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Transatlantic moves

The Edison Electric Institute's Dr Lawrence Jones explains what the incoming US administration means for climate change and transatlantic cooperation. *Page 13*



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Coal may no longer be leading carbon capture and storage (CCS) progress but the technology could still be an economic lifeline for coal power. *Page 14*



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With a changing EU landscape, it's time to work on shaping new EU ties. Junior Isles explains. *Page 16*



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Renewables in Asia Pacific to undercut coal

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Egypt's New and Renewable Energy Authority (NREA) has allocated EGP9 billion (\$573 million) to renewable energy projects in its 2021 budget.

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The lure of hydrogen as an energy vector in a low carbon economy has seen several European utilities adjust business strategies in preparation for the nascent market.

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Climeworks plans to demonstrate the possibilities for capturing carbon dioxide directly from the air at a geothermal plant in Iceland.

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UK details pathway to net zero but work still needed

Boris Johnson's government recognises that more needs to be done



As host of the next COP26 conference, the UK's plans to transform its energy system to tackle climate change and drive a green economic recovery are under the spotlight. Its recently published Energy White Paper has offered some detail on how the government aims to meet its goals but many questions still remain. **Junior Isles**

Following on from the Ten Point Plan and the National Infrastructure Strategy, the UK has provided further clarity on how it plans to achieve its target of net zero emissions by 2050 and drive a green industrial revolution. In December the government published its policy paper, 'Energy White Paper: Powering our net zero future', detailing those plans.

The long-awaited paper, which was delayed several times, has been widely welcomed and comes as the UK prepares to host the postponed UN COP26 conference on climate change in Glasgow. It follows publication of the Climate Change Committee's Sixth Carbon Budget – its first route map for a fully decarbonised nation – as well as a pledge to cut emissions by around two thirds within a decade.

Publishing the paper, the government stated: "We estimate the measures in this paper could reduce emissions across power, industry and buildings by up to 230 MtCO₂e in the period to 2032 and enable further savings in other sectors such as transport." It also stated, however, that "more will need to be done to meet key milestones on the journey to net zero".

In its end-of-year report, think-tank, Green Alliance said the promises to protect the climate are not yet backed by policies and cash. It noted there is a "significant gap" to the tune of £22.7 billion (\$30.6 billion) between Boris Johnson's "world-leading plans" and what is needed to meet the UK's carbon-cutting targets.

The proposals for the power sector

will allow big infrastructure projects such as new nuclear, carbon capture and storage (CCS), hydrogen production facilities, and renewable generation to be developed. The white paper also confirmed that a UK Emissions Trading Scheme (UK ETS) will replace the UK's participation in the EU ETS from 1 January 2021.

The Aldersgate Group welcomed the Energy White Paper's recognition of the central role of rapid energy decarbonisation in creating a net zero economy.

Nick Molho, Executive Director at the Aldersgate Group, said: "The Energy White Paper should be commended for looking beyond just energy and recognising the central role of the power sector in supporting the decarbonisation of a wide range of

sectors, including heating, transport and heavy industry. In many ways, the Energy White Paper sets out a low carbon industrial strategy vision for the UK and is based on the right premise that achieving net zero emissions can deliver significant supply chain growth and job creation across many regions of the UK.

"The commitment to a UK Emissions Trading Scheme and the ambition to fully decarbonise the power sector are both welcome, but it is clear from the sixth carbon budget that we need a zero carbon power sector by 2035, together with significant investments in grid reinforcements, storage and flexibility services. All of these areas need to become policy

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World leaders urged to accelerate emissions cuts

World leaders have been urged to bring forward their plans to cut emissions and set net zero targets.

At last month's virtual international Climate Ambition Summit 2020, hosted by the United Nations, United Kingdom, France, Chile and Italy, UN chief Antonio Guterres pressed world leaders to declare a "state of climate emergency" in their respective countries.

"If we don't change course, we may be headed for a catastrophic temperature rise of more than 3°C this century," he warned.

The summit, which marked five years since the landmark Paris Agreement on climate change that seeks to limit global warming to

1.5°C compared with pre-industrial levels, witnessed some significant announcements.

At least 24 countries declared new commitments, strategies or plans to reach carbon neutrality, and a number of states set out how they are going even further, with ambitious dates to reach net zero: Finland by 2035, Austria by 2040 and Sweden by 2045.

Pakistan Prime Minister Imran Khan announced that his country would have no new coal fired power generation as part of its contribution in global efforts against climate change. By 2030, Khan said 60 per cent of all energy produced in Pakistan will be from renewables, while 30 per cent of all vehicles would be

electric.

China's President Xi Jinping, meanwhile, committed to increasing the share of non-fossil fuel in primary energy consumption to around 25 per cent by 2030.

The Summit was labelled as the starting gun for "the sprint to Glasgow", referring to the delayed UN Climate Conference (COP26) which is scheduled to be held in the Scottish city in November 2021.

As host of COP26 and keen to lead by example, UK Prime Minister Boris Johnson announced that the country will end direct government support for the fossil fuel energy sector overseas.

The world-leading policy will see

the UK put an end to export finance, aid funding and trade promotion for new crude oil, natural gas or thermal coal projects, with very limited exceptions.

Just ahead of the summit, the UK set its Nationally Determined Contribution (NDC) to at least 68 per cent reduction in greenhouse gas emissions by 2030, relative to 1990 levels.

The goal is a notable increase on a previous target for a 57 per cent emissions cut by 2030, but still falls short of the reduction that some environmental campaigners have called for.

In its sixth carbon budget, the Committee on Climate Change recommends an emission reduction target of 78 per cent by 2035.

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priorities in the early 2020s, alongside the development of a carbon price trajectory aligned with the net zero target and a strategic approach to marine planning to support the rapid and environmentally sensitive deployment of offshore wind."

Importantly, the white paper's proposals will allow projects to attract private finance. LCP's Energy Analytics practice has estimated that to meet net zero by 2050 a total of £350 billion of investment will be required across power generation capacity alone. As such, it is crucial that the market framework delivers this investment at lowest cost.

Kyle Martin, Head of Market Insight at LCP said: "This investment in power assets needs to be done in conjunction with building out network capacity to transport energy around the country to where it is needed. Since January 1, 2020, Great Britain has turned down enough wind power to have powered over 800 000 homes for the whole year. Achieving net zero will mean ensuring we can use and store the renewable power we generate, and this will require coordination between Ofgem and BEIS to deliver whole system solutions."

Investment in new nuclear has also been a point of hot debate, as the government indicated a Regulated Asset Base (RAB) model is a credible solution for funding large-scale nuclear projects.



Martin: investment in power assets needed alongside network capacity buildout

The model is seen by some experts and nuclear proponents as a sound concept and an important piece of the puzzle for cost-effective new nuclear, as it allows nuclear developers to borrow money at a cost close to what the government would pay. Some, however say it will not solve the problem of delivering affordable nuclear power.

Vince Zabielski, Special Counsel at Pillsbury law, said: "Most recent nuclear new build projects in the West have largely been financial disasters. The RAB model doesn't solve any underlying issues affecting project risk, and until the basic performance issues are addressed, we can continue to expect more of the same."

"Unless carefully implemented, the RAB model may actually encourage sloppy project planning and sub-par project risk management. The major problem with building a new nuclear plant using the existing RAB model is that there is little incentive for the developer to identify and mitigate risks in order to build it on-time and on-budget. The developer has no skin in the game – after all, their investment is safe come hell or high water."

"Absent a robust governance mechanism, ideally combined with a contracting strategy that aligns the interests of the consumer with those of the developer, the consumer could wind up footing the bill no matter how incompetently the developer proceeds."

Offshore wind gears up to drive hydrogen production

- Equinor and RWE join NorthH₂
- AquaVentus eyes 10 GW wind farm to produce hydrogen

Junior Isles

The drive to use offshore wind to ramp up the production of green hydrogen is gathering momentum, with the recent announcement of several significant developments.

Last month, Norwegian energy major Equinor and German utility RWE joined the NorthH₂ green hydrogen project in the Netherlands. Partners in the project – launched in February 2020 by Shell, Groningen Seaports, Gasunie, and the province of Groningen – intend to jointly establish a system of offshore wind farms, electrolyzers, gas storage, and pipelines in order to convert offshore wind power into green hydrogen, store it and transport it to industrial clusters in north-western Europe.

The goal is to produce green hydrogen using electricity from about 4 GW of offshore wind off the coast of the Netherlands by 2030, and 10+ GW by 2040.

The North Sea looks set to be the

leading global location for hydrogen production from offshore wind, as such projects continue to spring up.

Also in December, the newly established AquaVentus association – a group of 27 companies, research institutions, and organisations – presented a project to install 10 GW of offshore wind capacity in the German North Sea for the production of green hydrogen. The wind farms would be built between the Heligoland island and the Dogger Bank sandbank by 2035.

Elsewhere, UK energy regulator Ofgem and the Scottish government have set aside up to nearly £25 million to finance a project that will use offshore wind power from the 7 MW Levenmouth demonstration offshore wind turbine to produce green hydrogen. The H100 Fife project, being developed by the gas network operator SGN, will use the hydrogen for heating homes in Fife, Scotland.

Floating wind turbines are also being built to play a role in producing green hydrogen. Tractebel Overdick recently said it has developed a new floating

wind foundation concept for 15+ MW wind turbines with a "hydrogen ready" option, and an offshore hydrogen production platform which can utilise the potential of large-scale offshore wind farms at an industrial scale of up to 800 MW.

Such developments will all play a part in reducing costs. According to a new report by risk management and quality assurance company DNV GL, the cost of floating wind will fall approximately 70 per cent by 2050 (to a global average of €40/MWh.) This will in turn help cut the cost of green hydrogen.

According to a recent report, 'Green Hydrogen Cost Reduction: Scaling up Electrolysers to Meet the 1.5°C Climate Goal', published by the International Renewable Energy Agency (Irena), hydrogen produced with renewable electricity could compete on costs with fossil fuel alternatives by 2030.

Governments and industry are already making significant progress in this area.

In early December a new joint industry programme was launched by the UK's Carbon Trust aimed at maximising the contribution of offshore wind to a low cost, flexible, predictable and low carbon energy future. The Integrator programme has secured support from six major offshore wind farm developers: EnBW, Equinor, RWE, ScottishPower Renewables, Total and Vattenfall who will collaborate on a series of projects over the next year, as part of this first-of-a-kind, developer-led programme in this field.

The Integrator is a programme designed to examine the interplay between offshore wind, existing infrastructure, and other technologies and developments to highlight opportunities for innovation investment.

The Integrator's programme of work is timely in the wake of the 2019 offshore wind sector deal with UK government, which identified integration as a key challenge for industry, as well as the increased focus on the role of low carbon hydrogen in a net zero future.

European Commission to revise TEN-E regulation

The EU is hoping that revisions to the rules on Trans-European Networks for Energy (the TEN-E Regulation) will better support the modernisation of Europe's cross-border energy infrastructure and achieve the objectives of the European Green Deal.

In December the European Commission published revisions to the regulation, which recognises that new infrastructure adapted to new technologies is a key tool in facilitating Europe's progress towards a climate neutral economy powered by clean energy.

The TEN-E policy supports this transformation through projects of common interest (PCIs), which must contribute to the achievement of the EU's emission reduction targets for 2030 and climate neutrality by 2050. The revised Regulation will continue to ensure that new projects respond to

market integration, competitiveness and security of supply objectives.

Executive Vice-President for the Green Deal Frans Timmermans said: "Now is the time to invest in the energy infrastructure of the future. The revised TEN-E rules will allow clean technologies to be plugged in to our energy system – including offshore wind and hydrogen. We need to update and upgrade now to achieve the Green Deal's goal of climate neutrality by 2050."

Commissioner for Energy Kadri Simson said: "The current TEN-E framework has been fundamental in creating a true single energy market, making it better integrated, more competitive and secure. But our ambitious climate targets demand a stronger focus on sustainability and new clean technologies. This is why our proposal prioritises electricity grids, offshore

energy and renewable gases, while oil and natural gas infrastructure will no longer be eligible for support."

The revisions also include a new focus on hydrogen infrastructure including transport and certain types of electrolyzers.

Hydrogen Europe welcomed publication of the revised regulation. It said that meeting the EU objective of achieving climate neutrality in 2050 will require massive scale up in renewables, energy efficiency and clean hydrogen.

It said in a statement: "The deployment of clean hydrogen at large scale is contingent on the availability of an appropriate infrastructure to transport hydrogen from its point of production to demand centres locally, regionally and internationally."

The organisation also said the conversion of Europe's natural gas infra-

structure into hydrogen infrastructure represents another important step towards cost-effective decarbonisation and the replacement of fossil fuels across the EU economy.

According to Hydrogen Europe, the EU's hydrogen economy will begin developing at a local level with the emergence of hydrogen valleys. In these hydrogen valleys, hydrogen producers can achieve economies of scale by supplying multiple demand sectors close to hydrogen production sites.

Moving forward, with the market for hydrogen developing, it said there is a need to foresee and plan for the transportation of hydrogen over longer distances in order to bring increasing volumes to demand sectors and to leverage the most cost-efficient clean hydrogen production locations both in Europe and globally.

Clean energy investment in developing economies bodes well for climate

As 2019 came to a close, the outlook for renewable energy growth in developing economies was exceptionally bright – a development that bodes well for climate change efforts.

Power generating capacity from solar plants such as photovoltaic projects reached 325 GW, up from just 1 GW a decade earlier, according to new findings from research firm BloombergNEF (BNEF). Wind investment hit an all-time annual high, with \$89 billion deployed to build projects in 30 emerging markets, both onshore and offshore.

According to BNEF's 2020 Climate-

scope, total foreign direct investment in support of renewables set a new record at \$32 billion in 2019, up from a previous high of \$24 billion in 2018. The vast majority – 84 per cent – of the 2019 total came from international project developers, utilities, commercial banks and other private sources.

The five top markets were Chile; India; Brazil; Jordan and mainland China.

Emerging economies accounted for 58 per cent (\$144 billion) of the \$249 billion in asset finance invested in utility-scale clean energy capacity worldwide during the year.

These are good indicators for the battle against climate change as the

likes of China and India are among the largest emitters, and many of the other developing economies, especially in Asia, are still dependent on fossil fuels.

A recent report from the International Energy Agency noted that renewables, along with energy efficiency were among the "mainstays" of global efforts to reach energy and climate goals.

The IEA, however, voiced concern over the pace of progress with energy efficiency. According to 'Energy Efficiency 2020', the latest edition of the IEA's annual update on efficiency trends, global primary energy intensity was expected to improve by less than

1 per cent in 2019, the weakest rate since 2010.

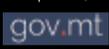
"While our recent analysis shows encouraging momentum for renewables, I'm very concerned that improvements in global energy efficiency are now at their slowest rate in a decade," said Dr Fatih Birol, the Executive Director of the IEA.

"For governments that are serious about boosting energy efficiency, the litmus test will be the amount of resources they devote to it in their economic recovery packages, where efficiency measures can help drive economic growth and job creation," he added.

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US renewable investors looking forward to good times

- Stimulus package extends tax credit support
- Incoming administration more favourable to clean power

Janet Wood

Despite a slow start, the US Energy Information Administration (EIA) expects 2020 to be a record-breaking year for renewable energy installations, with 23 GW of new wind generation nearly doubling 2012's record of 13.2 GW. The boom was fuelled by an expected phase-out of the full value of US support for renewables, which comes in the form of a production tax credit (PTC). But the PTC is set to be extended as part of new stimulus measures recently agreed by Congress in

response to the Covid pandemic.

Longer term the industry expects a boost from the new administration led by incoming President Joe Biden, which will be more favourable towards clean power. The Department of Energy is expected to be led by Jennifer Granholm, who served as energy adviser to Hillary Clinton's 2016 campaign and expanding Michigan's clean energy industry during her two terms as governor.

Collin Rees, a senior campaigner in the environmental group Oil Change US, said: "Jennifer Granholm is an

experienced leader with a strong record of support for renewable energy." The new administration will add impetus to states programmes that have ambitious low-carbon plans.

Democrat-leaning states such as New York are most in accord with the Biden administration – the state is said to be leading, with plans of a zero-emissions electricity sector by 2040 including 70 per cent renewable energy generation by 2030 – but some Republican states also have made major investments.

Texas has the most wind turbine

capacity of all the states – 29.1 GW installed as of August 2020. Project developers in Texas expect to add another 4.0 GW by the end of 2020. Oklahoma expects to increase wind capacity from 8.2 GW to 10.9 GW by then.

Wind is set to be a big winner, with big investments in large offshore installations. For example the 800 MW Vineyard Wind, 15 miles off Massachusetts and seen as a test case for more than a dozen wind leases in federal waters along the US Atlantic coast, will now be decided under the Biden

administration after a permit application was delayed again. Lars Pedersen, Vineyard Wind's Chief Executive, said change at the White House was "not a factor in our decision", instead citing changes such as a switch to larger turbines from General Electric instead of Danish group Vestas.

Meanwhile Ørsted North America has announced plans for 'Ocean Wind 2' a 2.4 GW wind energy project. It will follow Ocean Wind 1, a 1.1 GW wind farm 15 miles off the coast of Atlantic City slated for completion in 2024.

Hydrogen strategy wins plaudits for Canada

A new Hydrogen Strategy that aims to make Canada a global leader by 2050, with up to 30 per cent of its energy hydrogen-based and plans for a national hydrogen fuelling station network, won immediate support from states and companies in the field.

Sonya Savage, Minister of Energy in Alberta, said: "The federal strategy – which Alberta contributed to – supports the work we are doing to build a provincial hydrogen road map and provide significant environmental and economic benefits to Alberta, Canada and across the world."

Announcing plans for a 90 MW hydrogen electrolyser, Hydro-Québec

President and CEO, Sophie Brochu said the company was interested in other projects for developing the hydrogen sector in Québec and wants to hear from potential partners.

The new strategy also sparked interest elsewhere in North America.

Joel Dumaresq, Chief Executive of investor company Clean Power said he was "thrilled", adding: "While Clean Power's current investment in the clean energy sector is based in the US, this new Canadian framework provides us with an exciting opportunity to identify new potential for renewable energy investments in Canada."



Sparking interest: Canada's new hydrogen strategy

US DOE hit by Sunburst hack

The US Department of Energy (DOE) has confirmed it was breached in a recently discovered computer hacking event affecting the US government. The Russian government denied the many suggestions it was behind the incursion.

Researchers, who have named the hack Sunburst, say it could take years to fully comprehend what is one of the biggest ever cyber-attacks. The US Cybersecurity and Infrastructure Agency said that addressing the intrusion would be "highly complex and challenging".

The hack had been placing malware in US government department systems since March 2020 and CISA said critical infrastructure had been damaged, and federal agencies and private

sector companies compromised, and that the damage posed a "grave threat".

DOE spokeswoman Shaylyn Hynes confirmed it was responding to a cyber-breach but said "the malware has been isolated to business networks only".

Bharat Mistry, Technical Director at Trend Micro noted that the hack had been accomplished by making use of third party software from Solarwinds Orion.

He said "The most worrying aspect about this hack is that service management platforms like Solarwinds Orion are often granted elevated or high privilege levels in order to monitor, collect and in some cases configure IT infrastructure. These credentials in the wrong hands creates a recipe for disaster."

Brazil remains an investment hotspot despite pandemic delays

- Next renewable energy auctions now rescheduled to June 2021
- Privatisation of Eletrobras still a priority

Janet Wood

The Covid pandemic has forced Brazil to cancel planned renewable energy auctions, and a new timetable sets them to restart in June 2021. The auctions had already been postponed from March.

The *Official Gazette* document now says auctions will restart next year and be followed by further auctions in 2022 and 2023 to contract power from wind, solar, biomass and hydropower sources. Two tenders will also allow for coal, natural gas and solid urban waste projects.

Meanwhile, however, construction on large-scale projects is continuing at pace. Enel Group's Brazilian renewable subsidiary Enel Green Power Brasil Participações has begun construction of 1.3 GW of new plant in northeastern Brazil – four wind farms and one solar plant – with a total investment of around \$1.1 billion.

"The start of construction of 1.3 GW of new renewable capacity is an unprecedented milestone in the history of our company in Brazil, especially in view of the challenges imposed by the current scenario," said Salvatore Bernabei, CEO of Enel Green Power. The company already has capacity of over 3.4 GW in Brazil (1210 MW of wind, 979 MW of solar and 1269 MW of hydropower).

The country remains a popular investment. Three Norwegian companies – Scatec Solar, Equinor and Norsk Hydro – recently announced plans to jointly develop a 480 MW solar project. Offshore, Equinor is seeking permits for two 2 GW wind projects (Aracatu I and II) and Iberdrola subsidiary Neoenergia was recently said to be considering three 3 GW offshore wind projects, off of Rio Grande do Sul, Rio de Janeiro and Ceará.

However, the Brazilian government recently confirmed that the pandemic

has not slowed plans to denationalise a host of companies, among them Eletrobras, which has direct control of about 220 companies.

It was among a new list of privatisable assets released in December. Martha Seillier, Secretary of the so-called Investor Partnerships Programme, insisted it remained feasible to auction the companies in 2021.

She said: "All projects presented with possible auctions in 2021 are already under way in terms of structuring; all ports, airports, railways, energy projects, are already with feasibility studies under way, many of them including studies in the Federal Court of Auditors (TCU); others with studies already approved by the TCU and others with notices already published."

Eletrobras is expected to realise some \$12.5 billion for state coffers, but its sale still needs the approval of the National Congress.

Mexico grid creaking under renewables surge

Network limits will force a slowdown in renewable energy deployment in Mexico next year, according to a new report from the International Energy Agency (IEA), but developers have taken legal action to try to force the network operator to accept more new generation.

In its 2020 analysis the IEA calculated there was a pipeline of new renewables capacity of 3.5 GW, with contracts awarded after government auctions.

But the Energy Regulatory Commission and the National Energy Control Center supported restrictions on new connections to the electricity grid and in May the Ministry of Energy issued a regulation on Reliability Policy Safety, Continuity and Quality in the National Electrical System that allows connection permits to be limited. Recently the Supreme Court of Justice suspended the new regulation, agreeing with developers who had taken legal action against the limits, but it

remains to be seen whether new connections will be forthcoming.

Capacity that offers grid stability has continued to win connections, among them a gasification power plant in Mexico City that will be fuelled with coal, biomass, and municipal and industrial wastes. Announcing the plan, Michael Itaeov of West Coast Commodity, said that it would be in operation in 18 months, adding: "The project will create jobs, lower the cost of power, and solve Mexico's energy crisis."



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■ Around 7 GW of storage in pipeline ■ Japanese companies invest in hydrogen

Syed Ali

Australia continues to be a hotbed for investment in clean technology as its pipeline of energy storage projects soars to accommodate growing electricity generation from renewable sources.

Last month, projections from Cornwall Insight Australia show there is about 7 GW of battery storage projects proposed or currently in the planning process.

Australia's rapid uptake of renewable energy in recent years has driven the need for investment in flexible energy storage technologies to manage the variable output from those

generation sources.

Notably, December saw the announcement of what will be the world's largest solar-powered vanadium flow battery (VFB). In this pioneering project, a VFB supplied by Invinity Energy Systems will charge from a solar PV array and provide power to the local grid on demand.

Yadlamalka Energy Trust has developed the innovative A\$20 million (\$15 million) project, combining an 8 MWh VFB with a 6 MWp solar array, to unlock low-cost, low-emission energy for the Australian grid, producing approximately 10 GWh of 'dispatchable' solar power each year.

The strong uptake of variable renew-

able energy has highlighted the need for increasing storage requirements and vanadium flow batteries could play a major role in addressing the emerging need for medium-duration storage.

VFBs are a leading alternative to lithium-ion batteries in stationary energy storage applications. Larger and more durable than lithium-ion batteries, Invinity's VFBs are well suited to heavy-duty applications such as 'time-shifting' renewables because daily charge and discharge cycles do not degrade a VFB's capacity even after decades of service.

In addition to time-shifting solar generation, the VFB will provide Frequency Control Ancillary Services (FCAS)

to the Australian Energy Market Operator (AEMO), delivering vital flexibility to the electricity network when required to help balance out spikes in demand and generation.

Hydrogen, another energy vector that can be produced from renewables to provide time-shifting for electricity from renewables or in other applications such as in the production of synthetic fuels or fertiliser, is also attracting increasing attention.

Last month, three of Japan's largest corporations invested in green hydrogen projects in Australia.

In one of the most significant investments, Kawasaki Heavy Industries is teaming up with Australia's Origin

Energy on a 300 MW electrolyser in Townsville in north Queensland. The electrolyser is expected to produce 36 000 tonnes a year of liquid hydrogen for export and domestic supply.

Also in Queensland, Japan's largest hydrogen supplier Iwatani Corporation has formed a consortium with Queensland Government-owned Stanwell Corporation. The consortium will progress planning on a new renewable hydrogen export facility in Gladstone.

Over in South Australia, Mitsubishi Heavy Industries (MHI) is investing in the developer of the A\$250 million Eyre Peninsula Gateway Project, set to be Australia's largest green electrolyser project.

China can accelerate journey to carbon neutrality

BloombergNEF (BNEF) and Bloomberg Philanthropies has released a new white paper detailing how China could take major steps toward its recently announced carbon neutrality pledge.

China is the world's largest carbon emitter, accounting for 28 per cent of global emissions in 2018. Progress toward carbon neutrality will be extremely challenging as its energy demand and emissions are still rising. Around 90 per cent of China's emissions come from electricity and heat production, industry, and transport.

The report, 'China's Accelerated Decarbonization', uses the 'New Energy Outlook', BNEF's annual long-term scenario analysis on the future of the energy economy, to consider two scenarios for China.

The first is the Economic Transition Scenario, an economics-led scenario that employs a combination of near-term market analysis, least-cost modelling, consumer uptake and trend-based analysis to describe the deployment and diffusion of commercially available technologies.

Second, the report takes into account the Accelerated Transition Scenario, building upon the Economic Transition Scenario results. Post-2023, this scenario considers a higher rate of direct electrification in road transport, buildings and industry, combined with increased uptake of zero-emission electricity supply to deliver a larger and cleaner power system.

The Accelerated Transition Scenario sees electricity accounting for

53 per cent of final energy consumption by 2050, some 92 per cent of which is delivered by zero-carbon power sources dominated by solar and wind, with hydrogen-fuelled gas turbines providing balancing needs.

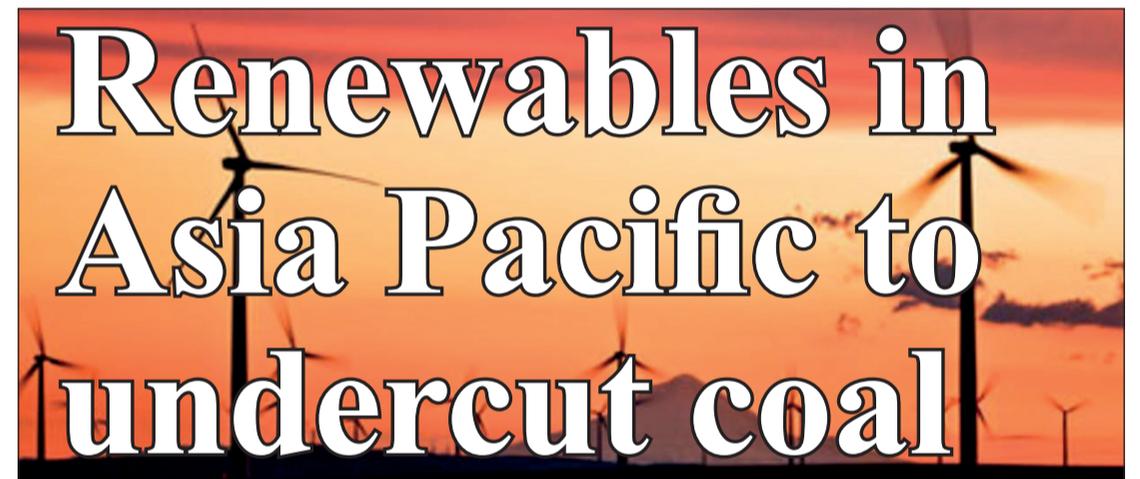
This faster transition sees emissions in the power sector peak as early as 2024, and decrease quickly thereafter, by around 150 million tonnes year-on-year, despite rising electricity demand. This makes it much easier for China to reach its carbon neutrality goal by 2060.

The Accelerated Transition Scenario requires \$7.9 trillion of investment in electricity generation capacity over the next 30 years – more than double the \$3.3 trillion needed under the Economic Transition Scenario.

Wind and solar account for 74 per cent of new capacity in the Accelerated Transition Scenario, with wind reaching just over 3.6 TW and solar 4.2 TW. Offshore wind also plays an increasingly important role, reaching 740 GW by 2050.

"Electrification will only help China deliver on its carbon neutrality goal if it is combined with a rapid reduction of the emissions intensity of power generation", said Yvonne Yujing Liu, senior analyst at BNEF and lead author of the report.

■ China has started operation of Fuqing 5, the first Hualong One reactor. The Chinese designed reactor has a net capacity of 1000 MWe and will avoid the emission of almost 8 million tonnes of carbon dioxide each year.



Most markets in Asia Pacific can expect to see cheaper levelised cost of electricity (LCOE) for renewables compared to coal by 2030, according to a recent report by Wood Mackenzie.

Across the region, new investments in renewables are expected to be 23 per cent lower cost than coal power on average by the end of the decade. Currently, renewable power costs about 16 per cent more on average compared to coal power but has been at a discount to gas fired power since 2019.

Wood Mackenzie senior analyst Rishab Shrestha said: "Today, India and Australia are the only markets in Asia Pacific where LCOE for renewables is cheaper than new-build coal. However, by the end of the decade, we can expect almost all markets in the region to have renewable power at a discount compared to the lowest cost fossil fuel. The stage is set for rapid growth of subsidy-free renewables in Asia Pacific."

By 2030, renewable generation in India and Australia are expected to be 56 per cent and 47 per cent cheaper than new-build coal, respectively. However, due to lower coal LCOE in China, the renewables premium remains relatively high.

Shrestha said: "The winds will change in China as we expect renewables' LCOE to be cheaper than coal next year. Over this decade, the renewables discount over fossil fuels will grow to 40 per cent on average across China, as the LCOE of new wind and solar plants fall below those of fossil fuels, and also taking into consideration a carbon price."

Three other markets – South Korea, Thailand and Vietnam – will join China with lower renewables power cost compared to coal in 2021.

Wood Mackenzie expects a modest carbon price to impact the LCOE of coal and gas in Asia Pacific. In the region, carbon prices are pushing up

LCOE by more than 4 per cent for coal and gas today and could double to 8 per cent in 2030.

An inclusion of a \$30/t carbon price would expedite new-build solar (utility PV) and wind (onshore wind) costs to be lower than coal by 2023 and 2030 respectively, five years earlier than the original timeline.

Northeast Asia's renewables premium averages at around 25 per cent currently. Japan, the most expensive renewables cost country in 2020, can also expect a 1 per cent renewables discount against fossil fuels by 2030. South Korea and Taiwan will see cost of renewables power to be around 30 per cent cheaper than fossil fuel power costs by the end of the decade.

Southeast Asia has a high renewables LCOE premium of 30 per cent due to its lower coal LCOE in 2020. Vietnam is expected to lead the region as utility PV power becomes cheaper than coal power as early as next year.

South Korea expands offshore wind

South Korea has moved closer to its target of reaching 12 GW of offshore wind by 2030.

In December South Korea's Doosan Heavy Industries & Construction signed an agreement with the government of North Jeolla Province to cooperate on the construction of a 2.4 GW offshore wind project.

The project will be developed off the southwestern coast between Gochang County and Buan County, with expected completion by 2028.

The announcement follows news that Danish green energy major Ørsted A/S intends to develop up to 1.6 GW of offshore wind power projects in South Korean waters.

These projects would be located off more than 70 km off the coast of Incheon City and its main parts. Ørsted said that it had deployed four floating lidars off Incheon's shores earlier this year, made progress in collecting all relevant data and started engagement with local communities and the fishing

industry to get their input.

Depending on the permitting process, off-take agreement with a Korean utility and final investment decision, Ørsted could start commissioning its wind farms from 2026 onwards.

■ The Ministry of Trade, Industry and Energy has said a total of 9 to 16 coal-fired power plants will be shut from December 1 to February 28 as part of efforts to reduce fine dust emissions in the winter period.



Clear skies: China has pledged carbon neutrality by 2060

North Sea the focus for low carbon energies

- Total joins Norway in carbon sequestration
- Denmark agrees energy hub investigations with Germany and the Netherlands

Janet Wood

The Norwegian North Sea is set to be the focus for a carbon dioxide transport and sequestration industry open to third parties, under the 'Northern Lights' project, which won the support of the Norwegian government in December. Now Equinor, Shell and Total have made a conditional investment decision on a joint venture to begin construction on the project once an operational plan has been agreed by the Norwegian parliament. The Northern Lights project will take carbon dioxide from industrial sources, transport it to sea by boat and place it in permanent storage in a reservoir. The facilities are due to open in 2024.

The North Sea already hosts cables

connecting wind farms to the onshore network and interconnectors that allow power to be transmitted across national borders. But they are all connections between two single points. The latest, NordLink, is a joint venture of Statnett, KfW and TenneT and it links Germany and Norway. When it went into operation recently TenneT COO Tim Meyerjürgens said: "Norwegian hydro-power and German wind energy complement each other in this system in an optimal way."

The carbon dioxide storage project is just one of the areas where EU Member States and neighbouring countries are joining forces to develop the North Sea's energy potential. They follow a step-change in the size of projects and investment required, and a new

urgency in lowering capital costs and maximising efficient operation.

Further south, the Netherlands and Denmark recently signed an agreement of intent in which networks TenneT, Gasunie and Energinet will research the possibility of a joint energy hub in the North Sea. The hub will allow energy from offshore wind farms to be transported to different countries as electricity or, possibly, hydrogen.

Manon van Beek, TenneT CEO, said: "Energy will increasingly become a cross-border business, and cooperation across the borders of organisations and countries is the key to a successful energy transition. In this context, we are already realising cross-border offshore projects and many more opportunities lie ahead."

Offshore wind will undoubtedly become the new powerhouse of north-west Europe, a region that is perfectly connected via the North Sea. And it will only be in a European context that we can and will make optimum use of every electron generated at sea."

He added: "Intensive cooperation between TSOs, governments and other bodies involved – across borders – must be the rule in order to ultimately achieve a European sustainable energy system."

Denmark also recently agreed to strengthen cooperation with Germany innovative North Sea energy hubs. The two countries want to maximise production of green power, green hydrogen and ultimately power-to-X technologies.

Dan Jørgensen, Denmark's Minister for Climate, Energy and Utilities, said in mid-December: "Last week, Denmark took the decision to phase-out our oil and gas production by 2050. Today, Denmark and Germany are taking another leap forward by strengthening the cooperation to jointly develop and connect the offshore wind energy hubs. This will not only increase renewable power production considerably in both countries. It is also a prerequisite for power-to-X technologies to produce sustainable fuels for shipping and aviation."

In the long term, Denmark plans to establish energy hubs with a total capacity of 12 GW of offshore wind energy in the North Sea and Baltic Sea.

Majors move into hydrogen

- Linde, Snam, sign MoU
- New coalition of companies sets \$2/kg target

Janet Wood

Hydrogen's growing reputation as a potential low-carbon energy vector has attracted investment from existing players and interest from new entrants.

Linde, which claims to have the largest liquid hydrogen capacity and distribution system in the world, recently signed a memorandum of understanding (MoU) with Snam to jointly develop clean hydrogen projects and related infrastructure in Europe. Snam owns and operates 42,000 km of pipeline across Europe.

Marco Alverà, Chief Executive Officer, Snam, said: "The collaboration with one of the world's leading companies in the sector strengthens our role as operator along the hydrogen value chain and lays the foundation for new joint projects."

Linde and Snam will work together to promote key technologies along the

hydrogen value chain and develop opportunities for joint investments in commercial projects in production, distribution, compression and storage.

Separately, a newly-formed coalition of seven energy firms has launched 'The +Green Hydrogen Catapult' with the aim of halving the cost of 'green' hydrogen to \$2/kg over the next five years. It wants to install 25 GW of renewables-based hydrogen production by 2026.

The partners include Saudi Arabia's ACWA Power, Australia's CWP Renewables, China's Envision, Spain's Iberdrola, Denmark's Eysted, Italy's Snam and Norway's Yara.

Trade body Hydrogen Council previously called that hydrogen price a "potential tipping point" to make green hydrogen a competitive energy source. "From an industry perspective, we see no technical barriers to achieving this, so it's time to get on

with the virtuous cycle of cost reduction through scale up," said Paddy Padmanathan, Chief Executive of ACWA Power.

But as hydrogen attracts major new investment, Steinar Eikaas, Equinor's Vice President for Low Carbon Solutions, warned recently that hydrogen will have to be supplied from so-called 'blue' sources – gas reforming with carbon capture and storage – until there is a surplus of renewable energy to power electrolysis.

"Green hydrogen consumes renewable electricity, which is a problem as long as we don't have surplus renewable electricity. So, there is a need to build huge amounts of renewable electricity generation alongside green hydrogen. Looking at the alternative of blue hydrogen, it builds on natural gas and we already have this technology in place and the network to carry this volume is in place," said Eikaas.

Sizewell C negotiations begin in earnest

The UK has begun formal talks with EDF about financing and ownership options for the proposed €20 billion Sizewell C new nuclear plant.

Both sides believe that the cost of the project will be lower if it is financed under a 'regulated asset base' (RAB) model and if it follows quickly on from the Hinkley Point C plant that is currently being built by EDF. But the framework has still to be agreed and there is strong opposition to the RAB model as it places much

higher risk on bill payers.

Justin Bowden, National Secretary of the GMB union, said, however: "This is brilliant news for the zero carbon electricity it will generate for future generations and the thousands of jobs it will generate being built."

The discussions have been stepped up following a long-awaited policy 'white paper', a precursor to the necessary legislation, which also promised support for small modular reactors and fusion.



New ideas: the RAB model could be used to finance Sizewell C

Battery investment takes off

The European Commission has adopted new regulations on batteries, supported by the European Battery Alliance, aimed at minimising their social and the carbon footprint.

Battery construction is surging across the continent.

Major new installations include: ■ Enel is to build 59.2 MW of storage capacity to provide fast reserve to Italian grid operator Terna SpA.

■ Endesa is to invest €300 million to deploy batteries in 2021-2023. The company wants to install 278 MW in the period and aims to ensure that all wind farms larger than 25 MW have

their own battery

■ Estor-Lux and Centrica Business Solutions will build a 10 MW/20 MWh battery in southern Belgium to meet the flexible capacity needs of system operator Elia.

But Europe's biggest battery storage project could be outside the EU, in the UK, where Intergen recently won development consent for a £200 million, 320 MW battery in Essex. Intergen is deciding whether to size it at 640 MWh or 1.3 GWh. One of Intergen's three owners, China Huaneng, is already building a 100 MW/100 MWh in southwest UK, in Wiltshire.

Coal exit moves in central Europe

Three major European coal-using countries have moved towards coal fired generation phase-out.

The Czech Republic has agreed to phase out coal mining by 2038 and replace coal generating capacity with renewable or nuclear power. The date was a compromise with environmental groups aiming for 2033.

Poland is finding it more difficult to develop a strategy. Its biggest utility,

PGE recently set out plans to separate the coal and lignite stations that form 85 per cent of its portfolio. But there were complaints that its plans are undated, unfunded and have no agreed mechanism.

Alternatives include renewables and nuclear and the European Bank for Reconstruction and Development (EBRD) recently announced a €39 million loan to finance two new wind

farms with a combined installed capacity of 59 MW.

Meanwhile in Germany, the federal government recently agreed to award compensation to Vattenfall for its Moorburg coal fired plant. "We welcome this decision. It provides clarity and will enable us to phase out Moorburg earlier than previously planned," said Anna Borg, President and CEO, Vattenfall.



Russia joins pan-European hydrogen drive

- Nord Stream 2 could carry hydrogen to Europe
- Gazprom creates low-carbon hydrogen subsidiary

by Nadia Weekes

Russia's government and state-owned energy companies are exploring opportunities in the burgeoning hydrogen market, Deputy Energy Minister Pavel Sorokin told a Russian-German forum at Moscow's Skolkovo Energy Center.

He said that promising export markets include Japan, South Korea and China in Asia, and Germany and France in Europe. Transport, power generation, the chemical industry, fertiliser production and oil refining are possible areas of application.

Rosatom Overseas President Yevgeny Pakermanov said his company was considering the creation of a hydrogen export cluster around its nuclear power plants in northwest Russia.

Oil major Gazprom plans to build a hydrogen production plant in the

north of Germany, near the exit of the Nord Stream and Nord Stream 2 gas pipelines, according to Head of Energy Conservation and Ecology, Alexander Ishkov.

Ishkov also formally announced the creation of Gazprom Hydrogen, a subsidiary engaging in the low-carbon production, storage, transportation and application of methane-hydrogen mixtures.

A German government official, Karsten Sach, confirmed that the Nord Stream 2 pipeline may become one of the routes for hydrogen supply to Europe. As demand shifts towards hydrogen, it makes sense that a major gas supplier like Russia cooperates with Germany and Europe "to start building up a new hydrogen infrastructure and hydrogen energy support schemes," Sach said.

The Nord Stream 2 project involves

building two pipeline strings with an annual capacity of 55 billion m³ from the coast of Russia through the Baltic Sea to Germany. It is said to be 93 per cent complete.

Meanwhile, Germany has signed a memorandum of understanding with Tunisia for a €30 million grant (\$37 million) to establish a Tunisian-German green hydrogen alliance named Power-to-X. Tunisia has the potential to become a green hydrogen producer, given its abundant renewable energy resources.

Elsewhere, international companies are said to be interested in investing in the special economic zones and free zones of Oman to produce electricity from solar and wind energy, and green hydrogen for export. Oman has designated a clean-energy zone covering 100 km² in Sizad, and other areas are also being considered.

Funding spree boosts Africa's clean energy drive

The African Development Bank (AfDB) has approved a \$25 million package to support independent power producers investing in renewable energy generation in sub-Saharan Africa.

The funding comprises \$10 million in equity and a \$5 million reimbursable grant from the Sustainable Energy Fund for Africa (SEFA), and \$10 million from the Clean Technology Fund (CTF).

The African Renewable Energy Fund (AREF) II will use the funding to help small and medium-sized producers to add more than 800 MW of hydropower, solar and wind power and battery storage in countries across sub-Saharan Africa.

"We are very excited to support AREF II at a time when, due to competing financing needs on account of the cost impacts of the pandemic and for post Covid-19 recovery efforts, there is real risk of under-investment in the African power sector, including in renewables," said Dr. Kevin Kariuki, AfDB's Vice President for Power, Energy, Climate and Green Growth.

AREF II, the second generation of the pan-African fund, is targeting a \$300 million market capitalisation. It will be managed by Berkeley Energy.

Meanwhile, Somalia has received an

\$8.5 million grant in support of clean energy by the Africa Enterprise Challenge Fund (AECF). The programme aims to give 300 000 people access to clean energy while creating jobs for young people and women.

"The Somali market presents a unique opportunity for us and other development partners to change the narrative of reliance on diesel-powered mini-grids as we facilitate a switch to renewable energy sources," said Victoria Sabula, Chief Executive Officer of AECF. She highlighted the importance of boosting renewable-energy value chains and securing the engagement of the private sector.

The World Bank estimates that 11 million Somalis lack access to electricity services. "For this call, we are looking to work with businesses at different developmental stages, particularly those at an early stage. In addition to the funding, we will provide technical support, business linkages and investment facilitation," said Sabula.

The programme targets private sector companies and microfinance institutions that can deliver low cost, clean energy products and services that benefit the poor in rural and peri-urban Somalia. The deadline for applications is January 22, 2021.



The AfDB is supporting renewable energy development

Ocean energy ambition requires global collaboration



A new report by the Ocean Renewable Energy Action Coalition (OREAC) calls for global collaboration between industry, government and key stakeholders to deliver 1.4 TW of offshore wind by 2050.

According to OREAC's 'The Power of Our Ocean' report, five building blocks are needed to maximise the benefits of offshore wind and other forms of ocean-based renewable energy: stable policies; pipeline visibility; resourced institutions; a supportive and engaged public; and a competitive environment.

OREAC says that ocean-based renewable energy offers an effective decarbonisation route to 2050 targets, and that offshore wind also reduces air pollution and water consumption for

energy use. If the 1.4 TW vision is achieved, the report finds, it could save \$1.88 trillion in pollution-related public health costs.

Offshore wind can revitalise coastal communities and support the development of critical infrastructure. The report estimates that a 500 MW offshore wind project with an average 25-year lifetime creates about 10 000 years of full-time employment.

OREAC is spearheaded by leading offshore wind developer Ørsted and energy utility Equinor. It includes a number of other major players in the global offshore wind sector and partner organisations such as the Global Wind Energy Council, World Resources Institute and the Chinese Wind Energy Association.

Egypt leads Africa's green energy charge

Ambitious Egypt sets the scene for Africa to attract green energy investment, as renewables become low-cost option of choice.

by Nadia Weekes

Egypt's New and Renewable Energy Authority (NREA) has allocated EGP9 billion (\$573 million) to renewable energy projects in its 2021 budget.

Egypt has ambitious targets for renewable energy to represent 20 per cent and 42 per cent of total energy produced by 2022 and 2035, respectively. It has a pipeline of large-scale wind and solar plants.

A 500 MW wind energy project to be developed by France's Engie, in partnership with the local Orascom Construction, Japan's Toyota Tsusho Corporation and Eurus Energy Holdings, has recently received environmental permits and will begin construction in 2021.

The same consortium commissioned the 262.5 MW Ras Ghareb wind project in 2019 – the first wind project in Egypt to be tendered under a build-own-operate model.

Meanwhile, Dubai-based AMEA Power has gained permission to expand its planned Abydos solar farm from 300 MW to 500 MW. The developer has

made power purchase agreements (PPAs) with the Egyptian Electricity Transmission Company (EETC) for both this plant and the 500 MW Amunet wind project in the Gulf of Suez.

AMEA Power has made network connection contracts with the EETC for both projects, and usufruct agreements with NREA. Egypt's finance ministry has issued sovereign guarantees for the projects.

AMEA Power also has PPAs for a 50 MW wind project in Kenya, a 30 MW solar project in Morocco, a 50 MW solar project in Mali and 120 MW of solar capacity in Chad. The company is building solar and wind farms in Jordan and Togo.

According to analysis by Rystad Energy, Africa's installed renewable energy capacity, which stood at 12.6 GW in 2019, is set for consecutive years of significant growth, driven by Egypt, Algeria, Tunisia, Morocco and Ethiopia.

The analysis forecasts capacity across the continent to have reached 16.8 GW by 2020, with 5.5 GW added in 2021 and a cumulative capacity of 51.2 GW

by 2025. As the cost of renewables continues to fall, investment in Africa is expected to become more attractive.

At present, South Africa leads with 3.5 GW of wind, 2.4 GW of utility solar, and a solar-dominant 1 GW pipeline of projects in development.

Egypt has approximately 3 GW of installed capacity and a massive 9.2 GW development pipeline mostly consisting of wind projects – putting it on track to overtake South Africa in 2025 and become the green powerhouse of Africa.

Morocco has 2.5 GW of installed capacity, dominated by 1.7 GW of wind power. Rystad Energy expects solar to drive the growth there, with a handful of large projects already in the works. Ethiopia's installed renewable capacity will leap from the current 11 MW of solar and 450 MW of wind to 3 GW by 2025.

Nearly 40 out of 50 African countries have installed or plan to install wind or solar projects. First-time market entrants will be able to leverage the lessons learned in frontrunners Egypt, South Africa and Morocco.

European utility businesses target hydrogen

■ RWE to set up hydrogen business ■ Hydrogen part of Uniper and Fortum cooperation

Junior Isles

The lure of hydrogen as an energy vector in a low carbon economy has seen several European utilities adjust business strategies in preparation for the nascent market.

In December German utility RWE AG said it will set up a new hydrogen business unit within its electricity production subsidiary RWE Generation.

The new business will focus on developing and implementing RWE's hydrogen strategy and promote project deployment in its core markets. The company highlighted its ability to produce green hydrogen through electrolyzers powered by electricity from its offshore wind parks. The hydrogen

can then be temporarily stored in its gas storage facilities and sold through its RWE Supply & Trading business, it explained.

"We are in a perfect position to play a leading role in hydrogen. With our new business unit, we ensure to fully leverage this advantage," said Roger Miesen, CEO at RWE Generation.

At present, RWE is taking part in more than 30 hydrogen projects in Germany, the Netherlands and the UK.

Last month also saw another German utility, Uniper and Finland's Fortum announce they are intensifying their cooperation to jointly tackle growth, performance and sustainability goals more effectively. This will include greater focus on hydrogen.

For Uniper, the strategy means moving away from coal and moving towards the expansion of gas as the fastest way to significantly reduce CO₂, and to develop hydrogen and renewable energies for the future.

Uniper aims to be overall CO₂ neutral by 2050, which is a common goal for both Fortum and Uniper.

In order to enable net zero, Uniper is developing new technologies for the further decarbonisation of gas fired power plants and is entering into targeted partnerships with manufacturers such as Siemens Energy and General Electric.

Fortum has been supporting the new Uniper strategy since it was announced in March 2020.

Joint working groups will drive both companies' growth opportunities in the hydrogen and renewable energies sectors. The goal is to pursue a "one team approach" in which one of the two companies takes over the lead.

According to Uniper, joint activities in the field of hydrogen will build on Uniper's extensive know-how.

It said in a press statement: "Uniper is one of the pioneers in this field. In our view, hydrogen is both a source of energy and a platform of opportunities to effectively advance the goal of climate neutrality for most industries, including the chemical, steel, heating, freight and shipping industries, as well as the manufacture of aviation fuels."

Uniper is present in all stages of the hydrogen value chain and has more than 10 projects in its development pipeline. Combined with Fortum's strong market access in the Nordic countries, this presents both companies with the opportunity to actively shape the international hydrogen market.

A concrete example of this type of collaboration is the project for the production of sustainable methanol with renewable hydrogen, with which the chemical company Perstorp is to be supported in significantly reducing its carbon emissions in Sweden.

"This is a real partnership project between Uniper and Fortum," said the statement.

Vestas continues offshore wind drive

Danish wind turbine manufacturer Vestas is continuing its drive to become a leader in offshore wind with the completion of the acquisition of MHI Vestas Offshore Wind. Closure of the deal formally ends the 50/50 MHI Vestas Offshore Wind A/S joint venture.

After securing regulatory approval, Vestas bought MHI's entire stake in the offshore wind turbine outfit to merge it back into the group. In exchange, MHI acquired 2.5 per cent in Vestas and earned a nomination to the Danish group's board of directors.

Capital increase, which saw Vestas issue roughly 5.05 million of its shares to MHI, has been completed, the turbine company said. Organisational integration of Vestas and MHI Vestas Offshore Wind is expected to finalise by February 1, 2021.

"Welcoming offshore back is the beginning of a new chapter in Vestas' history, offering strong growth opportunities towards 2030 and further acceleration of the deployment of renewable energy," said Bert Nordberg, chairman of the Vestas board.

Since divesting its offshore business back in 2013, the company has been in partnership with Mitsubishi Heavy Industries.

Vestas CEO Henrik Andersen said he expects the integration to give the company a stronger position in the industry. "The immediate priority for us will be to integrate offshore into our operating model, which together with a leading offshore product platform and continued focus on execution will enable us to lead the industry overall and accelerate the energy transition," Andersen said.

The company also recently announced that it will be expanding into

project development through a new tie-up with fund manager Copenhagen Infrastructure Partners.

In December, the Danish wind turbine manufacturer said it is investing €500 million in the venture, thereby expanding its push into developing projects.

Andersen said the new deal would help Vestas work across the value chain of clean energy by growing its project development business, which encompasses the permitting, design, construction and operation of wind farms.

Speaking to the *Financial Times*, he said: "We would like to see how we can take a more active role, developing new markets and new projects across the world in the next 10 to 20 years."

The tie-up with CIP – which will launch a new Energy Transition Fund next year, with Vestas as anchor investor – is the turbine maker's biggest step yet into project development.

CIP's managing partner Jakob Baruel Poulsen said the new Energy Transition Fund would focus on expanding in markets outside Europe, as well as 'power-to-X' projects, which convert wind power into other forms of energy such as green hydrogen.

The two partners will not have any exclusivity agreements as part of the deal; CIP is still free to buy turbines from any manufacturers, while Vestas is free to work with other developers and investors.

■ The latest research by Wood Mackenzie finds that Vestas, Siemens Gamesa Renewable Energy and GE Renewable Energy will hold 60 per cent market share by 2029, up from 43 per cent in 2019. It predicts Siemens Gamesa will dethrone Vestas as the top installer by 2025, a position it will keep through the end of the decade.

Rolls-Royce to shed civil nuclear I&C unit

British engineering company Rolls-Royce Holdings plc (R-R) has agreed to divest its civil nuclear instrumentation and control (I&C) operations to French nuclear reactor company Framatome, as part of a stated plan to raise over £2 billion (\$2.67 billion) from asset disposals. The divestiture does not include R-R's UK civil nuclear business or small modular reactor activities.

The deal requires regulatory approvals and is scheduled to complete at the start of the second half of 2021.

Through this acquisition, Framatome will add to its engineering expertise, and expand its global capabilities in

I&C systems. Under the deal, Framatome – which is majority-owned by French electric utility EDF – will acquire the I&C division's activities and teams in France, the Czech Republic and China.

Framatome will incorporate R-R's products and technologies, which are installed in 150 operating reactors worldwide, as part of its I&C portfolio. This transaction will allow Framatome to integrate all safety critical functions, to serve its clients and particularly the French nuclear plants.

"The purchase of the Rolls-Royce Civil Nuclear I&C business aligns with our strategy to ensure the conti-

nity of a strong skill base and to expand our footprint for long-term operations," said Bernard Fontana, CEO of Framatome.

The I&C operation to be sold employs 550 staff and generated revenue of £85 million in 2019.

In November R-R completed a planned £2 billion rights issue, raising funds from the bulk of its existing shareholders to fend off the most damaging effects of the Covid-19 pandemic.

The UK engineering firm has lost 48 per cent of its stock value in the past 12 months and has a current market capitalisation of £10.95 billion.

Equity funding boosts Greencom international expansion plan

GreenCom Networks AG, the Germany-based energy IoT company has concluded its latest financing round of €12 million, led by Shell Ventures and supported by Energy & Environment Investment (EEI) and existing investors. The investment enables GreenCom to expand its strategy of international growth and to further enhance its position in Europe's residential energy IoT (Internet of Things) market.

Shell Ventures, Shell's corporate venture capital arm, and Japanese venture capital firm EEI have joined existing investors such as Centrica,

E.On's Future Energy Ventures, Munich Venture Partners and SET Ventures to further advance GreenCom's technology solutions to digitally connect distributed assets and provide an IoT platform for home energy management.

The new funding from Shell, EEI and existing investors will be used to enhance GreenCom's energy IoT position in Europe, while also leveraging its new investors to penetrate markets outside Europe and connect GreenCom with new heat pump, inverter, and battery storage manufacturers in Asia.

"We have been very impressed by the quality of the technology platform and the management team at GreenCom," said Jurgen Hornman, Investment Director at Shell Ventures. "GreenCom's ability to connect, provide insights into, and control distributed energy assets such as solar PV, battery storage, EV chargers and heating devices of various manufacturers greatly enhances a service provider's ability to offer integrated home energy solutions to end consumers, energy communities and a fast-growing group of prosumers."

10 | Tenders, Bids & Contracts

Americas

GE wind turbines head for Oklahoma

In early December, GE Renewable Energy won an order from Allete Clean Energy for a 265 MW onshore wind turbine order for its Caddo Wind farm, located in Caddo County, Oklahoma, USA. The wind farm will utilise GE's 2.8-127 turbines.

Construction on the project has begun, with commissioning expected in 2021. The agreement also includes a 15-year full-service agreement. According to a previous arrangement, McDonalds will purchase 200 MW from Caddo Wind through a PPA.

Caddo is the fourth wind farm GE Renewable Energy and Allete Clean Energy have built together in the USA. On completion, they will have a combined installed base of over 750 MW.

Tim White, GE Renewable Energy's CEO for Onshore Wind Americas, said: "Our 2 MW platform leverages proven, reliable technology and is ideally suited for this part of the country at a time when the world needs access to clean, affordable energy."

SGRE to service Senvion fleet in Chile

Siemens Gamesa Renewable Energy (SGRE) has signed a 10-year, full-scope service contract with Aela Energia to manage end-to-end O&M for the largest Senvion fleet in Latin America. The contract covers a total of 93 Senvion wind turbines, 50 units at the Sarco wind farm and 43 units at the Aurora wind farm.

The Sarco wind farm is located in the Municipality of Freirina, Atacama region, and has an installed capacity of 170 MW. The Aurora wind farm, located in the Municipality of Llanquihue, Los Lagos Region, has a nominal capacity of 129 MW.

The contract is SGRE's first to service Senvion turbines in the Latin American market, adding 299 MW to Siemens Gamesa's service portfolio.

Aela is a joint venture between Actis (60 per cent), a global fund aimed at investing in developing countries, and Mainstream Renewable Power (40 per cent), a global developer of renewable energy projects.

The Sarco and Aurora wind projects were completed in 2019.

As part of the full-scope service agreement, SGRE will provide remote monitoring, supply chain access and specialty tooling, design and engineering support and software updates.

Microgrid installation at Port of San Diego

EDT Renewables North America (EDFR) has won a contract to build a 700 kW/2400 kWh microgrid infrastructure project for the Port of San Diego, USA. The project is designed to island the electrical infrastructure at the Port's Tenth Avenue Marine Terminal (TAMT).

The project consists of a battery storage system and electrical infrastructure and is expected to achieve \$3.2 million in energy savings for the Port during regular operation over 20 years. The system will provide emergency back-up power to the Port-operated facilities. The microgrid will advance the Port's use of renewable energy.

During typical grid connected operations, the battery system optimises operations by allowing the facility to draw from the stored energy during the utility's expensive evening

on-peak period. The storage system also reduces utility costs by discharging the battery to mitigate spikes in usage. During a power outage, instead of using only a diesel generator for backup power, the microgrid can support the facility resulting in fuel savings and reduced greenhouse gas emissions.

CPS issues RFP for 1.4 GW of capacity

CPS Energy, the US electric and gas utility, issued a Request for Proposal (RfP) for up to 900 MW of solar and 50 MW of energy storage capacity at the end of November. It is also seeking proposals for 500 MW of firming capacity.

The Texas-based CPS Energy said that it launched the RfP to support its FlexPOWER Bundle initiative, through which it aims to replace ageing power generation capacity and introduce new technologies.

Both large- and small-scale proposals for solar, energy storage, and new technologies are invited. Community solar and storage projects are also eligible. All interested parties will be able to bid by February 1, 2021. Shortlisted candidates will be announced in summer 2021.

Asia-Pacific

Vestas turbines for 50 MW projects in Vietnam

Vestas has won an order to supply and supervise installation of V150-4.2 MW wind turbines for the two 50 MW projects Nhon Hoa 1 and 2 Wind Farms in the Gia Lai province of Vietnam. Both projects are expected to be commissioned by the third quarter of 2021.

The order was placed by Phu Dien JSC, one of Vestas' biggest customers in Vietnam. Phu Dien signed contracts for two other projects with a combined capacity of 88 MW earlier in the year.

Once the projects have been commissioned, Vestas will start a 20-year full-scope Active Output Management 5000 (AOM5000) service agreement for both projects. The agreement contains a yield-based availability guarantee.

Voith secures Asahan 3 hydro contract

Mitsubishi Corporation has awarded Voith Hydro the electro-mechanical equipment contract for the Asahan 3 hydropower project in Indonesia. The plant will be operated by the state-owned utility Perusahaan Listrik Negara (PLN). The project is supported and financed by Japan International Cooperation Agency (JICA).

Voith will be responsible for the design, manufacture, and supply of two 87 MW vertical Francis turbine and generator units. It will also provide the control system, complete electrical and mechanical balance-of-plant equipment, and a 150 kV switchyard.

The project is scheduled for completion in 2024 and will support Indonesia's target to achieve a renewable energy share of 23 per cent in its energy mix by 2025.

Europe

EDF to optimise largest UK battery site

Gresham House Energy Storage Fund, the UK's largest listed battery storage fund, selected EDF to optimise its new 50 MW battery site at Wickham Market. This site is capable of storing 75 MWh of energy and is the UK's largest battery installed to date.

EDF and its controls partner Upside Energy will direct the battery's

energy flow into all markets including Dynamic Containment, generating revenue both within and outside the National Grid.

EDF supported Gresham House Energy Storage Fund through the asset's initial operational period. Now the site is operational, EDF will operate the asset. The site will utilise EDF's Powershift platform, which is already optimising a range of storage technologies in the UK.

Haliade-X for Dogger Bank

GE Renewable Energy has secured a preferred turbine supplier contract to provide its 14 MW Haliade-X wind turbine for the third phase of the Dogger Bank offshore wind project. The 14 MW Haliade-X is an upscaled version of the 13 MW unit, which will be installed at Dogger Bank A & B. Dogger Bank C will mark the first time it is installed at any project worldwide.

Installation of the turbines for Dogger Bank C is due to start in 2025, with completion of the overall project in 2026. The Turbine Supply Agreement and the Service and Warranty Agreements for Dogger Bank C will be finalised in the first quarter of 2021, confirming the order and number of turbines, subject to reaching financial close in late 2021.

Cypress turbines selected for Cuevas de Velasco

GE Renewable Energy has announced that it has been selected by Azora to supply 19 Cypress onshore wind turbines for the 100 MW Cuevas de Velasco wind farm located in the Cuenca province in Spain. Each Cypress turbine has a rotor diameter of 158 m and will operate at 5.5 MW.

This is GE's first order in Spain for the Cypress platform. GE's scope of work will also include a 30-year services agreement.

The Cypress two-piece blade will be produced by GE's wind turbine blade subsidiary, LM Wind Power. The wind turbine towers will be produced in Spain, and the nacelles will be produced at GE's factory in Salzgitter, Germany.

According to Spain's National Energy and Climate Plan (PNIEC), the country intends to reach 50 GW of installed wind power by 2030, requiring the installation of 2300 MW annually during the decade.

Siemens Energy to stabilise Baltic grid

Estonian transmission system operator Elering AS has awarded Siemens Energy with a contract to build three synchronous condenser plants in Estonia. This is the first Flexible Alternating Current Transmission System (FACTS) Siemens Energy will install in the Baltic States. The three synchronous condensers will help stabilise the grid and manage the ongoing integration of renewable energy generation.

Siemens Energy is responsible for the design, supply, and installation of the three 330 kV synchronous condenser plants. These will be located at Püssi, Viru and Kiisa in the north of Estonia. The synchronous condensers will provide short-circuit power and inertia for stable operation of the Estonian grid while also providing or absorbing reactive power.

Each of the three plants will be able to provide the grid with reactive power of 50/+50 MVA and up to 1750 MW-seconds of inertia. They will have a short-circuit capability of more than 900 MVA. The plants will be commissioned successively between April 2023 and May 2024.

Linxon secures Viking Link extension

Linxon has won an order to deliver extension work for the National Grid Bicker Fen 400 kV substation to facilitate its connection with the Viking Link interconnector.

Viking Link is a 1400 MW HVDC link between the British and Danish transmission systems, connecting the Bicker Fen substation in Lincolnshire, England and the Revsing substation in southern Jutland, Denmark.

The link is a joint venture between the UK's National Grid Ventures and Denmark's Energinet.

The interconnector project involves construction of a converter station in each country, connected by submarine/underground cables. The Viking Link will be around 760 km long.

Linxon's scope of work includes the extension of double busbars, bus coupler and two interconnector bays, including civil works. The majority of the Linxon project work is scheduled for completion by October 2022.

Synthos orders Ansaldo Energia gas turbine

Ansaldo Energia has been awarded a contract worth around €50 million by Polish chemical company Synthos for the supply of an 80 MW AE64.3 gas turbine along with the related maintenance.

The turbine will be part of a combined cycle plant unit that will replace an old coal boiler at the Oswiecim plant.

The new unit will guarantee the production of electricity and process steam for the production of rubbers and polymers, as well as heat for local district heating.

International

Thermal storage for Dubai solar complex

ALEC Energy of the United Arab Emirates has ordered a thermal energy storage unit for a project at the 950 MW phase IV of the Mohammed bin Rashid al Maktoum solar complex in Dubai from Swedish energy company Azelio. ALEC Energy is leading the EPC for phase IV of the mega-project.

In early December, Azelio said that its TES.POD unit will form part of a system powering a visitor centre at the phase IV site.

Azelio said that the system designed for the visitor centre will combine its technology with PV and fast response equipment such as lithium-ion batteries. It said that the TES.POD unit will handle energy shifting for baseload power in the system, while the batteries will manage mini-grid stability.

Vestas signs Australian wind deals

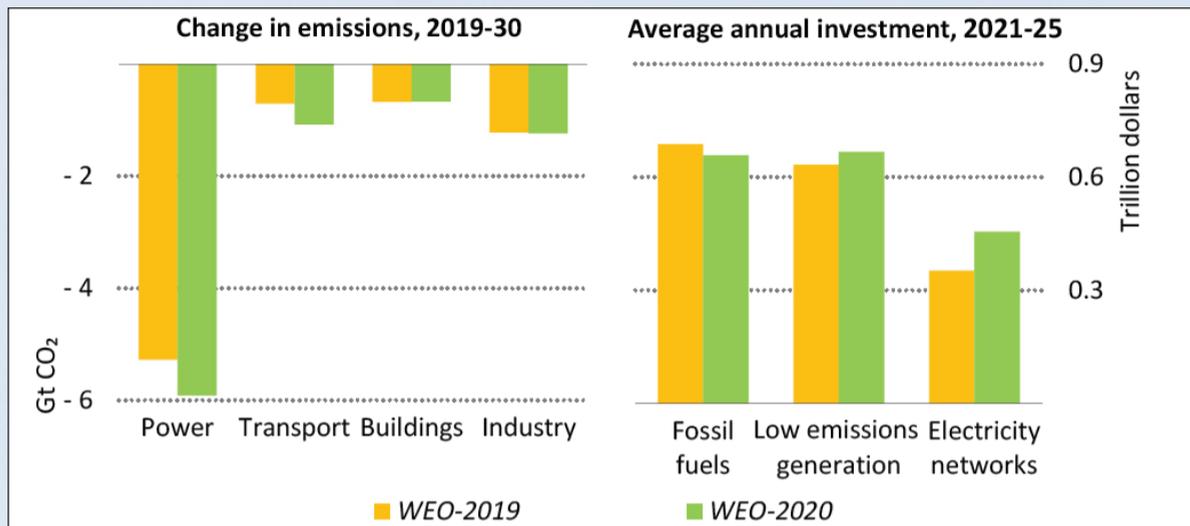
Vestas has won a contract for two wind projects in Victoria, Australia, with a combined capacity of 328 MW. The order includes the supply and installation of 52 V136-4.2 MW wind turbines for the Ryan Corner Wind Farm as well as the EPC of 26 V136-4.2 MW wind turbines for the second stage of Berrybank wind farm. Vestas has a 15-year Active Output Management 5000 (AOM 5000) service agreement for both projects.

Vestas is in partnership with Global Power Generation, a subsidiary of the power company Naturgy Group, for both projects.

Delivery of the turbines for both projects is scheduled for the third quarter of 2021, with commissioning due in the third quarter of 2022.



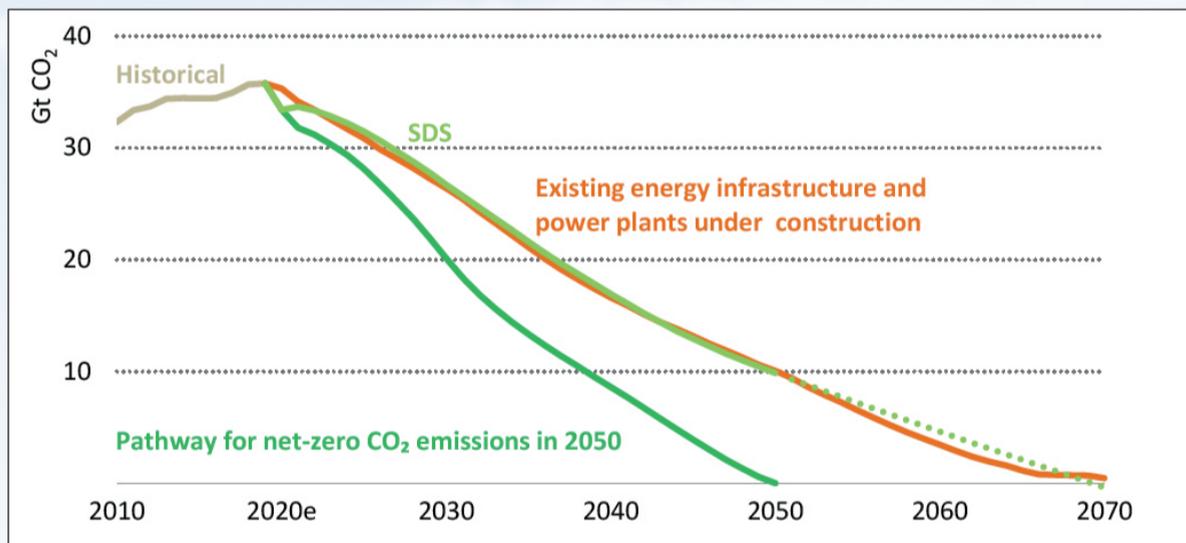
Change in CO₂ emissions by sector, 2019-2030, and average annual investment 2021-2025 in the Sustainable Development scenarios in WEO-2019 and WEO-2020.



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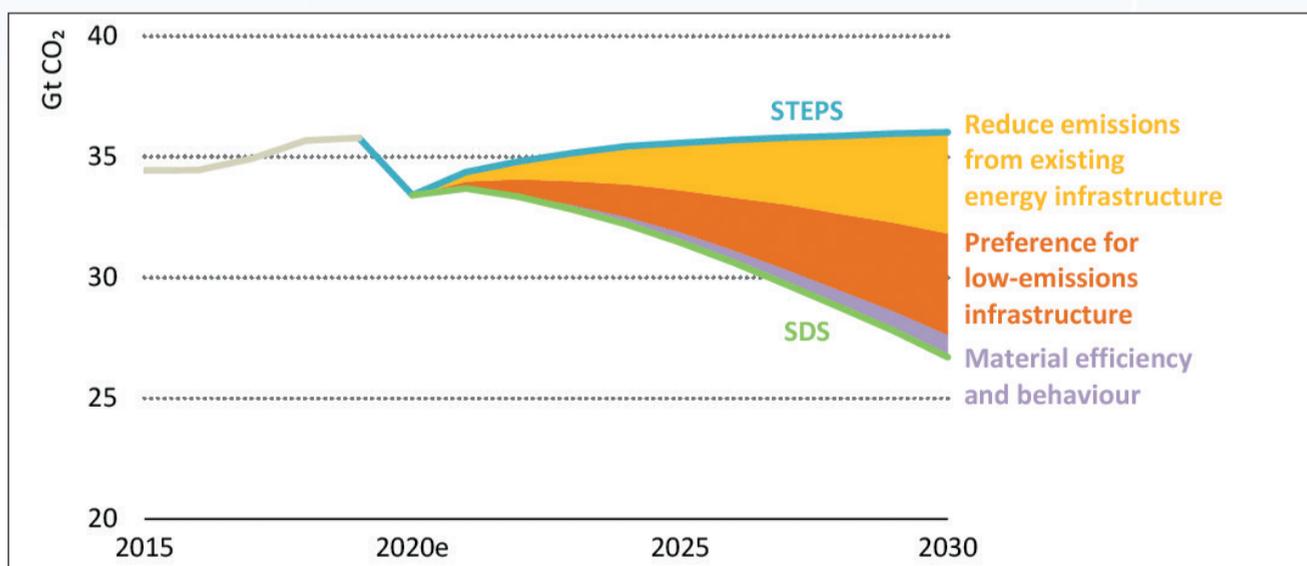
World Energy Outlook 2020, © IEA/OECD, Figure 3.7, page 101

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



World Energy Outlook 2020, © IEA/OECD, Figure 3.8, page 102

CO₂ emissions reductions in the Sustainable Development Scenario relative to the Stated Policies Scenario



World Energy Outlook 2020, © IEA/OECD, Figure 3.9, page 103

Hydrogen

Hydrogen prime candidate for fuelling energy transition, says study

- Cost of green hydrogen has to fall by more than 50 per cent by 2030
- Electrolyser construction costs could decrease by 30-50 per cent

A new study conducted by S&P Global Ratings finds that hydrogen can play a big role in pushing the energy transition forward provided policies are coordinated, production costs decline, and there is significant growth in renewables.

Hydrogen has historically occupied a niche in refining, chemicals and ammonia fertilisers because it is more expensive to produce than conventional fuels, the study points out. Hydrogen priced at \$2.00/kg can be equated to a gas price of \$17.60 per million BTUs.

According to the study, government decarbonisation policies and long-term emissions targets are strengthening the case for low carbon hydrogen, but the cost of producing it from renewables would have to more than halve by 2030 to make hydrogen a viable alternative by that time.

Blue hydrogen, which is produced from natural gas power generation sources coupled with CO₂ capture and storage facilities, could make advances as it is now more cost efficient than

green hydrogen, which comes solely from solar and wind generation. But in July 2020, the European Commission announced its hydrogen strategy, giving a priority focus on green hydrogen. Green hydrogen production targets for 2030, announced recently by Germany, France, Portugal, Spain and the Netherlands, account for more than 50 per cent of the EU's 40 GW target for installed electrolyser capacity by that year.

The study cites a Hydrogen Council report that suggests hydrogen could account for 15 per cent of global primary energy supply by 2050, yet producing that much hydrogen will face huge costs. Therefore, it is likely that advances in hydrogen production and use over the next decade will concentrate on commercial transport vehicles, assuming that the cost of fuel cells decline.

A full-fledged hydrogen economy, one in which hydrogen is used for heating buildings and balancing the power grid, lies beyond 2030, the study says. That scenario will require zero-carbon

policies and renewables comprising at least 70-80 per cent of the power mix, considering that the most cost-efficient way to decarbonise is to replace coal and gas fired power with renewables.

Supplying sufficient cost-competitive green hydrogen will not be easy, according to the study, citing market projections that suggest green hydrogen costs will drop by over 50 per cent by 2030, to around \$2-3/kg from \$3-6/kg today. This means a price closer to the blue hydrogen cost of \$2/kg.

The study says achieving a reduction of green hydrogen production costs to \$2/kg requires low-cost renewable power of \$25/MWh, while operating electrolysis plants at 50 per cent capacity with storage costs no higher than \$0.30/kg.

Steep declines in green hydrogen costs are possible by 2030, the study says, with cost reductions coming from three factors: first, the levelised cost of electricity (LCOE) for renewable power; second, capital investment costs of electrolysis plants (30-40 per cent of total costs); and third,

an increase in capacity utilisation factors to 50 per cent from 40 per cent would reduce the cost of hydrogen by \$0.20-0.30/kg.

The study says large-scale electrolyser construction costs could decrease by 30-50 per cent if their construction expands. It also notes that a decline in capital expenditure for electrolyser plants by \$250/kW would cut the cost for hydrogen by \$0.30-0.40/kg and says that it anticipates a substantial decline in the cost for such plants to \$400-500/kW from more than the current price of \$1000/kW because industrial scale plants capable of producing over 100 MW are being contemplated, compared to the 2-3 MW plants of today.

Developing hydrogen markets will primarily be influenced by future policy choices, the study says.

Apart from the cost competitiveness of hydrogen relative to other low-carbon alternatives, policies will likely need to consider the carbon impact, complexity of hydrogen-infrastructure investment, and future

changes to carbon pricing or import taxes once subsidies are phased out, to ensure competitiveness of existing conventional fuels, according to the study. Of equal significance is the price sensitivity of direct hydrogen buyers or end markets. Policies will likely be implemented at the national level, and thus also reflect local industrial and employment considerations.

Projecting how and when a hydrogen economy might take shape is subject to a lot of uncertainty, the report says. In the case of Europe, hydrogen will have a marginal impact on companies in 2020-2025, it says, adding that this is because policies and direct subsidies must be clarified first. Between 2020-2025, the study projects further progress in the refining, chemical and fertiliser sectors, along with heavy transport and possibly green ammonia fertilisers.

In the long term, the study says, hydrogen could become more than a niche fuel if abundant cheap renewable electricity is available and other end markets take off.

Gas

LNG to advance during Biden presidency, despite pro-climate agenda

While US President-elect Joe Biden is being urged to ban fracking altogether, he is expected to take the step to ban the methane leaks from gas wells, making gas production, and subsequently LNG production, cleaner. This could boost exports of US LNG to Europe and other markets.

Gary Lakes

The US LNG industry is expected to make substantial gains during the coming administration of President-elect Joe Biden despite plans to implement pro-climate policies aimed at reducing greenhouse gas emissions. Actually, a return to more strident emission regulations could wind up benefitting the LNG industry.

According to one recent report, Biden intends to bring a halt to methane gas emissions from natural gas wells. Methane emissions have become an issue with European consumers who are planning to observe strict measures to reduce polluting fuels, whether in their use as fuel or through their production.

European gas consumers are under pressure to take note of their LNG supply sources, and US frackers are known to be responsible for a high volume of methane leaks. France recently refused a shipment of US LNG because of the volume of methane

associated with its production.

The French government stepped in last autumn to prevent French trading company Engie from signing a 20-year, \$7 billion deal to import US LNG from the NextDecade export facility in Brownsville, Texas. The gas feedstock for the facility is reported to be coming from fracked wells where there are uncontrolled leaks for methane gas.

The regulatory roll-backs implemented by the Trump administration, especially those concerning methane emissions, and the US industry's failure to reduce emissions, have caused concern within EU markets that are planning to use gas as a bridge to cleaner energy sources. But if production of the LNG is linked to large volumes of gas emissions, it is being considered just as dirty as oil or coal.

While Biden is being urged to ban fracking altogether, he is expected to take the step to ban the methane leaks from gas wells, making gas production, and subsequently LNG production, cleaner. Gas producers are expected to

grumble with any regulation, but a step like this could very likely boost exports of US LNG to Europe and other markets if it shows itself to produce lower emissions.

A recent forum on LNG put together by *Petroleum Economist* determined recently that Biden's low-carbon agenda is not likely to slow energy projects that are already underway. One panelist pointed out that the US has more than 26 billion m³ (bcm) of gas projects approved and underway, and it would be a challenge to stop them. The industry expects the Biden administration will look at methane regulations and probably ban fracking leasing on federal lands, the panelist said, but that is not expected to have a significant impact on the industry's export outlook.

The European Union is putting considerable support into hydrogen as a future fuel, but in the meantime, natural gas will fill the gap as steps are taken to reduce the use of coal and petroleum products. The better the quality of gas from the US, the better

for US producers.

China is also expected to be a major market for US LNG if Biden can improve trading arrangements with Beijing. It could take months or years for the two countries to come to a suitable agreement, but gas demand in China is expected to grow, and as such, it is an important market for the US.

US exports of LNG to China resumed last March after an interruption of more than a year. But since then, China has imported, or will import during 2020, a total of 49 cargoes with an aggregate volume of 7.92 bcm, or 168 billion ft³ (bcf) of gas, according to data intelligence firm Kpler. China has received 24 US cargoes since October, Kpler reports, signalling that the China market is reopening for US LNG.

Natural gas feedstocks to US LNG facilities now averages 11.5 bcf per day, and more than double that is planned. In December, with just a few weeks left in the Trump administration, the US Department of Energy extended several long-term LNG

export authorisations to US companies that are good until 2050. Previously, authorisations were issued for 20 years. With these latest extensions, there are now 13 LNG facilities with authorisation to export LNG until 2050. Also included is the Costa Azul facility in Mexico owned by Semptra Energy. The plant will import and liquefy US natural gas for export.

A number of recent projections have forecast a favourable path ahead for LNG, but much will depend on how strictly global governments will adhere to the Paris Climate Accord parameters and what impact that could have on gas demand, especially within the EU. Innovations in the use of hydrogen will also impact future gas demand, but while there are nearly daily reports of advances in hydrogen research and its implications for energy use, that side of the energy industry remains in its infancy. In the meantime, there is gas, and the best thing that Biden could do for US gas is to make it as clean a fuel as possible.

A new era for transatlantic climate cooperation

There is renewed hope that the incoming Biden administration will push the energy transition back up the US government agenda and galvanise global efforts to combat climate change. **Junior Isles** speaks to the Edison Electric Institute's Vice President for International Programs, Dr Lawrence Jones, about what the election of Joe Biden could mean for the world of energy.

As the dust slowly settles following the US election, there is renewed hope that under the incoming Biden-led administration the world will now be able to act in greater unison in tackling the climate emergency. And although President-elect Joe Biden has vowed to re-join the Paris global climate agreement and laid out plans to put low-carbon energy at the heart of the country's economic recovery, there is still much debate around what that low carbon economy will look like and how transatlantic collaborations will pan-out.

Dr Lawrence Jones, Vice President International Programs at the Edison Electric Institute, which represents all US investor-owned electric companies and has more than 65 non-US electric company members with operations in 90 countries, is one of those who believes that the new government could provide a shot in the arm for the battle against climate change.

"The declarations of the new administration thus far are very important from a global perspective. Under the previous administrations, the US was a global player on the climate stage and really drove the Paris agreement home. Its disengagement over the last four years has created some concerns. So, re-engagement by the US is extremely important, not just in terms of sending the right signals but also in terms of taking the right actions."

Certainly, there is already much activity in the US at the state level, with a number of states bullish on their own climate objectives, but the signals at the federal level are important in galvanising the private

sector. And actions like the creation of a new climate envoy in the form of former Secretary of State, John Kerry, who played a major role in negotiating the Paris agreement, will strengthen the belief that the US is back in the game and keen to re-establish its climate credentials as a nation.

"Based on conversations with industry leaders around the world, there is expectation that the US will come to the table with concrete actions and not just words," said Dr Jones, "And I think that the creation of the climate envoy is at least one action that indicates that the incoming administration is going to prioritize this topic."

The world will be taking note of how fast the US sets about putting any rekindled climate ambitions into practice. How much the incoming Democrat administration can achieve in reaching any new clean energy targets – especially if the Republicans secure a majority in the Senate – is, however, certainly a topic for debate.

Biden's climate plan released in July promised \$2 trillion over four years to fund clean energy and infrastructure as a way of reviving the US economy. It is a huge number, which some argue will most likely have to be scaled back. The President-elect has said he will target net zero emissions by 2050, and for all electricity to be emissions-free by 2035. He has also pledged to electrify large parts of the country's transit network and crack down on pollution.

But while politics and changing governments can set goals and targets, it is the general direction of travel that is most important.

"Targets are targets, actions matter," said Dr Jones. "I remember many years ago when the UN came up with their Millennium Development Goals. The aim was to have these goals met by 2015 but as we neared the date, another target, 17 Sustainable Development Goals (SDG), was set in 2016 to be met in 2030 – soon here by the way."

"One thing a target does, is it sets a timeline and creates an ambition, which is one way to catalyse bold actions... today several countries have set net zero targets – many with different timelines. Targets galvanise a level of engagement from the private sector; the momentum that comes with setting these targets arguably is more important than the actual targets themselves."

"In the US, for example, the Obama Administration's Clean Power Plan called for the electric power industry to reduce its carbon dioxide emissions by 32 per cent by 2030. As of the end of 2019, we had reduced emissions by 33 per cent, hitting the target a decade early."

We have seen the impacts of targets in many OECD and emerging economies in terms of the energy system transition.

As Dr Jones pointed out: "While

the direction of trajectory of the energy transition may be set by policies, there are many external factors that ultimately determine the pace and permanence of systemic change. Politics alone cannot ensure change. Instead, as we are seeing across the globe, the collective actions of the private sector and citizens around the world are critical to realising a clean energy future. But how we get there – the pathways – consist of diverse policies and investment strategies, etc."

In addition to continuing the drive to install wind and solar, all indications are that low carbon technologies more broadly will be a focus of the incoming administration.

Dr Jones firmly believes nuclear will be "part of any strategy" aimed at achieving net zero globally. "Looking at other trends around the world, we cannot safely and reliably decarbonise by excluding nuclear," he said. "And not just large nuclear but also small modular reactors."

Noting that "wind and solar alone is not going to get us there", he sees two other areas of focus – hydrogen and carbon capture utilisation and storage (CCUS).

Dr Jones says that although hydrogen has several benefits, the question is how to generate it. "The generation of hydrogen has to be clean. There are some parts of the world, such as Australia, Japan and Norway, for example, where companies are doing some impressive things. The UK government is also looking at hydrogen." He added: "Although it's been talked about for years, I also think a breakthrough could be coming very soon for CCUS. The cost issue is real but over time we will see it come down."

He also noted that large long duration energy storage would be "part of the equation" in terms of commercial technologies that will have a big impact. "In short, the technological innovation that is necessary to drive decarbonisation is in sight and private investors are looking at it as a growth opportunity enabled by the right public policies."

While President-elect Biden's stance on the role of fossil fuels in the energy mix and the future of fracking is not completely clear, it is likely that gas will still be a key part of the generation mix of any realistic energy transition. "And it should be," said Dr Jones. "As we talk about transitioning the energy system, we have to understand that every nation has a different energy mix... I don't know whether the Biden administration will put a stop to the use of natural gas because the reality is, to bridge into the 21st century you need some flexibility in the system. This will partly come from flexible gas fired power plants for resilience and reliability."

Like many countries around the world, the incoming administration sees clean energy as a route to economic recovery in the aftermath of

the Covid-19 pandemic. Dr Jones sees a clear link between the pandemic and climate change efforts, not just in the US but globally.

"I call it the three C's – climate, Covid and cost – because in a sense, if done in a holistic way, the impact of Covid [on tackling climate change] could be minimal. One has to ask: where are the future jobs coming from? Covid presents an opportunity to seriously rethink how to create a new set of jobs in a low carbon economy. The bottom line is, we have to rethink life."

Like most of the world, Dr Jones hopes the Biden administration will make international collaboration a priority. He sees the appointment of a climate envoy and talk of creating a "czar" to focus on relationships with Asia, as good signs that the US will start rebuilding "relationships that have struggled or ones put on ice for the last four years".

He said: "Global collaboration is essential for addressing global challenges and the incoming administration has declared it a priority; let's hope they can put the actions in place so we can all benefit from greater collaboration."

There is plenty to be done from a global perspective and the EU is already sending the right signals to the incoming Biden administration. On December 2, Brussels proposed a 'new EU-US transatlantic agenda for global change'.

The agenda spans four areas, one of which is climate change and biodiversity. The EU is proposing to establish a comprehensive transatlantic green agenda, to coordinate positions and jointly lead efforts for ambitious global agreements, starting with a joint commitment to net zero emissions by 2050.

Dr Jones stressed, however, that the economics of climate change must be at the forefront of the energy transition. "We have to spend more time on it because that's where things can fall apart. It has to be just and equitable," he said. "If it's not done right, we are in danger of creating significant energy policy challenges – even in a place like Europe. It's an area the incoming administration should also prioritise. This transition will create challenges for some aspects of our economy and some of our citizens in terms of jobs. So, it's an economic debate as well as a climate debate."

Dr Jones' final piece of advice is for global leaders to advocate what he calls an "inter-generational dialogue" on climate. He concluded: "We can't have a world where most of the people fighting for change are the youth, while the ones making decisions are the older people; there's a disconnect between the urgency of addressing existential global challenges. We need a movement where we start to bring everyone – all demographics – together to create solutions that are fit for a sustainable future and planet for all."

Dr Jones says global collaboration "is essential" for addressing global challenges and the incoming administration has declared it a priority





Coal may no longer be leading carbon capture and storage progress but there is a chance the technology could still provide a lifeline for some coal fired power plants, especially in Asia. **Toby Lockwood** explains.

Despite everything, 2020 turned out to be a good year for carbon capture and storage (CCS), with both the UK and Norway committing to spend big on new infrastructure to store CO₂ emissions deep beneath the North Sea. In the US, the climate change mitigation technology received early backing from the President-elect. CCS has previously struggled under half-hearted support, cast by critics as a desperate bid by fossil fuel companies to maintain the status quo. Following an initial wave of political interest in the 2000s, relatively few large projects were realised, and many high-profile initiatives fell through due to rising costs or insufficient backing.

The recent rise of corporate and national net zero carbon targets has been instrumental in putting CCS back in the frame – now a fundamental means of making the numbers add up. Several governments have concluded that carbon capture must finally be cracked, while oil and gas companies – who crucially have the engineering expertise to store the greenhouse gas – have scented a business opportunity, which could also secure their long-term future. CCS advocates now hope that the technology will feature heavily in post-Covid stimulus packages.

But CCS today looks quite different to CCS ten years ago. Where once the technology was practically synonymous with ‘clean coal’, coal power now appears low on the agenda. This is perhaps unsurprising, given that in Europe and North America, where interest in CO₂ capture is greatest, coal is in sharp decline. The political focus is increasingly on emissions from process industries such as steel and cement, as well as the idea of decarbonising the production of hydrogen from natural gas. While some countries still envisage a role for CCS-equipped power plants in balancing renewable generation, the

vision – and sometimes the economics – has shifted in favour of gas or biomass-fuelled plant. The association with coal is seen by some as an embarrassing relic of the technology’s less successful past.

Where does this leave coal power? CCS was once regarded as the salvation of the sector, capable of ushering in a more sustainable future and averting plant closures. The technical feasibility of fitting CO₂ capture to a coal plant has been demonstrated over the last decade by pioneering projects at Boundary Dam 3 in Canada, and Petra Nova in Texas, which both achieved their performance targets after some initial teething problems. Based on this experience and other advances, capture technology manufacturers claim cost reductions of around a third are possible for a next wave of coal plants. But any kind of CCS is still a costly business, which makes little commercial sense unless it can be used to generate some kind of revenue.

In 2018, the US took a major step towards creating just such a business case with the expansion of the existing 45Q tax credit to directly reward CCS – raising it to \$35 per ton of captured CO₂ used in enhanced oil recovery projects, and up to \$50 per ton for storage in saline aquifer formations. A thriving market for CO₂ to boost flagging oil well production has long put the US at the forefront of CCS developments, but these revenues are too low to fund capture of the greenhouse gas from relatively dilute, large-scale emitters like power plants. The new credit therefore represents an effective income stream, which could put many more projects in the black.

Even with 45Q, and the slightly perverse ‘advantage’ of producing large amounts of CO₂, fitting CO₂ capture to coal plants is still on the brink of profitability, particularly for

first movers. The US Department of Energy (DOE) has therefore helped fund detailed engineering studies for CCS on nine existing power plants – five coal fired and four gas fired. Located across the country, the projects tend to feature cheap coal and communities with an interest in retaining a vital local industry. Several are also backed by capture technology providers keen to prove their worth on a full-scale plant. Most claim they will achieve a capture cost of around \$45 per ton of CO₂ – coming in conveniently below the 45Q level.

Aside from oil recovery projects, a major initial barrier to CCS expansion has been the costly, time-consuming process for characterising and permitting geological storage sites. The DOE’s ‘CarbonSAFE’ initiative, which is performing this work for several suitable formations around the country, is therefore a huge benefit for coal power plans including Prairie State in Illinois, Project Tundra in North Dakota, and Dry Fork in Wyoming. An initiative at San Juan Generating Station in New Mexico, meanwhile, plans to simply link up to the existing nearby network of CO₂ pipelines for the oil industry.

With coal power in the US already struggling to compete with cheap gas, CCS seems unlikely to forge a future for new coal capacity, but it may well extend the lifetime of some well-located generators with healthy demand and limited gas. The justification for the current wave of projects often rests on a comparison between the cost of fitting CO₂ capture to the unit with the cost of its replacement by a new gas-fired plant, while recognising that no matter how cheap wind or solar gets, some backup will be needed.

Following the mothballing of the Petra Nova capture project in May 2020, the new initiatives have also been quick to point out the unusual business model of the Texas facility, which encompassed ownership of an oil field and was therefore intimately linked to falling oil prices. Some of the projects will directly claim the tax credit, and others will look to secure stable offtake agreements for CO₂. Proposed legislation aims to further strengthen 45Q by converting it to a direct cash payment and extending the deadline to begin construction – currently set at the end of 2023.

Completing at least some of these 45Q-driven coal projects in the US will be vital in further establishing the technology and reducing costs, but the real market for CCS with coal power will always be in Asia. The massive global scale of coal emissions was a key reason for the initial focus of CCS on coal, and it is not a problem which has gone away. Well over half the world’s coal capacity has been built in the last 20 years, with 90 per cent of that growth taking place in Asia and two thirds in China alone. Existing coal plants will pro-

duce over 100 Gt of CO₂ if allowed to see out their normal economic life.

Although China has been active in CCS research since the 2000s, even setting up some fairly large-scale facilities, real political support seems to have balked at the idea of burning more coal for less power. However, following President Xi Jinping’s September announcement of a target to reach ‘net zero’ in 2060, many expect this stance to change. With its huge fleet of mostly ‘cookie-cutter’, efficient plants built in the last 15 years, good domestic capture technologies, and favourable geology for CO₂ storage, the stage seems set for mass CCS roll-out.

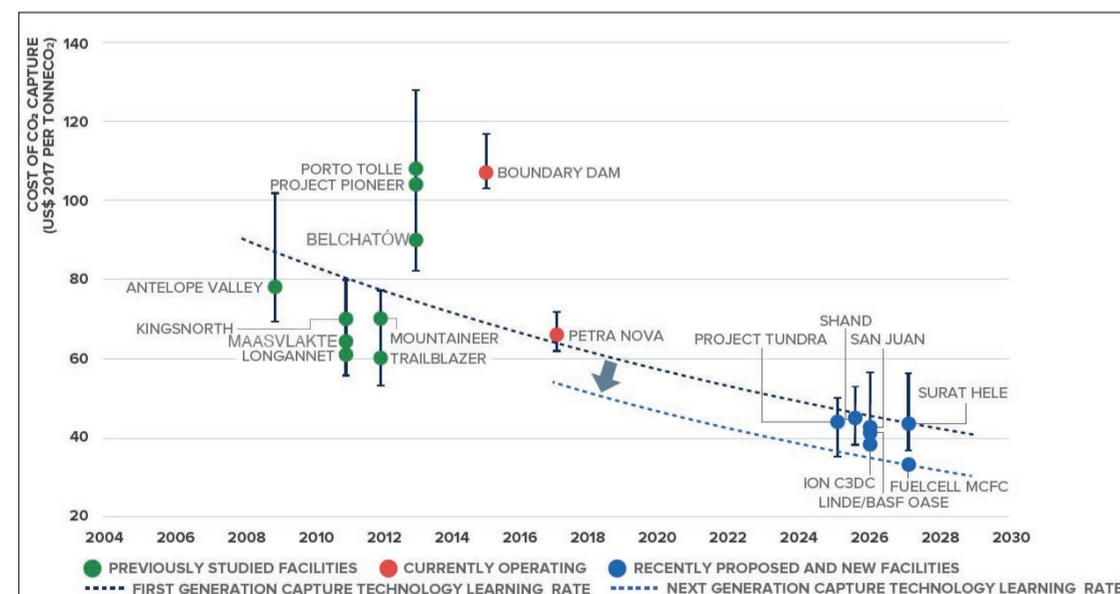
Prior to the net zero announcement, interest in CCS for the power sector was already growing, partly as a result of an average CO₂ emissions intensity target placed on the country’s major power companies. Given China’s highly regulated power market and current excess of coal capacity, awarding CCS-equipped plants with guaranteed operating hours is often proposed as an initial driver. Although next steps in China also seem centred in the oil and gas sector, such as an initiative in the far west of the country led by the Oil and Gas Climate Initiative and China National Petroleum Corporation, a few coal power projects are on the drawing table.

Coal may no longer be leading CCS progress, but there is a chance it can follow. Much of the current shift in direction is linked to a widespread realisation that the major hurdle to overcome is the development of shared infrastructure for CO₂ storage and transport – an activity naturally dominated by the oil and gas sector. If a viable CO₂ storage service industry can be created, then emitters of all types will be free to concentrate on capturing CO₂ and selling it at the plant fence. Why shouldn’t a coal plant tap into such infrastructure if the price is right? Might even Germany consider equipping its many new, efficient coal plants with CCS, perhaps for the CO₂ to be shipped to vast North Sea stores? On the other hand, the ‘pay to take away’ model proposed in Europe will not favour the high CO₂ intensity of coal in the same way as 45Q currently does.

While not even CCS is likely to alter the anti-coal mood in Europe, the technology must surely play a role in decarbonising China and the many other Asian countries where coal remains king. In these regions, a protracted shift from coal to gas would merely delay the eventual need for CO₂ capture on all fossil plants. So far, lower-income economies have understandably hesitated to properly back CCS while the West still dithered – now, the world will be watching their next move.

Toby Lockwood is Senior Analyst at the IEA Clean Coal Centre.

Levelised cost of CO₂ capture for large scale post-combustion facilities at coal fired power plants, including previously studied facilities



Capturing carbon direct from the air

Climeworks direct air capture plant close-up
Copyright Climeworks - Photo by Julia Dunlop



Capturing carbon dioxide directly from the air could be an important part of the toolkit in getting to net zero emissions by 2050. Climeworks plans to demonstrate the possibilities at a geothermal plant in Iceland.

Dr. Nathalie Casas

Over the last century, the Earth's temperature has risen by 1.14 °C, largely due to atmospheric carbon dioxide produced by human activity. Solving the climate crisis is possible but it will not be easy. As UN Secretary-General António Guterres remarked: "The climate emergency is a race we are losing, but it is a race we can win".

The way we win is by tackling the challenge from multiple angles at the same time and creating a whole solution. Energy will always be an important part of this — whether for recycling plants, the production of energy efficient technology, or simply to keep the lights on. Clean renewable energy supplies are, therefore, going to play a major part in achieving net zero emissions by 2050.

Yet, even if we managed to completely revolutionise the economy, and made every product more energy efficient, we would still have historic high levels of CO₂ in the atmosphere and would still be adding to it because some sectors, such as aviation, are hard to fully decarbonise.

So, along with finding ways to reduce the amount of carbon dioxide being added to the atmosphere, we also need to find ways to remove unavoidable emissions as well as the CO₂ already in the atmosphere. The obvious way to remove CO₂ is by planting trees. Yet, the number of trees required is huge and conflicts with the need for space, so it's hard to see how tree planting can be the only answer.

Climeworks is a company that is supplementing the CO₂ removal work of trees with a rather more high-tech solution: direct air capture. Carbon dioxide is captured directly from the air by sucking it through one of the company's CO₂ collectors that contain a patented filter material, which binds the CO₂. When the filter material is saturated,

the collector automatically closes, and is gently heated. At elevated temperatures the CO₂ is then released from the filter material, and can be collected. Subsequently, it can be up-cycled into climate-friendly products such as carbon-neutral fuels and materials, fertiliser for greenhouses or for carbonating fizzy drinks; or it can be safely and permanently stored. Afterwards the collector re-opens and starts the whole process again. This cycle happens thousands of times a year to capture tonnes of CO₂ from the atmosphere.

The real magic to the process is the filter material. Climeworks has developed several actively used classes of filters based on well-known and understood materials, as well as experimenting with new materials to develop new and improved efficiency filters.

Since the whole process takes energy to complete, Climeworks is working closely with renewable energy providers, situating its direct air capture plants near renewable energy generation facilities to make the process as efficient as possible. Using energy from fossil fuel power plants would require the capture of far more CO₂ to see a net benefit and is, therefore, not an option for Climeworks.

In Iceland, this relationship with renewable energy providers is taken one step further. Iceland meets almost all its energy needs from renewables, with around 73 per cent coming from hydropower and 27 per cent from geothermal. Climeworks works closely with Reykjavik Energy, a geothermal power producer, and its subsidiary Carbfix, specialised in CO₂ storage. Carbfix mixes Climeworks' air-captured CO₂ with water and pumps it underground where the CO₂ is mineralised, and turns into stone — it is thus permanently and safely removed from the atmosphere.

This fairly unique arrangement means Climeworks' new plant in Iceland, named Orca, has all its energy needs met by renewables while being able to easily store the air-captured CO₂ in an ideal location.

Orca is located in the Geothermal Park of ON Power, Climeworks' project partner, in Hellisheidi, Iceland. ON Power provides energy (electricity and heat) to the Climeworks plant directly. Typical energy consumption figures expected for the scaled-up machines are approximately 2000 kWh heat and about 650 kWh electricity per tonne of carbon dioxide that is captured. Long-term energy requirement projections based current technology assumptions for the direct air capture (DAC) process are expected to be around 2000 kWh per tonne of CO₂ (400 kWh electrical and 1600 kWh thermal).

Since Orca is located on the site of the Hellisheidi geothermal power plant, the integration is relatively straightforward and simple. Because Climeworks' direct air capture plants

can be built very close to both the energy source and the CO₂ injection site, it delivers a substantial reduction on costs for media and utility connections (electricity, geothermal heat, CO₂ transport).

Climeworks is deploying the new optimised CO₂ collector design for the Orca plant where, in addition to improved capture efficiency and other improvements, the amount of steel used has been reduced by 40 per cent compared to the previous generation of CO₂ collectors, generating further cost improvements. In terms of economics, the overall investment for Orca amounts to more than \$10 million.

Kicking off construction of the plant, Christoph Gebald, the co-founder of Climeworks, said: "Breaking ground on the construction of Orca marks an exciting milestone for Climeworks and an important step in the fight against climate change. Climeworks' new Orca plant demonstrates that scalable, pure carbon dioxide removal via direct air capture is possible. And we are excited to be a vital part in kick-starting the carbon dioxide removal industry."

When construction is completed in spring 2021, the Orca plant will capture 4000 tons of CO₂ per year. This might sound like a lot of carbon dioxide, but it is a drop in the ocean compared to the 3210 billion tonnes currently in the atmosphere. Most other carbon capture companies focus on building large plants that have a high initial capacity. Unfortunately, however, this can risk the project failing to complete as budgets dry up or appetite changes. Unfortunately, this has often been the case for large scale CO₂ capture projects in Europe in the last decade.

In contrast, the technology behind Climeworks' Orca plant is highly modular — the modular CO₂ collectors can be stacked to build machines of any size — allowing for a relatively small plant to be built quickly as a proof of concept. Not only does this mean that Climeworks can rapidly deploy direct air capture technology, but it also helps mitigate risk. By starting small and then scaling up projects, Climeworks can adapt to demand and budgets to ensure that projects are fully completed and operational on time.

In addition, through expanded operations within its current acreage, Reykjavik Energy has indicated it can and would accept up to 2 million tonnes of carbon dioxide per year. For storage in basaltic systems, the conditions at Hellisheidi make it one of the very best sites in the world and the right place to start.

In 2020, Carbfix, ON Power and Climeworks announced the scale-up of carbon dioxide removal capacities in Iceland. For example, in Iceland, as much as 50 million tons of CO₂ per year could be stored within the Icelandic Rift System. On a global scale, many studies have concluded that the global capacity

of CO₂ storage in basaltic systems is well over a trillion tonnes — between 5-30 trillion. Good sites are distributed all over the world, including North America, the Middle East, and China.

For direct air capture to become a major component of the response to the climate emergency, it needs to be cost-effective and sustainable in terms of investment. There is already financial pressure on companies to be more environmentally friendly, in the form of industry regulations, carbon taxes, and financial incentives like tax breaks, green bonds and government grants.

To bolster the economic argument for direct air capture, it is essential for providers to work hard to bring costs down even further. For example, bringing the CAPEX (capital expenditure) of direct air capture plants down will reduce the capital investment needed upfront to make a project successful.

Climeworks' modular approach keeps CAPEX to a minimum, scaling up once results have been proven. First, a smaller plant is built and starts generating results. Investors then have a great case for further funding, scaling up the plant size to capture even more CO₂. This, in turn, creates an appetite for more direct air capture plants in different areas, expanding and scaling the approach across the world and helping to achieve net zero emissions by 2050.

Another way costs can be reduced is through the technology. While the basis of the tech is fairly straightforward, more efficient and cost-effective filters can make a big difference to the development and operating costs. More efficient filters lead to lower energy consumption per tonne of CO₂ and a reduced footprint of direct air capture plants.

By reducing costs and increasing awareness, Climeworks aims to make direct air capture technology available to everyone, regardless of budget, helping to create a big, exciting market.

To raise awareness, the company is also working to inspire one billion people to remove carbon dioxide from the air and become part of the mission to reach net zero emissions. As such, people can subscribe to the company's carbon dioxide removal service, which allows them to have CO₂ removed from the atmosphere in their name, giving individuals a practical, affordable way to take climate action.

By working together on a set of clear goals, implementing and developing new energy generation and direct air capture technology, and giving both companies and individuals access to permanent and safe carbon dioxide removal solutions, everyone can contribute to achieving net zero emissions by 2050 and thereby build a climate-positive world.

Dr. Nathalie Casas is Head of R&D at Climeworks.

Dr. Casa: The real magic to the process is the filter material





Junior Isles

Shaping new connections

While Europe and the rest of the world attempts to limit cross-border interaction in an effort to slow the spread of Covid-19, the European Commission is pushing moves in the opposite direction on the energy front. Yet forging closer ties is seldom straightforward.

December was an important month for the bloc's electricity grids, as the Commission adopted a proposal to revise the EU rules on Trans-European Networks for Energy (the TEN-E Regulation) in order to better support the modernisation of Europe's cross-border energy infrastructure and achieve the objectives of the European Green Deal.

Certainly the transition to a new infrastructure adapted to new technologies is a pre-requisite to climate neutral economy powered by clean energy. The TEN-E policy supports this transformation through projects of common interest (PCIs), which must contribute to the achievement of the EU's emission reduction targets for 2030 and climate neutrality by 2050. According to the Commission, the revised regulation will continue to ensure that new projects respond to market integration, competitiveness and security of supply objectives.

Among the new proposals are: a new focus on offshore electricity grids with provisions facilitating more integrated onshore wind; as well as upgraded rules to promote the uptake of smart electricity grids to facilitate rapid electrification and scale up of renewable electricity generation.

Commenting on the revisions, Commissioner for Energy Kadri Simson said: "The current TEN-E framework has been fundamental in creating a true single energy market, making it better integrated, more competitive and secure. But our ambitious climate targets

demand a stronger focus on sustainability and new clean technologies. This is why our proposal prioritises electricity grids, offshore energy and renewable gases, while oil and natural gas infrastructure will no longer be eligible for support."

As with any new proposal or revision, it is always a point of debate as to whether it goes far enough.

WindEurope criticised the TEN-E revision, first claiming it leaves a door open for fossil fuel projects, and then went on to highlight the lack of cooperation on planning.

"The TEN-E revision confirms the essential role of these hybrid offshore wind projects in saving money and space as well as improving electricity flows across borders. It also introduces a dedicated 'offshore one-stop-shop' per sea basin to simplify the permitting process of offshore grids for renewable energy. But it does not provide for the joint planning of the generation and transmission assets. Member States will need to address this," it said.

Just ahead of the revision, Eurelectric, the organisation that represents Europe's electricity industry, presented two new publications at an online media roundtable assessing the state of play in Europe's networks. The papers outlined what the organisation would like to see from the TEN-E regulation and, more generally, the regulation of grids going forward – with a particular focus on distribution grids.

Kristian Ruby, Eurelectric's Secretary General, said: "We know: big investments are going to be needed; there will be significant amounts of renewable energy coming on to the grid; and there's a general decentralisation of the grid happening. What does that entail for the grids? And how

should the EU and regulation make this happen with the tools they have at their disposal?"

With increasing decentralisation, it is quite right that there should be a focus on distribution grids. Europe's distribution setup is a complex picture. According to Eurelectric there are 2556 distribution system operators (DSOs) in the EU-27, operating 10 million km of power lines connecting more than 300 million customers. These DSOs supply 2800 TWh of electricity/year – a significant figure. Further, by 2030 over half of the generation fleet will be decentralised and connected at the distribution grid level, predicted Eurelectric.

Louise Rullaund, Eurelectric's Advisor for Distribution & Market Facilitation, and Infrastructure & Flexibility Lead, commented: "This illustrates that the energy transition cannot effectively be achieved without a very large scale of distribution grid digitalisation."

A key indicator of progress is the level of smart meter rollout – an essential part of digitalisation and the realisation of smart grids. Smart meters are key to enabling DSOs to offer new services and ways to manage electricity distribution. Eurelectric's data shows there are currently around 120 million smart meters installed in the EU-27, representing about 48 per cent of all metering points. Rullaund noted, however, that "while this is very satisfying", the rollout is very different from one country to another.

She stressed that strong support is needed to incentivise investments in power distribution. Eurelectric calculates that achieving a smart meter penetration of 92 per cent by 2030 calls for €41 billion in investment.

Pierre Braun, Advisor, Distribution & Market Facilitation, and Investment

Lead at Eurelectric, analysed the state of investment in distribution. He noted that between 2015 and 2020, EU funding from the five financing instruments has been mainly allocated to electricity transmission and gas networks.

"In the different instruments, the share of funding for electricity distribution has been quite marginal," he said. "In terms of total allocated amounts, funding for distribution projects represents a small share – just 0.3 per cent of available funding."

Clearly there is a disconnect between the growing share of decentralised power and the investment needed to create a system that can absorb the increasing amount of renewables.

"We have an energy system that is decentralising very rapidly. Today we have a share of less than 20 per cent distributed power in the system but in 10 years it will be more than 50 per cent if we are to meet the targets. [But] the investments made by the EU are consistently ploughed into centralised grid infrastructure – whether it's gas or electricity," said Ruby. "That really should give everybody a little food for thought."

Ruby therefore stresses that a completely different agenda has to be set for grid investment going forward. "TEN-E is a crucial element here but is only one of several. It is critical that investments reflect the need of a future more decentralised energy system."

In line with this thinking, Eurelectric set out some key asks for the TEN-E revision. "We first need to acknowledge that electricity infrastructure has a key role when it comes to delivering on decarbonisation," Ruby said. "Decarbonisation means electrification; it's just a plain fact. It's not the only needed vector but it's the main vector."

Taking the next steps in the energy transition through increased electrification will need a wider system approach. In addition to prioritising projects that foster electrification and direct use of renewables, Eurelectric says TEN-E should leverage the deployment of distribution grids to enable decarbonisation of mobility, heating, renewable integration and active customers.

"When you look at the funding and how it's going, there is really not sufficient support for low voltage grid projects. That's where a lot of the action is going to be in the future and we need to take that into account," said Ruby.

Eurelectric is therefore calling for revision in governance of the Ten-Year Network Development Plan (TYNDP). The TYNDP 2020 was due out for public consultation on January 4th and Eurelectric is suggesting there should be wider stakeholder involvement, especially from DSOs, in drafting TYNDP scenarios.

It makes perfect sense; shaping a different system calls for input from different organisations or we risk repeating what has been done in the past. As Ruby puts it: "What got us here, is not going to get us there."

The end of December also marked the finalisation of the official divorce between the EU and the United Kingdom. It has been a long, drawn-out and often acrimonious affair. Now the EU-27 and the UK must look towards making the new relationship work. Gearing up for a new reality requires flexibility of thought and coordination between groups that often have different priorities. Energy integration is no different. It will be fundamental if Europe is to realise its net zero ambitions.

Cartoon: jemsoar.com

