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Energy transition is key to global recovery

Jorgensen: economic recovery and job creation go hand-in-hand with the green energy transition

There is growing support for investing in a low carbon, sustainable economy as a way of addressing both the global economic crisis and climate change. **Junior Isles**

A growing number of governments are placing sustainability and the transition towards a green energy sector at the heart of their economic recovery plans.

In July, 40 ministers from the world's biggest energy consumers – including China, US, EU and India – representing more than 80 per cent of the world economy gathered at the International Energy Agency's (IEA) Clean Energy Transitions Summit to discuss how to bring about a sustainable and resilient recovery from the Covid-19 crisis and achieve a definitive peak in global carbon emissions.

The meeting was the culmination of a series of key IEA activities in recent months and followed just weeks after a Special Report on Sustainable Recovery presented in June by the Paris-based agency.

In an analysis carried out in cooperation with the International Monetary Fund, the report shows that the set of policy actions and targeted investments over the 2021-2023 period can achieve a range of significant outcomes.

IEA Executive Director Dr Fatih Birol said: "Policymakers are having to make hugely consequential decisions in a very short space of time as they draw up stimulus packages. Our Sustainable Recovery Plan provides them with rigorous analysis and clear advice on how to tackle today's major economic, energy and climate challenges at the same time. The plan is not intended to tell governments what they must do. It seeks to show them what they can do."

Governments, as well as a group of investors representing more than $12 trillion in assets, welcomed the recommendations in the IEA report. Dan Jorgensen, Denmark's Climate Minister, said: "This report clearly shows that economic recovery and job creation go hand-in-hand with the green energy transition. The IEA's 'Sustainable Recovery Plan' shows us the way forward."

Last year, the global energy industry employed around 40 million people but 3 million of those jobs have been lost or are at risk due to the Covid-19 pandemic.

The IEA says its proposal would boost global economic growth by an average of 1.1 percentage points a year and save or create roughly 9 million jobs a year. The largest portion of the new jobs created would be in retrofitting buildings to improve energy efficiency, and in the electricity sector, particularly in grids and renewables. The plan would also reduce annual global energy-related greenhouse gas emissions by a total of 4.5 billion tonnes by the end of 2023.

Achieving these results would require global investment of about $1 trillion annually over the next three years. This sum represents about 0.7 per cent of today's global GDP and includes both public spending and private finance that would be mobilised by government policies.

Recent IEA analysis shows that global energy investment is set for an unprecedented plunge of 20 per cent, or almost $400 billion in 2020, raising serious concerns for energy security and clean energy transitions. Power sector spending is on course to decrease by 10 per cent in 2020, according to the IEA's World Energy Investment 2020 report *(see page 10)*.

The European Commission has put climate programmes at the heart of its massive economic recovery effort. As member states begin to shape their recovery plans, several have already announced stimulus packages that include green measures.

In December, the European Commission led by new President Ursula von der Leyen launched the European Green Deal in a bid to make the EU climate-neutral by 2050. This plan quickly faced the added challenge of

Continued on Page 2

Biden sees green in US revival

US Democratic presidential nominee Joe Biden is putting clean energy at the heart of a $2 trillion plan to revive the US economy and stop all climate-damaging emissions from US power plants by 2035. Under his plan the US would also rejoin the Paris climate accord and reduce emissions to net zero by 2050.

Biden said his clean energy plan would create "millions of good-paying jobs" in sectors from construction to electric-vehicle manufacturing and the decommissioning of abandoned oil and gas wells.

In what was his first detailed policy statement on energy, Biden highlighted the clear difference in energy policy between him and President Donald Trump. "When Donald Trump thinks about climate change, the only word he can think of is hoax," said Biden. "When I think about climate change, the word I think of is jobs."

US environmental group Sierra Club said the former Vice President's plan "stands in stark contrast to the actions by Donald Trump, who has repeatedly denigrated the clean energy industry, which had employed 3.4 million people before the pandemic".

Biden's proposal does not go as far as some measures in the Green New Deal, the sweeping proposal from progressives in Congress that calls for achieving net-zero greenhouse gas emissions across the economy by 2030. It does, however, go further than the House Democrats' proposal, which sets a 2040 deadline for stopping fossil fuel power production.

The American Wind Energy Association (AWEA) lauded Biden's campaign. Tom Kiernan, CEO of AWEA said: "As our country strives to recover from the global pandemic, racial injustices, and economic recession, this is the right moment to grow the investments and good-paying American jobs associated with renewable energy development, including the significant economic benefits, lower cost electricity bills, and diverse community support that wind energy brings to rural parts of the country.

"The American wind industry is prepared to rapidly grow its 120 000-person workforce to help our country achieve a 100 per cent carbon-free electric grid by 2035, leading the way as other sectors of the economy begin to rely more and more on clean, affordable electricity to power businesses and communities."

The Trump campaign said Biden's "radical" clean energy proposals made clear that "union jobs related to oil, natural gas, fracking and energy infrastructure will be on the chopping block".

Mike Kelly, a Republican congressman from Pennsylvania, where the economy relies heavily on the oil and gas sector, accused Biden of planning to kill more than 600 000 jobs that are supported by fracking in the state.

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Covid-19 pandemic, which has pushed the world into a sharp economic downturn.

Dr Birol noted, however, that with its recovery plans, the EU has "a real opportunity" to boost economic activity, create jobs and support the long-term transformation of its energy sector.

"The European Green Deal represents an opportunity to strengthen economies across the continent by pooling investments in energy technologies that are likely to play a crucial role in the future," Dr Birol said. "Hydrogen electrolysers and lithium-ion batteries could potentially be game-changers both for the EU and globally."

Dr Birol noted that with its recovery plans, the EU has "a real opportunity

During a virtual meeting in July Michael Bloomberg, founder of Bloomberg LP and Bloomberg Philanthropies, said: "Growing the economy and fighting climate change go hand-in-hand." At the meeting hosted by Bloomberg Philanthropies and BloombergNEF (BNEF), Frans Timmermans, Executive Vice-President of the European Commission for the European Green Deal, and Michał Kurtyka, Poland's Minister of Climate discussed the status of the clean energy transition and green recovery efforts in Europe's coal regions.

A BNEF report published alongside the meeting noted that clean energy investment, in Bulgaria, Czech Republic, Poland and Romania can be important drivers of Europe's green recovery and climate efforts.

The report found that by 2030 the least-cost scenario would allow these four countries to reduce their power sector emissions by 48 per cent from 2018 levels. Taken together, new renewable capacity in these four markets could bring up to €53.7 billion in new investment.

In a separate report 'Global Trends in Renewable Energy Investment 2020', produced in collaboration with the UN Environment Programme (UNEP) and the Frankfurt School-UNEP Collaborating Centre, BNEF revealed that 184 GW of clean power capacity was added globally in 2019, a 20 GW jump from 2018. Moreover, this new capacity was delivered with almost the same investment as in 2018 – $282.2 billion – demonstrating falling costs.

The report said nearly 78 per cent of the net new GW of generating capacity added globally in 2019 was in wind, solar, biomass and waste, geothermal and small hydro. Investment in renewables, excluding large hydro, was more than three times that in new fossil fuel plants.

In June the OECD and the International Energy Agency (IEA) said that as governments design stimulus measures for economies hit by the Covid-19 crisis, they should seize the opportunity of historically low oil prices to redirect some of the half a trillion dollars spent annually supporting fossil fuels into sustainable investment including low-carbon energy.

EU banks on energy integration and hydrogen

- Energy System Integration Strategy will end energy "silos"
- 6 GW of renewable hydrogen electrolysers by 2024

Junior Isles

The recently announced EU strategies for energy system integration and hydrogen will pave the way towards a more efficient and interconnected energy sector, driven by the twin goals of "a cleaner planet and a stronger economy", according to the European Commission.

In its latest move to reach net zero emissions by 2050 while tackling the climate crisis, on July 8th the Commission adopted a new clean energy investment agenda, in line with the Commission's Next Generation EU recovery package and the European Green Deal. It said the planned investments have the potential to stimulate the economic recovery from the coronavirus crisis, create European jobs and boost Europe's "leadership and competitiveness" in strategic industries, which are crucial to the bloc's resilience.

The Commission says the current model where energy consumption in transport, industry, gas and buildings is happening in 'silos' – each with separate value chains, rules, infrastructure, planning and operations – cannot deliver climate neutrality by 2050 in a cost efficient way.

The EU Strategy for Energy System Integration will see the system planned and operated as a whole, linking different energy carriers, infrastructures, and consumption sectors. This connected and flexible system will be more efficient, and reduce costs for society.

The Commission also acknowledged the central role of hydrogen produced through electrolysis using renewable electricity, based on solar and wind, to support the complete decarbonisation of hard-to-abate sectors. Renewable-based hydrogen should be prioritised and developed into a cost-competitive solution for Europe's end-users, by producing 1 million tonnes of renewable hydrogen by 2024 (with 6 GW of renewable hydrogen electrolysers installed in the EU) and 10 million tonnes by 2030 (with 40 GW of electrolysers).

Renewable hydrogen will be supported through incentivising the roll-out of dedicated gigawatt-scale renewable hydrogen factories, providing quotas for renewable hydrogen in certain end-use sectors, and proposing a European-wide criterion for the certification of renewable hydrogen based notably on GHG emission savings. To deliver this strategy, the Commission is launching the 'European Clean Hydrogen Alliance', to develop a concrete pipeline of projects.

Commenting on the strategy at the time of the announcement, Aurelie Beauvais, Policy Director and Interim CEO of SolarPower Europe, said: "Today, the European Commission made an important step towards the ambition of the Green Deal, by recognising renewable hydrogen, powered by solar and wind-based electricity, as the most promising way to decarbonise hard-to-abate sectors."

The Commission further announced that it will address the use of hydrogen in the transport sector in its upcoming 'Sustainable and Smart Mobility Strategy', scheduled to be presented by the end of the year.

Giles Dickson WindEurope's CEO, said: "More than 60 per cent of final energy consumption can be covered directly by electricity. But some sectors will need different solutions. This is where renewable hydrogen, produced through electrolysis and based on renewable electricity, comes into play."

WindEurope is part of a new initiative called 'Choose Renewable Hydrogen', which currently includes nine other companies and associations: Akuo Energy, BayWa r.e., EDP, Enel, Iberdrola, MHI Vestas, SolarPower Europe, Ørsted and Vestas.

Hydrogen roll-out accelerates cost reductions

The production costs for green hydrogen, already down by 50 per cent since 2015, are expected to fall by an additional 30 per cent by 2025, according to IHS Markit.

The main drivers will be economies of scale and more standardised manufacturing, says the market research firm. According to the IHS Markit 'Power-to-X Tracker', the average size for power-to-x projects scheduled for 2023 reaches 100 MW, which is 10 times the capacity of the biggest systems currently in operation.

IHS Markit also forecasts that by 2030 the production of hydrogen through electrolysis could be cost competitive with the predominant methods today, for which the feedstock is natural gas.

The power-to-x investments planned globally, where hydrogen accounts for the large majority, are seen to surpass $700 million in 2023, surging from just $30 million in 2019.

"Hydrogen's overall share in the energy mix will ultimately depend on the extent of decarbonisation that is desired. In Europe, currently the primary market for hydrogen projects, hydrogen could account for as much as one third of the energy mix if the aim was 95 per cent decarbonisation or greater," IHS Markit says.

The analysis comes as a number of projects to scale green hydrogen production take shape and several countries set out new hydrogen strategies.

At the end of May a consortium – made up of Engie Solutions, Siemens Energy, Centrax, Arttic, German Aerospace Center (DLR) and four European universities – said it will implement the world's first industrial-scale power-to-X-to-power demonstrator with an advanced hydrogen turbine.

The project, known as HYFLEXPOWER, will be launched at Smurfit Kappa PRF's recycled paper manufacturing site in Saillat-sur-Vienne, France. The project is being set up to prove hydrogen can be produced and stored from renewable electricity and then added with up to 100 per cent to the natural gas currently used with combined heat and power plants.

Such projects could become increasingly common as governments move to support the production and use of hydrogen as part of their decarbonisation strategy.

In early July, Shell Nederland said it is teaming up with Eneco and CrossWind to set up a green hydrogen hub in Rotterdam, the Netherlands. Shell plans to produce hydrogen using electricity from wind power, preferably from the 759 MW Hollandse Kust (noord) offshore wind farm starting up in 2023. The aim is to produce 50-60 tonnes/d of hydrogen, which will be first supplied to Shell's refinery in Pernis to decarbonise fuel production.

Decarbonisation through greater hydrogen use is increasingly becoming a central feature of stimulus packages based around clean energy strategies.

Germany's Covid-19 recovery stimulus package recently earmarked €9 billion ($10 billion) for the expansion of hydrogen capacity at home and abroad. The strategy will also play into the further development of the European Hydrogen Strategy, which is to be adopted during the German Co-Presidency of the Council of EU in the second half of 2020.

Under the plans, which are part of a larger €130 billion boost to the economy, Germany eyes hydrogen capacity of up to 5 GW by 2030, with a further 5 GW to be installed by 2040 at the latest. This will cost about €7 billion, with a further €2 billion earmarked for partnerships with countries where hydrogen can be efficiently produced.

The Portuguese government also recently said it plans to invest €7 billion to increase hydrogen-based power generation over the next 10 years. During a Council of Ministers meeting in May, the country approved the 'National Energy and Climate Plan 2030' and the 'National Hydrogen Strategy' (EN-H2). Among the projects and initiatives, a highlight is the construction of a green energy production unit in the city of Sines with an investment of more than €2.85 billion.

Elsewhere in Europe, Norway recently presented a NOK3.6 billion $384 million) green transition package to support low carbon solutions, including hydrogen and offshore wind. It also released a hydrogen strategy, which envisages an increase in the number of pilot and demonstration projects in Norway.

In Denmark a group of six major Danish companies, led by Ørsted, announced plans to develop a 1.3 GW green hydrogen scheme, which would be powered by one of the world's largest offshore wind farms

Outside of Europe, Saudi Arabia recently announced a $5 billion dollar green hydrogen production facility to be sited in NEOM.

In mid-July German company Linde signed a Memorandum of Understanding (MoU) with Beijing Green Hydrogen Technology Development Co., Ltd., a subsidiary of China Power International Development Ltd., under which both companies will collaborate on several green hydrogen initiatives.

Eurelectric and E.DSO to study distribution networks needs

A comprehensive study on Europe's electricity distribution networks for the coming years is now under way after Eurelectric and E.DSO announced that they will work together to quantify the investment needs of a distribution network that can meet the 2030 decarbonisation ambitions.

Eurelectric, the organisation representing Europe's largest power companies, and E.DSO, representing the operators of European distribution systems, together connect more than 95 per cent of Europe's electricity consumers.

The study, which is being conducted with analytical support from Monitor Deloitte, will assess the main drivers and connection costs of optimising and modernising low voltage infrastructure. A consortium of 10 national associations and companies will contribute to the study, ensuring a strong geographical and technical dissemination. Countries covered by the study will include Germany, Denmark, Spain, France, Hungary, Ireland, Italy, Poland and Portugal, and Sweden.

Kristian Ruby, Secretary General of Eurelectric, said: "The 2020s will be the DSO decade… It is important to understand investment needs in this area in order to comply with the European Green Agreement."

Roberto Zangrandi, Secretary General of E.DSO, added: "The main European DSO knows that the energy transition is heavily dependent on them. Their investments are more than €20 billion per year, so the need to allocate this effort in the best and most effective way is crucial. We need to work together to make sure there are no dispersions; and to allow market players and active consumers to do so properly."

The study will be completed by the end of 2020. It is the first EU-level analysis to separate operator data from distribution and transmission systems so they expect it to become an important resource for policymakers, as it will provide data on investment needs, identify obstacles and include recommendations on regulatory frameworks and tariff structures. In addition, it will serve to inform the Ten Year Network Development Plan (TYNDP) that must reflect the increasingly decentralised electricity sector.

USA set for energy storage boom

The Electricity Reliability Council of Texas is predicting strong growth in energy storage systems, at the expense of gas-fired power plants. **David Flin**

The Electricity Reliability Council of Texas (ERCOT) says it is anticipating a growth in energy storage systems, at the expense of gas fired power plants.

In a recent statement, the Texas-based grid operator said that batteries are starting to compete with one of the central features of gas fired power plants – providing power when renewable generation is below demand. Accordingly, the drive towards ever-lower emission levels will encourage an increase in energy storage to stabilise the grid.

ERCOT predicts that there will be an increase of 7 per cent in output from battery storage systems in Texas over the next three years, compared with natural gas, which will add just five per cent in new capacity over the same period.

As an example of the likely expansion of energy storage already under way, Broad Reach Power, a Houston energy storage company, said in June that it will install 15 utility-scale batteries at sites in Houston and Odessa, Texas. Six sites are expected to be operating by the end of this summer, with the other batteries being installed later in the year. Each site will contain battery systems capable of storing and distributing up to 10 MW.

This rise in renewables, even greater than had been expected, is partly driven by the costs of solar falling faster than expected. According to research from Wood Mackenzie, costs are falling faster due to module price reduction being greater than anticipated. Wood Mackenzie says it expects to see greater focus in the future on soft cost reduction from EPCs and developers, and that module costs will decline at a slower rate in the future.

Molly Cox, Research Analyst for Wood Mackenzie, said: "There are efforts under way to address high permitting and inspection costs for residential PV systems. The Solar Foundation and NREL have collaborated to form The Solar Automated Permit Processing platform (SolarAPP), which could yield savings for residential PV systems."

The US Energy Information Administration (EIA) released data in July showing that both wind and solar have shown sharp growth, expanding faster than all other energy sources. During the first four months of 2020, solar-generated electricity in the USA expanded by 20.7 per cent compared to the same period in 2019, while wind grew by 12.2 per cent. Wind and solar together provided 12.3 per cent of total US electrical production. Combined with hydropower, biomass, and geothermal, renewables provided 21.6 per cent of total electrical output. Over the same period, coal produced just 17.0 per cent of the total, falling by over a third from the figure for last year.

Puerto Rico power privatisation proceeds

Puerto Rico's transmission and distribution system will be finalised by August 2021

Privatisation of Puerto Rico's transmission and distribution system will be finalised by August 2021 but the official announcement might take place sooner, according to José Ortiz, Deputy Director of Puerto Rico's Electric Power Authority (EPA).

Ortiz also said that he hopes to reach an agreement shortly on the costs of renewing the electricity system, which is estimated will be around $15 billion. This would be covered with funds from the Federal Emergency Management Agency (FEMA).

Officials recently said that a consortium of Canadian and US firms will take over the transmission and distribution system of the Puerto Rico Electric Power Authority (PREPA). The consortium, LUMA, consists of the Canadian firm ATCO and the US-based companies Quanta Services and IEM.

At the end of June LUMA was awarded a 15-year contract to operate the T&D system, while PREPA retains ownership. LUMA will initially be paid $70 million, with $90 million in the second year, $100 million in the third year, and $105 million for each of the following years, with a possible total bonus of $20 million. LUMA will also be responsible for billing and collection, capital improvements, and human resources.

LUMA will have problems to resolve in the T&D system. Fermín Fontanés, Executive Director of Puerto Rico's Public-Private Partnerships Authority, said that a lack of maintenance has led to an average of 4.5 interruptions a year for customers, compared to an industry average of 0.98. Customers see an average outage time of more than 12 hours a year, compared with a baseline of less than two hours. Furthermore, the T&D infrastructure is three times older than the industry average.

Privatisation of the operations of the T&D system will take up to a year, with LUMA promising it can reduce annual system energy costs by $150 million.

Wayne Stensby, President and CEO of LUMA, said: "We understand the significance of this announcement. This is not our first rodeo."

Brazil plans auction to meet rising demand

Brazil's Ministry of Mines and Energy (MME) is planning to hold an energy auction on 4 December 2020 to meet the needs of local distributors for the next year.

The auction will be the A-1 Existing Energy Auction, and will contract power from all available power plants in the country. The Brazilian government will award Power Purchase Agreements (PPAs) with a two-year term, with power supply starting on 1 January 2021.

MME says that it will no longer hold the A-2 energy tender this year due to uncertainties about the post-pandemic energy load market.

The A-1 auction is significant because it is predicted that Brazil's energy demand will grow by an average of 2.2 per cent per year, reaching over 550 Mtoe (million tonnes of oil equivalent) by 2050. The highest growth is expected to take place over the next decade.

This growth will be met by a mixture of energy sources.

A study by the government highlights that Brazil will need large volumes of natural gas, which will require new business solutions, such as gas storage projects. The country currently only has one underground gas storage project but is looking to develop more.

Nuclear power is expected grow from a current 2 GW to 23 GW over the next three decades. This, however, will depend on cost reductions of nuclear plants. Brazil has two operating nuclear units, Angra I and II, with a third under construction.

However, the biggest potential growth area will be solar and wind power. Wind power could grow from the current 16 GW to as much as 195 GW, reaching a 33 per cent share of the energy mix, while wind power is expected to grow from 6 GW to 90 GW, 16 per cent of total capacity.

Hydropower, which currently supplies 60 per cent of the country's energy, will expand in total, but there will be limits. Large hydropower plants are controversial, especially in the Amazon and Tocantins-Araguaia basins, as they impact indigenous lands and require the flooding of large areas of rainforest.

The growth of wind and solar in Brazil will be significant over the next decade. The state of Minas Gerais demonstrated this in June with the approval of a 1.36 GW solar PV facility. The power plant, which will be built by Aurora Energia, will require $1.2 billion investment. Construction is due to start later this year, with completion expected by 2023.

Ecuador climate goal receives financial boost

Ecuador's efforts to cut carbon emissions have received a boost through a loan from the Inter-American Development Bank (IDB).

In June the IDB announced that it would provide the country with a $280 million loan to implement policy reforms to help it reach its climate change goals and consolidate its fiscal and external accounts.

The IDB loan will also support increased efficiency, modernisation, innovation, and sustainability of the local electricity supply chain as well as energy trading with countries neighbouring Ecuador. This will help ensure Ecuador's national supply in possible scenarios involving adverse conditions.

Ecuador is working to reduce its consumption of fossil fuels, and is doing so through modernisation and transformation of its energy network. It aims to cut carbon dioxide emissions by 9 per cent by 2025, and plans to achieve this by transforming, diversifying, and improving its transmission grid and improving the efficiency of its power plants.

Ecuador also plans to increase the use of, and access to, renewable energy sources in the country.

The IDB noted that, in the midst of the current Covid-19 pandemic, Ecuador's fiscal revenue will suffer a major decline, which would impact its climate change effort.

Virginia Snyder, Director of the IDB project team, said: "Sectoral policies such as those that Ecuador has been implementing are essential for improving the performance of the electricity sector. The evidence is clear that reforms of sectoral policies can lead to an increase in investment and in quality of service by improving the efficiency of the electricity sector and its financial sustainability."

Australia backs low carbon technologies

Australia is looking to low carbon technologies, including hydrogen and batteries, in the fight against climate change.

Syed Ali

The Australian government's new proposal to tackle climate change will focus on the use of low carbon technologies including hydrogen and batteries. It hopes to turn the latest proposal, put forward at the end of May, into formal policy in September.

The new plan is based on scaling up hydrogen production, driving down energy storage costs to back up wind and solar power, and electrifying industrial processes.

The so-called Technology Roadmap is designed to help Australia meet its Paris Climate Accord commitment to cut carbon emissions by between 26 per cent and 28 per cent from 2005 levels by 2030.

"At its core, this is about technology not taxes. It means reducing emissions, not reducing jobs and the economy," Energy and Emissions Reduction Minister Angus Taylor said in a statement.

The proposal essentially supports a trend that is already gaining momentum. Notably, the roadmap states that the development of a hydrogen industry in Australia would create 7600 jobs by 2050, an area that is witnessing significant activity.

In mid-July the Australian Hydrogen Council and the Clean Energy Council (CEC) signed a Memorandum of Understanding (MoU) to jointly explore the potential for hydrogen-based energy projects in the country. Also in July, the Territory Government released the Northern Territory's first ever Renewable Hydrogen Strategy.

"There is growing momentum for the development of large-scale, clean hydrogen, given Australia's riches of wind and sun – particularly for the export market," said CEC's Chief Executive Kane Thornton. He cited estimates by the Australian Renewable Energy Agency (ARENA) showing that hydrogen exports from the country could reach A$1.7 billion ($1.19 billion) per year by 2030, provided that the right conditions are in place.

In recent months Commonwealth and State Governments have announced a number of funding and policy developments dedicated to "energising" Australia's position in the global hydrogen economy. Notably, the Clean Energy Finance Corporation's (CEFC) $300 million Advancing Hydrogen Fund launched in May is one of the largest commitments made to the hydrogen sector by any government in the world. The fund is aimed at building investor confidence in the Australian hydrogen industry.

Investors have already launched or announced plans for several hydrogen schemes. ARENA says it has received proposals for renewable hydrogen projects worth over A$3 billion in its first funding round for large-scale projects in the country.

In June a newly formed Australian renewable energy company called Austrom Hydrogen unveiled ambitious plans for what it says could be a massive 3.6 GW solar hydrogen project near the Port of Gladstone in central Queensland.

Other projects include the 15 GW Asian Renewable Energy Hub and the 10 GW Sun Cable project. Siemens is also proposing a 5 GW green hydrogen project in Western Australia, and BP is considering a 1.5 GW solar and wind hydrogen plant in the same area.

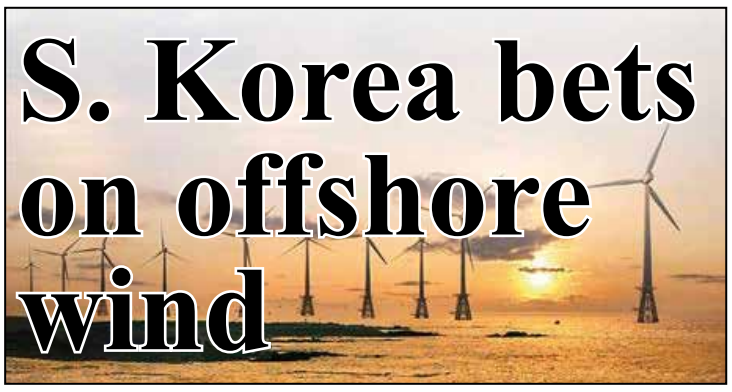
The growing use of wind and solar has also seen battery storage touted as a key technology in the roadmap.

A recent study by consultancy group Wood Mackenzie showed energy storage capacity in Australia is expected to increase by 1.2 GWh this year, bringing the country's total to 2.7 GWh.

In late June Transgrid, the operator of the electricity transmission network in the Australian state of New South Wales agreed a grid connection for a 720 MW solar farm coupled with up to 400 MWh of battery storage.

In South Australia, meanwhile, regulators authorised an expansion of the capacity of the 100 MW/129 MWh Tesla battery at the 315 MW Hornsdale wind farm operated by French renewable energy company Neoen.

- Queensland Parliament has introduced the 'Forest Wind Development Bill 2020' to advance planning of the 1200 MW onshore wind farm. The Forest Wind farm has the potential to become the largest onshore wind farm in the Southern Hemisphere.



S. Korea bets on offshore wind

- Government plans 12 GW of offshore wind by 2030
- Nuclear plants to be scrapped

South Korea is turning to offshore wind as the government moves to reduce its dependence on coal and calls for a halt to new nuclear plant.

In mid-July President Moon Jae-in pledged to expand the country's offshore wind power capacity 100-fold by 2030 as a key engine for the nation's transition to renewable energy and environmentally-friendly growth.

Under the plan, the government aims to expand offshore wind capacity to 12 GW by 2030 from the current 124 MW. According to the Ministry of Trade, Industry and Energy, it will complete the construction of offshore wind farms with a combined capacity of 2.4 GW by 2028.

Moon said: "The government's goal is clear and is to become one of the world's top five offshore wind energy powerhouses by 2030, taking advantage of our geographical advantage of being surrounded by water on three sides."

Moon projected the offshore wind energy industry would create up to ten times more quality jobs than other electricity generation sectors, and create new demand for the shipbuilding, steel and construction industries.

The ministry says it will first carry out studies by building offshore wind power facilities with a combined capacity of 400 MW before beginning full-fledged construction in 2023.

The news came as Norwegian oil giant Equinor announced plans to build the world's largest offshore floating wind farm. Construction of the 800 MW Firefly project is scheduled to start in 2023 for possible start of electricity production in 2026.

A week before announcing its offshore wind plan, South Korea unveiled its Green New Deal, which will see investment of Won73.4 trillion ($61.2 billion) to transform the nation's fossil fuel-reliant economy as a way of recovering from the economic downturn caused by the coronavirus crisis.

He promised to introduce "post-coal" policy in line with his campaign promise to abandon coal power to ease air pollution.

Moon also vowed to scrap all plans to build new nuclear reactors. "I will scrap all preparations to build new reactors currently under way and will not extend the lifespan of current reactors," he said. "South Korea is not safe from the risk of earthquake, and a nuclear accident caused by a quake can have such a devastating impact."

South Korea currently operates 25 nuclear reactors, which generate about 30 per cent of the country's power supply.

Transmission issues threaten Vietnam solar sector

Investors in Vietnam's solar power plants are concerned that transmission grid issues will prevent them from meeting a year-end deadline after which tariffs might be reduced.

Twenty-five plants are currently being built and investors are rushing to finish them to secure the feed-in tariff of 7.09 ¢/kWh for 20 years. Investors fear tariffs will be reduced further in the new year following an earlier cut from 9.35 cents in June last year.

Energy company Hado Group is building a 50 MW solar farm in the central province of Ninh Thuan, and was scheduled to become operational in July. However, Nguyen Huu Vinh, Deputy Chairman of the group's energy development board, said at a recent meeting that since a transmission line would not be completed by September, the operation date of the plant might be delayed.

The second phase of the 104 MW Sao Mai Solar Power Plant in southern An Giang Province, the first solar farm there, faces a similar problem.

Eleven solar farms began operating in July, bringing the total number in the country to 110 with a total capacity of 5482 MW, or 9.5 per cent of Vietnam's electricity supply. So far 35 have qualified for the 7.09 cents tariff.

National utility Vietnam Electricity (EVN) said it has been making efforts to enable more solar power plants to connect to the national grid. The National Load Dispatch Center (NLDC) said it has been upgrading transmission lines in Ninh Thuan and Binh Thuan provinces to accommodate new renewables projects.

The country's power grid has struggled to keep up with the proliferation of renewables coming online. Although progress has been made, major infrastructure updates are required to ensure the grid is ready for the wave of new projects.

In late June Vietnam gave the go-ahead to build 7 GW of new wind energy plants. The move comes as fears mount that Vietnam could face severe power shortages from 2023.

Amid such concerns, the country released a new energy strategy earlier this year that strongly promoted wind and solar energy, with ambitions to source up to 20 per cent of the country's electricity from renewables by 2030.

Japan turns its back on coal

Japan's promise to cut support for coal power in the developing world is being hailed as a turning point in the country's climate change policy.

A new policy announced in July will curtail an important source of official finance for coal power stations in southeast Asia and help spur a regional shift towards cleaner energy.

Shinjiro Koizumi told the *Financial Times*: "[Until now] Japan's attitude was that if we can sell, then we should. That is completely changed. In principle, there will be no support."

Under the new policy, Japan will only support exports of the most efficient ultra-supercritical plants, and only when the buying country has a decarbonisation strategy in place.

The announcement followed news that Japan will close most of its aging coal fired plants, about 100 units by 2030, as it shifts towards more renewables. Japan currently relies on coal for about a third of its energy needs.

Offshore wind will form the bulk of replacement capacity, with plans to add 1 GW each year over the coming decade, eventually reaching a combined 30 GW by 2040.

Germany raises offshore wind target but fears remain

- Offshore wind 2030 target raised from 15 GW to 20 GW
- No new projects due online until 2021

David Flin

The wind industry has welcomed the security offered by the recent amendment of Germany's long-term target for offshore wind. In early July, the government raised the goal from 15 GW to 20 GW by 2030, and 40 GW by 2040.

However, there are concerns over the feasibility of reaching those targets. Only 219 MW were brought online in the first half of 2020, and no new projects are due online until 2021 at the earliest. As a result, the German offshore wind industry is currently in the middle of an expansion gap.

Responding to the government's announcement, Deutsche WindGuard said that the "fastest possible tendering" is required, along with "an economically efficient remuneration system for future offshore wind farms." It said contract for difference-style tendering, as used in UK, France, Italy, and Denmark would guarantee low and stable electricity costs.

In a joint statement, the industry organisations BWE, BWO, VDMA, WAB, and the German Offshore Wind Energy Foundation, said: "Because of the long planning time of offshore wind farms, we have long warned that an expansion gap is imminent. We are now in the middle of it. The challenge now is to keep this expansion gap as small as possible and to strengthen the domestic market for offshore wind energy sustainability."

Experts from the German Institute for Economic Research believe that electricity production costs from offshore wind can be reduced by about 30 per cent compared to the current proposals of the German Federal Ministry of Economics and Technology (BMWi).

Germany has held the Presidency of the North Sea Cooperation since January, and took over the EU Council Presidency in July. It aims to leverage this position to develop several energy policies, with a strong focus on the rapid expansion of offshore wind.

The government stressed that offshore wind has a key role to play in achieving the EU's ambitious renewable energy targets and ensuring security of energy supply. It hopes to get the EU Commission to adopt the EU Offshore Renewable Energy Strategy in October 2020.

Giles Dickson, CEO of WindEurope, said: "The EU has great plans for the expansion of offshore wind. If they want to reach their goal of 450 GW by 2050 cost-efficiently, hybrid projects will have a big role to play." Hybrid projects are those that go beyond one single grid connection from the wind farm to the mother country.

WindEurope published a paper on the EU Offshore Renewable Energy Strategy, which identifies the need for a collaborative and long-term approach to maritime spatial planning, aligned with EU climate goals. It highlights the key role of both hybrid offshore wind farms and floating offshore wind.

Dickson said: "Germany not only holds the EU Presidency, but also the Presidency of the North Seas Energy Forum. This puts them in an exceptional position to drive the expansion of offshore wind and the collaboration between countries that is needed to deliver it."

Germany finalises coal phase out plan

Germany will be the first major economy to phase out both coal and nuclear power generation.

German lawmakers recently passed legislation that finalises the details of the country's phase-out of coal. Both houses approved bills that will ensure all coal fired power plants will be shut down by 2038, allocating €40 billion to help affected regions cope with the transition.

The move is part of Germany's 'energy transition' – a task that has been made harder by its existing commitment to phase out nuclear power by 2022.

Svenja Schulze, Germany's Environment Minister, said: "The days of coal are numbered in Germany. Germany is the first industrialised country that leaves behind both nuclear energy and coal." She also said there will be regular government reviews to see if the final phase-out date can be brought forward. She noted that by the end of 2022, eight of Germany's most polluting coal fired plants will have been closed.

According to the Fraunhofer Institute, 55.7 per cent of net electricity generated so far this year for the public power supply came from renewable sources. Coal accounted for 20 per cent, followed by nuclear and natural gas with about 12 per cent each.

Katja Suding, a leading FDP lawmaker, said the government should have opted to expand existing emissions trading systems that put a price on carbon, encouraging operators to shut down unprofitable coal plants. She said: "You just have to make it so expensive that it's not profitable anymore to turn coal into electricity."

EU pushes for green recovery

The European Commission plans to accelerate the European Green Deal and deliver investments into green energy with support from the European Investment Bank (EIB), to help build a resilient, future-proof economy.

One area that will be targeted for investment is wind energy. The spike in financing costs from the Covid-19 crisis has caused many wind projects to be put on hold. Restarting these is an immediate issue.

As a start of this Recovery Strategy, the EIB recently invested in wind farm developments in France and Spain.

In June it granted a €450 million credit line to co-finance construction of the Fécamp offshore wind project in France. The 497 MW offshore wind farm will be built between 13 and 22 km off the coast of northwest France and is scheduled to startup in 2023.

More recently, Iberdrola of Spain received €800 million in financing from the EIB and Instituto de Crédito Oficial (ICO) to develop over 2000 MW of solar plants and wind farms in 20 projects across several locations.

Ignacio Galán, President of Iberdrola, said: "With this agreement, we are moving forward with our commitment to accelerate investment and put 3000 MW of new capacity into service in Spain by 2022."

Investors wary of Ofgem's £25 billion plan for UK energy networks

Ofgem's plans for heavy investment in its energy networks has been largely welcomed, but not all are happy with how it aims to keep the cost of that investment down. **David Flin**

Ofgem, the UK regulator for electricity and downstream natural gas markets recently announced that it will invest around £25 billion in a five-year investment programme to transform Britain's energy networks.

To keep the costs of the investment as low as possible, however, it has proposed cutting rate of return on capital for energy network companies to 3.95 per cent, down from the 7-8 per cent allowed under the current regulatory regime – a proposal that has been less than welcome. Network companies claim that weaker returns would risk their ability to deliver reliable services.

Keith Anderson, Chief Executive of ScottishPower, said network companies would take their case to competition authorities. He said: "We're headed towards a huge regulatory fight. We're probably all headed towards the Competition and Markets Authority."

National Grid said it was "extremely disappointed" by the proposals, which left it concerned as to its ability to deliver resilient and reliable networks. It said the decision jeopardises the delivery of the energy transition and the green recovery. SSEN, the networks arm of SSE, said it was "deeply concerned".

Ofgem, however, said that its analysis shows that Britain's energy networks are a low-risk and attractive sector for investors. There is strong evidence to suggest that investors will accept lower returns and continue to invest in the sector.

Jonathan Brearely, Chief Executive of Ofgem, said: "Ofgem is working to deliver a greener, fairer energy system for consumers. This is why we are striking a fair deal for consumers while making room for around £25 billion of investment needed to drive a clean, green, and resilient recovery."

Under the proposals, Ofgem will allocate £25 billion upfront expenditure to maintain and operate Britain's gas distribution, and gas and electricity transmission networks as well as support the growth of green energy. Ofgem will also unlock additional funding of up to £10 billion that companies can access to drive emissions-free energy and infrastructure upgrades.

Also, there will be a new Strategic Innovation Fund, which will provide £630 million to drive R&D into green energy projects.

Dr Jonathan Marshall, Head of Analysis at the Energy and Climate Intelligence Unit (ECIU) was upbeat over Ofgems's proposal.

He said: "Shifting focus to cutting carbon at the same time as controlling network profits is good for efforts to get the UK on track to meet its climate targets. Ofgem appears to have listened to criticism that it hasn't been pushing hard enough on environmental measures and giving the networks an easy ride.

"Until now there has been a lot of talk on innovation from the network companies, but little action. Linking returns to carbon emissions will give them nowhere to hide, and should ensure that UK resources, such as offshore wind, are bolstered by smart technologies needed to balance the grid at low cost."

World Bank loans will support African infrastructure

Eastern and Southern Africa are set to receive a boost from the World Bank, which has moved to fund the region's ailing power sector infrastructure.

David Flin

World Bank loans totalling $425 million are expected to go some way to improving Eastern and Southern Africa's ailing power sector infrastructure. The World Bank approved the loans in June through its subsidiary the International Development Association (IDA) financing to support infrastructure development across several projects in the two regions.

Effective power generation in the region is less than the installed capacity by 20-30 per cent due to drought, lack of maintenance, and system losses in both transmission and distribution. The World Bank estimates that such deficits cause a loss of about 2 per cent in GDP growth in most of the countries, and prevents a large number of people in the region from having access to electricity.

Among recent projects being funded by the World Bank are the Cameroon-Chad Power Interconnector Project and renewable projects in South Africa and Djibouti.

The proposed Cameroon-Chad Power Interconnection Project will receive a $385 million loan from the IDA. The amount will be split between the two countries: $295 million for Cameroon and $90 million for Chad. It will mature in 30 years with a grace period of five years.

The project involves construction of a 1024 km, 225 kV transmission line with associated transformer stations. It will also include construction of rural electrification distribution networks bringing electricity to 478 localities, 409 in Cameroon and 69 in Chad. The project is valued at $744 million, and is being co-financed by the African Development Bank (AfDB). The Bank is also making renewable investments in South Africa and Djibouti.

The Multilateral Investment Guarantee Agency (MIGA) has insured investments in 288 MW of new renewables in South Africa and in Djibouti's first utility-scale wind project.

MIGA has issued guarantees in support of two solar and two wind power projects being developed by the South African-based IPP BioTherm.

The solar power projects – Aggeneys and Konkoonsies II – are located in Northern Cape, while the Golden Valley and Excelsior wind farms will be built in the provinces of Eastern Cape and Western Cape.

MIGA has also issued guarantees to Djibouti Wind Company to support all stages of a 58.9 MW wind power project in Djibouti, which will become the country's first independent power producer (IPP) project. The wind farm will be located in the Ghoubet area. Once in operation, its output will be sold to state-owned power utility Electricité de Djibouti under a 25-year PPA.

New task force will drive floating offshore wind

- 6.2 GW of floating offshore wind will be built by 2030
- Up to 19 GW could be built by 2030 if cost reduction accelerated

David Flin

The Global Wind Energy Council (GWEC) has launched the Floating Offshore Wind (FOW) Task Force to address barriers to growth in the sector and provide the best practices.

Members of the Task Force include: Equinor, GE Renewable Energy, Iberdrola, Ideol, the Japanese Wind Power Association, MHI Vestas, Ørsted, Principle Power, RenewableUK, Siemens Gamesa Renewable Energy, Shell, Stiesdal, wpd, and The World Bank Group. The Task Force will be chaired by Henrik Stiesdal, with Maf Smith, formerly Deputy CEO of RenewableUK as Vice-Chair.

Stiesdal commented: "To ensure the success of the industry and achieve the cost reduction needed to ramp up deployment of the technology, we need to see coordination amongst the leading market players and share our experiences in the different pioneer markets emerging globally."

Floating offshore wind can increase offshore wind resource ten-fold by opening up locations where fixed-bottom offshore wind is not possible. At the end of 2019, 65.7 MW of floating offshore wind capacity was installed globally, in the UK, Japan, Portugal, Norway, and France.

GWEC Market Intelligence predicts that, based on the current project pipeline, 6.2 GW of floating offshore wind will be built by 2030. However, it claimed that if cost reduction is accelerated, up to 19 GW would be possible in that time frame.

According to projections made by the Carbon Trust, up to 10.7 GW of floating wind capacity could be installed globally by 2030, and 70 GW by 2040.

Ben Backwell, CEO at GWEC, said: "To reach over 1400 GW of offshore wind capacity installed by 2050, it is vital to develop floating offshore wind capability to enable turbines to be deployed in deeper waters, unlocking up to ten times more offshore wind resource than is possible with fixed-bottom turbines alone."

In addition, the UK's Offshore Renewable Energy Catapult has launched a national Floating Offshore Wind Centre of Excellence (FOWCoE). Ten organisations have joined FOWCoE: Equinor, Shell, Total, EDF Renewables, EDP Renewables, ESB, Mainstream Renewable Power, ScottishPower Renewables, SSE Renewables, and Offshore Wind Power. FOWCoE said it will focus on four aspects of developing floating wind activity in the UK: technology development; supply chain and operations; development and consent; and delivering net zero. The goal is to cut the cost of energy from floating wind, speed up development of floating farms, and support innovations in manufacturing, installation, and O&M.

- MingYang Smart Energy is working to install the first floating wind turbine in China next year, off the coast of Yangjiang City in Guangdong Province. The turbine will have a capacity of 5.5 MW. This turbine will initially be deployed for demonstration purposes at the site of Yangxi Shapa III offshore wind farm, mounted on a semi-submersible floating foundation.

Boom in global orders for wind turbines

Nearly 14 GW of wind turbine capacity was ordered globally in the first quarter of 2020, according to recent analysis by Wood Mackenzie. This is the second-highest first quarter on record, valued at around $13.4 billion.

The research firm also noted that nine of the top 10 onshore wind turbine models sold during this period have been introduced within the past two years highlighting the rapid pace of development of wind turbine technology.

Luke Lewandowski, Research Director for Wood Mackenzie, said: "Onshore demand in Europe, primarily in Scandanavia, the UK, and Poland tempered weak order intake in the USA, India, and Australia." China was typically active, ordering more than 5 GW during the quarter.

Japan and Taiwan accounted for 33 per cent of Q1 global offshore wind turbine orders, with MHI Vestas winning all of this demand.

Overall, Vestas secured the most orders of all the wind turbine OEMs, winning 3.3 GW of order in Q1.

Wood Macknezie is also predicting a boom in the US offshore wind industry over the next decade. It predicts the sector might reach 25 GW by 2029, starting from a current position of near-zero.

Max Cohen, principal analyst with Wood Mackenzie, noted: "More than 9 GW of projects are already contracted or soon to be approved, and up to 6 GW more will be solicited through 2022."

However, beyond that, uncertainties make further predictions difficult. He added: "The US Federal Government's lease programme currently supports 20-30 GW, and areas supporting as much as 45 GW are under consideration."

Cohen also said optimistic scenarios would bring challenges, particularly with regard to integrating so much offshore wind into a constrained transmission grid. "The US offers an opportunity for experienced European players. With over 39 GW of thermal plants due to be retired, and state renewable power generation targets, opportunities exist for offshore wind."

Uzbekistan advances low carbon energy strategy

Uzbekistan's Ministry of Energy has secured support from the European Bank for Reconstruction and Development (EBRD) and international company Corporate Solutions in developing its National Low Carbon Development Strategy.

The news follows an announcement in May, that the country will receive assistance from the Asian Development Bank and the World Bank to develop a concept for electricity production for 2020-2030. This will involve modernising existing power plants and developing renewable energy sources and nuclear power plants, with the aim of reducing greenhouse gas emissions by 10 per cent by 2030, compared to 2010.

Special attention will be paid to the development of renewable energy sources. The country plans to develop 3 GW of wind power plants, 5 GW of solar power plants, and 2.4 GW of nuclear power plants by 2030.

As part of this plan, the UAE-based Masdar Clean Energy said it will build a 500 MW wind farm after it signed a PPA with JSC National Electric Grid of Uzbekistan in June.

Masdar will design, finance, build, and operate the plant in the Navoiy region in southwest Uzbekistan, which will involve direct foreign investment of $600 million. Construction of the wind plant will be carried out in phases, and work will start by the end of 2020. The first phase of 250 MW is scheduled by mid-2022, with full output in 2024.

Masdar will also install a 100 MW solar power plant, for which it tendered the lowest tariff of 2.679 ¢/kWh. This will also be located in the Navoiy region.

- The Ministry of Energy has signed an agreement with the Turkish company Aksa Energy for construction of a 240 MW combined cycle gas turbine in Tashkent. Aksa Energy will operate the plant and sell electricity to Uzbekistan for 25 years. Construction will begin when the site has been selected. Commissioning of the plant is scheduled to be within 12 months of the start of construction.

Utility transformations take shape

- E.On and RWE complete asset swap
- Iberdrola plans record investment

By David Flin

Reorganisation plans by utilities are moving forward, as several of Europe's energy giants marked significant milestones in adapting to the changing energy landscape.

On July 1st, RWE and E.On announced that the asset swap – the final step in one of the largest transactions in Germany – has been completed, with RWE taking over E.On's innogy activities.

The transaction means that the wind, solar, and hydropower businesses as well as the biomass, biogas, and gas storage activities have been transferred to RWE. Another asset that has been transferred is innogy's stake in the Austrian power utility Kelag, with its hydropower assets.

This completes a process that began back in March 2018, when RWE and E.On agreed that E.On would take over RWE's 76.8 per cent stake in innogy, while RWE obtained all E.On's major renewable energy activities and innogy's renewable energy business, as well as a 16.7 per cent stake in E.On.

Rolf Martin Schmitz, CEO of RWE, said: "The new RWE has been completed. It is a new, bigger, and more diverse company, with a clear goal. We will be carbon neutral by 2040. We have an outstanding position, with a strong renewables business which is channelling its energy towards growing internationally. We have a fleet of flexible and conventional power stations to build a reliable bridge to the new energy era. And with energy trading operations with the expertise to seize opportunities on global energy markets."

In order to complete the deal in the context of antitrust approval of E.On's takeover of innogy, E.On also agreed to sell innogy's entire electricity and gas retail business in the Czech Republic to MVM Group for an undisclosed sum. The transaction is scheduled to close by the end of the year.

Johannes Teyssen, E.On's CEO, said: "Our goal is a swift and direct integration of innogy into E.On. The completion of the take-over of innogy is the decisive step in the realignment of our company. We will soon be able to focus systematically on our core businesses – intelligent power distribution networks and customer solutions. E.On, together with its customers and partners, will make a significant contribution to climate protection in Europe."

In June, Italian energy giant Enel SpA said it is accelerating its plans to decarbonise its global power production, exit coal and make way for more wind, solar and a hydrogen venture, which could come to life in 2021 at the latest.

Speaking with journalists at a press briefing, Antonio Cammisecra, Enel's head of global power generation and CEO of Enel Green Power, highlighted that if he could close the company's coal fired plants tomorrow, he would, leaving no doubt as to the company's resolve to head into the renewables direction.

Meanwhile in early July Iberdrola announced plans to invest at record levels, calling the crisis recovery as a once-in-a generation opportunity for the energy sector to transform itself.

The Spanish energy giant is carrying out €10 billion of investment in 2020 – a level it plans to maintain after this year.

Ignacio Galán, Chairman and Chief Executive, told the *Financial Times*: "Over the past years, we have been investing an average of around €5 billion, €6 billion; this year we are going to invest €10 billion… in more renewables and accelerating the construction of networks.

"It will not be very different in the coming years… we will be at these levels."

Iberdrola's focus on renewables has helped it become Spain's second-largest listed company, with a market capitalisation of about €66 billion. It is Europe's second-biggest energy utility, behind Italy's Enel.

The group has boosted annual investment by more than 50 per cent over the past two years from €6.2 billion in 2018.

Iberdrola is also active in the UK, where it owns Scottish Power, now a 100 per cent wind energy company; the US, where its Avangrid unit is the third largest wind operator; Brazil; and Mexico.

Key investments this year and next are a joint venture in a $2.8 billion US offshore wind farm, a €1.5 billion hydro energy storage project in Portugal and a €300 million solar energy development in Spain.

Galán told the *FT* that the company practised "greenfield M&A" – buying smaller groups and then building up infrastructure around them, as it has done in the US in recent years.

Siemens eyes more renewables and storage investment

Following the recent formation of Siemens Energy, the company's new CEO says investments in renewables are set to increase.

As it prepares to spin-off from the German industrial conglomerate on September 28, Siemens Energy says it plans derive more value from its wind business, Siemens Gamesa, which is being merged with its power and gas unit. Markus Tacke stepped down as CEO of Siemens Gamesa Renewable Energy in June.

Christian Bruch, who was appointed Chief Executive of Siemens Energy on May 1, recently told *The National*: "We are going invest some more money into sustainable technologies and more to further efficiency improvements. But, definitely, I expect our portfolio over the next 10 years to develop to a more sustainable base and to raise the share of renewables and sustainable technology to bigger than it is today,"

The massive development in variable output renewables will also see Siemens Energy put more focus on energy storage.

In late June Siemens Energy launched the 'Future of Storage' initiative to share knowledge and build a network of technology partners to offer energy storage solutions tailored to the needs of operators. The initiative will bring together a team of experts from all energy storage technologies, including batteries, thermal, and thermo-mechanical energy storage systems.

Jörn Schmücker, CEO Large Rotating Equipment at Siemens Energy, said: "Energy storage is the key to a decarbonised world. This initiative will enable us to offer our customers the exact solutions that fit their needs, solutions that will also improve efficiency and thus profitability of their plants."

Anette Ossege-Schaffrath, heading the team at Siemens Energy, said: "This gives us access to a broad portfolio of storage technologies. We need to have the necessary expertise and develop suitable business models. With Future of Storage, we are creating an important prerequisite for achieving these goals."

The company also entered into a long-term partnership with EnergyNest of Norway, which supplies thermal energy storage systems. The partnership will offer modularised and standardised thermal energy storage systems for industrial customers. EnergyNest has developed a heat battery capable of discharging renewable steam when required, increasing plant flexibility.

There have been a number of recent orders for energy storage technology, indicating the potential of this market. These include orders to Fluence, the energy storage specialist formed by Siemens AG, and AES Corp.

In June Fluence secured orders with a total capacity of 800 MW/2300 MWh for its new energy storage stack. Customers for the technology include: Enel, LS Power, sPower, and Siemens. Fluence said that it also had customers who have committed to its technology in the Asia-Pacific, North America, and Europe.

Enercon looks to international markets

German wind turbine manufacturer Enercon has decided to refocus its operations after the collapse of its home onshore wind market.

The company recently obtained long-term debt to support its operational turnaround plan that will give priority to international wind markets rather than the domestic sector. While the development, sales and services of onshore wind turbines will remain its core business area, the company will still own power generation assets and produce and market electricity.

These activities, however, will be transferred to a new company that will potentially be an entity formed together with German utility EWE AG. A letter of intent (LoI) for a joint venture (JV) is already in place.

"The agreement gives us the planning security we need to successfully implement the operational turnaround," said Chief Financial Officer Thomas Cobet. He added that the deal is also expected to normalise Enercon's relationship with its suppliers and stabilise project financing.

Oil and gas majors move to cut emissions

With the expectation that the pandemic will accelerate the pace of transition to a lower carbon economy and energy system, oil and gas companies are implementing a range of measures to cut carbon intensity.

In a move to drive those efforts, in July the Oil and Gas Climate Initiative (OGCI) announced a target to reduce the collective average carbon intensity of member companies' aggregated upstream oil and gas operations to between 20 and 21 kg CO2e/boe by 2025, from a collective baseline of 23 kg CO_2e/boe in 2017.

The range is consistent with the reduction needed across the oil and gas industry by 2025 to support the Paris Agreement goals. The target represents a reduction of between 36 and 52 million tonnes of CO_2e per year by 2025 (assuming constant levels of marketed oil and gas production).

The target covers both carbon dioxide and methane emissions from OGCI member companies' operated upstream oil and gas exploration and production activities, as well as emissions from associated imports of electricity and steam.

To contribute to the reduction of their collective average carbon intensity, OGCI member companies are implementing a range of measures in their own operations, including improving energy efficiency, reducing methane emissions, minimising flaring, electrifying operations using renewable electricity where possible, co-generating electricity and useful heat and deploying carbon capture, utilisation and storage.

Tenders, Bids & Contracts

Americas

GE to build substation for Brazilian PV plant

GE's Grid Solutions unit has signed a contract to supply a 500 kV turnkey substation for the 415 MW Sol do Setao solar PV complex in Brazil. The EPC contract also covers installation of two 300 MVA power transformers as well as its grid automation and telecommunications system.

Work on the contract is scheduled for completion in Q1 2021, and the solar power complex is due to begin commercial operations in the second half of 2021.

Copel wind farm orders Nordex units

Germany's Nordex has received an order to supply wind turbines for the 90 MW Jandaira Copel wind project in Brazil. The contract covers supply of 26 Nordex AW132/3465 turbines and 20 years of servicing.

The wind farm will be constructed near Jandaira, in the state of Rio Grande do Norte, in eastern Brazil.

Vestas wins 429 MW of wind turbine orders

Vestas Wind Systems has won contracts for projects in North America for a total of 429 MW.

It received a 151 MW order from Canadian IPP Capital Power Corp for wind farm expansion projects in Alberta, the 97 MW Whitla Wind 2 and the 54 MW Whitla Wind 3 projects. These will use V136-3.45 MW turbines in a 3.6 MW power optimised model. The contract with Capital Power includes supply and commissioning of the turbine fleet and a ten-year service agreement. Deliveries and commissioning are planned for 2021.

Vestas has also won a contract for 278 MW of turbines in the US for a customer whose name has not been disclosed. Vestas will supply and commission V150-4.2 MW machines and provide a ten-year Active Output Management 5000 service. Turbine delivery is due to start in Q2 of 2021, with commissioning scheduled in Q4 of 2021.

Asia-Pacific

India awards 420 MW solar contract to Enel

Italian energy group Enel has won a 25-year energy supply contract for a 420 MW DC solar farm in India. The PV project was awarded to EGP India by government company Solar Energy Corporation of India (SECI) under the 2GW Ninth Tranche of the national solar tender. This project is Enel's first solar power plant in India, and it expects to invest $180 million into the project.

The project will be located in Rajasthan state. Plant operation is scheduled to start by the end of 2021.

Valmet to supply biomass fuel feeding system

Valmet has won a contract to supply a biomass fuel feeding system for one of the CFB boilers owned and operated by Cikarang Listrindo at its Babelan Power Station, Indonesia. The investment is part of Kikarang Listrindo's initiative for greener energy production. Commissioning of the complete biofuel feeding system is scheduled by the end of 2020.

The modification of the CFB Unit 1 is part of Cikarang Listrindo's renewable energy development programme. It will modify the CFB boiler so that it can replace 20 per cent of the coal by biofuels. Palm kernel shell will be initially used as biofuel, with other options being considered later.

Valmet's scope of delivery includes engineering, supply, and erection of the new biomass fuel feeding system for the CFB Unit 1.

Europe

Seagreen orders MHI Vestas turbines

MHI Vestas Offshore Wind has won an order to deliver wind turbines for the Seagreen offshore wind farm in Scotland. The order comprises 114 V164-10.0 MW turbines delivered in different load optimised modes to adapt to grid requirements.

Linxon is supporting Petrofac to deliver the turnkey onshore substation and supply, install and commission the HVAC equipment for the offshore substation.

HVDC link for 1.4 GW Sofia offshore wind farm

A consortium of GE's Grid Solutions and Sembcorp Marine has won a contract from RWE Renewables, the UK subsidiary of RWE, to install two HVDC converter stations for the 1.4 GW Sofia wind power plant off Dogger Bank in the North Sea, 195 km from the nearest point of the UK coast.

As consortium leader, GE's Grid Solutions will be responsible for the EPC and installation of two HVDC converter stations capable of transmitting 1400 MW of power at 320 kV. The consortium will design, manufacture, and install the HVDC offshore and onshore converter platforms, along with related equipment, in addition to commissioning and maintenance work. The offshore converter station will be built and installed by Sembcorp Marine.

Onshore construction of the wind farm is expected to start in early 2021, to be followed by offshore construction in 2023. More than 50 per cent of the components will be manufactured in local facilities.

HVDC link to connect Crete and Greece

A consortium led by Siemens Energy has won a turnkey contract for two converter stations for a HVDC link connecting Crete with mainland Greece. The project will enable an exchange of 1000 MW. The customer is Ariadne Interconnection, a wholly-owned entity of the Greek independent power transmission operator IPTO. Commissioning of the interconnector is scheduled for mid-2023. The value of the contract is €370 million.

The EPC turnkey contract comprises design, supply, and installation of a 1000 MW converter system at a DC voltage of ±500 kV, a GIS substation on Crete with 10-year service contracts for the GIS and control and protection systems of both HVDC stations. The two converter stations – one located near Athens and the other near Damasta in the north of Crete – will be linked by a 330 km DC power cable.

Nordex wins 312 MW Spanish wind farm order

The Nordex Group has won an order to supply and install 65 N149/4.0-4.5 wind turbines in the 4.8 MW operating mode for the 312 Gecama wind farm. The customer is Enlight Renewable Energy, an Israeli power utility. Gecama is Enlight's first project in Spain, and its first joint project with the Nordex Group. The order also includes a 20-year service contract.

The Gecama wind farm will be located near Cuenca in the Castilla-La Mancha region.

Nordex will install Delta 4000 turbines with a hub height of 120 m. The concrete towers will be produced at the company's factory in Motilla del Palancar in Castilla-La Mancha, which is scheduled to start operation in August 2020.

Hanwha Energy secures 50 MW solar deal

Hanwha Energy has won a contract with the Spanish firm GRS to build a 50 MW solar power plant in Spain. The plant is scheduled to be completed by the end of this year.

The Las Naranjillas plant will be equipped with 121 800 solar modules, and will reduce emissions of CO_2 by 52 000 tonnes per year.

According to Spain's National Energy and Climate Plan (PNIEC), the country will construct a total of 39 GW of solar power plants by 2030.

Hollandse Kust Zuid to use Siemens turbines

Siemens Gamesa has won a €5 billion contract to supply and install 110 wind turbines for Vattenfall at a 1.5 GW offshore wind farm.

The Hollandse Kust Zuid offshore wind farm (HKZ 1&2 and HKZ 3&4) will be located off the Dutch coast and have a total installed capacity of 1.5 GW.

The order includes the supply, delivery, and installation of 140 SG 11.0-200 DD offshore wind turbines. These will be installed in 2022, and the project is scheduled to be fully operational by 2023.

SuedLink Corridor opts for Prysmian cables

Prysmian Group has been awarded contracts for the SuedLink Corridor in Germany by the German transmission grid operators TransnetBW and TenneT. Under the contracts, worth over €800 million, Pysmian will design, manufacture, lay, joint, test, and commission a 2 GW underground cable system from North to South Germany.

Prysmian will deliver a complete ±525 kV HVDC underground cable system able to transmit 2 GW. The route, with a length of around 700 km, will run from Wilster in Schleswig-Holstein to the southern connection point at Bergrheinfeld in Bavaria. Project completion is scheduled for 2026.

Enka to build power plant in Tatarstan

Turkish energy and construction company Enka has signed an agreement with JSC Tatenergo of Russia for the turnkey construction of a 858 MW combined cycle power plant worth $360 million in Tatarstan, Russia. Enka said that the project will be in a 1x1 configuration, equipped with GE's 9HA.02 gas turbine.

Enka said that when complete, the plant will achieve an output of 858 MW at 64.7 per cent efficiency, and that it "would be the most efficient power plant of the Russian Federation". The project in Zainsk, Tatarstan, is scheduled to be operational by the end of November 2023.

SNC-Lavalin to inspect Cernavoda

SNC-Lavalin's wholly-owned subsidiary Candu Energy was awarded two contracts by Societatea Nationala Nuclearelectrica (SNN) for fuel channel and feeder assembly inspections on the Romanian Cernavoda Unit 1 reactor during the 2020 outage.

International

Fluence secures global energy storage orders

Fluence, an energy storage specialist company formed by Siemens and AES, has announced that it has secured orders with a total capacity of 800 MW/2300 MWh for its new energy storage technology stack.

Customers include Enel of Italy, US investment, development, and operating company LS Power, US wind and solar developer sPower, and Siemens. In additon, power suppliers and industrial customers have committed to using the technology in the Asia-Pacific, North America, and Europe.

Schneider Electric to optimise Egyptian grid

Schneider Electric has signed an agreement with Egyptian Electricity Holding Company, Egypt's national utility provider, to build four control centres to monitor and optimise the electricity network. The contract is worth $290 million.

The four control centres will use Schneider Electric's Advanced Distribution Management System to monitor and control the network through the use of big data and artificial intelligence.

The agreement also includes over 12 000 smart ring main units that will be installed throughout the national network.

The project has a timeline of 18 months and will help create a country-wide smart grid. Much of the equipment that will be used for the project will be manufactured in Egypt.

Egypt's government is looking to significantly increase energy output from renewable sources, to 20 per cent of total supply by 2022, and 42 per cent by 2035.

The project will help to improve energy availability by detecting network faults as soon as they occur, then reconfiguring the network to ensure stability.

Schneider Electric will also upgrade 1000 distribution points and substations to enable them to be connected to the smart grid.

Doosan wins contract for CCGT in UAE

Doosan Heavy Industries & Construction has won a contract to supply key components for the Fujairah combined cycle gas turbine (CCGT) power plant in the United Arab Emirates. The contract is valued at Won70 bilion ($60 million).

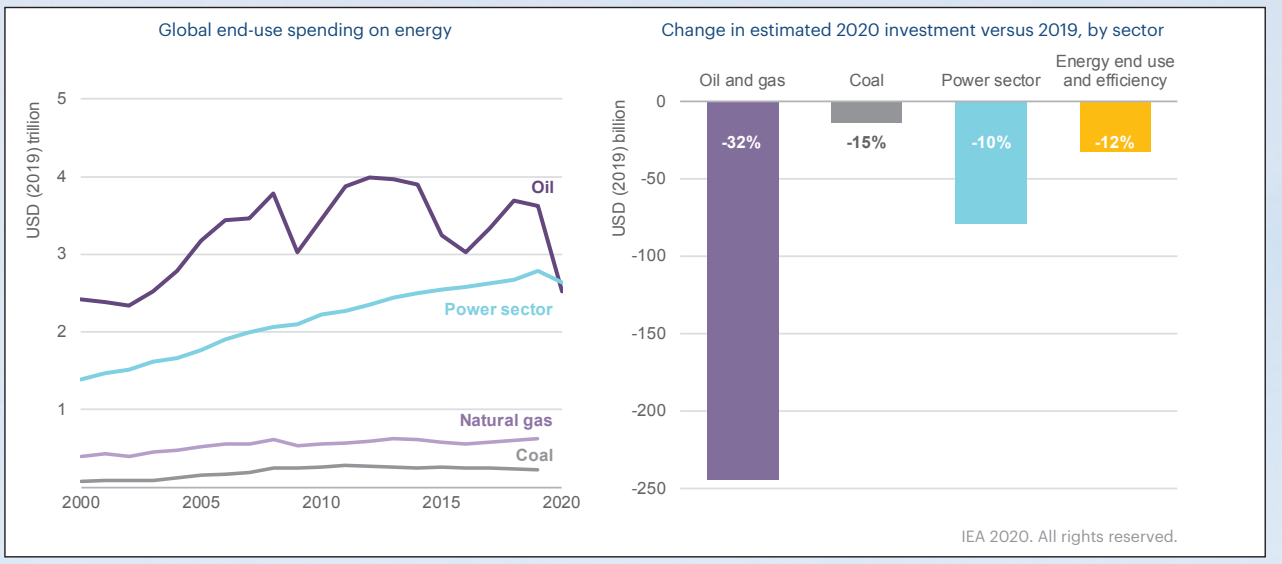
Doosan will supply one 270 MW steam turbine and a 540 MW generator. Samsung C&T is the EPC contractor for the 2400 MW power palnt, which is located in the emirate of Fujairah, around 300 km northeast of Abu Dhabi.

Linxon wins $80 million substation contract in Iraq

Linxon has won a $80 million contract from the Ministry of Electricity in Iraq to deliver four turnkey 132/33kV GIS substations. The contract forms part of the Electricity Sector Reconstruction Project (Phase 2) financed by Japan International Cooperation Agency (JICA).

The order includes all equipment (switchgear, transformers, control & protection, communications) as well as design, civil construction works, installation, and commissioning. Work will start immediately and is scheduled to last for 18 months.

Investment activity has been disrupted by lockdowns but also by a sharp fall in revenues, especially for oil



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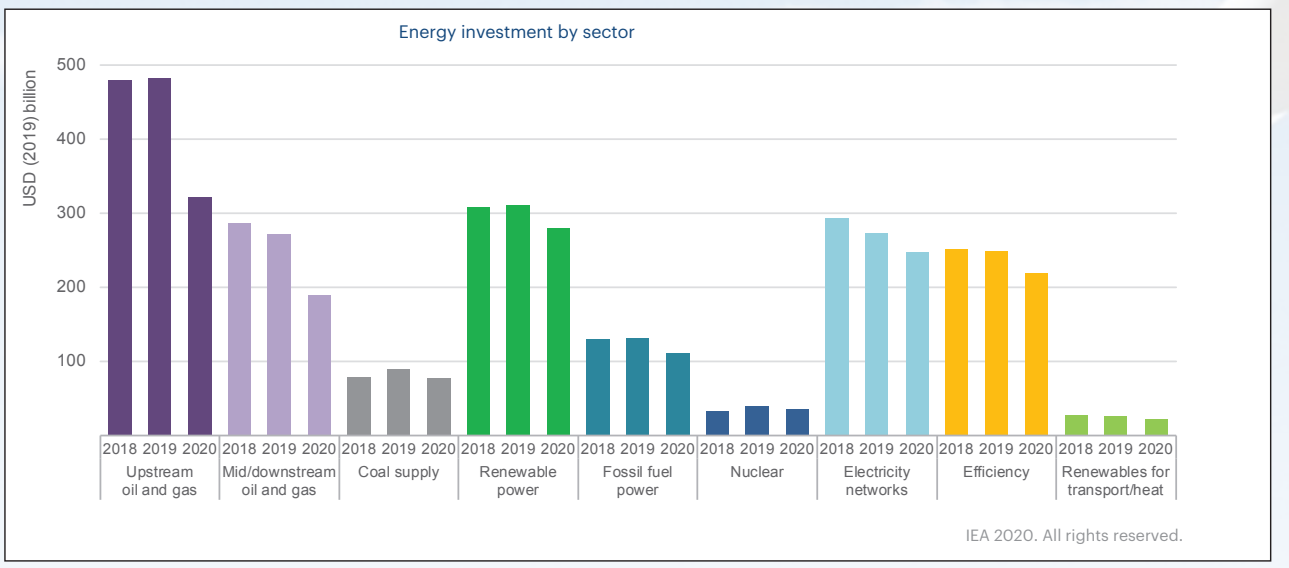
Fuel supply investments have been hit hardest in 2020 while utility-scale renewable power has been more resilient, but this crisis has touched every part of the energy sector



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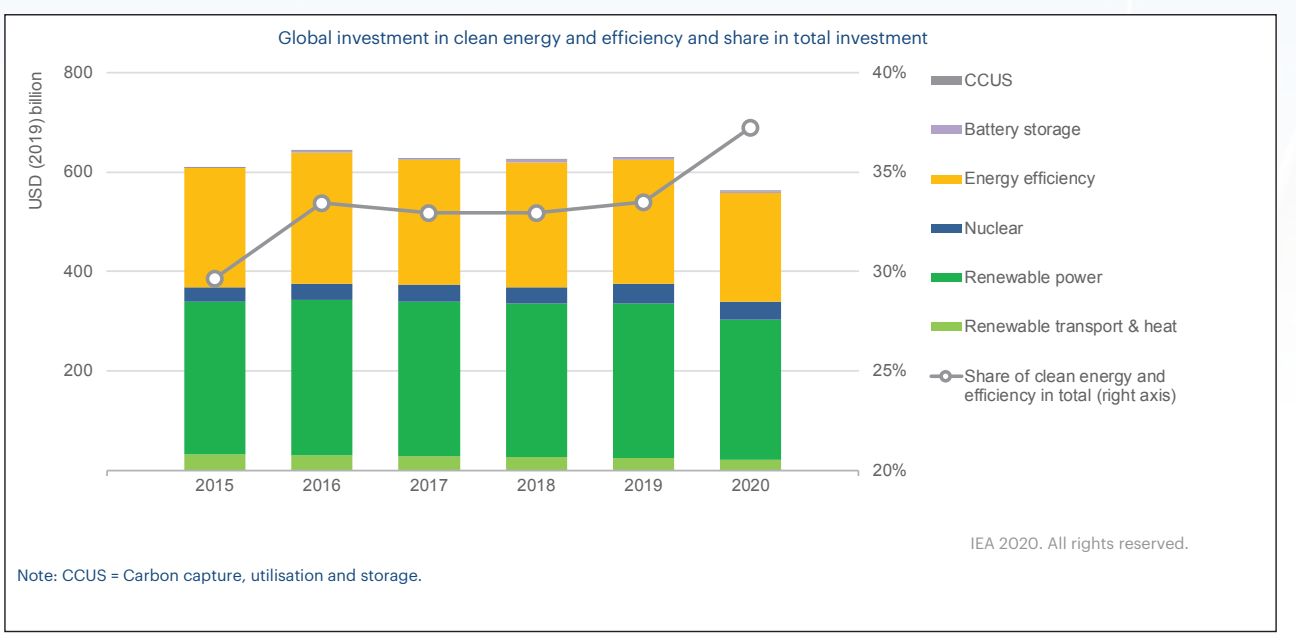
Clean energy investment has been relatively resilient in the downturn, but a flat trend of spending since 2015 is far from enough to bring a lasting reduction in emissions



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Hydrogen

Hydrogen set to make steady inroad as fuel for new energy age

- Plans for 6 GW of electrolysers by 2024
- Support for 'blue hydrogen' during transition phase

Gary Lakes

They say that opportunities arise out of crises, and the old adage will likely be put to the test during the course of the coronavirus and the collapse of oil prices. Advocates for green energy and lower carbon emissions are making a strong argument for the promotion of hydrogen as a viable green fuel that could help the world to battle climate change – the crisis that will continue to plague us whether Covid-19 ever goes away or if oil and gas prices ever recover.

Since the current circumstances came into being and the skies of cities heavily polluted by fossil fuels began to clear, a keener than usual interest has been given to the development and use of renewable energies, particularly hydrogen. Governments are launching programmes into hydrogen research and investors are creating funds designed to get the new fuel to a commercial level. While it has its complications, hydrogen is being viewed as a realistic alternative to fossil fuels even if prices do recover.

It appears that hydrogen is an idea whose time has come, although the oil and gas industry will surely not be pleased to lose its grip on the established order as popular pressure grows to address climate change issues, and governments take steps towards reversing greenhouse gas emission trends.

Oil and gas producers big and small have delayed projects as demand has dropped and revenues have fallen, according to numerous media reports. Ratings agency Moody's has speculated about demand return, suggesting it will not reach 2019 levels until 2025, if ever.

BP, for one, has taken the situation serious enough to greatly reduce the value of its oil and gas assets. Investors are now reported to be keen to move into renewables, seeing that installed capacity is growing and bringing social improvements with it.

As Shaikh Ahmed Zaki Yamani once said: "The Stone Age didn't end because Man ran out of rocks."

With growing investment in solar, wind and hydrogen, the fossil fuel age could end before 2050. But it will take effort. There will continue to be demand for hydrocarbons, in the petrochemical industry in particular. The big change will come when transport and power generation shift to hydrogen.

Most hydrogen produced today is made by using natural gas in a steam methane reformer and actually produces more carbon than burning natural gas directly. Producing hydrogen in this way produces 'blue hydrogen'. The alternative for producing 'green hydrogen' is to produce hydrogen from water, and once the hydrogen interacts with oxygen and is burned or used in a fuel cell, it turns back into water. But the amount of carbon produced in the making of hydrogen will depend on the source of electricity.

It takes more energy to split a water molecule than the hydrogen itself produces, but this problem can be addressed with the excess production of electricity through solar or wind generation. As more electricity is created by sun and wind, producing 'green hydrogen' becomes more economic. Once renewable electricity becomes cheap, hydrogen produced by electrolysis will become a practical fuel and essential for decarbonising industry and transport.

Yet as hydrogen is introduced to power generation it will likely be mixed with natural gas, an argument that the oil and gas industry supports.

The European Union in early July decided to set an ambitious target of having 40 GW of electrolysers for the production of 'green hydrogen' installed within its borders by 2030 and another 40 GW set up in nearby countries that can export to the EU.

The EU said it would support 'blue hydrogen' during a transition phase, but the group clearly sees 'green hydrogen' as key to meeting the 2050 net-zero carbon economy.

To produce 'blue hydrogen' as expected by the EU, producers will have to employ carbon capture and storage (CCS) and the contest between the two may show that 'blue hydrogen' will not be able to keep costs down considering the CCS investments needed. Furthermore, it may take the companies backing 'blue hydrogen' until the end of the 2020s to have the infrastructure in place that will allow it to compete with 'green hydrogen'.

Currently, the EU has some 250 MW of 'green hydrogen' installed. Under its coronavirus economic recovery plan, it aims to have, 6 GW of electrolysers in place by 2024 and 40 GW by 2030. Advocates for 'green hydrogen' argue that by 2024 alone production costs will be much lower than required to hydrogen produced from natural gas.

Gas

No easy route for Iraq in quest for own electricity supply

Under pressure to end electricity imports, Iran is looking to develop its gas reserves and end flaring to provide a fuel source for the power sector but the task will not be easy.

David Gregory

Pressed by Washington to end its dependence on gas and electricity imports from Iran, Iraq says it is preparing to take solid steps towards developing its massive natural gas reserves and expand its own power generation capacity.

To this end, Iraq intends to end the expensive and wasteful practice of flaring the gas associated with crude oil production, but the task will not be easy. Very little has been accomplished on this road so far, and the financial crisis that the country faces only complicates the situation.

Iraq stated earlier this summer that it intends to develop for power generation some 1.2 billion cubic feet per day (bcfd) of gas out of the 2.7 bcfd that it normally flares. It also plans to develop the non-associated gas fields of Mansouriyah and Akkas, which together have a production potential of 700 million cfd.

Billions of dollars of investment will be required in a part of the world that remains highly volatile.

Iraq is not only one of the world's main oil producing countries, but it is also one of the world's main gas flaring countries because of it.

Iraq burned 16 bcm in 2019, more than many countries use for annual power generation. That volume of gas could earn Iraq a healthy income and save millions of dollars for domestic generation.

The practice of flaring also generates large volumes of carbon but Baghdad has promised to end flaring by 2030, in line with global targets. It will have to push to attain that goal.

But work in that direction is already under way. A GE executive said during a recent virtual conference on Iraq that his company was prepared to discuss with the Iraqi authorities capturing flared gas and channelling it to power generation.

Joe Anis, CEO of MENA and South Asia for GE Gas Power, told the online gathering that 30-40 per cent of the gas that is currently flared could generate 3.3 GW of electricity. Citing it as a "huge opportunity," Anis said captured flared gas could ensure additional power generation with a resource that is readily available.

He added that GE is also interested in any renewable energy projects undertaken by Iraq. The Iraqi government in mid-June announced that it would restart a tender for a 755 MW solar project.

GE is already working in Iraq to increase power supply to the towns of Samawah and Nasiriyah. Production at the stations in those cities is expected to reach 750 MW each. Both stations are being powered by natural gas.

In June, the Iraqi Ministry of Electricity signed a contract with Siemens Energy for the Hamudhia substation in northern Baghdad. The station will provide power to the cities of Ramadi, Fallujah, Saqlawyah, Khalediyah and other areas of Al Anbar province.

The project is a turnkey 400 kV substation that will provide greater grid connectivity and will allow for a higher utilisation of the Al Anbar power plant's generation power and support demand growth of 10 per cent annually.

Iraq's natural gas reserves are around 135 tcf, about 75 per cent of which is associated gas, and the more crude it produces the more gas it flares. An additional downside comes from the fact that Iraq is burning crude oil and diesel to generate electricity and push it through infrastructure that is inadequate to cope with demand.

Baghdad has also turned to Saudi Arabia, seeking financial investment for the development of one of its gas projects.

In the mid- to long-term Iraqi-Saudi development of Iraq gas resources could be to the benefit of both countries. Saudi Arabia burns millions of barrels of crude oil every summer in order to keep up with electricity demand.

Earlier this summer Iraq's Electricity Ministry said it would add 635 MW to its current 16.77 GW of generation capacity by September. Baghdad has also finished negotiations to link up with the Gulf Cooperation Council (GCC) electricity. It was due to import 500 MW in May from the GCC grid, but Iraq's poor economy has caused a delay.

In the meantime, Iraq continues to rely on electricity supplies from Iran. It signed a two-year supply agreement with Tehran in early June. The country imports from 7 GW from Iran, plus gas imports.

Despite continuing US pressure for Iraq to distance itself from Iranian energy, Washington extended its sanctions waiver for Iraq in early May by 120 days in order to provide support to the government of new Iraqi Prime Minister Mustafa al-Kadhimi.

The carbon clock is ticking

Time is running out for accelerating cuts in carbon emissions. Ambitious action is needed from the energy sector and governments in Germany, the UK and elsewhere to create a hydrogen economy, says **Andreas Schierenbeck**

We are living through uncertain times. Across Europe and the rest of the world, the pandemic continues to hold back normal life and we are now set the test of trying to kickstart economonies again. However, as we deal with Covid-19 and work together towards a more positive future, we must continue to focus on evolving the energy industry to reduce carbon emissions.

The current crisis has highlighted just how interconnected we are and how the solutions to our biggest challenges demand a connected effort. Health systems, businesses, the travel industry, governments and their citizens will all need to work together to coordinate an effective response.

The energy industry is no exception. Energy generators are doing all they can to ensure safe conditions for power station workers so that they can keep the lights on for all of us. Our sector's work and the people that carry it out are more important than ever – after all, the energy system is a vital public utility that everyone relies on.

At the same time, it is vital that we do not allow this crisis to halt the progress we have already made towards decarbonisation but accelerate it even further. The wave of climate awareness over the past couple of years was needed and it has pushed decarbonisation to the top of the political and societal agendas – with potential to unify sentiment across Europe.

Over the past few years, the energy sector has reduced CO_2 emissions faster than the transportation, steel, chemical or cement industries. This is a great achievement but limiting the rise in global temperatures to well below 2°C is an urgent priority and we need to find ways to make quicker inroads to reduce carbon emission levels.

So far, governments' main response to this challenge has been to subsidise green energy sources, like wind and solar, and penalise grey ones. Renewables now provide about 19 per cent of Europe's energy, 14 per cent of North America's and 14 per cent of China's. These percentages are expected to keep growing steadily, but given its intermittency, having renewables provide 100 per cent of these markets' energy is not possible.

But despite these achievements, global carbon emissions keep rising and show no sign of abating. This is partly because energy demand continues to rise – as much as 23 per cent ahead of 2040 – and much of this demand, particularly in Asia, is being met with coal. In the current Covid-19 crisis, it is indeed true we have seen an unprecedented drop in global energy demand. This is one of the factors behind the UK going without coal fired power generation for the longest period since the Industrial Revolution in April. However, this is only a temporary dip and demand will quickly resume its escalating trendline after lockdowns lift across Europe and the rest of the world.

It's also true that many growing business sectors – transport and chemicals, for example – still rely predominantly on fossil fuels and do not have any viable alternatives at present. As these sectors grow, so will their carbon emissions, with transport alone project to grow 434 per cent ahead by 2040.

The addition of wind and solar farms steadily increases the supply of clean electricity in the energy mix, but the global energy demand and the fossil fuel reliance of many growing economic sectors are making humans' climate impact progressively worse, not better. The reality is that the increasing role of renewables in the energy mix will never be big enough on its own to counteract these two prevailing factors. As a planet, we are repeatedly taking one step forward and two steps back.

In the face of ever-increasing energy demand, producing more energy while achieving the meaningful emission reductions that the world needs will require pragmatism and a willingness to promote evolution.

Moving from coal fired generation to gas is the fastest way to decarbonise the energy industry, while at the same time rapidly reducing emissions in heavy industry, space heating and transport. Converting these and other sectors to clean burning natural gas is the quickest and most cost-effective option for Europe to reduce its carbon emissions by up to 65 per cent.

Gas fired power plants emit just 350g of carbon per kWh compared to more than 500g for coal in modern plants. As the cleanest fossil fuel, gas has a unique ability to deliver deep and rapid emissions reductions across many sectors. This will help make a real and vital difference in the immediate term when it comes to making the strides, we all want to see on decarbonisation.

The benefit of this approach is that it can be carried out quickly while making the most of the existing energy infrastructure. Lignite and hard coal fired power plants, refineries, large chemical plants and steelworks can, with the right remodeling, be repurposed to support generation from gas. In this way, these reliable assets can have their life extended, while also playing a vital role in the energy transition.

Gas' most important role, though, will be to act as a vital emissions-reducing tool today while transformative technologies like synthetic fuels are developed and scaled up. Decarbonising gas to produce blue hydrogen in addition to displacing fossil fuels with green hydrogen produced by renewables-powered electrolysis equipment – otherwise known as power-to-gas (P2G) – should be at the centre of the energy sector's innovation efforts.

Hydrogen from natural gas and P2G would make it possible to avoid 90 per cent of the greenhouse gases emitted by conventional fuels. Both blue and green hydrogen can be used in fuel cells to power various forms of transportation and – thanks to fuel cells only emitting water – make them dramatically climate friendlier.

When combined with captured CO_2, hydrogen can produce climate-neutral chemicals and fuels like synthetic diesel and synthetic aircraft fuel. Introducing the use of climate-friendly gas, therefore, will be a major step towards energy system transformation.

But no company can change things alone. The transformation the world needs can only come from a collective effort, with various stakeholders working as one, pooling expertise and breaking out of sector silos. This means as an industry we can take important decisions together and find solutions that meet the world's growing energy needs while safeguarding the planet for future generations.

For instance, scaling up processes like P2G and synthetic fuel development will require coordinated action from the energy sector, industry, transport, policymakers, governments and NGOs – as well as trillions of euros of investment. The situation demands policy and regulatory changes with real vision.

At their outset, the likes of blue and green hydrogen will not be economically competitive compared to other more polluting fuels, and renewables can't do it alone. Let's not fool ourselves here. Solar and wind will never cover 100 per cent of our energy needs in a stable manner. In reality, it will barely exceed 60 per cent. The net-zero emissions energy mix of the future will be based on renewables and hydrogen, in addition to hydro and nuclear. And there will also still be a place for fossil fuels.

To achieve this more environmentally friendly energy sector, we need to see more ambitious plans from governments in Germany, the UK and elsewhere on the creation of a hydrogen economy.

Beyond top-down policy changes, companies serving different aspects of the energy industry should look for synergies between their businesses and ways they can collaborate to catalyse decarbonisation. This was the approach behind the cooperation agreement Uniper signed with Siemens Energy, which commits both companies to decarbonising coal fired power plants – as part of Uniper's mission to close or convert its coal fired power plants in Europe by 2025 – while also looking to the future and investing in green hydrogen projects.

Energy companies can also have a huge role to play in helping other industries lower their emissions, by identifying companies that need CO_2 for their production processes and partnering to develop carbon recycling businesses. Carbon recycling involves transforming CO_2 into a valuable green resource. It could permanently bind large amounts of CO_2 in building materials and other products, preventing it from entering the earth's atmosphere. In this way, we could create a global carbon recycling industry – much like we already have for plastic, glass and other waste.

For a long time, the energy sector has simply been seen as perpetuating climate change, but in recent years tangible steps and innovations with real promise are being developed on the road to successful decarbonisation. We cannot let the current situation with Covid-19 temper the positive pace of change that we have seen or for those within the industry to retrench and focus on maintaining business continuity. We must continue to look to the future and find ways that we work together to make significant and growing reductions to carbon emissions.

Andreas Schierenbeck is CEO of Uniper SE, an international energy company headquartered in Düsseldorf, Germany.

Schierenbeck: scaling up processes like P2G and synthetic fuel development will require coordinated action

Why we need a monumental green investment now

Protecting the climate, investing in future-proof technologies and driving digitalisation are urgently necessary and profitable. Yet designing green stimulus plans is hard and complicated and requires a monumental effort from many parties

Christian Chudoba

Distributed and digitalised energy will power the world. The sooner we get there, the better for the environment, societies and economies. The technologies to create this new energy world exist, though the speed at which we adopt and scale them depends largely on government regulation and how post-Covid-19 stimulus packages are designed.

Stimulus spending that ignores the climate crisis is short-sighted and will hinder future growth. But designing green stimulus plans is hard and complicated. We can't just copy past efforts, such as after the Great Recession of 2007-09, which largely disregarded long-term climate goals. The economic boom that followed that crisis led to emissions of unprecedented levels. However, the extra time and effort it takes to develop plans with longevity will ultimately increase the monetary and environmental return on investment for years to come and make industries more resilient to future crises.

Any stimulus packages must consider the environmental impact of the industries they support. They should focus public investments and investment programmes on energy efficiency, green electricity, demand-side flexibility and climate-friendly mobility.

It's understandable that governments are struggling to figure out how to best support essential industries such as aviation and manufacturing, which are large polluters and rely heavily on fossil fuels. Simply not supporting them, as some groups are demanding, is neither economically viable nor socially tenable.

However, considering schemes such as the German Abwrackprämie of 2009 that paid consumers to scrap their cars and buy new, supposedly cleaner ones, is also not the way forward. That scheme simply ignored emissions produced during manufacturing. It's promising to see that the German post-Covid-19 stimulus programme includes €2.5 billion support for electric vehicle (EV) technology and charging infrastructure and that it has not adopted the Abwrackprämie again.

I hope that most governments will not support industries so that they can simply return to pre-pandemic levels and that any assistance will be tied to enforceable commitments to reshape and modernise operations.

Any stimulus plan, however ambitious in its green efforts, will only be fully effective if regulation keeps up. The German stimulus programme is a promising start. It now needs to follow up with rapid legislative and regulatory changes. Enthusiasm to invest in photovoltaic technologies was curbed by the 52 GW cap that was in place in Germany until June this year. It seems that everyone, from politics to industry, wanted to see it lifted. But despite repeated promises, no definite legislation was passed until time nearly ran out. Likewise, regulation regarding the distance between onshore wind and residential areas, plus offshore wind restrictions, was making it unnecessarily hard for renewables. These last-minute changes need to be replaced by a much quicker and forward-looking legislative process in the future.

To drive the energy transition forward, regulations and incentive schemes, such as flexible grid usage fees, need to be introduced to allow an efficient load management of the grid, enable the use of demand-side response capabilities and avoid the unnecessary and costly expansion of the electricity distribution system. As EVs will play an important role for load management and grid stabilisation, regulation needs to keep up with the progress of vehicle-to-grid technologies.

Europe and individual states need comprehensive green energy bills. Instead of amending the Renewable Energy Sources Act, that reflects past conditions and has become out of touch with progress, Germany should establish future-oriented laws. These need to reflect current energy market developments, where participation and the strong community aspects of green energy are promising both economically and environmentally.

Broadly, this means that subsidies should be replaced by incentives for sustainable business models. More specifically, we need a clear regulatory framework around renewable generation and self-consumption, ensuring the economical remuneration of exported surplus for instance. We need incentives for small-scale flexibility aggregation, mandatory market-wide regular settlement and an acceleration of digitalisation in all European countries.

At the same time, the European Green Deal must not be pared back. Doing so would send contradictory signals to business and investors and make them question their plans, even though the direction in which the energy world is moving is clear.

Worldwide lockdowns have led to what is likely to become the largest drop in energy demand in history according to the International Energy Agency. The only winner will be renewable energy sources (RES). Compounded by the ongoing shift towards RES, this is leading to fossil fuel consumption becoming considerably less profitable at the same time as becoming less and less acceptable.

The drop in energy demand has also accentuated that current grid management systems are outdated. In the first quarter of 2020, renewable energy generation hit records globally. In Germany, over 50 per cent of electricity came from RES. Average energy prices in April were about 50 per cent cheaper compared with the same month last year. The large amount of negative pricing at the European Energy Exchange this year shows the grid management system's rigid nature, lack of flexibility and inability to manage varying loads and demand.

Even with current technology, German solar and wind power could provide 1200 TWh of electricity annually, nearly double the current annual demand of 600-650 TWh. So far, less than a third of the potential of RES is being used. Distributed energy resources (DER) unlock this potential.

The one-directional interactions of centralised power plants with households are being replaced by a large number of multi-directional interactions between many market participants. Grid management has become an entirely new ball game, with interesting new possibilities such as demand-side response technology. In the first quarter of 2020, over 167 000 new EVs were registered in Europe according to the European Automobile Manufacturers' Association. Using them for energy storage and grid regulation via vehicle-to-grid technology on a large scale is within close reach.

The millions of DER, prosumer communities and meter readings as often as every second are leading to a large increase in data that needs to be processed efficiently and securely. Legacy systems are struggling to handle this data-driven energy market. Managing DER is a challenge. But it's a challenge we not only know how to handle, but are turning into an opportunity by creating profitable new business models on the one side and convenient, affordable and enjoyable energy products for consumers on the other.

In the future, energy won't be a cumbersome, non-transparent necessity but a lifestyle choice made with customer interest and engagement. With the right regulations in place, small-scale energy producers will be able to supply themselves and maximise investment by feeding surplus energy back to the grid when it's needed. Consumers will get understandable and lower energy bills. Mobility will be fully decarbonised.

To harness the full potential of RES and manage DER profitably, we need scalable, modular cloud-based solutions that can operate in multi-national contexts and adapt to the diversity of use cases that are now emerging. Such solutions need to be able to integrate smoothly with both existing and new, ever-evolving systems. This requires a high degree of digital prowess.

The current pandemic shows that while all physical interactions are impacted, the digital space is resilient. The lesson for the energy industry should be clear: digitalisation and automation make us robust and crisis-proof. Digitalising processes across all market participants will allow us to harness the full potential of DER and demand-side response, plus be a key differentiator on the export market. The recent establishment of the balancing platform Equigy by three of Europe's largest grid operators – TenneT, Swissgrid and Terna – shows that grid operators have understood the need to manage small-scale flexibilities to balance the grid.

The technology to digitalise energy exists, all that remains to do is to implement it on a large scale. If we applied some of the thinking, focus and investment that took man to the moon in the space of just one decade, it could transform the energy sector quickly.

Governments need to not just make green promises but enable regulations accordingly, and investors and banks need to apply ethical, environmental standards to their investment decisions, as businesses demand reassurance and need encouragement and pressure. At the end of April, an association of 68 German companies from various sectors, including energy suppliers EnBW, E.On, Innogy and Vattenfall, called upon Angela Merkel to ensure that climate policy is embedded in German stimulus plans. This was echoed in requests from highly energy-intensive industries such as steel, cement, metal and chemistry that have until recently opposed environmental measures.

Protecting the climate, investing in future-proof technologies and driving digitalisation are urgently necessary and profitable. Let's not squander that potential, or our talents and skills, because it's a bit more difficult to do so than not. Let's galvanise our strengths and change the course of our destiny. It's still possible, but it requires a monumental effort from many parties. Humankind is able to do this, as it has proven during past crises and throughout decisive moments in history.

Christian Chudoba is Founder & CEO at Berlin-based Lumenaza, which develops software to connect producers and consumers of green distributed energy.

Chudoba: We can't just copy past efforts, such as after the Great Recession of 2007-09, which largely disregarded long-term climate goals

Creating smarter synergies

Following the recent completion of the deal between ABB and Hitachi to form Hitachi ABB Power Grids, *TEI Times* caught up with Claudio Facchin, CEO of the new entity, to discuss what the joint venture means to both companies and the market. **Junior Isles**

In accordance with an agreement signed in December 2018, Hitachi Ltd and ABB Ltd recently announced the completion of all the required procedures as planned, despite the challenges of the global pandemic.

Just weeks after completing the deal, Claudio Facchin, formerly President of ABB's Power Grids business and now CEO of the new company Hitachi ABB Power Grids, spared some time to outline how the new venture will benefit both companies and the industry.

According to Facchin, Hitachi's acquisition of the majority of 'Power Grids' is in some ways the culmination of a strategy that ABB Power Grids first embarked on in 2015 (with the HVDC joint venture in Japan) – although he points out that it is more "the start of the journey than the end".

Around five years ago, ABB began an internal reorganisation to form Power Grids by pooling together different parts of the business to create a stronger portfolio and team in order to address the needs of the energy sector in terms of transmission and distribution and the increasing drive towards electrification.

Facchin noted that the move would address what the company could see was a "tremendous ongoing transformation" occurring in the market. This transformation, which has been accelerating in recent years, continues to see a growing amount of distributed energy resources such as intermittent renewables on the grid.

This, says Facchin, was creating challenges for utilities trying to integrate and manage all of these new energy sources, while at the same time dealing with changing consumer behaviour and patterns in consumption brought about by, e.g. prosumers. The changing markets also meant utilities were having to transform business models and adjust investment. At the same time, decarbonisation efforts were beginning to drive the electrification of vehicles and buildings, adding new complexities.

"The transformation that we were seeing was coming at a much faster pace than we had seen, and it was on a global scale. While in the past we saw regional or local trends in different parts of the world, this transformation is global. It is at different stages of maturity from market to market but all the markets are more or less on the same curve – everyone is seeing the same trends and all are seeing the need for more investment in transmission and distribution and digitalisation."

Facchin: it is more "the start of the journey than the end"

In addition to reorganising its team and resources to address the changing market, ABB Power Grids also embarked on an internal transformation programme to adjust its portfolio to meet its customers' needs as well as their future needs. This meant investing in more digital technology and products to address power quality, as well as investing in grid edge technology to allow distributed energy sources to be delivered efficiently and reliably.

However, ABB saw the need to take this transformation to the next stage.

Facchin noted: "A few years ago, we also communicated that we would be looking for partners to help us go through this transformation. And fast forward to 2018, we announced the intention to create the joint venture with Hitachi."

On December 17, 2018, Hitachi signed an agreement with ABB to acquire 80.1 per cent of ABB's Power Grids business for $6.85 billion, with an option to acquire the remaining 19.9 per cent. The deal closed on July 1st.

Following the closing of the deal, Facchin said: "Hitachi saw the opportunity of translating their long term strategy – of which the energy transition is the centrepiece – to make sure they would be a major player from a global perspective. It was their opportunity to acquire the global leader in that space."

The deal was also a chance for Hitachi to invest more in technology that would support more electrification," said Facchin.

Due to its size, the deal – which values ABB's Power Grids business at $11 billion and covers factories and engineering centres, etc., in 90 countries – took 18 months to complete. "We had to create a programme to carve out all of that. We set up a standalone unit to take the corporate functions and corporate resources (that used to be commonly shared within the ABB Group) under Power Grids from January until closing of the deal, which we managed to do on time despite the current challenges.

"The deal makes sense for the whole energy space and us because it gives ABB the opportunity to focus on the industrial side – to support and create value for the industrial customers through digitalisation to improve productivity. We can then take the energy part of the portfolio and work together with Hitachi. With the acquisition of the Power Grids business, Hitachi create, inorganically, the energy platform and implement their long term strategy.

"Hitachi has invested in its multi-billion dollar business on the digital side for many years and this competence and know-how, together with the hardware and software for the OT [operational technology] side. It's a unique opportunity for us to join forces and provide additional value to all the key stakeholders."

Facchin sees the tie-up as wholly complementary. "Utilities have the lion's share of our revenues but we also serve industry, transport and infrastructure, which is about a third of what we do from a Power Grids standpoint.

"When you look at Hitachi, they also have energy and utilities but are less relevant, so we complement each other, but they are much more relevant than Power Grids in smart cities, buildings, IT, mobility and rail. So these are areas where we will be able to leverage their strength and technology. And these are the segments that we had identified, even before the deal, as high growth. So although we were well-positioned before, we are even better positioned now going forward."

And going forward the strategy of Hitachi ABB Power Grids will be partly a continuation of the 2025 Strategy that ABB put in place in 2017. "The new company will continue with the strategy we put in place to address the energy transition. What will change when we are with Hitachi, is the opportunity to create growth and synergies."

According Facchin, there are cost synergies mainly on "the back end". Carving out the Power Grids business from the ABB Group will not only allow market synergies but also customer segment and technology synergies.

"The most obvious synergies will come from combining our expertise on the energy side and OT side with their expertise in the IT and digital space," he said. "To tap into these synergies, we will have to invest mainly in the front end."

Beyond this, Facchin does not anticipate much of a footprint change in terms of manufacturing and engineering centres, as there is almost no overlap. "We are a $10 billion business in the T&D space; Hitachi's business in that area is a fraction of that and that is in Japan, where we are not relevant."

This gives the joint venture (JV) the opportunity to leverage its platform and grow in the Japanese market, while at the same time leveraging the cost of access to that market as well as the technology that Hitachi has outside of Japan.

Facchin explained: "The single most evident opportunity for us to create synergies with Hitachi is by putting in the digital scale that they have.

"They have the Lumada horizontal digital platform that we will be able to leverage. It will add forecasting and predicting capabilities, with machine learning to further improve our own energy management and distribution management systems that we already have depaloyed."

ABB Power Grids' Strategic Plan 2025 focuses on investment that drives technology for a sustainable energy transition, so grids can be "stronger, smarter and greener". This means investing in bulk transmission of large scale renewables, e.g. HVDC for offshore wind, as well as in technology to address power quality caused by intermittent energy sources, e.g. static variable compensators (SVC) and flexible AC transmission systems that are needed to stabilise the grid.

There will also be more investment in distribution systems such as microgrids and grid edge technology, including battery storage, along with all the control systems and software required to manage demand response and increase the reliability and resilience of those distributed systems.

In line with the whole digitalisation trend, ABB Power Grids has been putting intelligence into its power transformers so they can communicate and thereby optimise opex and capex in the planning and execution phase, as well as in operation and maintenance.

It is too early say how the strategy of the joint venture will change beyond 2025. While there might be updates, Facchin concludes that the direction of travel will likely be in line with both companies' existing strategies.

"Hitachi communicates its strategy every two years, with the next update planned for 2021. This gives us time to prepare and learn from each other. We have already triggered a number of initiatives and will therefore come with an updated plan next year that also reflects the opportunities presented by the synergies.

"But broadly, I would expect the pillars of the 2025 Strategy to still be there and I'm sure we will be stronger when we join forces in investing in some of these technologies with Hitachi."

Demanding a response

Changing conditions have shown that now is the time for demand response, and the Covid-19 recovery is the perfect opportunity to push things forward. **Simon Bushell**

As well as causing immeasurable suffering and disruption, the Covid-19 pandemic has offered glimpses into how certain aspects of life will look in the future. One particularly interesting area is how our electricity systems operate, from generation through to consumption.

During lockdown, according to the International Energy Agency, European countries including France, Germany and Italy saw record highs in the contribution of solar PV and wind sources as a share of the electricity mix, at a time when demand was much lower than usual. As a result, our formerly steady and stable systems have faced stresses never seen before.

However, as lockdown restrictions continue to be eased and businesses look to give economies a much-needed kick-start by reopening, it is anticipated that electricity demand will soon rise back up to pre-pandemic levels.

This expected surge in demand shouldn't mean that we default back to how things used to be, just because it's the easiest and quickest thing to do. In fact, the Covid-19 recovery is the perfect opportunity to push the energy transition forward and see countries introduce flexible, carbon-free electricity systems, with demand response at the core.

Taking a closer look at how Covid-19 impacted electricity consumption, at the height of the pandemic demand was down approximately 15 per cent across Europe as businesses closed down offices and industries shut factories. At the same time, a very sunny yet windy spring season saw supplies of solar and wind energy flourish. These conditions meant that there were high amounts of renewable energy available at a time when demand was much lower than usual, with electricity prices regularly dropping below zero as a result.

Bushell: The expected surge in demand shouldn't mean that we default back to how things used to be

Once considered a rare event, average day-ahead prices for the whole day in Germany settled at negative values six times in the first half of this year, compared to only twice in the same period of 2019. Meanwhile in the UK, electricity prices were negative for 66 hours in April alone. Consumers on flexible, real-time tariffs were actively encouraged to use electricity at these times, as in the current system it is easier and more economical for grid operators to pay customers to use electricity as opposed to turning generators off when there is too much power in the system.

This high fluctuation resulted in increased volatility – the day-to-day percentage difference in the price of the commodity – in the electricity market. High levels of volatility reflect extraordinary characteristics of supply and demand and overall market uncertainty. Volatility impacts all consumers, but especially commercial and industrial users who tend to be hit by price changes harder than residential electricity customers who see less price variation because their bills reflect monthly average prices.

Seeing high levels of available renewable energy is not a new phenomenon. In fact, renewables have been becoming a bigger part of the energy mix for a long time. The share of renewables in global electricity generation rose approximately 2 per cent in the first quarter of this year to nearly 28 per cent, compared to the same time in 2019 . Specifically in the UK, renewables supplied over 40 per cent of the country's electricity during Q1 of 2020, overtaking fossil fuels, which saw a 25 per cent reduction in generation in the same period compared to 2019 levels.

Both solar and wind energy continue to grow at an exponential rate. In Europe, power production from wind and solar sources surpassed coal for the first time last year. This year, solar PV is anticipated to be the fastest growing of all renewables, with wind energy expected to increase the most in absolute generation terms.

Traditional fossil-fuel powered generators are also being phased out at a quicker rate than ever before, meaning more renewables will be required to meet electricity demand. Germany is one country leading the way in this respect, while momentum is growing in Eastern European countries such as Poland, which have spotted the potential leverage in phasing out fossil fuels to be eligible for green support schemes. Another factor is the electrification shift across various transportation industries, which will further increase electricity demand.

The continued growth of solar and wind energy, which are two of the less controllable forms of renewable energy, is just one of the reasons why we need demand response now more than ever. Back in 2018, the European demand response market was forecast to grow from £0.68 billion to £2.6 billion by 2025, according to the IEA's Global Energy Review 2020 and a separate Frost and Sullivan report. This significant growth was expected to be driven by utilities and aggregators investing in innovative technologies and tools to reduce power generation costs and solve grid failures and outages.

Scandinavia is an interesting region to analyse when it comes to implementing demand response, as it has its own electricity system that is not synchronised with the rest of continental Europe. Because the Scandinavian grid is smaller, it is more vulnerable to frequency, production capacity and production mix changes, so it has a greater need for new markets.

An example of this is the recent opening of the fast frequency reserves (FFR) market by transmission system operators (TSOs) in the Nordics to handle low inertia situations. Operating conditions with low inertia have become more frequent in Nordic power systems, with the inertia being so low at times that the previous reserve products were unable to handle significant disturbances in electricity generation quickly.

The launch of the FFR market in the Nordics shows that the region is already at the forefront of implementing innovative grid solutions, enabling more renewables to enter the market and helping drive the energy transition.

Here at Sympower, we are working with Vattenfall to help increase the amount of flexibility in Sweden's reserves markets. This collaboration includes controlling approximately 60 MW worth of assets of the country's FFR, 85 per cent of the total market, for two customers of Vattenfall. The benefits of this FFR market are three-fold. Not only does it enable more renewables to enter the market and help drive the energy transition, but it also unlocks new revenue streams for companies who take part.

For demand response to be successfully integrated into electricity systems, adoption of EU Directive 2019/944 on common rules for the internal market for electricity and Regulation 2019/943 on the internal market for electricity needs to accelerate, quickly. These state that EU members must permit and encourage participation of demand response through aggregation, plus allow final customers to participate alongside producers in a non-discriminatory manner across all electricity markets. It also states that consumers should be free to buy and trade electricity services independently from their electricity supply contractors.

smarten, the European business association for digital and decentralised energy solutions, has identified several ways to encourage the adoption of the directives. Firstly, effective incentive structures need to be set for distribution system operators (DSOs) that are in line with the new and revised directives. DSOs should also be able to purchase flexibility services from the market and not own and operate the resources providing the services themselves.

According to smarten, flexibility markets at both local and system-level need to be open and accessible to decentralised flexibility resources, while products should be tailored towards a system-needs perspective, rather than the specific capacities of traditional providers. Finally, the procurement of flexibility services must be transparent and non-discriminatory. Both DSOs and TSOs should provide information to the market regarding congestion management needs. At the same time, mutual deals between system operators and flexibility providers should be limited to situations where market-based procurement isn't possible.

Another important aspect of the EU directives previously mentioned is the important role independent aggregators will play if we are to increase flexibility participation and ensure a successful energy transition. Member states must ensure that regulatory frameworks contain the necessary mechanisms for market participants engaged in aggregation – including independent aggregators – to enter electricity markets without needing consent from other players. The European Commission has also stated how important independent aggregators are as they enable healthy market competition, allowing electricity consumers to pick their preferred energy company of choice.

However, traditional energy companies are attempting to use their position, brand recognition and existing relationships to stop independent aggregators entering the market as they feel threatened and want to protect their traditional business models. That is not to say that they don't see the potential and benefits of aggregation, both for their customers and product portfolio. They just know that keeping the status quo maintains their business position.

We need to encourage more independent aggregators to enter the market to help shape our electricity systems of the future. Giving consumers more choice when it comes to energy providers is vitally important as it not only leads to attractive pricing structures and tariffs, but increased innovation on the market as companies look to grow their customer portfolios.

We have been given a glimpse into the future of our electricity systems. Now is the time to make the future our present by implementing demand response globally and accelerate the shift from fossil fuel generation to a world powered by renewables.

Simon Bushell is Founder and CEO of Sympower.

Staying safe during lockdown

The Covid-19 lockdowns has seen an increase in cyber attacks, a scenario for which organisations are unprepared. **Junior Isles** reports.

Levy: an energy company needs to look at its attack surface holistically

The recent security breach of Elexon, the company responsible for facilitating payments on the UK electricity market, is a reminder that the threat of cyber attacks in the power sector is real and present. And with more employees now working from home as a consequence of Covid-19 lockdowns, companies involved in the generation and supply of electricity have to be even more vigilant as the number of cyber attacks increase.

A recent report by Bitfender showed not only that attacks have increased since the pandemic but that organisations are ill-prepared. The study, based on feedback from 6700 information security professionals, revealed that half of their organisations did not have a contingency plan in place, or did not know if they did, for a situation like Covid-19 or a similar scenario. This lack of forward planning has come at great risk, as 86 per cent of respondents admitted that attacks in the most common attack vectors were on the rise during this period. Cyberwarfare and IoT as an attack vector were reported to be up by 38 per cent.

Uri Levy VP of Global Channels, GSIs & Alliances at Skybox Security – a global company headquartered in San Jose, California, that specialises in cyber security – started his career in Scada (supervisory control and data acquisition) development for power grids. As someone who has spent years writing Scada Historian software followed by decades in cyber security, he is well placed to see the dangers that power companies are currently facing.

According to Levy, the ongoing breaches have to be analysed in the context of a number of factors. "First," he says, "national critical infrastructure, which energy is part of, is becoming the frontline of cyber warfare."

Levy noted: "It is becoming a tool used in political conflict. Power plants, water facilities, etc., anything that is part of the critical infrastructure, is the number one target to be attacked."

The second factor, he says, is the integration of information technology (IT) with operational technology (OT). "If you go back 10 years, most of the industrial networks – the substation networks and command and control networks – were not using IT; they used serial, point-to-point, communication with proprietary technology. By definition, it was difficult to access or attack, as they were completely isolated. However the cost of managing and investing in proprietary communications systems was 10 times more expensive than adopting an IT stack."

Levy noted that although taking a more IT-based approach cut costs and provided reliable open standards, it compromised security. Greater connectivity and the ability to interconnect data offers better visibility and control of assets, while bringing consumers the benefits of digitalisation, through, for example, smart meters, but it brought risks.

The third factor, he says, is organisational culture. "OT guys, like people in the command and control rooms, are electrical engineers responsible for generating and distribution of electricity. [Cyber] Security is their last concern. So you have an organisation that has people with a culture that is completely blind to those risks."

Such factors now have to be considered in an environment where actual security is weakened by the need for remote access to networks as a consequence of lockdown measures.

Levy explained that many security measures or controls that are currently in place have internal segregation. "In OT there are five levels, where functions of different devices are separated so that even if one compartment is hacked or has an issue, it is contained and will not propagate to other compartments. The basic assumption, however, is that your operators [physically] come to the secure network and operate from there".

With Covid-19, this is no longer always the case. "A lot of the operational teams and suppliers now need access to networks and systems, which existing architectures and sensors were not designed for," said Levy. "Now you need to be able to let people into different areas of the network in a secure manner."

The necessary architectural changes that are needed can only be done gradually, since asset owners need to maintain availability, and this is creating openings for hackers.

One area where attacks are becoming increasingly common is through "terminal services", e.g., operator workstations in the control room. These are essentially dumb terminals that can access the network. With lockdown, organisations are now being forced to give certain employees access to these from home, with potentially serious consequences.

Now your [organisation's] attack surface is completely different than it was before," said Levy. "This could be an open door to attacks on remote terminal services or the end-point. It has given hackers the chance to penetrate to a highly classified network within a power plant by hacking an employee at home."

As an organisation's boundaries are eroded, attacks are likely to become more commonplace.

Although the attack on Elexon's internal IT systems in mid-May is still being investigated, it is quite possible that the entry point of attack was via an operator terminal, as the company was left unable to send or receive emails. Following the breach, Elexon sought to reassure market participants that the attack was contained to its own internal IT systems – and had not spread to the balancing and settlement code central systems.

Commenting on the breach, National Grid ESO, stated: "We're aware of a cyber attack on Elexon's internal IT systems. We're investigating any potential impact on our own IT networks. Electricity supply is not affected. We have robust cyber security measures across our IT and operational infrastructure to protect against cyber threats."

So what can organisations do to protect themselves? Levy notes that there is no one silver bullet. "It is a combination of people, processes, technologies, discipline, etc.," he said.

He did, however, highlight a few areas of particular weakness. The first is visibility.

The Industrial Internet has a number of different technologies from different vendors that use various protocols and these are all accessed by different people. "This is, almost by definition, a problem," said Levy. "It is very difficult to understand how all of those devices are connected and their level of security and risks. You also need to know this risk in the context of the network and the other networks that these are connected to. It's like a jigsaw and you have to be able to understand the whole picture in order to put the right security controls in place. Lack of visibility is the best friend of the attacker."

The second area of weakness is understanding the risk – to assets, networks, sub-networks, etc. – and the ability to apply different security measures to different areas of the network based on their risk and criticality.

The third area is understanding the separation between IT and OT. According to Levy most attacks on OT begin in the IT system. "If you analyse the attacks on OT, about 75-80 per cent of them started in IT and propagated to the OT environment. Because the perimeter between IT and OT was so permissive, it was very easy for attacks to propagate into critical networks where industrial processes operate."

His advice is that an energy company needs to look at its attack surface holistically, i.e. devices and users that are outside the perimeter, both the OT and IT networks together and their interconnections. As Levy put it: "It needs to be viewed through a single pane of glass."

He summarised: "There has to be a risk-based approach where action is taken according to the probability of an attack and the level of its impact. There is an increasing awareness. And as countries push harder on compliance, companies should invest in cyber security and leverage it for operational excellence."

AI-driven cyber defence

Artificial intelligence (AI) looks set to play an important role in advancing cyber security. SparkCognition and Siemens recently announced a new collaboration on an AI-driven cyber security system, known as 'DeepArmor Industrial, fortified by Siemens', which is designed to protect end-point, or remote, operational technology (OT) assets across the energy value chain by leveraging AI to monitor and detect cyber attacks.

According to the companies, the new system will deliver next-generation antivirus, threat detection, application control, and zero-day attack prevention to end-point power generation, oil and gas, and transmission and distribution assets, and for the first time brings fleet level cyber security monitoring and protection capabilities to the energy industry.

Leo Simonovich, Head of Industrial Cyber security at Siemens, commented: "Cyber attacks on the energy industry are on the rise in volume and in sophistication, and they increasingly threaten companies' physical safety and security, business operations, and the critical infrastructure that powers communities throughout the world."

He said many energy companies with remote, end-point assets have struggled to defend their environment because they either lacked the visibility to detect, or the agility to mitigate, cyber attacks that threaten operational technologies. "This new partnership combines Siemens' cyber security expertise in securing operational technology with SparkCognition's expertise in artificial intelligence to deliver the energy industry's first solution capable of detecting and protecting remote assets against cyber attacks."

Sridhar Sudarsan, Chief Technology Officer at SparkCognition, said his company had "seen the pain points and challenges" the energy industry is facing. "The industry needs security solutions that can both operate autonomously and are designed with the modern industrial environment in mind. Together with Siemens, we are excited to bring next-generation end-point protection that is specifically designed to increase the cyber resilience of OT networks and prevent advanced threat actors from impacting critical infrastructure."

Most current technologies rely on updates. A system updated on Monday is ineffective on Friday against any new attacks emerging on Tuesday, Wednesday or Thursday. DeepArmor Industrial, however, features a machine learning detection engine that uses advanced classification algorithms to predict and prevent zero-day industrial attacks without frequent updates or cloud access, greatly enhancing asset protection.

During the launch of the new system, Simonovich noted DeepArmor Industrial will be particularly useful during the Covid-19 outbreak, which has seen an increased number of employees working remotely and many companies foregoing maintenance.

"We can provide protection between maintenance cycles and detect attacks on the end-point, especially insider threats or attacks coming from the IT environment into the OT environment

From coal to biomass

Poland's Konin power plant: switching from lignite to biomass will help the country meet emission targets

While some question the green credentials of biomass as an energy source for power generation, there are situations where it still makes sense. A project to convert the Konin lignite power plant to burn biomass, illustrates a straightforward route to significantly reducing carbon emissions in a country that is heavily dependent on coal. **Junior Isles** reports.

Hard coal and lignite still account for the lion's share of electricity production in Poland. Although falling slightly in 2019, it still accounted for 75 per cent of electricity production, down from 80 per cent in 2018, according to the Energy Regulatory Office (URE).

Under its proposed National Energy Climate Plan (NECP), the country aims to reduce greenhouse gas emissions by 7 per cent in 2030 compared to 2005 levels, for sectors not covered by the EU Emissions Trading System (non-ETS). And while the country has recently embarked on a substantial wind power programme, its coal-based power sector will remain a challenge if it is to make a significant dent in its annual carbon emissions output.

Converting some of these coal fired plants to burn biomass is an option that some generators are pursuing. One such project recently got under way in central Poland. At the end of April Valmet received an order from Zespół Elektrowni Pątnów-Adamów-Konin SA (ZE PAK) to convert a lignite fired boiler into a biomass fired boiler at its power plant in the city of Konin.

ZE PAK is Poland's second largest electricity producer from brown coal, owning three power plants in the same area – Pątnów, Adamów and Konin. It also owns lignite mines that feed the plants. Konin is a 50 MWe plant first commissioned in June 2012 to provide heat and power to the city.

Commenting on the move, Zygmunt Artwik, Vice President, ZE PAK, said: "The reconstruction of the K-7 boiler is the main element of our transition project from fossil-based energy to renewable energy production. Converting the existing boiler from coal into biomass combustion is a very cost-effective way for us to carry out this energy transition. The investment will enable Konin to be the first Polish city that is heated with energy originating exclusively from renewable sources."

Following serious discussions with Valmet and a feasibility study on likely project costs, ZE PAK took the decision to go ahead about a year ago.

Jouko Kylänpää, Director, Boiler Rebuilds and Conversions, Pulp and Energy business line, Valmet, noted: "Their mines were beginning to empty but they were unsuccessful in securing permits for new mines. This has already resulted in the closure of Adamów. At Konin there are six boilers – one is a circulating fluidised bed boiler (CFB) burning biomass while the others run on brown coal.

When they decided to stop using coal at Konin, they essentially had two options: either buy gas fired boilers or convert one of the units to biomass. Converting using BFB [bubbling fluidised bed] technology is a very easy thing to do for pulverised coal fired boilers."

Under its €20 million order, Valmet will also supply a selective non-catalytic reduction (SNCR) system to lower NOx emissions as well as modernise the plant's instrumentation and electrification systems. Separately, ZE PAK will renovate the existing electrostatic precipitators (ESPs) to handle dust.

It is the kind of project that Valmet has been executing in Poland in the past. The work involves cutting away and replacing the bottom part of the old boiler with a new BFB bottom section.

Kylänpää explained: "Firstly the old boiler has to be in a sufficiently good mechanical condition; and there has to be no unusual layout, since you have to build a new fuel handling system for biomass.

"You then cutaway the bottom part of the furnace and manufacture a new one suitable for BFB firing. You also have to replace the burners and fans, etc."

Valmet's boiler solution utilising BFB combustion technology is called Valmet BFB Boiler (formerly HYBEX). It features wide fuel flexibility, high combustion efficiency, high reliability, excellent controllability and low emissions. According to Valmet, a combustion efficiency of over 99 per cent, results in boiler efficiency typically around 90 per cent even with high moisture fuels.

Typically, such fuels include wet biomasses and different types of process sludges. Dry biomass is also a suitable fuel, and references range between 15 to 65 per cent moisture content. Typical recycled fuels are recycled wood, recovered industrial waste and even processed municipal waste (RDF).

The BFB combustion principle is based on the fluidisation of a sand bed. The hot bubbling sand and solid fuel are mixed together in the lower part of the furnace. The high heat capacity of the sand bed ensures fast fuel combustion and absorbs fluctuations in fuel quality.

The fundamental core of the Valmet BFB Boiler is the patented Hydro Beam grate. It enables efficient and reliable removal of impurities and coarse material from the bottom of the furnace. Over 30 per cent of the rigid water-cooled grate construction area is open for easy removal of ash from the bottom.

Kylänpää notes that the technology will dramatically reduce emissions at Konin. "As there is no sulphur in biomass, there will be no SOx. Levels achieved are in line with BAT (Best Available Technology)."

According to Valmet, the annual reduction of gas and dust emissions from a biomass-fired boiler compared to a brown coal-fired boiler may amount to: SO_2 - approx. 375 Mg/year; NOx - 76 Mg/year; dust - 11 Mg/year; CO – 13.4 Mg/year; HCl - 32.2 Mg/year, HF – 5.8 Mg/year and Hg – 0.0125 Mg/year.

Notably, this is all possible without any penalty on energy output. As Konin uses brown coal, the maximum capacity of the power plant will be unaffected post-conversion; for a hard coal fired boiler, the use of biomass would allow perhaps 70 per cent of capacity to be reached.

At Konin, the converted plant will have a total thermal capacity of about 160 MW, enough to deliver about 50 MWe of electricity and over 100 MW for district heating.

The biomass used to fuel the plant will be partly agro-based pellets, sourced from the open market. "This is a stipulation in Poland," noted Kylänpää, "Some part of the biomass used for power generation has to be agro-based. But it is all biomass; no waste-derived fuel such as demolition wood."

With startup scheduled for autumn 2021, the project is currently in the engineering phase and equipment purchasing is ongoing. Erection is due to begin this winter.

According to Kylänpää, with support and various incentives for green energy, such projects are becoming popular once again. He said: "Globally we have executed between 60 and 70 similar modifications… In Finland they have all been modified."

With biomass coming under greater scrutiny, however, future projects, seem increasingly unlikely to be based on forest and agro-based biomass. Some experts point out that wood releases more carbon than fossil fuels per unit of energy generated – almost four times more than natural gas, and over 1.5 times that of coal. The use of food crops for biofuels is also controversial.

Kylänpää agrees that it does not make sense to use raw timber as fuel but says wood waste is green. "Fast growing crops are fine but traditional slow growing trees will not fly; not in Europe," he said.

The European Commission recently said in a draft strategy that it is "continuously assessing" biomass supply and demand at EU and global level in order to "ensure that EU biomass-related policies are sustainable.

That process will culminate by the end of 2020 when the Commission will publish the results of this work with regard to the sustainability of bioenergy," the draft policy document says, adding, the review will look "especially (into) the use of forest biomass for energy production."

The Commission's climate chief Frans Timmermans has made forest conservation and restoration one of the key aspects of the European Green Deal, which aims at reaching carbon neutrality by 2050.

Like other observers, Kylänpää believes this will severely slow any growth in projects using this type of biomass. Instead, he sees the real growth coming from waste derived biomass.

"We have many projects in Europe for this kind of coal phase-out. In Germany, for example, you have to do something. We have many in the feasibility phase for old CFBs to be modified to burn RDF or some kind of other biomass or waste fuel."

He cited a project in Indonesia where the company is converting a coal burning CFB plant so it can also burn biomass. "It will only burn 20 per cent biomass from palm kernels in the beginning but if all goes well, the share will increase."

Looking forward, Kylänpää believes biomass gasification also has great potential. Valmet has a couple of reference projects where gas produced from the gasification process is burned in a boiler. "This process allows you to use all parts of the fuel stream. So this is one future technology possibility, for sure."

He concludes: "Coal gasification will not fly but biomass or waste gasification can happen. You would not do it if you are building a new plant but if you have an existing boiler and want to add biomass, then you could use gasification."

Junior Isles

Rap star or rock star?

A hydrogen economy has been talked about for many years but has largely remained just that – talk. But with global developments over the last couple of months, perhaps it is now time to believe that hydrogen is more than just hype.

Hydrogen is explicitly mentioned a number of times by the European Commission in its recovery plans and is set to feature prominently in several of the various schemes.

Most notably, in July the EU formally adopted its Hydrogen Strategy, alongside its Strategy for Energy System Integration. The EU recognises that in an integrated energy system, hydrogen can support the decarbonisation of industry, transport, power generation and buildings across Europe.

Hydrogen Europe welcomed the news, noting that "the fact that the European Commission has decided to present a dedicated communication on a hydrogen strategy is testament to the commitment for a systemic change out of fossil into electricity and hydrogen in order to achieve the EU's 2030 and 2050 climate targets".

The Hydrogen Strategy addresses how to transform this potential into reality, through investments, regulation, market creation and research and innovation. It is therefore an important part of the European Commission's Recovery Plan for Europe to counter the crisis caused by Covid-19 and to restart the economy.

The EU Recovery Plan, which is all part of the European Green Deal policy, consists of two instruments, which add up to this first response: the Next Generation EU fund and a revised EU budget, worth a total €750 billion and €1100 billion, respectively.

Next Generation EU is the European Recovery Instrument. It will be exceptional and temporary, and addresses the most urgent challenges of the recovery.

The €750 billion in funding, to be raised on financial markets, will consist of grants and loans, which will be channelled through EU programmes.

The funds are designed to have an immediate impact. Between this year and 2024, the Commission will help finance the installation of several hydrogen production facilities. During this period it will support the installation of at least 6 GW of renewable hydrogen electrolysers in the EU, and the production of up to one million tonnes of renewable hydrogen.

Looking beyond this, the Commission stresses that from 2025 to 2030, "hydrogen needs to become an intrinsic part" of its integrated energy system, with at least 40 GW of renewable hydrogen electrolysers and the production of up to 10 million tonnes of renewable hydrogen in the EU.

To help deliver on its strategy, the Commission launched the European Clean Hydrogen Alliance (ECH2A) with industry leaders, civil society, national and regional ministers and the European Investment Bank. The Alliance will build up an investment pipeline for scaled-up production and will support demand for clean hydrogen in the EU.

Certainly Europe is already proving to be a hotbed for hydrogen and we are already seeing a surge in projects that will see significant scaling.

In May Siemens Energy, together with Engie Solutions and Centrax jointly announced they will implement what will be the world's very first industrial-scale power-to-X-to-power demonstrator with an advanced hydrogen turbine. The purpose of this project is to prove that hydrogen can be produced and stored from renewable electricity and then added, up to 100 per cent, to the natural gas currently used in combined heat and power plants. Known as HYFLEXPOWER, the project is being funded under the European Commission's Horizon 2020 Framework Program for Research and Innovation. The plant will be operational in 2023.

During a recent webinar, Corporate Strategy Manager, Siemens Energy's Nakul Prasad, said: "Siemens will be providing the electrolyser and burn the hydrogen in an SGT400 gas turbine… the unit will also generate 20 MW of heat and will be able to fire any blend of natural gas and hydrogen."

Clearly the coming decade will be big for the hydrogen sector. Announcing the EU's Hydrogen Strategy, Frans Timmermans, Executive Vice President for the Green Deal, noted. "We want to stay ahead because the rest of the world is quickly catching up," and referred to a new energy facility planned for Saudi Arabia. "They are talking about gigawatts , not megawatts in terms of production."

In July Saudi Arabia revealed plans for the world's largest green hydrogen plant in NEOM. This will be a key part of the Kingdom's Vision 2030 plan to diversify the economy. The NEOM project will use about 4 GW of renewable power from solar, wind, and storage to produce 650 tons per day of carbon-free hydrogen. Using Haldor Topsøe technology, the hydrogen will be converted into 3500 tons per day – or 1.2 million tons per year – of green ammonia. Air Products will be the exclusive off-taker of the green ammonia produced at the NEOM site and intends to transport it around the world to be converted back into carbon-free hydrogen at local hydrogen refuelling stations.

With hydrogen production currently dominated by fossil fuel-based processes and situated throughout North America, East Asia, and Europe, key markets in these regions are likely to maintain their prominence even as the industry expands.

In a recent press commentary Fitch Solutions Country Risk & Industry Research, said it expects the global demand for hydrogen to keep growing over the coming decade, supported by strengthening future use cases for the gas.

It said the demand for hydrogen across the globe has seen a steady rise over the past 40 years and doubling to the current value of 10 EJ of global energy demand, equivalent to 2778 TWh, of which the majority is used for industrial feedstock purposes. Almost all hydrogen use is dominated by industrial applications, with over 79 per cent consumed by petrochemical refining and ammonia production in 2015, alongside methanol and steel as other key consumers.

However, with the uses for hydrogen being explored for a variety of new markets and its ability to decarbonise industries, the size of the market is set to grow strongly.

"In 2017, the global hydrogen market was valued at $129 billion, though we forecast this figure to reach $183 billion by 2023 and anticipate its value to keep climbing over the decade, as these expanded use cases are developed," said the research firm.

At the same time, all-important work on infrastructure for transporting the gas is making headway. In May Germany's gas transmission grid operator umbrella organisation FNB Gas presented the so-called H2 Startnetz for the establishment of a grid that could start transporting green hydrogen by 2030. And in July, on the occasion of the launch of the ECH2A, Marco Alverà, CEO of SNAM, Italy's biggest energy infrastructure operator, said: "The blending of hydrogen into gas networks has already begun. Without a doubt, we need hydrogen-ready backbones. We are making it happen."

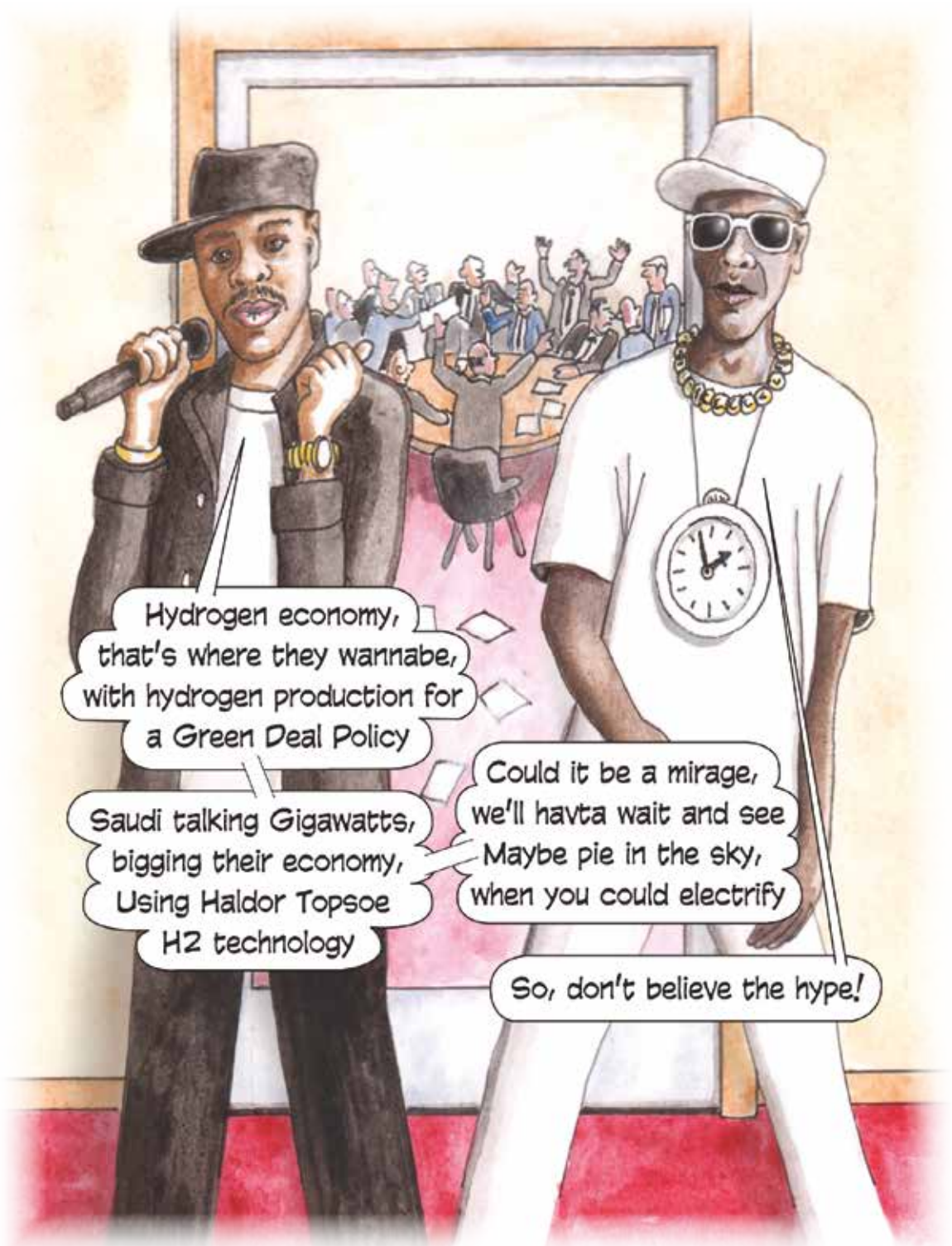
Speaking during a recent webinar on e-mobility, Daniel Mes, a Cabinet Member of Frans Timmermans' Green Deal team called hydrogen the "rock star" of energy system integration.

While it is easy to get carried away with the unprecedented buzz surrounding hydrogen and the recent European Commission announcement, some remain philosophical.

Björn Ullbro, Vice President for Europe and Africa at Wärtsilä Energy Business, commented: "It's hard to say now if hydrogen will be a silver bullet, history tells us that the energy transition will most likely result in a mosaic of technologies, fuels, etc. That said, we welcome with open arms the opportunity hydrogen presents to accelerate the sustainable energy transition, and to exponentially increase Europe's share of renewable electricity this decade to address the climate emergency."

Michael Liebrech, Founder of Bloomberg New Energy Finance and now Founder and CEO of Liebreich Associates was less enthusiastic about hydrogen, at least with regards to transport. He felt that from an efficiency point of view, battery powered electric vehicles are the way to go. During the panel debate in the Eurelectric webinar, he said: "Hydrogen is not the rock star; hydrogen is the mirage of the oasis: always over the horizon. It doesn't actually solve any problem today... any vehicle that doesn't drive more than 300 miles regularly, just electrify the damn thing."

Chuck D of legendary US rap group Public Enemy immortalised the line "Don't believe the hype". It seems that when it comes to talk of hydrogen, a few are still hearing a little more rap than rock.



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