Chief Executive, Ignacio Galán, called the deal the "next step" in the group's strategy of "friendly transactions, focused on regulated businesses and renewable energy, in countries with good credit ratings and legal and regulatory stability, offering opportunities for future growth".

He said the group was concentrating on "five or six main countries" including the US. Other acquisitions this year have included the French renewables company Aalto Power for €100 million and Australian renewables group Infigen.

Iberdrola plans to capitalise on its bet on renewables now that countries across the globe were moving away from fossil fuels. The company also hopes to benefit from the EU's €750 billion coronavirus recovery fund, in which the transition to clean energy is a top priority.

In September Iberdrola said it plans to establish green hydrogen business units in the UK and Spain to position itself as a supplier to hard-to-decarbonise industries.

Corporations continue coal exit

A growing number of companies are exiting coal as they move towards becoming carbon neutral.

In mid-October Japanese trading house Mitsui & Co Ltd announced plans to sell its remaining stakes in coal fired power stations by the end of the decade as it shifts to gas from coal to help achieve its 2050 net zero emission target.

Its Chief Executive, Tatsuo Yasunaga, told *Reuters*: "Renewable energy can't replace all other power sources in one fell swoop. Gas goes well with volatile renewable energy as gas fired power generation is easy to switch on and off," adding Mitsui is also keen on cleaner energy such as offshore wind farms and hydrogen projects. "We still own stakes in coal fired plants in Indonesia, China, Malaysia and Morocco, but our goal is to make it zero by 2030."

GE also announced that it is setting a goal to achieve carbon neutrality for its facilities and operational greenhouse emissions by 2030. It follows the recent news that it is exiting the new build coal power market, as a start toward reducing emissions associated with its products.

A growing number of companies are committing to decarbonising their operations. At the end of September Europe's leading tech companies joined forces under the initiative, Leaders for Climate Action (LFCA). Their aim is to fight the climate crisis by pledging to make their own companies carbon-neutral, build an active community that sets more sustainable industry standards, and influence policy makers.

LFCA takes a unique approach to growth by connecting directly from leader to leader. Since starting out a year ago as a small group of entrepreneurs from the Berlin tech industry, its members have actively worked on the reduction of their carbon footprint (-20 per cent goal) and initiated a collective investment of over €4 million in climate protection projects, saving more than 250 000 tons of CO_2.

Americas

Modernising Ohio's Keokuk hydropower plant

Two turbines (units 5 and 15) at Ameren's Keokuk Hydroelectric plant in Iowa, US, will be refurbished and upgraded by American Hydro, part of the Wärtsilä Corporation. The new contract includes: all field labour and supervision for a two-unit outage, disassembly of the major turbine and generator components, installation of the new runners and refurbished turbine components, and commissioning of the upgraded turbines.

The outages will start shortly, and the refurbishments are scheduled for completion in spring 2021.

The 142 MW Keokuk plant was originally commissioned in 1913. The plant is listed in the US National Register of Historic Places.

Nordex wins 297 MW US wind turbine order

Nordex Group has won an order to supply 62 N149/4.0-4.5 turbines for a wind farm in the USA. The units will be supplied in the 4.8 MW operating mode.

The 297 MW wind farm will be built in the midwestern USA. Construction is due to start in spring 2021 with commissioning scheduled for the end of 2021.

The project and customer have not been disclosed.

Asia-Pacific

Indonesian mine to get fuel flexible power

PT Freeport Indonesia has ordered a 128 MW power plant from Wärtsilä. The order comprises 14 Wärtsilä 34DF dual-fuel generating sets. An order for eight generating sets was placed in June 2020, with a further six ordered in September. A consortium consisting of Wärtsilä and PT PP will install, construct, and commission the power plant.

The plant will be located at Amamapare, PT Freeport Indonesia's port site in Papua, Indonesia and electricity will be sent from the plant to the Grasberg mine via a 100 km transmission line.

Equipment is scheduled for delivery between July and November 2021. The first seven engines are scheduled to be handed over in March 2022, and the remaining seven in July 2022.

The engines can run on a variety of fuels, and will initially run on Indonesian B30 biodiesel.

Vietnam to build 1200 MW coal plant

Doosan Heavy Industries & Construction has been engaged by Vapco, a Vietnamese unit of Korea Electric Power Corp (Kepco), to build a 1200 MW coal fired power plant in northeastern Vietnam. Doosan will also provide equipment for the plant, including the boilers. Construction will take place from March 2021 to February 2025.

Kepco decided in October to go ahead with the $2.2 billion Vung Ang 2 project. Kepco holds a 40 per cent stake in Vapco, as does Japan's Mitsubishi Group. South Korean firm Samsung C&T will also participate in the project.

Latest Enercon wind turbines for Dak Lak

The German firm Enercon has won a wind turbine contract with the Trungnam Group for the Ea Nam onshore wind farm project in Vietnam.

The 400 MW wind farm will be located in Dak Lak province in Vietnam's Central High;ands. Enercon will deliver its new turbine models, the 5.5 MW E-160 EP5 E2 turbines for the project, in addition to some 4 MW E-138 EP E2 turbines.

Construction on the project will begin later in the year and is scheduled for completion in 2021.

Andritz to equip 1.2 GW pumped storage plant

Indian power producer Greenko Energy has chosen Austrian firm Andritz to equip the 1.2 GW Pinnapuram pumped storage plant in the state of Andhra Pradesh. Andritz will supply the electro-mechanical equipment for the project, including four 240 MW units, two 120 MW reversible pump units, main inlet valves, and associated auxiliaries. The contract covers the design, manufacture, supply, transportation, erection, testing, and commissioning of the equipment.

When commissioned, which is scheduled for 2023, it will be the largest pumped storage facility in the country. Andritz said that this plant will be part of the first integrated renewable energy storage project that mixes solar and wind power generating components with hydro pumped storage.

India places 327 MW wind turbine order

SB Energy, part of the SoftBank Group, selected GE Renewable Energy to supply, install, and commission 121 sets of 2.7-132 onshore wind turbines for the 327 MW Pritam Nagar onshore wind farm in Madhya Pradesh, India.

SB Energy won the Pritnam Nagar project during the tranche-VI auction of wind projects by Solar Energy Corporation of India.

GE Renewable Energy claims that its 2.7-132 wind turbine has industry leading performance at low wind speeds. Product design will be primarily based at GE's Technology Centre in Bengaluru, blades manufactured in GE's plants in Vadodara and Bengaluru, and assembly at the GE Multi-modal Manufacturing Facility in Pune.

Gilan Sabatier, Regional Leader for GE Renewable Energy's Onshore Wind Business in South Asia and ASEAN, commented: "This is one of the largest wind projects ever awarded in India and will significantly contribute to the country's renewable aspirations."

Europe

Mitsubishi Power secures European SOFC order

Mitsubishi Power has secured an order to supply its first solid oxide fuel cell (SOFC) in Europe. The highly efficient hybrid system will be put into operation at the Gas- und Wärme-Institut Essen e.V. (GWI) in Essen by March 2022.

The system, which is part of a research project, can theoretically supply electricity and heat to a large office building, a hospital or about 300 houses. In addition to natural gas, liquefied natural gas and biogas, it can also be operated with hydrogen, where the only emission is water, thereby contributing to decarbonisation of electricity. Mitsubishi Power already has installed 9 units of Hybrid-SOFC systems in Japan.

Among other things, flexible operation of the hybrid-SOFC and the proportional use of hydrogen as a fuel gas are to be researched under real conditions.

GHS electrolyser heads for the Netherlands

Green Hydrogen Systems (GHS) will supply the electrolyser for a 1.4 MW power-to-X pilot project in the Netherlands. The Dutch energy company Alliander is constructing the plant at the Ecomunitypark in Oosterwolde in collaboration with solar farm developer GroenLeven.

The contract is for supply of three GHS HyProvide A90 electrolysers with a combined capacity of 1.4 MW. The hydrogen produced will be compressed and stored at 300 bar in a tube trailer. Subsequent expansion requirements can be met by the addition of further units to the initial cluster.

Ben Tubben, managing the project for Alliander, said: "This project will enable us to explore the entire green hydrogen value chain, from equipment suppliers to end-customer service and including the whole regulatory and taxation setup."

Norway's first fully digital eco-efficient substation

A new, eco-efficient 145 kV substation will be built at Sutterø in Norway to will extend and increase the reliability of the grid around Stjørdal, outside Trondheim in central Norway.

The project will be undertaken by Hitachi ABB Power Grids and Norwegian power grid operator Tensio TN. The substation delivery is scheduled for June 2021.

Increased demand for electric vehicles in Norway, with the country aiming to end the sale of fossil-fuelled cars from 2025, is resulting in an upsurge in electricity demand. To help meet this, Hitachi ABB Power Grids and Tensio TN are collaborating to develop an integrated substation with reduced environmental and physical footprint.

This includes an eco-efficient gas-insulated switchgear (GIS) with Air-Plus gas replacing SF_6, and with fibre-optic cables instead of copper cables where possible. Together with the digitalised design of the automation system. This enables a 70 per cent space reduction compared to a conventional air-insulated switchgear substation.

This substation also includes extensive digital technology, enabling data collection and sharing, resulting in fast decision-making support to operators in critical situations.

Siemens Gamesa wins largest 5.X deal in Sweden

Siemens Gamesa has secured its largest ever deal for its 5.X wind turbine platform for the 372 MW Björnberget project in Sweden. It will supply 60 units of its SG 5.8-170 turbine to a consortium of Prime Capital and renewables developer Enlight Energy. The wind turbines will be covered by a 15-year service agreement.

The 60 units have OptimaFlex technology, enabling each of the units to operate at 6.2 MW. This, combined with the largest rotor in the onshore segment leads to high Annual Energy Production (AEP) and low cost of energy.

The wind turbines have been certified for a 30-year lifetime, and will be installed in 2022 in Ånge in central Sweden.

The deal also marks the first investment of the Prime Green Energy Infrastructure Fund (PGEIF), created to invest in large-scale wind-powered energy assets in the Nordic countries, with no reliance on government support and with the lowest levelised cost of electricity in Europe.

Jacobs supports UK fusion research

Jacobs of the USA has been selected by the United Kingdom Atomic Energy Authority (UKAEA) to support research into nuclear fusion and related technologies at the Remote Applications in Challenging Environments (RACE) facility at Culham Science Centre in Oxfordshire, United Kingodm.

Work will include engineering design and installation of control panels, safety interlock panels, and wiring looms for a control cubicle to support the testing of a new range of actuators being developed by UKAEA.

International

Nuclear fuel contract signed for Rivne

Westinghouse Electric Company and Energoatom has signed a contract for the supply of nuclear fuel for the VVER-440 reactors at Rivne nuclear power plant in Ukraine. They also signed a letter of intent to study localisation of production of components for fuel and assembly parts in Ukraine. Atomenergomash, a division of Energoatom, is currently qualifying for the production of VVER-1000 top and bottom nozzles for Westinghouse fuel.

Patrick Fragman, President and CEO of Westinghouse, said: "We are pleased that Energoatom has once again demonstrated its confidence in Westinghouse's nuclear fuel performance. With this agreement, we further extend our commitment to Ukraine's energy security and focus on further improving the operational excellence of its nuclear fleet. Westinghouse is looking forward to continuing to support Energoatom in other areas of expertise as a global strategic partner."

Hybrid energy for Niger

Sterling and Wilson Solar of India has won a contract to provide a hybrid energy project in Agadez, Niger. The project consists of 18.9 MW of solar capacity, 11.55 MWh of battery energy storage, and a diesel generator.

The project will be constructed in consortium with French renewable energy company Vergnet and SNS Niger.

The EPC contract was awarded by the Nigerian Electricity Company, and includes a two-year O&M agreement for the hybrid power plant. The project also includes rehabilitation of the Agadez electrical network and electrification of the village of Tibinitene.

GE Renewables strengthen Benin's network

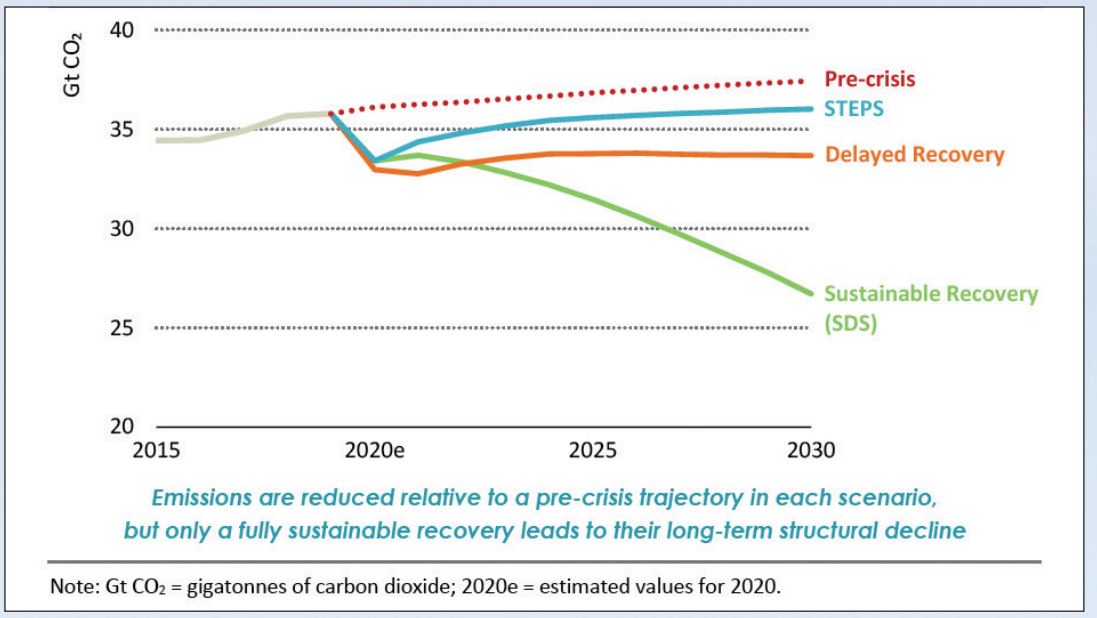
A contract worth around $47 million has been awarded to GE Renewable Energy's Grid Solutions business for the installation of four substations and seven extensions in Benin. The contract was awarded through the Millennium Challenge Corporation (MCC), a US foreign assistance agency established by US Congress.

Under the contract, GE will supply four substations, including gas-insulated switchgear (GIS) and seven substation extensions.

The scope covers the most important high-voltage substation in the country, Vedoko, and will help strengthen the country's transmission network.

GE will also work on upgrading the substations in Maria-Gleta, Berecingou, Djougou, Bohicon, Natitingou, and Parakou.

Energy sector and industrial process CO_2 emissions by recovery trajectory for Stated Policies Scenario (STEPS); Delayed Recovery Scenario and Sustainable Development Scenario (SDS)



World Energy Outlook 2020, © IEA/OECD, Figure 1.3, page 34

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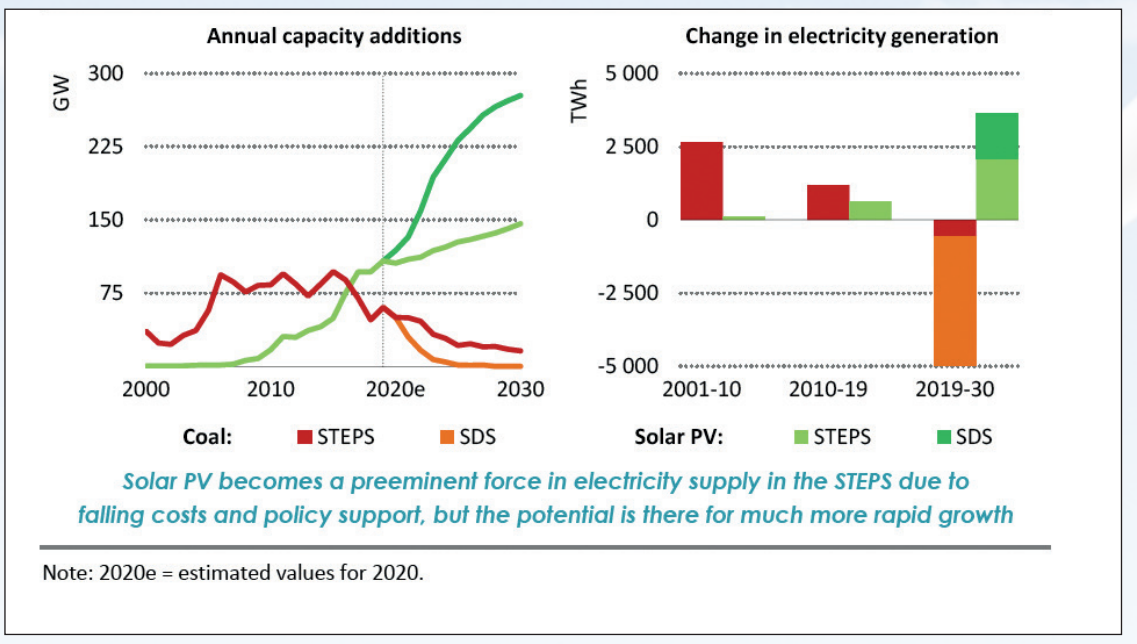
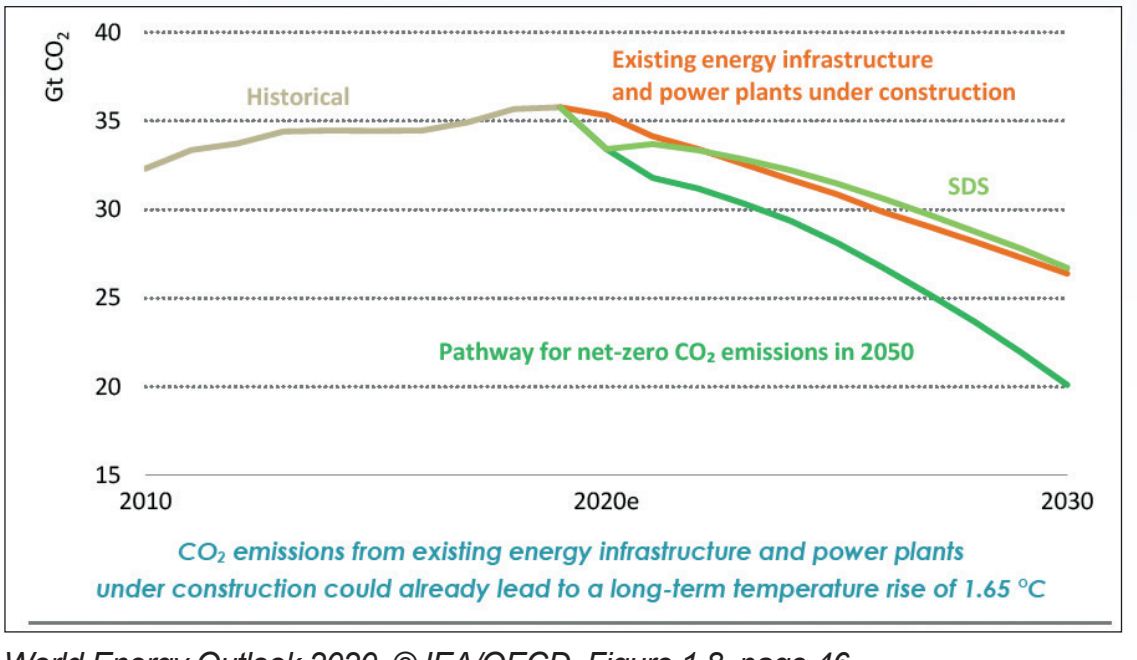
Email: bookshop@iea.org
website: www.iea.org

Average annual solar PV and coal annual capacity additions worldwide and electricity generation by scenario



World Energy Outlook 2020, © IEA/OECD, Figure 1.4, page 36

CO2 emissions from energy infrastructure in use and power plants under construction operated in line with past practice



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Hydrogen

Hydrogen research makes global inroads

- New proof-of-concept design for a seawater electrolyser
- Plastic blasting could produce hydrogen and cut plastic waste

Gary Lakes

This year has seen a real shake-up in the way we think about energy. The arrival of the deadly Covid-19 pandemic has shaken the global economy, at the core of which are the energy systems that are used to keep the world turning.

Widespread shutdowns across the globe, resulting in the use of less electricity, have seriously impacted the energy models that rely heavily on oil and gas. Both of these sectors of our traditional energy paradigm have seen declines in demand and decreases in prices.

Few but Opec and the oil companies express a desire to see a return to the ever-rising demand for oil, which would only exacerbate global warming at a time when everyone and every industry needs to be considering their actions in relation to climate change.

To this end, hydrogen has come to be seen as the new green, renewable fuel for the next era. Judging by the advances reported daily about technical advances in hydrogen research or the announcement of new projects and investments in hydrogen, the element seems destined to impact global energy in a manner that is beneficial in numerous ways.

Scientists have recently reported that they have found a way to make hydrogen by blasting plastic with microwaves of iron oxide and aluminium oxide. If the technology shows that this process can be carried out on an industrial scale, it could contribute towards alleviating some of the problems faced in producing hydrogen, but also in ridding the world of the huge plastic waste problem. By pulverising the plastic with microwaves, the process produces hydrogen and carbon nanotubes that can be used in other applications.

At Penn State in the US, researchers have integrated water purification technology into a new proof-of-concept design for a seawater electrolyser, which uses an electric current to split apart the hydrogen and oxygen in water molecules, NSF Public Affairs recently reported.

The new method of 'seawater splitting' could make it easier to convert wind and solar energy into a storable and portable energy source, the report said. One catch to this, however, is that the seawater must first be desalinated or the chloride ions in seawater will turn into toxic chlorine gas, but the researchers have found a way to avoid this by using a semi-permeable membrane.

"Hydrogen is a great fuel, but you have to make it," Bruce Logan, an environmental engineer, said in the report. "The only sustainable way to do that is to use renewable energy and produce it from water. You also need to use water that people do not want to use for other things, and that would be seawater. So, the holy grail of producing hydrogen would be to combine the seawater and the wind and solar energy found in coastal and offshore environments."

The report also noted that the ability to create hydrogen from a sustainable source, such as seawater, would do wonders for the US hydrogen economy.

Advances in hydrogen research are taking place everywhere, even in oil-producing countries.

The UAE announced recently that it is initiating hydrogen projects. State-owned Dubai Electricity and Water Authority (DEWA) is producing hydrogen at a solar-powered electrolysis facility at the Mohammed bin Rashid Al Maktoum Solar Park that will have a capacity to generate 5 GW of hydrogen by 2030. It is also looking at blue and grey hydrogen production, which uses oil and gas to create hydrogen, and studying the technology of carbon capture utilisation and storage (CCUS).

In Italy, the state-owned rail operator Ferrovie dello Stato and Snam have signed a deal to study the use of hydrogen for railway transport. The agreement calls for the companies to experiment with innovative technological solutions related to the production, transport, compression, storage, supply and utilisation of hydrogen to contribute to the development of sustainable mobility.

Meanwhile, Chile will soon embark on its first green hydrogen power project, which will be one of the largest in Latin America. Chile's oil company ENAP, Italy's Enel Green Power Chile, Chilean power company AME, as well as Siemens Energy and Porsche will participate in the project that is scheduled to be commissioned in 2022. The facility will use wind power to generate hydrogen.

Gas

Southern Gas Corridor brings even greater gas security for Europe

The Southern Gas Corridor is "substantially complete", further reducing Europe's dependence on Russian gas.

Gary Lakes

After nearly two decades of proposals, debate, route selection, changing partnerships, financing and construction, the Southern Gas Corridor pipeline, meant to serve as the means to transport natural gas from the Caspian Sea region and other eastern sources to Europe, will be finished and operating by the end of the year.

The consortium for the Trans Adriatic Pipeline (TAP) announced last month that its 878 km section of the 3500 km SGC is "substantially complete" and being filled with natural gas from its starting point at the Greek-Turkish border to its delivery point in southern Italy.

TAP is "currently finalising preparations for launching the commercial operations and offering capacity to the market in alignment with the adjacent transmission system operators (TSOs)", the group said in a statement, adding that the interconnection point between TAP and the Snam Rete Gas TSO in Puglia, Italy, should be finished and ready for operation by mid-November this year.

The $4.5 billion TAP is the last leg of the three-section SGC which starts with the production of natural gas under Stage 2 development at Azerbaijan's offshore Shah Deniz gas field that is then processed and pumped from the Sangachel processing station south of Baku across Azerbaijan and Georgia to Ersurum, Turkey, through the expanded South Caucasus Pipeline (SCP), which has been in operation since 2006, transporting Stage 1 Shah Deniz gas. The 692 km SCP is now capable of carrying 16 billion m^3 annually (bcm/year) to Turkey, which is currently contracted to take some 12.6 bcm/year of Azeri gas.

At Erzurum, the SCP connects with the 1850 km Trans Anatolian Natural Gas Pipeline (TANAP), which reached transport capacity of 16 bcm/year this summer. TANAP runs the full length of Turkey and connects with TAP at the Greek-Turkish border. TAP will carry 10 bcm/year, of which at least 1 bcm/year will go to Bulgaria, which will link-up with TAP through the 3-5 bcm/year-capacity Interconnector-Greece-Bulgaria (IGB) pipeline, construction on which will begin in the coming months. Another 1 bcm/year will go to Greece, leaving 8 bcm/year for Europe, which is already seeing an over-supply of gas.

Altogether, the investment in Stage 2 development of Shah Deniz and the construction of the three pipelines has required some $40 billion.

When discussions on a Southern Gas Corridor began nearly 20 years ago, they concentrated on the Nabucco gas pipeline project that was to carry Caspian gas from the region as far west as the Central European Gas Hub at Baumgarten, Austria. That project, however, fell away as the Shah Deniz partners, led by BP and Azerbaijan's state-owned Socar, opted for the three-segment option, which had more flexibility.

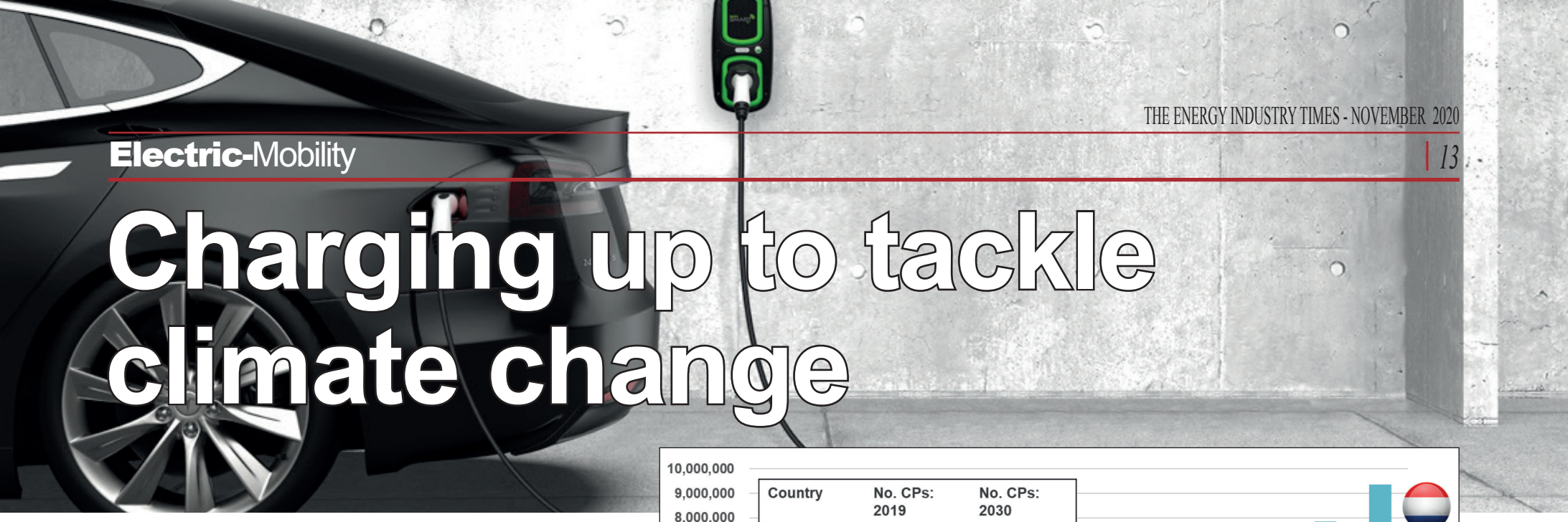
Much has changed in the global gas market since the mid-2000s. The SGC was and still is meant to serve as an alternative source of supply for Europe other than Russia, which supplies 30-40 per cent of European demand, as well as a new route outside the control of Russia, which would give Europe added security. Moscow attempted to counter the SGC first with the South Stream pipeline across the Black Sea, and when EU regulations prevented that project, Moscow switched to TurkStream, which is now in operation delivering gas to Turkey and eventually to Gazprom's customers in Southeast Europe. Russia has also since launched the Nord Stream pipelines to Germany through the Baltic Sea, the first phase of which is working.

There has been widespread development of LNG and its delivery to global markets, among them several in Europe. Numerous LNG regasification terminals exist in Europe, but new ones in Poland and Lithuania have cut those former Soviet satellite states' dependence on Russian gas. Terminals proposed for northern Greece and Croatia will also expand the EU's source of LNG supply to Southeast Europe.

Furthermore, projects to connect the organisation's gas pipelines and infrastructure are underway, which will also boost EU security of supply.

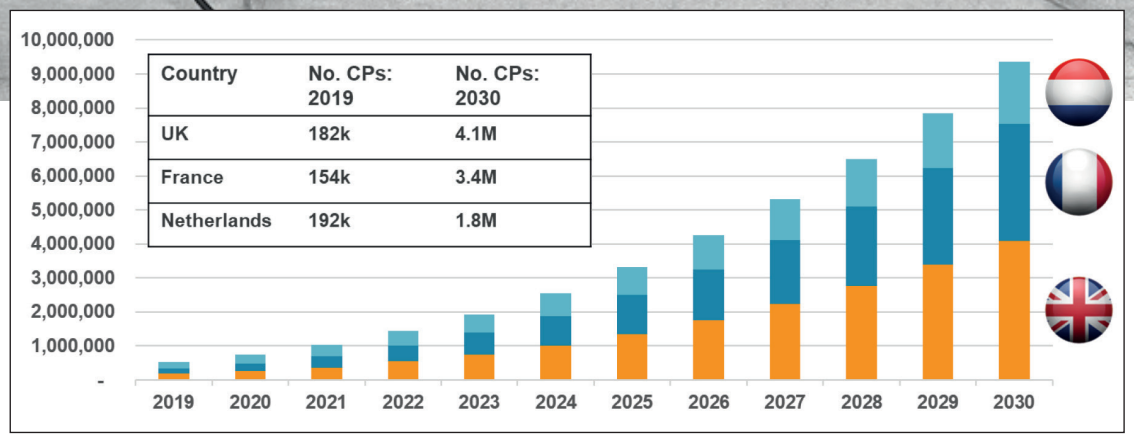
The US is keen to find a place for its LNG in the European market, as are countries in the nearby East Mediterranean. Cyprus, Israel and Greece want to build an EastMed Gas Pipeline, capable of carrying up to 12 bcm/year to Europe, but that project is viewed as a long shot, as questions about Europe's future gas demand and its new emphasis on renewables now dominate the energy conversation. According to one East Mediterranean energy expert, SGC and Russia's Nord Stream 2 will probably be the last gas pipelines built to Europe. If East Mediterranean gas gets there, it will probably be in the form of LNG.

The gas market was seeing low prices before the corona virus pandemic, but the outbreak caused further drops in global fuel prices. While the completion of the SGC is a major achievement for the companies participating in it, they are facing prices in the neighbourhood of 4.50 per million Btu in Europe – probably much less than they had expected so many years ago.



Charging up to tackle climate change

The growth in electric vehicles is driving ambitions to see vehicle-to-grid technology become a key weapon in the battle against climate change. **Junior Isles**



Country	No. CPs: 2019	No. CPs: 2030
UK	182k	4.1M
France	154k	3.4M
Netherlands	192k	1.8M

Cumulative charge point forecasts to 2030 in the leading European countries – UK, France and the Netherlands. The chart represents charge points in all locations: home, work and public. *Source: Delta-EE*

E-mobility will play a key role in combatting climate change and facilitating the energy transition – not just because electric vehicles directly remove carbon emissions from road travel but also due to the role they can play in balancing variable generation from renewables on the grid.

Accordingly, in recent months under the umbrella of various green recovery packages the EU and national governments have committed unprecedented financial support to e-mobility related industries as a response to the economic consequences of the Covid-19 crisis.

Under plans announced in late May, the European Commission unveiled a two-year €20 billion EU scheme of grants and guarantees to boost sales of "clean" vehicles, with 2 million electric and hydrogen vehicle charging stations to be installed by 2025.

Such support will inject further momentum into the growing number of EVs, charge points and smart charging programmes that are crucial if EVs are to fulfil the their potential as a resource that energy companies can use effectively in realising the energy transition.

Speaking at a webinar in July jointly hosted by Eurelectric and BloombergNEF, Michael Liebreich, Chairman and CEO of Liebreich Associates, and former CEO of Bloomberg New Energy Finance, said: "The percentage of electricity from non-hydro renewables grew to 11 per cent in 2019 from 1 or 2 per cent just a decade or so before. It's important to bear that in mind because e-mobility with its batteries, works well with renewables."

Despite what he called "a bit of a wobble" over the last year, Liebreich said EV sales have seen "tremendous" compound annual growth rates over the last few years. This has been partly due to a rapid drop in battery prices, which have fallen by more than 85 per cent over the last decade, which has in turn reduced the cost of vehicles. At the same time, there has been a dramatic improvement in the performance of batteries.

During a webinar in mid-October, Mike Hughes, President of Schneider Electric UK & Ireland, said: "The EV story is happening in the middle of a massive revolution around the whole grid and the way energy is managed."

He cited the UK, noting that in 2008 there were 80 points of generation, with just 4.9 per cent coming from renewables. In 2050, he says there will be more than 1 million points of generation. "That's a complete fragmentation of the generation side of the grid. And projections are saying that renewables will represent up to 85 per cent of the energy being fed into that grid."

Such fragmentation represents a huge technical challenge. At the same time, there will be a significant increase in electricity demand. According to Hughes, demand in the UK will increase from around 308 TWh per year in 2020 up to 530 TWh in 2050, with some 40 per cent of that new demand forecasted to come from EVs. The number of EVs in the country is predicted to grow from about 300 000 to 37 million by 2050. Across Europe the 2 million currently on the roads is expected to rise to 40 million by 2030 according to figures published by Delta-EE.

Yet while EVs are part of the problem, they are also part of the solution. Although electrification of transport through e-mobility will drive an increase in demand on networks and decentralised generation, using them to provide storage and flexibility management will allow them play a critical role in balancing those same networks and addressing energy needs.

Hughes noted: "The EV story is existing within a story of grid fragmentation on generation and increased demand. And if we get to the projected number of 37 million EVs [in the UK] by 2050, you will end up for the first time in the history of the electricity grid, having roughly 17 per cent of a demand that is mobile. This means 17 per cent of the national demand can theoretically move around and appear in a place you may not have thought about."

He added, however, that 37 million EVs on the road have sufficient battery capability to deliver 2.2 TWh. This is a significant resource, whereby vehicle-to-grid (V2G) technology can enable bi-directional flow of energy to provide a major backup source of energy for stabilising the grid.

V2G essentially allows EVs to feed electricity into the grid to sell demand response services. Drivers can store renewable energy in their cars, use that energy to power their homes and sell excess energy back to the grid at peak times, earning rewards from smart charging their electric vehicle.

It is a huge opportunity and energy companies are already taking their first steps into this area. According to V2G Hub, there are around 80 projects in 22 countries around the world. More than half of these projects are in Europe, with the UK currently at the forefront of developments.

At the end of 2018 UK supplier, OVO Energy claimed a world first with the installation of a domestic V2G charger in a customer's home.

Over the last two years other companies have launched their own trials. In September Octopus Energy, through its sister company, Octopus Electric Vehicles, announced that is was offering customers the chance to lease an EV for a "reduced price" in return for particpating in a V2G trial.

At the end of October Kaluza, the intelligent energy platform, together with Bosch, a supplier of charging services and embedded vehicle technology, successfully proved how EVs can be smart charged to meet the needs of the local grid via direct connection with a digital platform.

Also last month the Electric Nation Vehicle to Grid trial, a project of Western Power Distribution (WPD) and CrowdCharge, announced electricity aggregator Flexitricity as its first energy partner in what is seen as a key project.

Electric Nation is different to other V2G projects because it is using up to five different energy partners instead of just one. WPD says this means that the trial "is a more realistic simulation" of a future world in which many streets will have a number of EVs using V2G chargers with different energy suppliers (see box).

Meanwhile, bi-directional charging technology continues to advance. In October ABB announced a new 11 kW station, which it will supply as part of a contract with France's DREEV, a joint venture between Électricité de France (EDF) and Nuvve, which specialises in intelligent charging for EVs. ABB's solution integrated with DREEV software technology will enable EV drivers to export surplus power back to the grid, with the potential to generate up to €20/EV/month for drivers. Under the partnership, ABB will supply V2G bi-directional kiosks in France, followed by installations in the UK, Italy, Belgium and Germany.

As technology continues to advance and such collaborations gain momentum, the future of V2G looks bright. With the need to rapidly bend the greenhouse gas emissions curve, hopefully it will not be long before EVs, through V2G, are an effective tool in the arsenal of technologies needed in the battle against climate change.

Flexitricity joins Electric Nation Vehicle to Grid project

In October Flexitricity was announced as the first energy partner in the Nation Vehicle to Grid (V2G) trial, a project of Western Power Distribution (WPD) and CrowdCharge that will demonstrate how electric vehicles (EVs) can provide V2G services.

Flexitricity aggregates distributed power generators as well as sites, which consume power, in order to balance the load on the electricity grid. The EVs that are part of the Electric Nation trial will be used to put power back into the grid when required and will be charged during periods of excess supply in the system.

Demand side response or demand side flexibility involves participants being financially incentivised to reduce or increase their energy use to provide flexibility to National Grid ESO or Distribution Network Operators (DNOs) when it is needed. As well as filling in for shortfalls or rapid spikes in national demand, providers taking part in demand side response can also be incentivised to use excess green energy from the grid, for example on a windy day.

Unlike other V2G projects, Electric Nation is using up to five different energy partners instead of just one. A selection of 25 applicants on the Electric Nation V2G trial will be offered the opportunity to join the project with the Flexitricity and CrowdCharge 'energy optimisation with grid services' proposition. Potential participants can join with any electricity supplier and on any electricity tariff. However, the best results will be gained from participants with a time of use and export tariff.

EV drivers will inform the CrowdCharge platform to state when they next need the car and how much energy they will need. The first priority for CrowdCharge is to ensure these requirements are met. People are often plugged in for over 12 hours overnight, yet they may only need 1-2 hours of charge on average each night. This allows considerable time and flexibility to fit in the EV charging.

If the EV driver has a time of use tariff, the CrowdCharge platform will schedule charging to reduce electricity bills for the EV driver by using electricity to charge the car at cheaper times, and in doing so CrowdCharge will also be able to reduce the carbon footprint of the household.

CrowdCharge can further reduce bills where a time-of-use tariff is active by exporting energy from the EV battery to power the home when electricity is more expensive, for example during the early evening.

For those who have solar PV panels on their property, CrowdCharge will aim to divert as much solar electricity to the car as possible, with any surplus energy being exported to the grid.

Technology pathways to net zero

The technological transformation of the power generation sector is a central element of the clean energy transition. The IEA's recently published 'Energy Technology Perspectives' looks at which technologies will get us there and what the power system will look like. ***TEI Times*** reports.

A major effort to develop and deploy clean energy technologies worldwide is urgently needed to meet international energy and climate goals. In its 'Energy Technology Perspectives (ETP) 2020' – the first since 2017 – the International Energy Agency (IEA) analyses more than 800 different technology options to assess what would need to happen to reach net zero carbon emissions by 2070 while ensuring a resilient and secure energy system.

Notably, the report, published in September, states that transitioning only the power sector to clean energy would get the world only one-third of the way to net zero emissions. Completing the journey will require devoting far more attention to the transport, industry and buildings sectors, which today account for about 55 per cent of CO_2 emissions from the energy system. Much greater use of electricity in these sectors – for powering electric vehicles, recycling metals, heating buildings and many other tasks – can make the single largest contribution to reaching net zero emissions.

Analysing what greater electrification will mean, the report says total power generation expands almost three-times over the next 50 years in the Sustainable Development Scenario. This means that the equivalent of China's current power generation is added to the world's electricity system every eight years. It predicts increasing electrification of end-use sectors is responsible for 70 per cent of the growth between 2019 and 2070.

In this respect, of the 800 technology options, carbon capture utilisation and storage (CCUS), hydrogen, batteries and bioenergy, appear to be the frontrunners today and, according to Dr Fatih Birol, the IEA's Executive Director, are "the game-changing technologies that are ready for the big time".

Clearly the technological transformation of the power generation sector is a central element of the clean energy transition. In the IEA's Sustainable Development Scenario, decarbonisation of the power generation fuel mix, coupled with the rising share of electricity in final consumption, makes a central contribution to achieving net zero emissions. The power sector is also the largest CO_2 emitter among all sectors today. According to the report, decarbonisation drives down the carbon intensity of electricity generation from 463 gCO_2/kWh in 2019 to below zero in net terms around 2055.

Reaching net zero CO_2 emissions in the power sector requires rapid deployment of clean technologies. Variable renewables – solar PV, onshore and offshore wind – dominate the generation mix in 2070 in the Sustainable Development Scenario, with a global average share of 57 per cent.

In the Sustainable Development Scenario, 475 GW of solar PV is added each year on average over the period to 2070 (compared with 108 GW in 2019), together with 190 GW of wind (60 GW in 2019), 15 GW of nuclear power (5 GW in 2019), and 25 GW of fossil fuel plants equipped with CCUS and 7 GW of bioenergy with carbon capture and storage (BECCS), although there was no BECCS in 2019 and would be no large-scale deployment until after 2025.

Nuclear power plays an important role in the transition to clean electricity in emerging economies in Asia, where electricity demand is growing strongly. That region accounts for more than 80 per cent of the growth in global nuclear capacity, which climbs from 415 GW in 2019 to more than 780 GW by 2070. Most of the growth in nuclear capacity relies on existing nuclear reactor designs. Some advanced nuclear technologies, notably small modular reactors (SMRs), support the rising share of variable renewable energy (VRE).

As the share of variable renewables increases, electricity systems need increasing flexibility to ensure they can supply enough power to meet demand when VRE generation is low. There are various ways of providing such flexibility.

Flexible generating technologies such as gas turbines, combined cycle power plants reciprocating gas engines, solar thermal plants that store energy, and pumped storage hydropower plants are one option.

In the Sustainable Development Scenario, around 4000 GW of gas turbines and combined cycle power plants without CCUS (12 per cent of total installed capacity) that run with natural gas, biomethane or hydrogen as fuel for under 500 hours on average in 2070 are the main source of flexibility and reserve capacity on the generation side. Thermal generation and hydro plants also provide ancillary services, such as frequency support, voltage stability and inertia. New wind turbine designs and PV systems are also cited as potential sources of frequency support.

Enhanced network interconnections, can also contribute to flexibility by balancing the load across wider geographic areas and by pooling sources of flexibility from across those areas reducing the amount of ramping that needs to be provided by generating plant. Long-distance high-voltage direct current (HVDC) east-west transmission lines are particularly valuable for providing PV generated power at early morning or late afternoon, while north-south transmission lines offer potential for seasonal balancing. Flexible high-voltage grid technologies, allowing better control of HVDC lines and the development of meshed HVDC grids, are currently at the demonstration stage, but will become important for long-distance transmission lines, while also enabling the integration of wind turbines in large offshore wind installations, where traditional alternating current (AC) lines are not economic or feasible.

The IEA says demand-side response has a large part to play in meeting rising flexibility needs, in particular by shaving peak demand and redistributing electricity to time periods when the load is lower and electricity is cheaper. The growing use of electricity to power vehicles and heat pumps for water and space heating (in combination with thermal storage) will increase opportunities for shifting electricity demand over time periods, facilitated by increasing digitalisation.

Energy storage technologies, which can store electricity when VRE generates more power than the system needs and then discharge it when VRE generation is low, are also crucial. Pumped hydroelectric storage has been around for many decades, with global capacity of 158 GW in 2019. The IEA says it remains an important option, in particular for storage of 10-15 hours, with global capacity of pumped storage almost doubling to 300 GW by 2070. With cost declines, stationary batteries are becoming increasingly attractive as another storage option, whether in the form of behind-the-meter storage in combination with rooftop solar PV, utility-scale battery storage plants or grid storage to reduce bottlenecks.

In the Sustainable Development Scenario, utility-scale storage capacity worldwide increases from 173 GW in 2019 to 2100 GW in 2070, most of which is provided by batteries with an average discharge duration of five hours.

Expansion of electric vehicles could also boost energy storage. The 2 billion electric light-duty passenger vehicles on the road in 2070 in the Sustainable Development Scenario potentially represent over 150 TWh volume of energy storage that could be used for grid support through vehicle-to-grid (V2G) inverters.

In regions with good solar conditions for solar thermal electricity generation, plants with thermal storage can provide additional flexibility. Hydrogen and hydrogen-based fuels produced from electricity via electrolysis such as methane and ammonia provide better options than batteries for long-term and large-scale storage, although they are currently expensive compared to other seasonal balancing options, in particular flexible generation from gas turbines.

The report notes, however, that a major obstacle to the decarbonisation of the power sector is the relatively young age of many fossil fuel-fired power plants, in particular coal plants, notably in China. If all the existing coal fired power plants and those under construction around the world today continued operating until the end of their technical lifetimes, they would emit around 4.5 Gt of CO_2 per year in the late 2050s.

A mixture of measures is needed to unlock the CO_2 emissions from these plants and achieve net zero power sector emissions in the 2050s in the Sustainable Development Scenario. Retrofitting with CCS helps to keep the youngest coal plants open where CO_2 storage is available, and around 190 GW of coal capacity is retrofitted with CCUS, mainly in China. Many existing coal plants change their role and are used mainly to provide reserve capacity to power systems, thus generating smaller amounts of electricity and CO_2 emissions. Co-firing with biomass in proportions up to 15-20 per cent, which requires only minor technical modifications, also contributes to emissions savings in the near term.

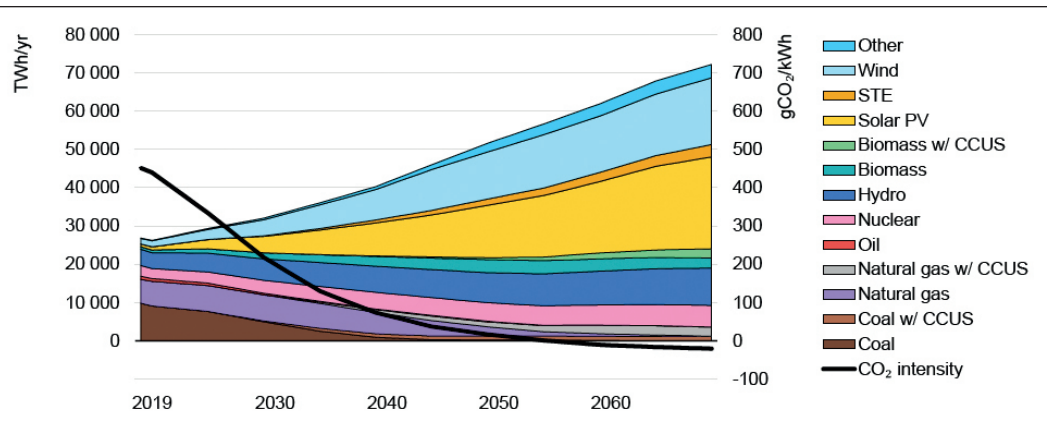
It is possible to co-fire ammonia in coal plants, as successfully demonstrated in Japan. It is also possible to fully convert from coal firing to biomass firing – a more costly solution than co-firing – as successfully demonstrated by several recent projects. Early retirements of some existing coal fired power plants, nevertheless, are an important measure in the Sustainable Development Scenario: 600 GW of the existing coal capacity of 2100 GW are retired earlier than in the Stated Policies Scenario.

The report stresses, however, that even if all of this is done, electricity cannot decarbonise entire economies alone. One of the key takeaways from the report is the major challenge of how to tackle emissions from the vast amount of existing energy-related infrastructure around the world.

According to the IEA, if no action is taken, today's existing infrastructure will emit about 750 Gt of CO_2 over the next five decades. The bulk of cumulative emissions from existing infrastructure is expected to come from the power (55 per cent) and heavy industry (26 per cent) sectors, reflecting their large shares of emissions today and the long lifetimes of the assets, e.g. power stations and manufacturing facilities.

Despite the tremendous challenge, however, the IEA remains positive. As Dr Birol summed up: "… Several recent developments give us grounds for increasing optimism about the world's ability to accelerate clean energy transitions and reach its energy and climate goals... This new IEA report not only shows the scale of the challenge but also offers vital guidance for overcoming it."

Global power generation by fuel/technology in the Sustainable Development Scenario, 2019-70. Global power generation sector achieves net-zero CO_2 emissions before 2060, largely from renewables, which account for over 85 per cent of the generation mix by 2070



Notes: TWh = terawatt-hours; gCO_2/kWh = grammes of CO_2 per kilowatt-hour; STE = solar thermal electricity; PV = photovoltaic; CCUS = carbon capture, utilisation storage. Other includes geothermal power, ocean energy and hydrogen.

Getting intelligent about cyber security

Siemens Energy is bringing its operations expertise and artificial intelligence to cyber security. **Junior Isles** explains.

Moving to an energy system that is more decentralised and digitalised is necessary, but brings with it problems that go beyond the challenges of dealing with integrating distributed energy sources. As energy companies embrace the energy transition, they now also have to address the growing number of cyber attacks on their operations.

In an effort to help combat the cyber threat, Siemens Energy recently unveiled a new artificial intelligence (AI)-based industrial cyber security service that monitors and detects potential cyber attacks in real-time.

Siemens Energy sees digitalisation and cyber security as "two sides of the same coin". Commenting on the cyber threat created by the changing energy landscape, Leo Simonovich, Global Head, Industrial Cyber and Digital Security, Siemens Energy said: "Each node of a digitally connected device that we bring online – and there will be 2.5 billion digitally devices added over the next couple of years in the energy sector – will expand the attack surface, or the pathways that bad actors can take to get into a system."

The core challenge that Siemens Energy has therefore been working on is what Simonovich calls the "visibility challenge" – with the basic premise being, "you cannot protect what you cannot see".

According to Simonovich, the energy sector has now "reached a tipping point" where the number of attacks, the sophistication of those attacks, and the gap between the defenders and attackers is increasing. He notes that a different approach is now needed.

"You have to understand how digital attackers are manipulating the physical world – so you have to focus on both the physical world and the digital world. You have to look at operational data, control data and network data in such a way that allows us to create a unified data stream and then detect anomalies, contextualise them and then take action," he said.

Siemens Energy has therefore introduced what it calls 'Managed Detection and Response (MDR), powered by Eos.ii.' MDR's technology platform, Eos.ii, leverages AI and machine learning methodologies to gather and model real-time energy asset intelligence. This allows Siemens Energy's cyber security experts to monitor, detect and uncover attacks before they execute. Armed with actionable insights from MDR's technology platform, Siemens Energy's cyber security experts implement precise defence measures in the company's state-of-the-art operational technology security operations centre (OT-SOC) to defend power generation, oil and gas, renewable energy, and transmission and distribution customers.

MDR is able to collect raw information technology (IT) and operational technology (OT) data from across an industrial operating environment, and then translate – and contextualise – it in real-time. This provides a unified picture of anomalous behaviour for defenders with actionable insights to stop attacks. According to Siemens Energy, its MDR service goes beyond conventional monitoring by achieving a deeper understanding of how digital systems relate to the real world.

With its unified OT and IT data stream, MDR's Eos.ii technology platform uses AI and digital twin technology to compare billions of real-time data points against a correctly functioning asset. This provides context for Siemens Energy's analysts to determine not only which events are abnormal, but which are consequential. Siemens Energy says the technical achievement of unified data streams and machine learning creates an "unprecedented platform" for targeted, in-depth analysis.

To collect and prepare vast amounts of network data for analysis, Siemens created a proprietary method called Process Security Analytics (PSA), which serves as the backbone of the Eos.ii technology platform. PSA is a systematic method for unifying OT and IT data streams, revealing anomalous behaviour and discovering cyber attacks in an OT environment.

Unifying IT and OT data streams enables greater visibility into the interactions of digital and physical assets. This is crucial. Where conventional network monitoring would only reveal that network traffic is higher than usual between two devices, MDR's PSA methodology applies advanced and continuously adapting algorithms to its data collection and synthesis process to power AI models for deeper insights.

Simonovich compared this to existing solutions. "The systems that are out there are heterogeneous, old and don't speak the same language. We've been working on how to aggregate the data, bring it into a single stream and then use our digital twin technology to model the threats. This allows us to answer the 'what if?' questions – what kind of damage an attack could cause to the physical world. And do all of that with billions of data points in real-time.

"The Eos.ii platform allows all these diverse data streams to be brought together into one, detect what is normal or not normal and provide actionable recommendations to the operators on proportionate response."

Simonovich believes that Siemens Energy has an advantage over its competitors in building cyber security solutions for industrial environments because of its understanding of operational data – how turbines run, how power plants function – combined with its understanding of traditional security data, i.e. networks and points. "The technology has been built on data gathered from services that Siemens provides to thousands installations around the world," he said.

"The Eos.ii platform has been in the making for the last three years. There are a number of startups that claim to do energy [cyber] security; they rapidly prototype and get something out there. We took our time – using decades of data to develop the platform. There are real consequences to detection and turning power plants on and off. We ensure that the algorithms and the rules and detection engine are really tuned to the individual customer environment.

"The technology we've developed gives us a complete view into the production environment and what's normal and not normal."

He added, however that it is not just about technology. "It's also about expertise and understanding what you are looking at," he said. "We call it human intelligence – an understanding of how an attacker may try to move through the system to cause damage."

Trained in plant operations, Siemens Energy says its experts can think and act like a hacker to stop an attack; and they remain dedicated to an incident case – from the time it is detected to the time it is neutralised.

Siemens Energy says a key goal was to make its service acceptable and affordable. "In addition to solving the visibility challenge, the other big thing we are striving for is to address the resource challenge, which is not enough qualified experts out there that understand what is going on," said Simonovich.

Over the last 10 years the company has therefore accumulated monitoring experts that can help asset owners understand what is going on. It is now bringing all of this to small and medium sized utilities.

"These are the organisations that need this type of service most," said Simonovich. "They just don't have the expertise in-house to access this type of technology and access to these types of experts. The service is not designed as a 'plug and play'. We look at the customer's specific environment – the fuel mix, how the environment is operated, and we tune the platform and the algorithm to the customer."

According to Simonovich, the system has been thoroughly tested to confirm how well it performs. One of the ways Siemens did this was through a "hackathon", where its best control engineers attempted to breach the system, and monitored if the platform could detect it.

"The platform has a rule engine – that contains the logic of our 60 top control engineers – which looks at ways to hack the environment. We then took that logic and put in the alerts to potential attacks and automated that logic."

According to Siemens Energy, the new service has been well received. "The feedback has been awesome because for operators, security is often a black box. If someone tells them something is odd in their network, the attitude is: 'well it doesn't relate to what I do day-to-day'. So being able to contextualise and say to them what's happening is really powerful," said Simonovich.

He also notes that the system has been useful in detecting misconfigurations, i.e. operational issues unrelated to cyber security, thus helping them improve operations as well as making them more secure.

"If you're a little guy, security can be a headache – it takes a huge amount of effort, capital and capabilities. If they can leave it to someone that can be a one-stop shop for monitoring, detection and then response and remediation, it takes a lot of the headache away."

The two initial target markets for the new service are the UK and the US. Siemens has built a security operations centre that houses the technology and analysts in Atlanta, GA, USA. It is using this centre to monitor its efforts in both countries. And with the first contract already in effect for a customer in the US and the next expected for the UK shortly, we could be at the start of eliminating much of cyber pain that small and medium sized operators are having to endure.

Simonovich says the energy sector has "reached a tipping point", where the gap between defenders and attackers is widening

Junior Isles

Salivating over offshore wind

Speaking on LBC radio in 2013, Boris Johnson, then London's Mayor, said: "Labour put in a load of wind farms that failed to pull the skin off a rice pudding. We now have the opportunity to get shale gas – let's look at it. It is part of the 2020 vision we have for this city – power generation is vital." How times change. Johnson is now Prime Minister and finds wind, especially offshore wind, a much more attractive proposition for consumption.

At his Conservative party conference in early October, the Prime Minister pledged a 40 GW target for offshore wind by 2030. With typical Johnson flourish, he said: "The UK government has decided to become the world leader in low cost clean power generation – cheaper than coal and gas – and we believe that in 10 years time offshore wind will be powering every home in the country, with our target rising from 30 GW to 40 GW.

"You heard me right. Your kettle, your washing machine, your cooker, your heating, your plug-in electric vehicle – the whole lot of them will get their juice cleanly and without guilt from the breezes that blow around these islands."

To achieve its ambitions the UK plans to invest £160 million in ports and factories across the country, to manufacture the next generation of wind turbines.

In addition to building fixed arrays in the sea, the government says that by 2030 it will also build 1 GW of floating wind farms – "15 times as much as the rest of the world put together".

The targets are all part of the UK's goal to reach net zero carbon emissions by 2050, while putting clean energy at the heart of economic recovery from the Covid-19 pandemic.

They are lofty ambitions, which are welcome, but are not without challenges. The UK is the world leader in offshore wind, with a third of the global installed offshore wind capacity and a strong pipeline of new projects. But achieving its 2030 goal from the current base of just over 10 GW is no easy task, and more will be needed if the net zero ambition is to be realised.

Unsurprisingly, the UK's announcement was front and centre at RenewableUK's recent virtual Global Offshore Wind conference.

Speaking in the opening session, the panel noted there are issues around consenting, the grid, and ensuring floating offshore follows the same commercialising and scaling, and cost reduction that we have seen for fixed offshore.

Chris Stark, Chief Executive of the UK Committee on Climate Change, said he could "give a solid dose of optimism" but would also have to stress that "things are not as rosy as we'd quite like them to be".

He likened the situation to the old Irish proverb, saying: "I wouldn't start from here, gov'. I think that was written for climate change policy workers during the pandemic. We are, though, starting from here, and will have to make the best of it. We are still in the grip of this pandemic, which is presenting a set of competing pressures to the steps that we might otherwise be taking to decarbonise our economy… the real uncertainty for me is whether we really grab this moment and accelerate our progress towards net zero here in the UK or whether we get distracted and hold things up unnecessarily. I hope we take the former but there is definitely a risk of the latter."

He noted that so far, the reaction of the government has been "really good" but with COP26 being held in Glasgow next year, he said the UK's credibility in terms of climate leadership and work towards net zero hangs on what it does over the coming 12 months. At the heart of that, is what the UK energy system will look like.

With Johnson's announcement, Stark noted that offshore wind "now looks like it will be the backbone" of that energy system. "That is such a pleasing thing to be able to say after years of doom-mongering and naysaying about it," he said. "The 40 GW commitment is fantastic but it's just a start… we could be looking for at least 100 GW by 2050."

Although Stark said there was now great clarity around what is needed, he noted that the investment challenge is huge – in the region of £50 billion, according to Aurora Energy Research. But it is likely there will be no shortage of money. Sean McLoughlin, an equity analyst at HSBC noted that the "investment euphoria" surrounding offshore wind should continue as long as the policies are there.

Stark also said the UK will need to build the networks and flexible demand for the electricity that will be generated offshore. This means increasing the number of electric vehicles on the road, heat pump installations, etc. And it has to happen at the same pace as the giant offshore wind farms that are being planned.

Another challenge is the mismatch between countries that support offshore wind and where turbines are made. During the discussion, Michael Liebreich, Chairman and CEO of Liebreich Associates, and former CEO of Bloomberg New Energy Finance said: "There is huge commitment of funds, and to the industrial future of offshore wind, but we don't make the turbines. We make lots of parts in the value chain but do we make enough?"

Others also voiced concern. On hearing the government's announcement, Danielle Lane, UK country manager for Vattenfall, which is building the 1.8 GW Vanguard wind farm off the Norfolk coast, said: "[But] for the rhetoric to become reality, it's important that the government doesn't overlook some significant hurdles. Planning decisions still take far too long, meaning renewable energy projects can be left in limbo for years before they know whether they will be approved."

Nevertheless, the news was largely welcomed without too much scepticism or criticism – even from Greenpeace who called it a "light bulb moment" before stressing that Johnson now needs to "follow through by knocking down all the barriers".

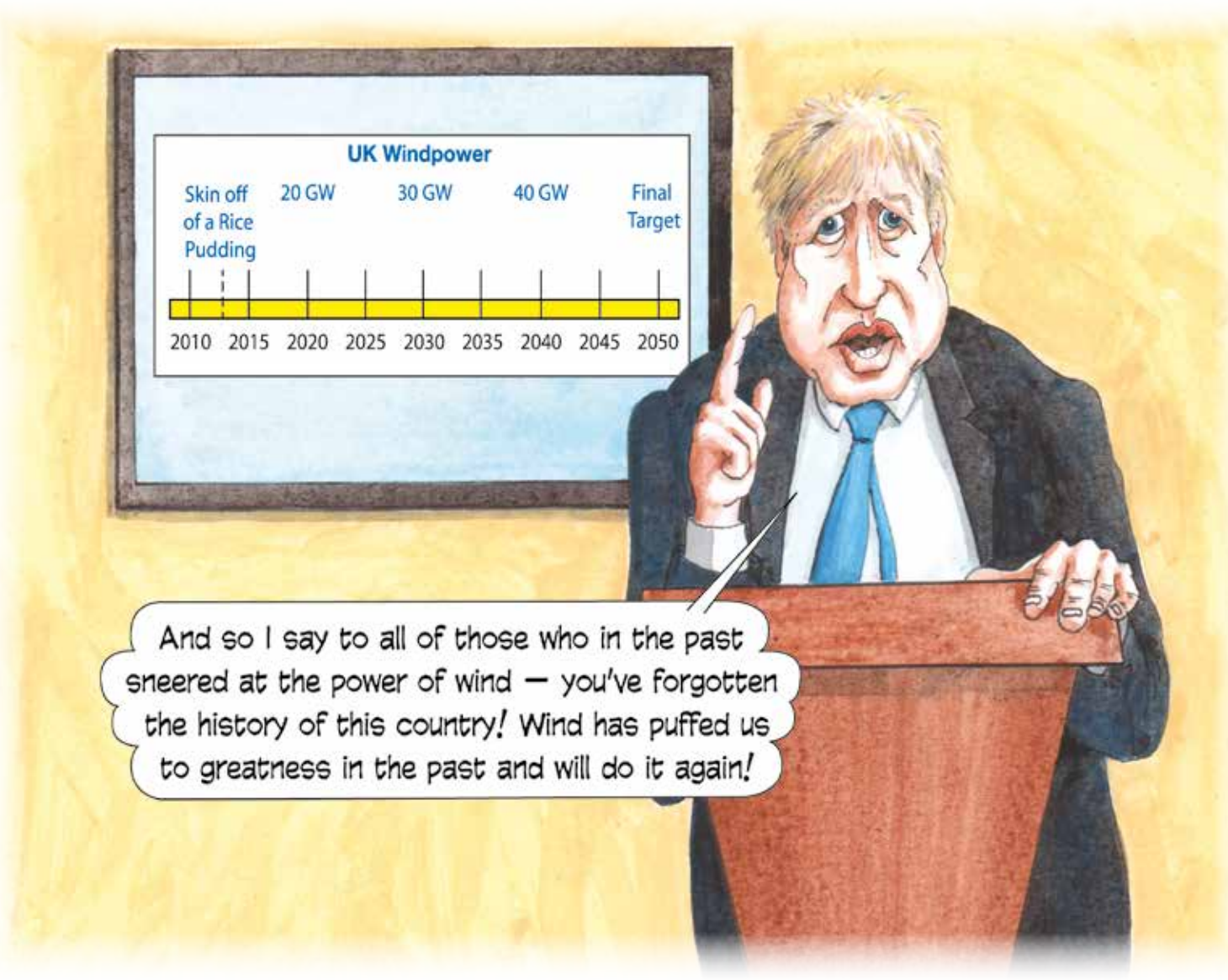
So it is time for Johnson to live up to his verbosity. The UK should indeed "be to wind what Saudi Arabia is oil". And the pandemic, although regrettable, has provided the ideal opportunity.

Winston Churchill is credited with the saying 'never let a good crisis go to waste' in the mid-1940s as the world approached the end of the Second World War.

This is Johnson's moment. Like Churchill, he certainly has the talk. "They forgot the history of this country. It was offshore wind that puffed the sails of Drake and Raleigh and Nelson, and propelled this country to commercial greatness," he said.

But can he walk the talk? We will soon see if Johnson has anything more to offer than Churchillian rhetoric in leading the UK out of this modern day World War.

Seven years after his rice pudding analogy, Johnson now quips: "I remember how some people used to sneer at wind power, 20 years ago, and say that it wouldn't pull the skin off a rice pudding." No doubt it was an admission that he has had to readjust his sails with the wind. Let us hope he also realises that if he keeps the fire under the offshore wind pudding, there will be no skin to worry about.



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