THE ENERGY INDUSTRY TIMES

December 2021 • Volume 14 • No 10 • Published monthly • ISSN 1757-7365 www.teitimes.com

The power of AI

Utilities are embracing the power of intelligent automation and artificial intelligence. *Page 13*

Life after COP

Did COP26 alter Asia's decarbonisation path? Joseph Jacobelli gives his verdict. *Page 14*

Final Word

Celebrate the small victories but not too much, says Junior Isles. *Page 16*

News In Brief

COP26 agreements drive clean energy
World leaders and industry announced a raft of agreements, alliances and financing to accelerate the deployment of clean technology at the recent COP26 climate conference. *Page 2*

Infrastructure spending plan signals new dawn for nuclear
A coal plant site in Naughton, Wyoming has been named as the first site for a new nuclear reactor design backed by investor Warren Buffett and Bill Gates. Naming of the site followed quickly on from the Biden Administration's recently agreed $1.2 trillion infrastructure act, which supports both new and existing nuclear plants. *Page 4*

China faces uphill struggle on climate change
China has pledged to become net zero by 2060 but faces a mammoth task in making the transition from coal to renewables. *Page 5*

Energy crisis deepens as gas prices continue to rise
European utilities are at odds over how to address recent soaring gas costs and protect customers. At an emergency meeting in Luxembourg, energy ministers discussed how the EU could complement measures taken by member states. *Page 7*

Nuclear potential highlighted in race to net zero
The contribution of nuclear power generation to climate change mitigation is highlighted in a new edition of the 'World Nuclear Performance Report'. *Page 8*

GE and Toshiba to spin-off energy businesses
GE and Toshiba are looking to split up their businesses in an effort to improve strategic flexibility. *Page 9*

Technology Focus: The 'clear' path to low cost zero emissions hydrogen
A process has been developed and field tested that enables hydrogen to be produced from abandoned oil wells at a cost that makes it competitive with natural gas per unit of energy. *Page 15*

COP26 makes significant progress but work remains

The recent COP26 conference on climate change saw a number of significant announcements that will accelerate efforts to limit global warming but there is still more work do. **Junior Isles**

The recently concluded COP26 climate summit in Glasgow, UK, took several significant steps towards keeping climate change within the goals specified under the Paris Agreement but there is still significant work to be done in order to avoid the worst effects of climate change.

After six years of negotiations, pending items that prevented the full implementation of the Paris Agreement on carbon markets and transparency were finally approved.

Although not what many had hoped for, the package adopted is a global compromise which, according to the UN "reflects a delicate balance between the interests and aspirations of the nearly 200 Parties to the core instruments on the international regime that governs global efforts against climate change".

There was overall consensus on the need to continue increasing support to developing countries. The call to at least double finance for adaptation was welcomed by the Parties. The duty to fulfil the pledge of providing $100 billion annually from developed to developing countries was also reaffirmed. And a process to define the new global goal on finance was launched.

Parties were encouraged to strengthen their emissions reductions commitments and to align their national climate action pledges with the Paris Agreement aimed at limiting global warming to well below 2°C, and preferably to 1.5°C, compared to pre-industrial levels.

In addition, a key COP26 outcome is the conclusion of the so-called Paris rulebook. An agreement was reached on the fundamental norms related to Article 6 on carbon markets, which will make the Paris Agreement fully operational. This will give certainty and predictability to both market and non-market approaches in support of mitigation as well as adaptation. And the negotiations on the Enhanced Transparency Framework were also concluded, providing for agreed tables and formats to account and report for targets and emissions.

Speaking at the conclusion of the two-week meeting Patricia Espinosa, Executive Secretary of UN Climate Change said: "I thank the Presidency and all Ministers for their tireless efforts throughout the conference and I congratulate all Parties on finalising the rulebook. This is an excellent achievement! It means that the Paris Agreement can now function fully for the benefit of all, now and in the future."

While progress was made, the outcome was not all that many had hoped for. Alok Sharma, UK President of COP26 said: "We can now say with credibility that we have kept 1.5 degrees alive. But, its pulse is weak and it will only survive if we keep our promises and translate commitments into rapid action."

Sharma was visibly disappointed that a deal to phase-out coal was watered down at the last minute, after pressure from India and other emerging countries.

Commenting on the news that approximately 46 countries, five subnational and 26 organisations pledged in total or in part to the Global Coal to Clean Power Transition initiative, Effuah Alleyne, Senior Oil & Gas Analyst at GlobalData, a leading data and analytics company, said: "Though the initiative addresses critical carbon emission directives, the noticeable absence and lack of urgency and support of major coal power generation

Continued on Page 2

Methane pledge is big boost to global climate change effort

The Global Methane Pledge signed during the COP26 climate change conference in Glasgow will play a significant role in supporting the international effort to limit global warming.

The Pledge – an initiative led by the US and EU, and now joined by more than 100 countries – aims to reduce global methane emissions by 30 per cent by 2030, thereby cutting global warming by 0.2°C. Under the 2015 Paris Agreement countries pledged to limit global warming to well below 2°C, and preferably to 1.5°C, compared to pre-industrial levels. According to the International Energy Agency, current country carbon reduction commitments will limit global warming to 1.8°C.

Methane is a potent greenhouse gas with around 80 times the global warming potential of CO_2 over 20 years. Commenting on the methane pledge, IEA Executive Director Fatih Birol, said: "The Global Methane Pledge was a major achievement and can make a vital difference in the short-term… a 30 per cent reduction will have the same impact on the temperature rise as if all the cars, trucks, planes and ships in the world turned to net zero technologies."

Dr Johan C.I Kuylenstierna, Research Leader at the Stockholm Environment Institute, University of York and co-author of the UNEP/ Climate and Clean Air Coalition (CCAC) Global Methane Assessment, noted: "It is important to address methane emissions as it is the only way we can reduce global warming in the near term. The Pledge is a good start, and is just compatible with the achievement of the 1.5°C goal, but the Global Methane Assessment identified that we have the ability to reduce methane emissions by 10 per cent more than what is set out in the Global Methane Pledge, which will more firmly ensure that we shift into a 1.5°C pathway. One way to make sure of this is for all major emitters to sign up to the Pledge, including China and Russia."

He added: "It is important that this Global Methane Pledge is taken in addition to substantial reductions in CO_2 and not instead of it. The science is clear, we cannot achieve a 1.5°C pathway without reducing methane emissions. At the same time, we cannot achieve it without large reductions in CO_2, other greenhouse gases and black carbon as well."

Russia, the world's largest methane emitter from oil and gas activities was a notable absentee from the pledge. Other large emitters who have not signed on include Turkmenistan, China, Iran, and Egypt.

As host of the summit, the UK has been looking to lead by example. In October OGUK which represents the UK offshore oil and gas industry sector said it will halve its emissions of methane, and put an end to routine flaring, by 2030.

OGUK's Methane Action Plan, published in June, found that in 2018 just over 50 000 tonnes of methane were released by the UK's upstream oil and gas sector including emissions at onshore terminals.

THE ENERGY INDUSTRY TIMES is published by Man in Black Media • www.mibmedia.com • Editor-in-Chief: Junior Isles • For all enquiries email: enquiries@teitimes.com

Continued from Page 1

producers has resulted in a less than auspicious start.

"Major coal producers – including China, India, the US and Japan – have not signed the agreement. In 2020, these countries collectively accounted for over 75 per cent of the cumulative coal capacity globally, with China alone responsible for roughly 50 per cent."

India, which set 2070 as its target to reach net zero, instead looks set to gradually replace its baseolad coal plant with nuclear. It also said that it would meet half of its energy requirements from renewables by the end of this decade.

Nuclear was among the key technologies discussed at the conference seen as crucial to tackling climate change. Four groundbreaking 'Missions' were announced during the summit to accelerate innovation in clean energy technologies that can decarbonise sectors responsible for 50 per cent of global emissions.

The Missions, announced by Ministers from the US, India, Saudi Arabia, Canada, Australia, Austria, the Netherlands and the European Commission, will accelerate technologies to facilitate urban transitions, eliminate emissions from industry, enable carbon dioxide removal, and produce renewable fuels, chemicals, and materials. Combined with three Missions first announced in June 2021, on power systems, hydrogen, and shipping, they have the potential to unlock affordable decarbonisation pathways for sectors responsible for 52 per cent of current global emissions.

Granholm: Missions will "turbocharge" key climate solutions

Jennifer Granholm, US Secretary of Energy, said: "Mission Innovation is all about collaborating across borders and working together to innovate so we can tackle the climate crisis faster. These four new missions will turbocharge key climate solutions and help grow clean energy worldwide, bringing with it unprecedented economic opportunities."

Mission Innovation is a key platform for governments and the private sector to work together to develop and demonstrate clean technologies across multiple sectors. It is fully consistent with the Breakthrough Agenda launched on Day 3 of the summit. The Glasgow Agenda is a commitment by countries to work together internationally this decade to accelerate the development and deployment of the clean technologies and sustainable solutions needed to meet Paris Agreement goals, ensuring they are affordable and accessible for all.

The Breakthrough Agenda will assist in global efforts to halving emissions by 2030 and keeping 1.5°C alive. It has been backed by more than 40 nations representing more than 70 per cent of the world's economy, including developing nations.

COP26 agreements drive clean energy

- Green Grids Initiative endorsed by more than 80 countries
- Global Energy Alliance for People and Planet (GEAPP) to accelerate investment in green energy transitions

Junior Isles

World leaders and industry announced a number of agreements, alliances and financing to accelerate the deployment of clean technology at last month's COP26 climate conference.

Perhaps the most significant was a new high-level coalition for clean energy involving major governments, international organisations, legislators, business leaders, researchers and citizen groups.

It includes a group of governments called the Green Grids Initiative – One Sun One World One Grid. The group was announced by summit host, Britain's Prime Minister Boris Johnson and Indian Prime Minister Narendra Modi. In the presence of other heads of government including US President Biden, the two Prime Ministers presented a One Sun Declaration, endorsed by more than 80 countries, setting out the group's aims.

A Ministerial Steering Group will lead a process to accelerate the construction of large solar power stations and wind farms in the best locations, linked together by continental-scale grids crossing national borders. The Steering Group includes France, India, the United Kingdom and the US, and will also have representatives from Africa, the Gulf, Latin America and Southeast Asia.

The move came as a new renewable energy alliance between the wind energy and solar PV industries called on governments to implement energy transition action plans and cut red tape to meet Net Zero targets.

A joint study by the Global Solar Council and the Global Wind Energy Council found that by 2030 there will be a 29 per cent shortfall in the projected wind and solar capacity required to keep the world on course to limit global warming to 1.5˚C and sustain a pathway to carbon neutrality by 2050.

In a noteworthy development aimed at facilitating the uptake of wind and solar, industry players announced the formation of the Long Duration Energy Storage Council. The Council includes some of the world's biggest energy and engineering companies, which have joined forces to call for as much as $3 trillion of investment into long duration energy storage to give the global power system the flexibility necessary to achieve net zero emissions by 2040.

The Council's 25 members including Bill Gates' Breakthrough Energy Ventures, BP and Siemens Energy, forecasts that 1.5-2.5 TW of capacity, capable of storing about 10 per cent of global electricity demand, could be installed by 2040.

Supporters say long duration energy storage, defined as systems capable of storing energy for more than eight hours, will be pivotal as the world replaces fossil fuels with less predictable wind and solar power.

How such technologies would be financed was also centre stage during the summit.

Governments are hoping the launch of the new Global Energy Alliance for People and Planet (GEAPP) in Glasgow will accelerate investment in green energy transitions and renewable power solutions in developing and emerging economies worldwide. Over the next decade, the Alliance aims to unlock $100 billion in public and private capital and tackle three profound human problems simultaneously: power – reaching one billion people with reliable, renewable energy; climate – avoiding and averting four billion tons of carbon emissions; and jobs – building an on-ramp to opportunity by creating, enabling, or improving 150 million jobs.

In another move, European Commission President Ursula von der Leyen and Bill Gates, the Founder of Breakthrough Energy, together with European Investment Bank President Werner Hoyer, officially entered into a pioneering partnership that will boost investments in critical climate technologies. The signing of a Memorandum of Understanding follows up on the initial announcement made in June this year at the Mission Innovation Ministerial Conference.

Meanwhile, the Climate Investment Coalition also announced a collective financial commitment of $130 billion by Nordic and UK pension funds to be invested in clean energy and climate investments by 2030.

Major energy exporters race to lead global hydrogen trade

The time is ripe for the world's major energy exporters to accelerate the energy transition, and mastering the hydrogen trade could make a difference, says Wood Mackenzie.

According to the global energy consulting firm, the global energy market was worth $2 trillion in 2020, contributing to more than 9 billion tonnes of carbon dioxide equivalent (CO_2e) emissions.

Wood Mackenzie Research Director Prakash Sharma, said: "In addition to investing in renewables to slash emissions and enhance energy security, countries and industries are now looking to electricity-based fuels and feedstocks, and hydrogen could be the gamechanger.

"A key differentiator is hydrogen's massive potential in traded energy markets. Low-carbon hydrogen and its derivatives could account for around a third of the seaborne energy trade in a net zero 2050 world."

Between now and 2050, Wood Mackenzie forecasts global demand for hydrogen to increase between two- and six-fold under its Energy Transition Outlook and Accelerated Energy Transition (AET) scenarios. Under the AET-1.5 scenario (1.5°C warming), low-carbon hydrogen demand reaches as much as 530 million tonnes by 2050, with almost 150 million t of that traded on the seaborne market.

Low-carbon hydrogen import demand from northeast Asia and Europe could account for about 80 million t, equivalent to 55 per cent of seaborne hydrogen trade, and 23 million t (16 per cent of total seaborne energy trade), respectively.

According to Wood Mackenzie, several countries are hoping to benefit from developing export-oriented hydrogen megaprojects, with blue and green hydrogen projects being developed in Russia, Canada, Australia, and the Middle East.

In the burgeoning green hydrogen space, nearly 60 per cent of proposed export projects are located in the Middle East and Australia, principally targeting markets in Europe and northeast Asia. Over the last 12 months, there has been a 50-fold increase in announced green hydrogen projects alone.

Wood Mackenzie says project developers, lenders and buyers will be drawn to locations with a proven track record of exporting natural resources, suitable conditions for low-cost renewable electricity and the potential for large-scale carbon capture.

Several countries are hoping to "snatch a slice of the hydrogen trade pie", noted the consultancy. Saudi Arabia, Brazil, Chile, Oman and Kazakhstan have all announced megaprojects targeting the export market, while others, such as Russia and Canada, have vast low-cost gas resources and plenty of carbon capture and storage (CCS) capacity.

Vice Chairman Gavin Thompson said: "While no two hydrogen export projects look the same, the most obvious difference in proposed projects is between blue and green hydrogen. But portraying this as an either-or choice is an over-simplification.

"The reality is that the world needs both to achieve the required pace of global decarbonisation. Blue hydrogen production has a scalability advantage over green hydrogen at present and can already be developed in the requisite volumes, though lead times are longer. Most proposed projects are currently a combination of the two.

Global energy efficiency progress recovering but not quickly enough

A rapid expansion of technologies and solutions that drive more efficient use of energy across the economy is necessary to keep global climate pledges within reach, according to a new International Energy Agency (IEA) report, which urges governments to take the lead in mobilising the required increase in investment.

Global progress on energy efficiency has recovered this year to its pre-pandemic pace, but that was already well short of what would be needed to help put the world on track to reach net zero emissions by mid-century, according to 'Energy Efficiency 2021', the IEA's annual market report on the topic. Total annual investment in energy efficiency worldwide needs to triple by 2030 to be consistent with a path towards reaching net zero emissions by 2050, as set out in the IEA's 'Roadmap to Net Zero by 2050'.

The IEA's latest global assessment of market and policy trends in energy efficiency highlights the urgent need for stronger implementation of clean energy policies – with energy efficiency at their core – in order to reach international climate goals. This is the first update of the IEA's energy efficiency market report since a raft of new spending commitments aimed at supporting the economic recovery were announced by governments over the course of 2021.

The report comes shortly after the end of the COP26 Climate Change Conference in Glasgow, whose final statement specifically called for the rapid scaling up of energy efficiency measures, recognising their key role in decarbonising energy systems.

"We consider energy efficiency to be the 'first fuel' as it still represents the cleanest and, in most cases, the cheapest way to meet our energy needs. There is no plausible pathway to net zero emissions without using our energy resources much more efficiently," said IEA Executive Director Fatih Birol.

Infrastructure spending plan signals new dawn for nuclear

- Government will shoulder up to half the cost for two new plant designs
- Existing plants to receive support

Janet Wood

A coal plant site at Naughton in Wyoming has been named as the first site for a new nuclear reactor design backed by investor Warren Buffett and Bill Gates. Naming of the site followed quickly on from the Biden Administration's recently agreed $1.2 trillion infrastructure act, which supports both new and existing nuclear plants.

Buffett's company, Berkshire Hathaway, owns the coal fired Naughton plant, and is shutting it down as part of the company's efforts to transition to cleaner fuels such as wind and solar. Pending federal and local approval, Gates' TerraPower company will now use the site for its $4 billion, 345 MW "first-of-a-kind" Natrium nuclear reactor. It is partnering with GE-Hitachi to build the plant, which will be able to take advantage of existing infrastructure, including cooling water and high-capacity transmission lines, and could be running within seven years.

"The Natrium reactor is the future of nuclear energy in America. It makes perfect sense to have it in Wyoming, the energy capital of the United States. Wyoming's economy will grow from having this groundbreaking technology in our state," US Senator John Barrasso, a Wyoming Republican, told *USA Today*.

The second reactor design that will receive up to half the cost of a demonstration plant is X-energy's Xe-100. Its first plant will be built in Washington State through a partnership with Energy Northwest. The Xe-100 does not need to be sited near water.

"This is a massive endorsement from the federal government of X-energy's first commercial deployment in Washington State and the opportunity for advanced nuclear energy in creating jobs as well as rebuilding US infrastructure," said Clay Sell, X-energy CEO.

The federal funding follows bailouts in several US states for nuclear generators on the brink of closure. "The bottom line is that you've got a lot of safe and reliable plants out there that are providing zero-carbon electricity exactly when our nation and the world need it most," said Jeremiah Baumann, Deputy Chief of Staff at the Department of Energy. "We can't afford to have the setback of losing a lot of carbon-free electricity." Since 2013, 13 US reactors have shut down, most recently New York's Indian Point.

Meanwhile, fusion company Helion Energy has raised $500 million in private funds to build a prototype of its fusion reactor. The company plans to build a fusion generator by 2024 that outputs more electricity than it inputs.

Offshore wind prompts supply chain investment in US

Construction has begun on the first large scale offshore wind farm in the US, the 800 MW Vineyard wind plant off the islands of Martha's Vineyard and Nantucket in New England. Developers Iberdrola and Avangrid guaranteed that at least 500 of the jobs created during construction will be filled by local personnel.

That offshore wind farm is expected to be the first of many, and recently the first investment in a US-based supply chain was announced by a global offshore wind turbine manufacturer. Siemens Gamesa announced it would open an offshore wind turbine blade facility at the Portsmouth Marine Terminal, Virginia. It will create over 250 jobs and will go ahead alongside a 2.6 GW offshore wind project planned by Dominion Energy. The blade facility represents a step in developing the Portsmouth Marine Terminal into an offshore wind hub. Siemens Gamesa expects to expand the facility if awarded future projects in the region.

Meanwhile Nexans has opened its first US high-voltage subsea cable facility in Charleston, South Carolina. The transformed subsea cable plant will support the expanding US offshore wind market, Nexans said. The company already has contracts for design and manufacturing of more than 300 km of export cables, as well as laying and protecting the cabling.

Southern California winter battery installation dwarfs some national plans

Southern California Edison is ready to add 535 MW of battery energy storage at three of its substations to increase grid reliability for next summer. SCE will use land at its existing substations to quickly interconnect the batteries, installed by Ameresco. The company already has 1355 MW of utility-scale battery storage, all installed last year and along with third party contracts it will bring its total storage capacity to 2.8 GW.

"The steps we are taking today will benefit our customers in many ways. They will make the grid more resilient to the effects of extreme weather and will help us continue our progress toward the clean energy future," explained Kevin Payne, President and CEO of SCE.

SCE's huge jump in storage sets battery investment in Chile in stark contrast. Recently announced plans to install 188 MW of battery storage in the country, although just a third of the capacity installed by SCE, will more than double Chile's battery storage capacity. It will be installed by Santiago-based AES Andes SA. At present, battery-based storage capacity in Chile's major network stands at 175 MW, said the ministry. By the end of 2023 this will rise to 363 MW, with energy storage of 1563 MWh.

For AES Andes, the initiative will represent an investment of over $400 million in battery storage systems integrated with renewables.

Argentina to produce green hydrogen for export

- Wind resource attracts Australian investor
- New York utility tests hydrogen blend in power station

Janet Wood

Hydrogen for export is the impetus for a new multi-billion dollar investment in onshore wind in Argentina led by Australia's Fortescue Future Industries (FFI).

The Australian company, which produces green hydrogen from electrolysis powered by renewable electricity, wants to produce 2.2 million tonnes/year of green hydrogen by 2030. It first plans to test the wind power potential in Rio Negro, Patagonia. It will invest $1.2 billion in a pilot project between 2022 to 2024 and $7.2 billion in a development phase to take production to the target by 2030.

Andrew Forrest, FFI's Chairman, said the project will help make Argentina "a world leader in renewable energy so that it can be an exporter". Argentinian President Alberto Fernandez said: "Green hydrogen is one of the fuels of the future."

This would be the first large-scale hydrogen project in Argentina, although recently the Argentinian state energy company IEASA said it is considering investing more than $200 million in a 200 MW offshore wind farm to produce green hydrogen for domestic consumption and export.

The Argentina plans followed soon after an announcement from neighbouring Uruguay that it would invest in green hydrogen. ANCAP, the state oil company in Uruguay, plans to hold auctions to build as many as 16 wind farms to produce green hydrogen for export, starting in the next two to five years.

Export destinations may include North America. The New York Power Authority (NYPA) is now taking forward plans to investigate partially substituting hydrogen for natural gas in its Brentwood power station.

The NYPA-led project, with the Electric Power Research Institute, General Electric, Airgas, Sargent & Lundy and Fresh Meadow Power, will evaluate the effects of different concentrations of hydrogen blended with natural gas at regular intervals to assess greenhouse gas emissions reductions and environmental impacts, including nitrogen oxide emissions. The project is expected to last between six and eight weeks.

Justin E Driscoll, NYPA Interim President and CEO, said: "The Green Hydrogen Demonstration Project is important to our path to decarbonisation. We are excited to learn from this project and to share our learnings with the industry so that we can together step further along the path to a clean energy economy."

Gil C Quiniones, NYPA President and CEO said: "In order for us to achieve an 85 per cent reduction in greenhouse gas emissions by 2050, we are going to have to use every tool in our toolbox, and use new tools and technologies, some that we may not have even discovered yet."

Nova Scotia to legislate closure for coal generation

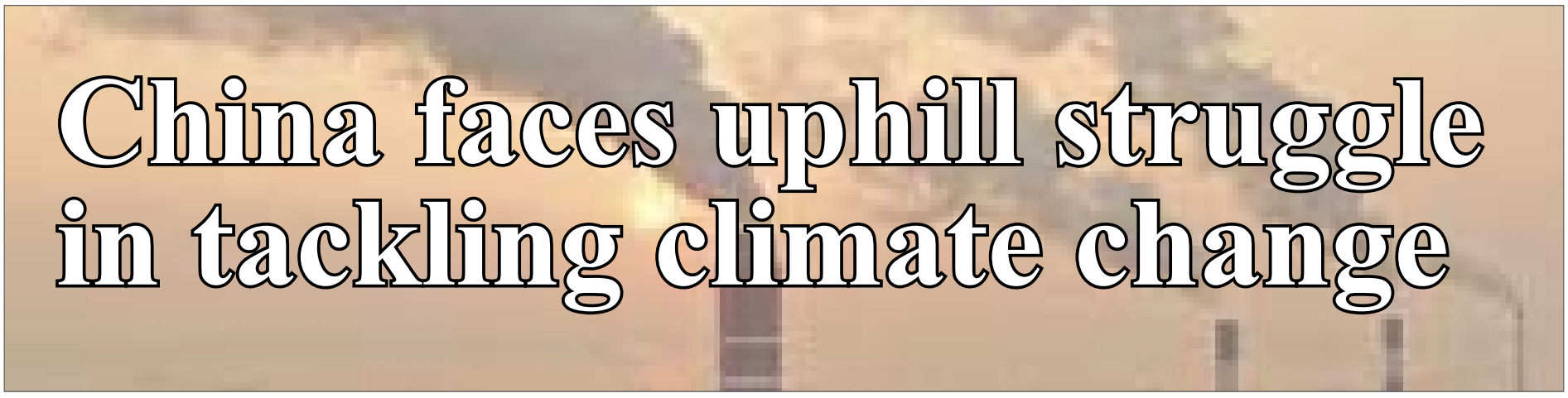
Nova Scotia is set to legislate to close all its coal fired plants by 2030, bringing forward by a decade previous plans and enshrining the new timetable in legislation.

The Canadian island province has eight coal fired generation units, all owned by Nova Scotia Power. Some are fired using petcoke, a byproduct of oil extraction.

The newly proposed Environmental Goals and Climate Change Reduction Act would also legislate to reduce greenhouse gas emissions to at least 53 per cent below 2005 levels by 2030 and to net zero emissions by 2050. The Progressive Conservative government is also pledging to have 80 per cent of the province's energy supplied by renewable sources by 2030 and to have zero-emission vehicles comprise 30 per cent of vehicle sales also by 2030.

Jason Hollett, Associate Deputy Minister of Environment and Climate Change, said: "We are actively pursuing opportunities to accelerate that (coal goal) and move that target from 2040 to 2030."

The plans raised speculation that Nova Scotia would invest in offshore wind and also revived discussion of an 'Atlantic Link' between Nova Scotia and mainland Canada.



China faces uphill struggle in tackling climate change

- Renewables and decarbonisation technologies will need $163 billion annually
- NDRC targets 1.8 per cent reduction in coal fired generation over next five years

Syed Ali

According to research and brokerage firm, Bernstein, China needs to unleash $6.5 trillion in green investments and radically reorganise its economy if the planet is to win the fight against climate change.

Neil Beveridge, a senior analyst at Bernstein in Hong Kong told the *FT*: "It's just very difficult to break this relationship between energy consumption and GDP growth."

According to Bernstein calculations, to fulfil its 2060 carbon neutrality pledge, China faces a "Herculean challenge" – $163 billion will have to be spent annually on renewable energy and other decarbonisation technologies.

China has pledged to become net zero by 2060 – 10 years after most developed nations and 10 years earlier than India – but faces a mammoth task in making the transition from coal to renewables.

The country's commitment to tackling climate change was questioned following its move to support India in watering down pledges to end coal fired power generation at last month's COP26 climate conference in Glasgow, UK.

Arthur Kroeber and Rosealea Yao, Beijing-based analysts from Gavekal Dragonomics, a consultancy, wrote during COP26: "The bottom line is that…China is now taking decarbonisation seriously. But it remains to be seen how much stomach the government will have for the likely economic costs."

In a statement released to coincide with COP26, China's economic planner, the National Development and Reform Commission (NDRC) said it is targeting a 1.8 per cent reduction in average coal use for electricity generation at power plants over the next five years, in a bid to lower greenhouse gas emissions.

Average coal use for electricity generation in China fell by about 17.4 per cent in the 15 years till 2020.

Just ahead of COP26 Chinese Ambassador to Britain Zheng Zeguang said China is committed to developing clean and low-carbon energy. In a speech via video link in the recent Responsible Energy Forum 2021, he said China has become the world's largest market for renewable energy, with renewable power accounting for 29.5 per cent of overall electricity consumption

At the start of November the country also said that it had begun a series of large wind power and photovoltaic projects in its desert areas since mid-October. According to the NDRC, these projects are in north China's Inner Mongolia and northwest China's Gansu, Qinghai and Ningxia, with an installed capacity of nearly 30 GW.

The commission said that promoting wind and photovoltaic power would help restore the ecosystems in desert areas, boost local economy, and contribute to the country's carbon-cutting endeavours.

The NDRC also said China will take steps to reduce waste, promote renewable energy and reform its power grid as part of its plan to bring carbon emissions to a peak by 2030.

Indonesia moves to implement net zero ambition

Indonesia is to work with the Asian Development Bank (ADB) in an effort to reach its clean energy goals. A memorandum of understanding signed by Indonesia's state-owned power company PLN and ADB at the COP26 climate summit will help the country achieve its recent commitment to reduce greenhouse gas emissions by 29 per cent by 2030. The country aims to achieve net zero emissions by 2060 or earlier.

Indonesia will need to invest $200 billion per year over the next decade in order to meet its target of decarbonisation, according to a government report.

The country also joined a pilot programme to support its transition from coal to clean energy, set up by global climate finance body the Climate Investment Funds (CIF). The Accelerating Coal Transition (ACT) programme, worth $2.5 billion, will work with six international development banks to provide a financial toolkit and technical assistance for participating coal transition countries.

Finance minister Sri Mulyani Indrawati said Indonesia would be able to retire coal by 2040 if it could get financial help from international development banks, the private sector and developed countries.

Indonesia signed the COP26 Global Coal to Clean Power Transition statement. However, it excluded a clause promising to "cease issuance of new permits for unabated coal fired power projects, cease new construction of unabated coal fired power generation projects and to end new direct government support for unabated international coal fired power generation".

■ Suy Sem, Minister of Mines and Energy, has said Cambodia does not plan to develop any new coal fired power plants in addition to the projects already approved by the Royal Government since 2019 and will continue to encourage investment in clean energy to respond to climate change.

Investors in coal face massive risks

A massive $110 billion of coal plants owned by listed Asian utilities could become uneconomic as the world takes action to meet climate targets, and more than half the risk is concentrated in 10 companies, finds a new report from the financial think-tank Carbon Tracker.

According to the report, Mumbai is the exchange with the greatest risk of asset stranding with $59 billion of coal assets at risk, followed by the Tokyo exchange with $22 billion at risk. Kuala lumpur, Manila and Seoul each have around $6 billion at risk.

Carbon Tracker Power Analyst and report author, Lorenzo Sani said: "This report is a warning to investors: if you invest in listed companies which own coal plants, there's a significant risk you may not recoup your investment or achieve the return you expected."

Just 10 Asian companies account for $65 billion of stranded asset risk. Six are Indian, including four of the top five. After NTPC, Adani is the company most exposed with $12 billion of risk – nearly double its market capitalisation.

The report came as India succeeded in watering down text at the Glasgow COP26 summit that would have led to the phase-out of coal fired power generation.

During the COP26 India was one of several emerging nations that lobbied to put the brakes on any rapid coal phase-out.

The Philippines Department of Energy (DOE) also steered clear of any commitment to phase out coal fired power plants.

In a formal correspondence to Alastair Totty, charge d'affaires at the British Embassy-Manila, who solicited the country's support to the "Global Coal to Clean Power Transition Statement" at the COP26 Summit by the Energy Transition Ministerial Meeting, DOE Secretary Alfonso G. Cusi said the country's unwavering support to energy transition will primarily rely on renewable energy (RE) installations and deployment of energy efficiency technologies.

There was nothing in the DOE's letter-commitment that would will pull the plug on coal fired power generation in the country.

Instead, the energy secretary demanded "climate justice" from more industrialised nations that have emitted more of the carbon emissions that impacted climate-vulnerable countries like the Philippines.

In late October the DOE countered the planned buy-out and phase-out or retirement of coal fired power plants in Mindanao, specifying that this is not part of a scenario set in the Philippine Energy Plan (PEP) in the next two decades.

The position of the DOE is diametrically opposed to an announcement from the Department of Finance (DoF) that coal plants in Mindanao grid will already be traversing their 'retirement' phase.

Cusi says, however, that power investors in the grid were unanimous in saying that their power generating facilities are "not for sale". He explained: "Our decarbonisation scenario will look into the possibility of converting fossil-fired power plants to other fuels such as biomass, fuel-wood, etc."

Meanwhile, the Japanese government last month said it has pledged a $25 million grant, channelled through the Asian Development Bank's energy transition mechanism (ETM), to support plans to buy out coal fired power plants in the Philippines and Indonesia in order to accelerate their retirement.

South Korea steps up offshore wind plans

A recent agreement between Norway's Equinor and Korean East-West Power (EWP) will provide a massive boost to South Korea's plans to ramp-up offshore wind power.

Last month the two companies signed a Memorandum of Understanding (MoU) to cooperate on 3 GW of offshore wind projects in the country. It is a big step towards advancing the Korean government's ambition to grow renewables by 60 GW to 2034, of which 12 GW is targeted for offshore wind by 2030. Equinor will provide floating wind expertise and technology as well as operation and maintenance (O&M) capabilities.

In Korea, where it has been present since 2014, Equinor plans to make use of its recently-unveiled semisubmersible wind turbine foundation, Wind Semi, which allows for the development of gigawatt-scale commercial floating offshore wind farms in a single phase and in harsh water conditions.

Offshore wind is part of the government's plan to phase-out the use of fossil fuels for power generation. In October it approved a roadmap to end coal power by 2050.

In November the government also said it will develop hydrogen and ammonia as feedstock for thermal power generation to support its effort. According to the Ministry of Trade, Industry and Energy, the government has launched a public-private council to lead the research, with an aim of introducing hydrogen and ammonia in the fuel mix as early as 2030.

The ministry's plan envisions more than half of South Korea's coal fired thermal power plants, or at least 24, using a fuel mix consisting of 20 per cent ammonia as early as 2030.

Energy crisis in Europe deepens as gas prices continue to rise

■ Nations at odds over action ■ Many GB suppliers in liquidation

Janet Wood

European utilities are at odds over how to address recent soaring gas costs and protect customers. At an emergency meeting in Luxembourg, energy ministers discussed how the EU could complement measures taken by member states.

Among the proposals, some nations including Greece and Spain wanted the EU to create a common platform to buy gas, France sought a review of the market design and Poland wanted changes in the EU carbon market, where prices are also increasing. "We need a joint European response because we're talking about the single market for energy," said Sara Aagesen, Spain's secretary of state of energy. "We need a very urgent response."

However, other nations including Germany, Austria, Denmark, Finland and the Netherlands argued that the high gas price is temporary. "I don't think we should place too high expectations on EU-level measures because we can't influence the world prices of coal and gas and oil," said Germany's Deputy Economy Minister Andreas Feicht. "We don't think we should go for overly hasty measures, which would actually lead to higher prices in the longer term or could actually undermine our climate objectives."

Maximo Miccinilli, head of energy and climate at FleishmanHillard EU said: "I don't see a lot of margin for manoeuvre for countries to come up with something concrete and new."

In the UK the gas price shock has sent 20 small energy suppliers into liquidation, along with Bulb, an emerging large player with 1.7 million customers. Industry members said that suppliers unable to raise prices above a regulator-set price cap had been unable to cover the cost of gas.

Meanwhile, renewable energy associations have called for a wider range of renewables to deliver a cleaner energy system that protects citizens and businesses from future energy shocks. They said that adding geothermal, solar heat, wave, hydro, concentrated solar power and tidal energy to wind and solar PV, could collectively provide decarbonised and balanced energy at any point in the day, season or year. But to achieve this the revised Renewables Directive and the 2022-23 Horizon research programme must prioritise diversity. In addition the European Commission needs to start modelling how a system of diverse renewables will operate, and to inform policy-making with these findings.

"Europe's early focus on wind and PV has delivered beyond anyone's wildest expectations. Today's shock is a clear signal to double down and replicate these successes with all of Europe's abundant renewable energy sources," said Rémi Gruet, CEO of Ocean Energy Europe.

UK invests in small modular nuclear reactors

Small Modular Reactors (SMRs) are to benefit from £405 million ($541 million) in funding from an industry consortium and the UK government.

Consortium leader Rolls Royce, US utility Exelon Generation and privately held BNF Resources will invest £195 million over three years while the UK government will invest some £210 million.

Commenting on the support, Business secretary Kwasi Kwarteng, said: "This is a once in a lifetime opportunity for the UK to deploy more low-carbon energy than ever before and ensure greater energy independence."

The funding could see four 450 MW SMRs built. Tom Greatrex, Chief Executive of the Nuclear Industry Association said: "Match funding for Rolls-Royce SMR sends a huge signal to private investors that the government wants SMRs alongside new large-scale stations to hit net zero."

Meanwhile new analysis from innovation agency Energy Systems Catapult says 10 GW of new nuclear beyond Hinkley Point C is a 'low regrets' option for the UK, saying that although offshore wind looks the key technology for decarbonising, ignoring nuclear would put the target at risk unnecessarily. It supported reactors as large as Hinkley Point C as well as SMRs but said costs need to fall.

Nuclear Practice Manager Mike Middleton said: "There are no easy paths to get the entire UK economy to net zero carbon emissions by 2050, but there is a credible path available to realise significant nuclear cost reduction delivering potentially lower costs and risks associated with achieving UK net zero."

Offshore wind takes another step up in ambition

■ Bigger wind farms and turbines
■ Floating moves quickly to large scale

Janet Wood

Recent announcements on offshore wind in Europe represent a marked step up in ambition. The Netherlands, for example, doubled its offshore wind target from the 11.5 GW to 22.2 GW of operating offshore wind capacity by 2030, in an Additional Draft North Sea Programme 2022-2027 recently published by its Ministry of Infrastructure and Water Management.

The Dutch government also wants more ambition in turbines. The minimum output of wind turbines to be used at the Hollandse Kust West Wind Farm Zone has been set to 14 MW.

In another example, RWE has stepped up its offshore wind plans from 2.4 GW to 8 GW, to help replace coal plants due to be phased out in Germany.

Floating wind is also scaling up fast. Developer Equinor says it wants to step up its design to full-scale gigawatt-scale commercial projects, if it is successful in the ScotWind leasing round. "We are ready to develop the next generation, large-scale commercial floating offshore wind in Scotland. By leveraging our 20 years of floating offshore wind experience and innovations, we plan to develop GW-size floating projects in one single phase," said Sonja C Indrebø, Equinor's Vice President of Floating Offshore Wind.

After UK seabed owner The Crown said the Celtic Sea could unlock up to 4 GW of new floating capacity the UK put up £160 million to help developers of floating offshore wind technology. That could see factories set up at sea, to allow wind farms to be built further out from the coast, in deeper waters. Business Secretary Kwasi Kwarteng said: "Floating offshore wind is key to unlocking the spectacular wind energy resource we enjoy in the UK, particularly in the deep waters around the coasts of Scotland and Wales."

Among individual floating wind projects announced recently:

- Iberdrola has unveiled plans to develop a €800 million, 300 MW project in the German Baltic Sea due to be operational in 2026.
- DP Energy announced plans for the 300 MW Gwynt Glas floating wind project to be located at a 1500 km^2 site in the Celtic Sea.
- BlueFloat Energy and Falck Renewables have announced a new 1.3 GW floating offshore wind farm scheme off the southern coast of the province of Lecce, Italy. It will be similar to their first project off the coast of Brindisi, 1.2 GW Kailia Energia.

Meanwhile Ireland's ESB says it remains committed to offshore wind in Irish waters despite the withdrawal of previous partner Equinor. "While ESB is disappointed with the decision by Equinor to withdraw from Irish offshore wind development, this in no way diminishes the ambition of ESB to deliver an offshore wind portfolio of scale in our home market," ESB said.

Baltics in first step to join EU grid

Plans for a new electricity interconnector have been announced that will link Lithuania and Poland. It is the first of 15 projects whose overall aim is to connect the Baltic countries to the European grid and enable synchronous operations with Poland, Germany and other European countries. The proposed links include construction of the 'Harmony Link' maritime link to Poland.

The LitPol Link will be the first step, allowing for import and export of electricity between Lithuania and Poland. It will also allow grid operator Litgrid and Polish grid operator PSE to test synchronous operation, should unforeseen reasons make synchronisation necessary before 2025.

"From 2025, the LitPol link will be a gateway for all three Baltic countries to connect their power systems with their European partners," said Rokas Masiulis, CEO of Litgrid, and added that this is a key guarantee for the energy security of all four countries, including Poland.

The total cost of the LitPol Link extension project is €22.5 million. The transmission project is being partly financed by the EU's Connecting Europe Facility.

Shell chooses two partners for hydrogen push

Shell has hedged its bets on recent investment in hydrogen. Its Shell New Energies Holding Europe subsidiary signed an agreement with Norsk Hydro to investigate green hydrogen for the companies' own use, supplying heavy industries and serving the maritime sector and road transport. Meanwhile Shell New Energies NL BV has signed a Memorandum of Agreement with RWE Generation to cooperate on green hydrogen production, consumption and distribution in Europe.

"Effective climate action needs cross-sector and cross-national cooperation. In our cooperation with Shell, we want to develop solutions that combine new approaches with proven technologies and, above all, can be applied quickly and on a large scale," said Markus Krebber, CEO of RWE AG.

Shell and RWE are already involved together in two major European green hydrogen projects, NortH2 in the Netherlands and AquaVentus in Germany. Now, they will examine the use of offshore wind power on a gigawatt scale for the production of hydrogen in the industrial regions in the north-east of England such as Teesside and/or Humberside.

The partnership will also look at new green hydrogen solutions for industrial customers and green hydrogen applications in the mobility sector in Germany, the Netherlands and the UK.

Nuclear potential highlighted in race to net zero

World Nuclear Association talks up nuclear power as key to abating CO_2 emissions amid stagnating capacity growth. Nadia Weekes reports

The contribution of nuclear power generation to climate change mitigation is highlighted in a new edition of the 'World Nuclear Performance Report', produced by the World Nuclear Association ahead of the COP26 summit in Glasgow in November.

Nuclear reactors worldwide have avoided 72 billion tonnes of carbon dioxide over the last 50 years, compared with coal fired electricity generation, the report states, representing twice the amount of CO_2 emitted globally each year.

In 2020, the 441 nuclear reactors in operation had a combined capacity of 392 GWe and generated 2553 TWh of electricity worldwide, just over 10 per cent of global electricity supply. Global nuclear capacity has remained almost constant for the last three years.

"It is vital that the contribution made by nuclear generation increases to help reduce greenhouse gas emissions from fossil fuels," said Sama Bilbao y León, Director General of the World Nuclear Association.

She added that nuclear energy, through the production of low-carbon heat, also offers enormous opportunities to decarbonise hard-to-abate sectors such as the heating and cooling of buildings, industrial processes, transport and shipping.

"The operation of the existing nuclear fleet must be extended as long as feasible, and the pace and scale of new nuclear construction must increase," she said.

A number of EU countries led by Portugal, however, signed a declaration ahead of COP26 calling for nuclear to be excluded from the list of sustainable energy sources, and for it to be barred from receiving European funding.

Elsewhere, Russian state-owned banking company SberBank has agreed to provide loans worth $800 million to Rosatom subsidiary Akkuyu Nuclear for the construction of the 4.8 GW Akkuyu nuclear power plant (NPP), Turkey's first.

The seven-year loan will be used for the construction of four NPP units featuring VVER-1200 power reactors to generate 35 GWh of electricity a year. The first unit is due to start operations in 2023, with all units due for completion by 2026.

Turkey's Nuclear Regulatory Authority (NDK) on 29 October awarded Akkuyu Nuclear a licence to construct unit 4 of the nuclear power plant. The licensing process involves obtaining about 120 licences and permits from various government departments.

To date, licences and permits have been issued in respect of environmental impacts, electricity generation, and construction of units 1-4. In future, NDK will consider applications for licences for fuel loading, commissioning and personnel accreditation.

The Akkuyu construction site has more than 13 000 people working on it and is one of the largest nuclear construction projects in the world.

The Turkish government, however, is also planning to expand renewable energy capacity, and has a goal to increase the share of renewables in the energy mix to 65 per cent by 2023.

In 2022 alone, some 1000 MW of solar energy capacity is expected to be added, while Turkey recently reached the 10 GW wind energy milestone.

Cem Ozkok, President of Turkey's Renewable Energy Investors Association, said that his country is extremely rich in wind, solar, hydro and geothermal resources. He called for foreign investors to support Turkey's renewable energy transformation and urged the government to introduce favourable legislation.

Neighbouring Armenia plans to start construction of a new NPP in 2026-27, according to a statement by the Minister of Territorial Administration and Infrastructure, Gnel Sanosyan.

He said that discussions are underway with Rosatom. The Armenian NPP is the only nuclear power plant in the South Caucasus region, and produces about a third of all electricity generated in Armenia. Modernisation of the project began in May 2021. Rosatom Corporation will participate in the technical operation of the station, and in efforts to extend the life of the reactor until 2036.

Further east, Kazakhstan's President Kassym-Jomart Tokayev has said he is likely to give the green light to the building of a NPP, despite expecting it to be an unpopular decision. Russia's President Vladimir Putin has said he will support such a facility.

Meanwhile, the Kazakh Ministry of Energy has signed a memorandum of understanding (MoU) with Total Eren for the development, financing, construction and operation of a 1 GW onshore wind-plus-storage complex in Kazakhstan.

The 200-turbine complex will generate around 3.8 TWh of electricity a year, and feature a 500 MW/1 GWh battery energy storage system.

Morocco seeks support for 1 GW wind energy programme

Morocco is seeking to mobilise international investments for a 1 GW wind energy programme worth MAD14.5 billion ($1.6 billion) and expected for completion in 2024, according to the Moroccan Ministry of Foreign Affairs.

The Moroccan government's announcement follows a decision by Algerian President Abdelmadjid Tebboune not to renew a contract for supplying Algerian gas to Spain through Morocco. The offshore gas pipeline, Medgas, entered into service in 2011.

The wind energy programme includes five projects: the 180 MW Midelt, the 300 MW Boujdour, the 200 MW Jbel Hdid, the 100 MW Tiskrad and the 70 MW Tanger 2. The facilities are due to be fully operational by 2024.

Kenya sidelines nuclear but boosts renewables

Kenya's state agency in charge of the country's roadmap to nuclear energy is set to be disbanded, after an official report found that the Nuclear Power and Energy Agency (Nupea) "serves no major purpose at the moment".

As it looked at ways to reduce the cost of power, the Presidential Task Force concluded that the country is years away from its first nuclear power plant, expected online in 2037, and does not yet need a standalone agency to steer the process.

"The cost implication of running Nupea as a distinct entity cannot be justified," the report said. The agency has spent on employees nearly half of the KES518.98 million ($4.6 million) it was allocated in the financial year to June 2019. The task force recommended Nupea's roles be transferred to a department within the Energy Ministry.

In a separate development, state utility Kenya Electricity Generating Company (KenGen) is accelerating renewable energy deployment, under the government's plan to achieve 100 per cent renewable energy use by 2030.

"Our future project pipeline, which is mostly green, includes geothermal, wind, solar and some hydro. The projects will be implemented in phases with the first expected to be commissioned by the end of this year," said Managing Director and CEO, Rebecca Miano.

"In Africa we have a golden chance to go green early enough when the opportunity for growth is still rife," she said. KenGen is East Africa's largest electricity generator, and a top-ten geothermal energy producer globally.

Meanwhile, the European Investment Bank (EIB) has cancelled a KES19.5 billion loan offer to Akiira Geothermal for the Akiira One geothermal project in Kenya, reportedly due to viability and environmental concerns.

The two-phase 140 MW project is to be developed in the Olkaria region of the Rift Valley.

South Africa attracts green energy investment

- Just Transition Partnership pledges $8.5 billion
- Eskom gets $57.67 million storage boost

Nadia Weekes

Funding of $8.5 billion will help South Africa start phasing out coal fired power stations, under plans announced at COP26.

The Just Transition Partnership – which includes a number of developed countries – has committed to loans, grants and other investments supporting the initiative over the next five years.

South Africa is highly reliant on coal for its energy production. In 2020, 86 per cent of electricity came from coal, compared to the global average of 34 per cent.

More than 90 000 miners in South Africa need to be supported in the transition to clean energy production, said Maria Flachsbarth from the German Ministry for Economic Cooperation and Development.

"A successful coal phase-out in South Africa has the potential to become a blueprint for other regions," added acting Environment Minister Svenja Schulze. Germany alone will invest €700 million ($810 million).

Meanwhile, the African Development Bank (AfDB) has approved a $57.67 million loan to South Africa's public electricity utility Eskom to support electricity generation from renewable sources. The project involves the development of 200 MW of battery storage with four hours of daily energy storage capacity.

Once onstream, Eskom will be able to dispatch electricity sourced from variable renewable energy that would otherwise have been wasted, reducing reliance on fossil fuel-generated electricity at peak times of the day.

Separately, Eskom has announced plans to spend ZAR170 billion ($10.5 billion) over the next decade in power transmission projects to cater for a 30 GW expansion in generating capacity, especially from solar and wind farms.

A combination of vandalism and breakdowns at ageing infrastructure has caused frequent power blackouts since 2007, with significant damage to the economy.

Under the plan, Eskom wants to add 8400 km of extra-high-voltage lines. But experts say the plans are open to legal challenges, and expect severe load shedding to continue in South Africa.

At the end of October, South Africa awarded nearly 2.6 GW of wind and solar projects in its latest auction. Winning bidders are required to reach financial close for their projects by March 2022, and connect them to the grid no later than April 2024.

Corporates in race to zero

- Private financing for net zero commitments hits $130 trillion
- UK forces corporations to set out net zero plans

Junior Isles

The number of corporations signing up to meet net zero emissions targets is rapidly gaining momentum. At the recent COP26 climate summit in Glasgow, UK, Mark Carney, former Bank of England Governor and now UN Special Envoy on Climate Action and Finance, said international financial firms have committed $130 trillion to hitting net zero targets.

Members of the Glasgow Financial Alliance for Net Zero (GFANZ), also chaired by Carney, will now adopt their own interim and long-term targets for achieving net zero by 2050 at the latest, and have committed to publishing annual progress reports. GFANZ already has more than 450 member firms, controlling 40 per cent of global financial assets, from 45 countries including banks, insurers, pension funds, asset managers and stock exchanges.

The news came as the UK Treasury said that by 2023, companies will have to set out detailed public plans for how they will move to a low-carbon future – in line with the UK's 2050 net zero target. Companies and their shareholders will be left to decide how their businesses will adapt to this transition, including how they intend to decarbonise their operations.

Speaking at the COP26 summit, British Chancellor Rishi Sunak claimed the UK was leading the world in becoming the "first-ever net zero aligned global financial centre".

Mark Campanale, Founder and Executive Chair of Carbon Tracker Initiative, praised the ambition of the plans, but said details of how it would work were still unclear.

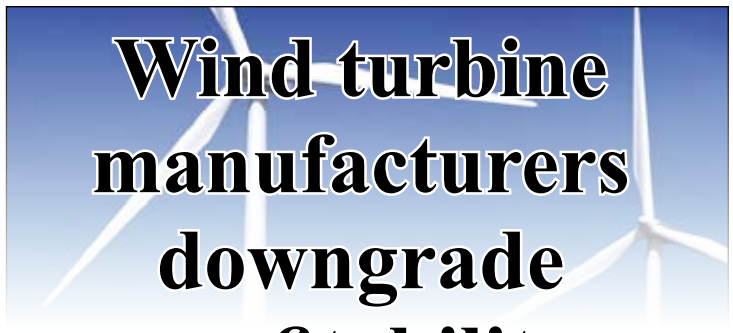
"None of the financial assets announced are currently aligned with net zero and no group of companies can say they are meeting the Paris target by continuing to invest in fossil fuels, so that needs to change considerably before London can be lauded as the world's first net zero financial centre and a model for the world," he said.

Commenting on news that more than half of FTSE100 companies are now committed to eliminating their contribution to climate change by 2050, Nick Molho, Executive Director at the Aldersgate Group, said: "The fact that 60 per cent of the FTSE100 has signed up to the Race to Zero shows that businesses in multiple sectors of the economy are already well engaged in the transition to net zero emissions.

A report by the *Financial Times*, however, claims that investors' increasing focus on sustainability has led to a plethora of disclosure standards, fuelling concerns about so-called standards shopping and 'green washing' by companies that only publish information which shows them in a favourable light.

Last month the IFRS Foundation, the body responsible for international accounting standards moved to tackle the issue, announcing it will create a new board to develop minimum sustainability disclosure requirements for companies around the world. The IFRS Foundation said it will set up the International Sustainability Standards Board to develop a comprehensive global baseline of sustainability disclosures for the global financial markets.

The new standards will ensure information is comparable across industries and financial markets. Companies will be required to comply once they are adopted by national regulators, who will have the power to tailor them at a local level.



Wind turbine manufacturers downgrade profitability forecasts

Several major wind turbine manufacturers are expecting lower profits, citing logistical challenges and the pandemic as contributing factors.

Danish wind turbine manufacturer Vestas lowered its full-year operating profit margin guidance from the previous 5-7 per cent to around 4 per cent, citing the impacts of the supply chain instability and cost inflation caused by the Covid-19 pandemic.

Group President & CEO of Vestas, Henrik Andersen, said: "With supply chain instability and high component, material and transport costs expected to last throughout 2022 as well as the growing climate and energy crises making our solutions ever more important, our full focus is to mitigate impact from external factors to protect profitability and execute on our strategy without compromising on safety or quality."

In the third quarter of 2021, Vestas generated revenue of €5.538 billion, an increase of 16 per cent compared to the year-earlier period. This was also the company's highest-ever quarterly revenue recorded.

The operating profit (EBIT) before special items decreased by €87 million to €325 million for the quarter. This resulted in an EBIT margin before special items of 5.9 per cent, compared to 8.6 per cent in the third quarter of 2020.

Vestas also warned of challenging conditions in renewable energy after projects in Europe suffered from low wind speeds.

Danish power group Ørsted, the world's largest offshore wind farm developer, said it had taken a DKr2.5 billion ($389 million) hit from lower wind speeds in the first nine months of this year compared with 2020 as it reiterated expectations its 2021 profits would come in at the lower end of a guided range.

Siemens Gamesa ended a complex financial year 2021 shaped by healthy long-term demand for wind energy, but also by challenging short-term market dynamics. Profitability was impacted by commodity price and transport cost increases and by higher ramp-up costs of the Siemens Gamesa 5.X platform. The company said this resulted in EBIT pre PPA and before integration and restructuring costs of -€96 million in FY21, with a margin of -0.9 per cent (vs. -2.5 per cent in FY20).

Presenting its preliminary results for the first three quarters of 2021 and revised guidance for FY2021, Nordex also reported a decrease in profitability. It said this was primarily a result of the effects of the increasing volatility in commodity and shipping costs, which adversely affected the Group's EBITDA and are expected to further impact results in the fourth quarter of 2021 as well as 2022. The operating (EBITDA) margin of previously 4.0-5.5 per cent has been adjusted to around 1.0 per cent.

GE and Toshiba to spin-off energy businesses

Both GE and Toshiba are looking to split up their businesses – a strategy already adopted by rival European conglomerates Siemens and ABB – in an effort to improve their strategic flexibility.

GE's plan will see GE Aviation, GE Healthcare, and the combined GE Renewable Energy, GE Power, and GE Digital businesses become three global, investment-grade public companies. GE intends to execute tax-free spin-offs of Healthcare in early 2023 and of the Renewable Energy and Power company in early 2024

Announcing the plan, GE Chairman and CEO Larry Culp said the company had simply concluded that letting the healthcare, aviation and energy businesses fend for themselves with "greater focus, tailored capital allocation and strategic flexibility" was the best way to set them up for the next 100 years.

Analysing the decision Sara Moeller, Professor of Finance at Pittsburgh University, said: "Basically, GE is telling us that smaller is better." The rise of private equity had made it harder for industrial companies to compete for the deals that conglomerates depended on, she added. "Now they needed to focus and stay within [their] lane, while becoming more efficient."

The plan will see Culp serve as non-Executive Chairman of the GE healthcare company following its spin-off. He will continue to serve as Chairman and CEO of GE until the second spin-off, at which point, he will lead the GE aviation-focused company going forward.

Scott Strazik will be the CEO of the combined Renewable Energy, Power, and Digital business, which will be named GE Renewable Energy and Power.

GE's renewable energy business currently has more than 400 GW of renewable energy installed and the newly set up company will offer a range of energy technology and services, from digitalisation of grid and electrical infrastructure gas and steam turbines, nuclear and hydropower, gas and steam turbines, to wind turbines.

The plan was announced just days ahead of a similar a move by Toshiba, which says it is restructuring to improve its competitiveness. The embattled Japanese technology conglomerate plans to spin-off its energy infrastructure and computer devices businesses.

The energy infrastructure spin-off will include Tokyo-based Toshiba Corp.'s nuclear power operations, including the decommissioning efforts at the nuclear plant in Fukushima, which suffered meltdowns after an earthquake and tsunami in March 2011.

The energy business will also include the company's sustainable energy and battery businesses. Its annual sales total about Yen2 trillion ($18 billion).

Toshiba said its restructuring would be completed by March 2024.

Companies ramp-up hydrogen investment

The scramble to ramp-up hydrogen production is continuing as companies around the world make the carbon-free fuel central to their strategies to leverage the energy transition.

Portugal's largest utility EDP is increasing its bet on green hydrogen (produced from renewables) and aims to reach 1.5 GW of installed capacity by 2030, capitalising on its presence in key markets such as Iberia, the United States and Brazil.

The announcement, made during the COP26 climate conference in Glasgow, came after EDP presented a strategic plan in February that envisaged investing in 250 MW of hydrogen electrolysers capacity by 2025.

EDP did not reveal how much it would invest, adding that the plan would involve converting old coal fired power stations into hydrogen centres as well as investment in new production units.

The announcement came as Danish catalysis and process technology solutions provider Haldor Topsøe said it aims to "conquer new markets" and position itself centrally in energy transition. The company is currently in the process of hiring more employees to grow its new business area of green hydrogen.

Meanwhile in Asia, India's Adani group said it is planning to invest $70 billion over the next decade to become the world's largest renewable energy company and produce the cheapest hydrogen on the Earth.

Adani Green Energy (AGEL) said is targeting 45 GW of renewable energy capacity by 2030 and will invest $20 billion to develop a 2 GW per year solar manufacturing capacity by 2022-23.

Americas

Wärtsilä to supply three power plants to Brazil

Wärtsilä will supply three gas engine power plants with a combined output of 150 MW to Brazil, following a Reserve Capacity Auction organised by the Brazilian Ministry of Mines and Energy in October. The plants are scheduled to be operational by Q2, 2022.

The contracts include 16 Wärtsilä 20V34SG gas engine generating sets. The projects will be delivered on an EPC basis to existing power plant sites UTE Luiz Oscar Rodrigues de Melo and UTE Viana 1, as well as a new power plant UTE Povoação 1, all located in Espírito Santo state in southeast Brazil.

Håkan Agnevall, President and CEO of Wärtsilä Corporation, said: "With these projects we are approaching the important milestone of 3 GW of installed base in the country and continue to meet the evolving needs of our customers. The high efficiency of the Wärtsilä engines, with their quick power ramp-ups, in a matter of minutes rather than hours or days, provide the flexibility and reliability needed in today's energy market."

Prysmian to supply US offshore wind cables

US energy company Dominion Energy has selected the consortium of DEME Group and Prysmian as the Balance of Plant (BoP) contractors for the 2.6 GW Coastal Virginia Offshore Wind (CVOW) project, located 43 km off the coast of Virginia Beach.

DEME Offshore's CVOW BoP contract includes transport and installation of 176 monopile transition piece foundations, three offshore substations, scour protection, and the supply and installation of export and inter-array submarine cable systems. DEME Offshore will oversee the complete offshore installation works for the foundations, substations, infield cables, as well as part of the export cables.

Prysmian Group will provide three 3-core 220 kV HVAC export cables each measuring approximately 62 km in length, with XLPE insulation and single-wire armouring, for a total of approximately 560 km. It will also supply 320 km of 3-core 66 kV offshore inter-array cables with XLPE insulation.

The total value of the contract is approximately €1.6 billion, of which around €630 million is related to Prysmian for the cable supply and the installation works under its responsibility. The project is expected to be completed by 2026.

Alberta wind power order for Siemens Gamesa

Siemens Gamesa Renewable Energy has signed its first project with Renewable Energy Systems (RES) in Canada to supply the 100 MW Hilda wind project in Alberta. Siemens Gamesa will supply 20 SG 5.0-145 turbines.

The 71 m blade on the SG 4.X platform has features that Siemens says will guarantee high energy production and reduced noise emission levels. This reduction in noise will improve the performance at the Hilda wind power project while remaining within the mandated noise emission levels. Siemens Gamesa currently has orders for more than 1.2 GW of power in western Canada with the SG 4.X platform for installation through 2023.

Peter Clibbon, Senior Vice President of Development with RES, said: "We are pleased to announce Siemens Gamesa as the turbine supplier for our 100 MW Hilda wind project in Alberta. We look forward to delivering clean, renewable energy and helping Alberta meet its 30 per cent renewable energy goal by 2030."

Offshore wind connection to New York

Siemens Energy, in consortium with Aker Solutions, has been awarded an offshore grid connection project to supply the HVDC transmission system for the Sunrise Wind offshore wind project delivering electricity to New York state. This will be the first offshore wind project in the US to use HVDC technology.

The 924 MW wind farm is being developed as a joint venture between the Danish company Ørsted and US-based energy provider Eversource. Sunrise Wind will be located around 50 km east of Long Island and will help New York state meet its goal of 100 per cent emission-free electricity by 2040.

Siemens Energy will deliver the HVDC system on a turnkey basis. The HVDC system will consist of two converter stations linked by a 160 km cable. Aker Solutions is responsible for the platform consisting of a steel jacket substructure, and a topside platform deck housing the electrical equipment. The final deliveries are scheduled for the second half of 2025.

Asia-Pacific

NEA to construct Arun-4 hydropower project

Nepal's Ministry of Energy, Water Resources, and Irrigation has awarded the 490.2 MW Arun-4 hydropower project to Nepal Electricity Authority (NEA). Detailed study and design of the project has been carried out. It will be built at Bhotekhola Rural Municipality and Makalu Rural Municipality of Sankhuwasabha district at the lower topographical region of Upper Arun Hydropower Project, for which NEA was given permission for construction last September.

The cost of Arun-4 has been estimated at $500 million.

MingYang wind turbines for 375 MW Vietnam

Chinese turbine maker MingYang Smart Energy has secured a supply contract with PowerChina International Group for the 375 MW Ca Mau offshore wind project in Vietnam. The project is the largest offshore wind power project planned in Southeast Asia.

MingYang will deliver 75 of its MySE 5.0-166 offshore wind turbines for the Ca Mau 1 project, which will be built in two stages, with the first batch scheduled to be dispatched in the first quarter of 2022. The project is located in the tidal flat area of Sanjiang Dongshe in Nangen County, Ca Mau Province.

The MySE 16.0-242 is a 16 MW, 242 m tall turbine with three propelling 118m blades covering a 46 000m^2 swept area.

SECI awards Karnataka project to Sembcorp

Solar Energy Corporation of India (SECI) has awarded a contract for a 180 MW wind power project to Green Infra Wind Energy, the renewable subsidiary of Sembcorp. The project is to be built in the state of Karnataka. On completion of the project, power output will be sold to SECI under a 25-year PPA.

Vipul Tuli, CEO of South Asia, Sembcorp Industries, said: "Winning the 180 MW SECI wind power project is an endorsement of our competitiveness and capabilities in renewable energy. It aligns with our target of growing our renewable portfolio and fits well with our long-term commitment to India's energy transition."

Europe

OX2 wins deal for Finnish wind farm

A €650 million contract for a zero-subsidy 455.4 MW wind farm in Finland has been awarded to OX2 of Sweden. On completion, the wind farm will be sold to a consortium of local energy companies. OX2 said it expects to complete the plant in early 2025.

The wind farm will consist of 69 turbines, each of 6.6 MW, to be built in Lestijarvi.

Following completion, the plant will be owned by Kymppivoima Oy (65 per cent), Oulun Energia (25 per cent) and Kuopion Energia (10 per cent).

The project includes a 15-year agreement for technical and commercial management. OX2 is also tasked with building the grid infrastructure to connect the wind farm, including a substation and a 58 km, 400 kV transmission line.

Siemens Gamesa preferred supplier for Norfolk

Siemens Gamesa has been named Preferred Supplier by Vattenfall for the 3.6 GW Norfolk offshore wind power projects in the UK. The agreement includes potential deployment of the new SG 14-236 DD offshore wind turbines and a multi-year service agreement. Located about 47-72 km off the English east coast, the agreement encompasses Vattenfall's Norfolk Vanguard and Norfolk Boreas projects. Each park has a capacity of 1.8 GW.

The SG 14-236 DD offshore wind turbine features a 236-m diameter rotor using Siemens Gamesa IntegralBlades, with a 43 500 m^2 swept area. This allows the SG 14-236 DD to provide an increase of more than 30 per cent in Annual Energy Production compared to the SG 11.0-200 DD offshore wind turbine. Furthermore, the machine can reach 15 MW capacity including the company's Power Boost function.

Oilon secures Finnish heat pump order

Hatanpään Valtatie 30 has ordered six heat pumps from Oilon to transfer excess heat from the data centres at Nokia's R&D vLab to provide district heating for Tampere, Finland. The pumps should be operational by the start of 2022.

The six Oilon ChillHeat industrial heat pumps will cool the data centre and transfer the heat to the district heating network.

Jussi Alpua, Sales Manager for Oilon, said: "It is really great that energy companies are excited about utilising excess heat. The district heating networks in Finland are all owned by energy companies, and that's why the decisions they make have such a big effect on how 'cleanly' we are able to heat our cities."

Nordex turbines selected for Ardderroo

The Nordex Group has received an order from Ireland for 22 turbines of the Delta4000 series with a total of 101 MW. Fifteen N149/4.X turbines and a further seven N149/5.X machines are to be supplied for the "Ardderroo" wind farm. Nordex also has a 20-year service contract.

The Ardderroo project is being built in County Galway on the west coast of the Republic of Ireland. The turbines will be installed and commissioned in the third quarter of 2022.

Electrode boiler for carbon capture project

PARAT Halvorsen will supply an 8 MW electrode boiler to Aker Solutions, which is building Norway's first Carbon Capture plant at Norcem's cement factory in Brevik. The design pressure of the boiler is 13 bar[g] with the design temperature of 195°C. The contract is valued at around $55 million.

The plant will be the world's largest carbon capture plant connected to a cement factory and will capture around 400,000 tonnes of CO_2 each year.

International

Saudi transmission line project for L&T

Saudi Electricity Company (SEC) has awarded a $67.2 million contract to Larsen & Toubro (L&T) for the construction of double circuit overhead transmission lines (OHTL) in Afif, Saudi Arabia. The 176 km, 380 kV OHTL will link the New Afif bulk supply point (BSP), Dawadmi BSP, and Khuf BSP.

L&T will deliver the works on a turnkey basis, being responsible for the design, engineering, materials procurement, installation, construction, testing, and commissioning of the OHTL.

Work is due to be completed in 24 months.

Nordex wins 68.4 MW order in Turkey

Enerjisa Üretim – the largest IPP in Turkey – has commissioned the Nordex Group to supply and install twelve N163/5.X turbines for the 68.4 MW Erciyes wind farm. The contract also includes a contract for maintenance and service of the turbines for 20 years.

The Erciyes project is located in the province of Kayseri in Central Anatolia. Nordex will install Delta4000 series turbines in 5.7 MW operating mode on 118 m towers in the cold climate version. Installation is scheduled to start in summer 2022, with commissioning planned for the end of 2022.

Enerjisa Üretim is the joint-venture company of Sabancı Holding of Turkey and E.On of Germany.

Patxi Landa, CSO of the Nordex Group, said: "We are very pleased that Enerjisa Üretim has opted for our 5 MW technology for the Erciyes project. This order further strengthens our leading market position in Turkey."

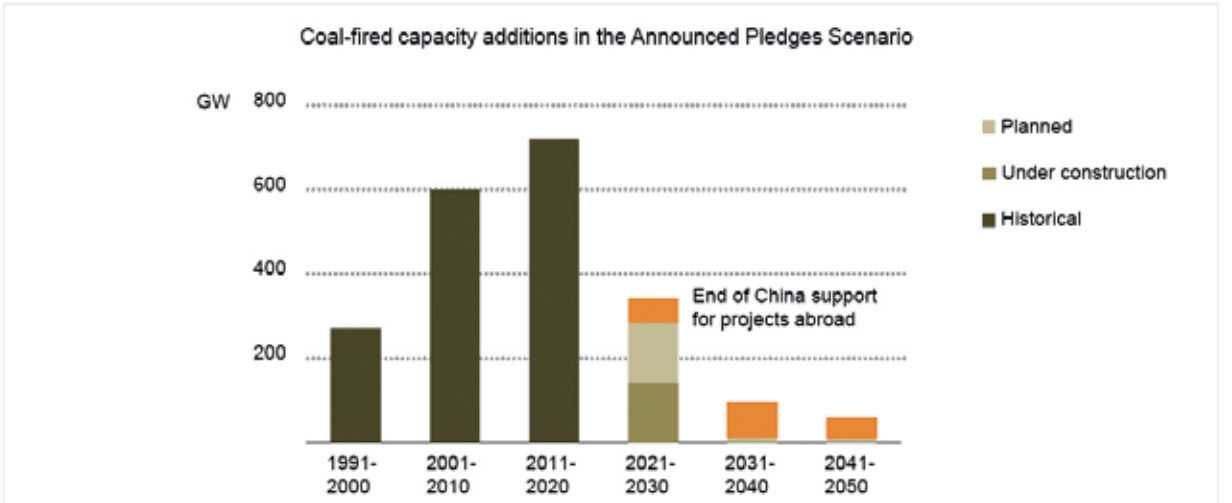
Repeat order from Nigeria for Wärtsilä

Wärtsilä will supply a 70 MW captive power plant for the BUA's new Sokoto cement production plant in Nigeria. The plant is required to supply the energy for an off-grid additional cement production line. This follows an order for a 50 MW power plant from the same customer just two years earlier.

Wärtsilä will supply 34DF dual-fuel engines primarily operating with LNG, but able to switch to an alternative fuel oil without interruption of the engines.

The plant will operate on seven Wärtsilä 34DF engines scheduled for delivery mid-2022. The plant is expected to be fully operational in 2023.

New coal power is on its way out



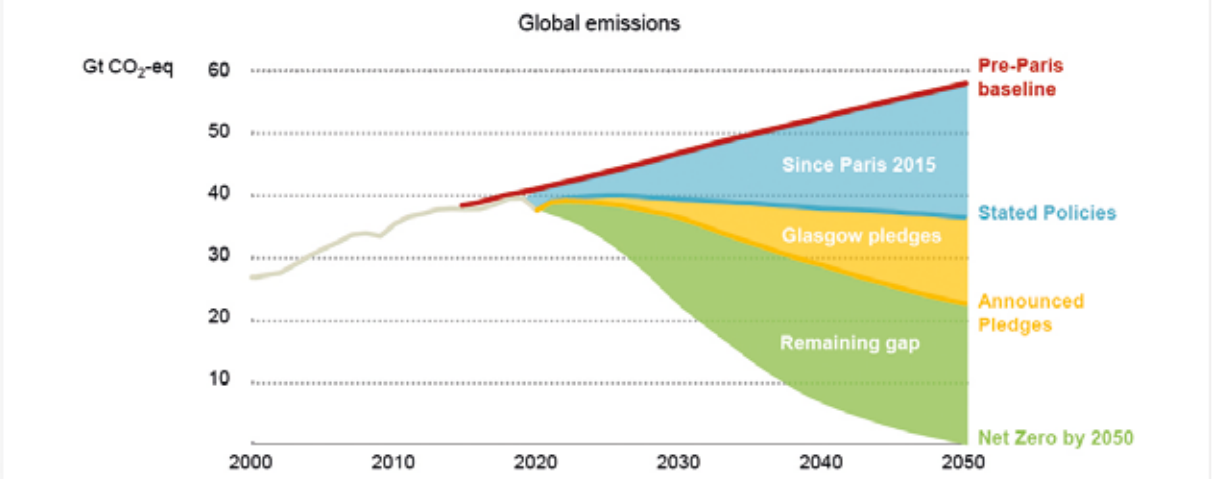
After decades of growth, construction of unabated coal power plants sharply declines under announced pledges, and cancellations could cut 20 Gt of emissions to 2050, comparable to savings from the EU reaching net zero by 2050

For more information, please contact:

International Energy Agency
9, rue de la Fédération
75739 Paris Cedex 15
France.

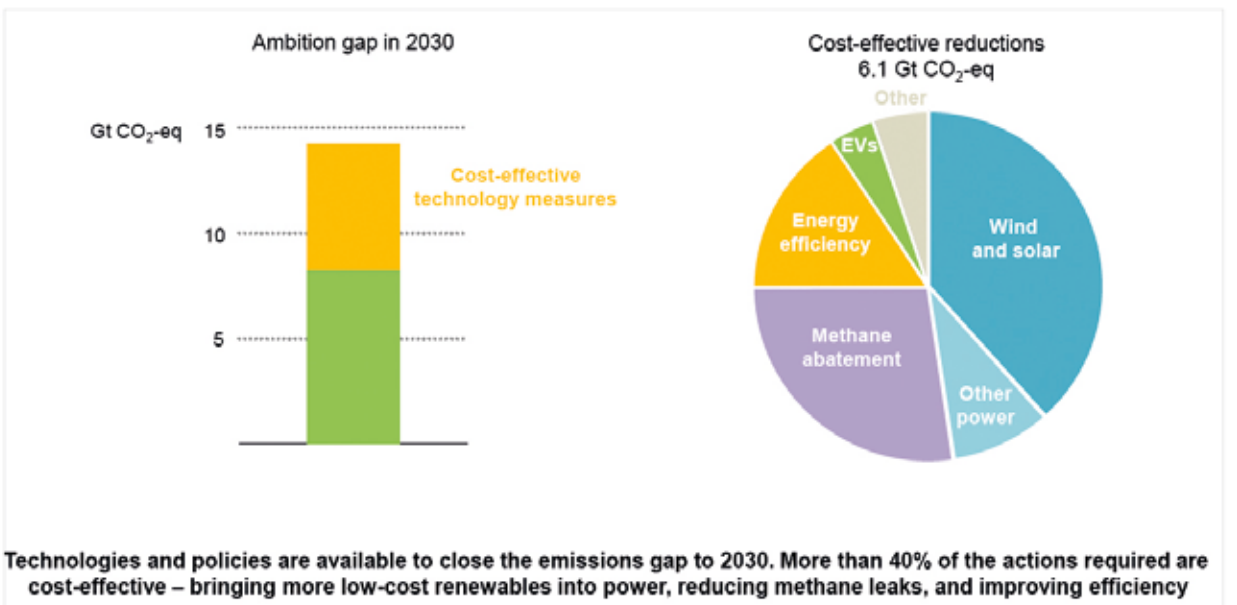
Email: bookshop@iea.org
website: www.iea.org

A large ambition gap remains in 2030



Despite some positive signs, today's pledges close less than 20% of the gap to the Net Zero by 2050 scenario: countries with net zero pledges and countries without each account for about half the remaining ambition gap

But we have cost-effective ways to close the gap



Technologies and policies are available to close the emissions gap to 2030. More than 40% of the actions required are cost-effective – bringing more low-cost renewables into power, reducing methane leaks, and improving efficiency

Hydrogen

US infrastructure bill seeks hydrogen hubs, billions available for energy transition

- $1 billion for electrolysis research, $500 million for hydrogen manufacturing and recycling
- Funding available for fuel cell technology

Gary Lakes

US President Joe Biden signed into law in mid-November a bipartisan infrastructure bill that includes financing designed to create incentives for hydrogen-producing companies and makes billions of dollars available for investment to transform the US into a clean energy economy.

More than $9 billion has been allocated in the Infrastructure Investment and Jobs Act that will drive large-scale deployment and private investment in hydrogen output and industries. The bill includes $8 billion for the creation of at least four large-scale hydrogen hubs that will be located in spots where industries will be able to have easy access to hydrogen. A further $1 billion is to go for clean hydrogen electrolysis research, and $500 million will fund clean hydrogen manufacturing and recycling.

The legislation makes significant funding available for fuel cell technology. "There are numerous other opportunities… that will enable hydrogen energy and fuel cell technology to be deployed throughout the nation's energy and transportation systems," a statement released by the Fuel Cell and Hydrogen Energy Association (FCHEA) said with regard to the bill's enactment.

"This bill demonstrates the incredible potential for creating the nation's hydrogen economy," FCHEA President and CEO Frank Wolak said in the statement, released on November 15. "FCHEA is encouraged by further discussions surrounding the Build Back Better Act, which includes an array of tax and policy activities that complement this infrastructure bill and will continue to drive innovation, economic growth, and emissions reduction," he added.

The bill is a major step forward for the US, which for years has been discussing the country's need to revamp its ageing infrastructure. Most of the $1.2 trillion budget is devoted to innovations in public transit, electric vehicle infrastructure, electric school buses, improvements at airports and sea ports, and addressing legacy pollution by capping abandoned oil and gas wells and reclaiming abandoned mines and brownfield sites. Reducing emissions, eliminating the escape of methane gas, improving the electricity grid and adapting to renewable energies will contribute along with other provisions to clean up the American environment and provide jobs that go beyond the poorly paid service sector.

Funds have been allocated for nuclear energy research and also for carbon capture and storage.

The infrastructure bill provides for setting up at least four hydrogen energy hubs located in different parts of the country. Regions that wish to qualify for government support must submit plans to the Department of Energy on how they would organise their teams.

The idea behind the hubs is to group hydrogen producers close to industrial users. That set-up is viewed as the best way to boost demand for low-cost, clean hydrogen. Media reports from the US state that a number of companies and organisations at separate locations in the US are already constructing partnerships in order to be designated as one of the hubs.

The criteria for selection call for the region to demonstrate the variety of uses for clean hydrogen fuel: power generation, industrial manufacturing, transportation, and residential and commercial heating. The criteria also call for a hub to be located in a different location in the country and that the hub makes use of energy resources that are abundant in that region. New York, the Gulf Coast, Los Angeles, the Pacific Northwest, the Midwest and the Carolinas are seen as possible locations for one of the hubs.

The $1 billion allocated to clean hydrogen electrolysis research is meant to go to grants and contracts for work that will reduce the cost of hydrogen produced by electrolysis to less than $2/kg by 2026. It also calls for the creation of a Clean Hydrogen Research and Development Program that will demonstrate a standard of clean hydrogen production by 2040.

Clean hydrogen, according to the bill, is H_2 that is produced in any way that emits 2 kg or less of carbon dioxide equivalent for every kilogram of hydrogen produced. Currently, hydrogen is priced at around $5/kg.

Also addressed is the storage and transportation of hydrogen and hydrogen carrier fuels that are in gaseous, liquid or solid forms. Natural gas transport systems can be retrofitted to accommodate these fuels.

A green hydrogen energy hub is already being planned in Mississippi by Hy Stor Energy, which plans to invest $3 billion in hydrogen production and storage. Called the Mississippi Clean Hydrogen Hub (MCHH), the facility intends to produce some 110 000 tons of green hydrogen annually by solar-powered electrolysis and may eventually add wind power and hydroelectric power to the mix.

Hy Stor chose to establish its hub in Mississippi because of the large salt caverns in the region that can store up to 70 000 tons of green hydrogen. The existing infrastructure in the area is also conducive for distribution via highways, gas pipelines, railroads, and ports on the Gulf Coast. Start-up of the hub's first phase is planned for 2025.

Gas

Fossil fuels cling to global energy future despite hopes for COP26

COP26 did not sound the death knell for fossil fuels as many had hoped for but a pledge on cutting methane production is seen as significant.

Gary Lakes

COP26 has come and gone and left the world with an uncertain picture of whether real gains towards limiting global warming to 1.5°C have been made. Many observers have expressed satisfaction with the outcome of the international conference, while many more have voiced a profound disappointment due to the fact that limits on fossil fuel production and use were not imposed.

Due to the reluctance of many countries to stop the use of coal anytime soon, COP26 is stuck with hoping that developed countries will end their use of coal by 2030 and that developing nations will end their use of it by 2040. But that could lead to another 20 years of emissions emanating from the fuel that set the industrial revolution in motion.

An advance, however, was made with regard to curbing emissions of methane gas, which is some 80 times more potent in contributing to global warming than carbon dioxide. Methane leaks from oil and gas wells and pipelines, as well as landfills, and is part of the digestive process for cattle, which has prompted calls for people to eat less beef. At COP26 more than 100 countries signed a pledge to reduce their methane emissions by 30 per cent from 2020 levels by 2030. However, the world's three largest methane emitters – Russia, China and India – did not sign the Global Methane Pledge. Those countries account for about a third of all methane emissions.

Washington has been pushing countries to sign on to the methane pledge since it was launched in September with nine members. US President Joe Biden has stated that he will see that the US would tighten and expand regulations forcing oil and gas companies to monitor and fix gas leaks. Europe's leadership plans to take steps to improve leak detection as well as limit venting and flaring of methane and gas.

According to reports, COP26 was attended by more lobbyists working for the fossil fuel industry than any of the attending countries, whose own delegations included other representatives for oil, gas and coal. Among the delegations was the Gas Exporting Countries Forum (GECF), which includes major gas exporting countries like Russia, Iran, Algeria, Libya, Qatar, Nigeria, Norway and Azerbaijan, among others.

The GECF's went to COP26 to argue that gas is a fuel that can provide energy for the world. The group noted that gas is the cleanest of fossil fuels and is abundant, flexible and affordable, which makes it an ideal choice for developing countries.

The group estimated that natural gas will become the most used source of energy in the world by 2050, accounting for 27 per cent of the global energy mix compared to 23 per cent currently.

The Secretary General of the GECF, Yury Sentyurin, said the group was taking steps in advancing technology and innovation to research and development in order to cement the role of natural gas as a solution for a balanced energy transition.

"Our Environmental Knowledge and Solutions framework has been initiated as a collaborative platform with designated measures to build capabilities and exchange expertise, specifically regarding greenhouse gas (GHG) emissions mitigation practices," Sentyurin said. "The GECF member countries have placed climate action at the forefront of their priorities," he added.

The GECF's acknowledgement of climate change is a positive sign in that it signals that countries whose economies are heavily tied to natural gas production and exports are willing to take part in efforts to reduce global warming and move to net zero.

For its part, Saudi Arabia, which has seen the accumulation of wealth beyond the riches of Aladdin's cave through the production and export of petroleum, products and petrochemicals, is reluctant to take steps towards a world that would see a vastly reduced demand for oil. While the country has taken steps to develop renewable energy, the motive is to reduce the use of petroleum domestically so that more oil will be available to sell on global markets.

Saudi Arabia is loathe to cut investment in the production of hydrocarbons and argues that it will employ the concept of a carbon circular economy, which includes measures such as planting trees and using carbon capture and storage (CCS) technology. Finding water for thousands of trees in the water-starved Middle East and putting stock in the unproven CCS technology is, however, viewed by many environmental activists as a meagre attempt to make it appear that Riyadh is playing its part for climate change.

Adopting artificial intelligence in the electricity sector

A global industry is emerging to apply intelligent automation and artificial intelligence to almost every aspect of sustainable electricity production and distribution, and large organisations are adopting automation platforms to deliver real change. Blue Prism's **Tony McCandless** has identified several areas where intelligent automation and AI are bringing demonstrable benefits.

According to the history books, the formal distribution of electricity to power homes and businesses reaches its 140th anniversary in 2022. The electricity industry has evolved and expanded to become one of life's most important services. But it also faces a unique set of challenges that means it can no longer carry on with business as usual.

These include the very real need for sustainability in power generation, underlined by outcomes from the 26th United Nations Climate Change conference (COP26) held in November 2021. Pledges by countries to decarbonise energy supplies are now firmly in place, and there will be a renewed emphasis on solar and wind power generation moving forward.

This has huge implications for the highly regulated electricity industry, which risks both fines and reputational risk when it fails to deliver power according to the requirements of the regulatory framework. The transition from fossil fuels to sustainable energy production will need to be managed carefully when less predictable methods are used.

Spikes in energy prices are also having a negative impact on electricity suppliers, especially those in the UK that failed to hedge against higher costs and have now had to close their businesses.

The direct result of this is that better established suppliers are having to take in thousands of new customers virtually overnight, putting massive pressure on both people and systems.

This brings us to the problem of legacy IT systems. As with the ageing infrastructure, which the electricity industry struggles to keep up-to-date because of the growing shortage of relevant skills and expertise, it is difficult to find the investment to upgrade IT platforms.

McCandless: The electricity industry has now reached an inflexion point where it needs to start doing things differently

So while initiatives such as smart metering should bring benefits through lower costs and greater efficiencies, in practice the vast volumes of data gathered are difficult to manage and analyse in any meaningful way, for example when making predictions for future consumption in real-time.

And while choice has been removed from some consumers because of the energy pricing crisis, providing excellent levels of customer service is a key element in reducing churn and gaining market share. This is the case both for signing up and servicing customers, but also in terms of fixing physical problems with supply.

Legacy IT systems mean that the information that contact centre staff need to support customers is often held in different systems. People are used as the connectors between those systems, creating friction in processes such as change of address, billing or fault repair scheduling.

So given the need to deliver value to shareholders, while meeting regulatory requirements and keeping customers satisfied, how can electricity companies adapt their processes and adopt a more data-driven approach to managing their businesses – without wholesale replacement of legacy IT systems?

One answer lies in the adoption of intelligent automation (IA) and artificial intelligence (AI), a fusion of technologies set to transform the way in which the electricity industry operates. A global industry is emerging to apply IA and AI to almost every aspect of sustainable electricity production and distribution, and large organisations are adopting automation platforms to deliver real change.

Through our work with electricity companies we have identified a number of areas where automation and AI are bringing demonstrable benefits.

- *Customer experience* – In the UK especially, utility companies can be massively impacted by their customer experience (CX) scores. This can mean millions of pounds per annum in incentives/penalties imposed by the regulators, and can be painful if it isn't managed effectively. By integrating customer relationship management (CRM) and billing systems utilities can avoid leaving customer agents with complex systems with multiple data sources. Digital workers can do the heavy lifting of pulling data into a single view of the customer.
- *Legacy infrastructure* – The reality for many organisations is that their underlying digital landscape is a mix of old and new. The capability to bring both together is key. Taking information from decades old customer IT systems to blend into modern workforce management systems is still to a degree done by human beings cutting and pasting from one system to the other. This alone provides a rich vein of improvement that would help operational response teams and create efficiencies. It also allows said humans to spend more time in empathetic discussions with customers, who are often under stress as most calls are to deal with a problem on a lifeline service.
- *Environmental reporting* – This is aligned with the climate agenda, but also includes metrics such as the reporting of performance around regulatory targets for pollution and efficient energy generation. Such reporting is critical, and underpinning automated systems can manage in-day monitoring and responses to then be able to provide accurate reporting against targets.
- *Smart systems* – The requirement for EU-27 Member States to move towards smart systems has added a layer of complexity. Each energy supplier has a target that they either undertake themselves or outsource to organisations. The interaction between the energy supplier systems and the installer is massively complex with a plethora of duplication and access issues, which IA and AI could help ameliorate.
- *Optimised plant maintenance* – Ageing energy generation and distribution infrastructure is one of the biggest challenges facing utilities in developed countries. It has a huge impact on their ability to provide a reliable, cost-effective and 'future-proof' provision for end users. In some cases these providers are working with 30+ year-old equipment and are looking to maximise its life by implementing IoT, IA and AI around workflows such as predictive maintenance. This is where sensors on large equipment feed data to a SCADA system where IoT/IA/AI/automation platforms can help determine the likelihood of a failure. Depending on their findings, they can automatically schedule a field service request and technician to fix before failure, resulting in extended life, lower costs and greater efficiencies.
- *Climate change* – Pretty much all providers have targets to achieve net zero within a certain timeframe. Embracing RPA, advanced analytics and AI is absolutely instrumental in meeting climate change goals and the growing demand for clean, cheap, reliable water. For example, San Diego Gas and Electric prevents wild fires by utilising sensor data – along with satellite weather data. Another great example is to use drones to perform inspections on infrastructure and solar farms and computer vision to detect anomalies where digital workers collect the data, analyse and perform the next best action.

But given the benefits IA and AI are capable of delivering to the electricity industry, why is there still reluctance in some quarters to adopt relevant technologies? For every organisation that has taken early-mover advantage and seen measurable results such as a reduction in customer onboarding, automated engineer scheduling and friction-free change of address processes, there are others that have yet to take any meaningful steps to adopt IA and AI.

In our experience, barriers tend to be cultural rather than technological, or even budgetary. There needs to be buy-in not just by the senior leadership team and the business, but also by the IT team; best results come from continuous programmes of change, not just one-off, ad hoc projects.

Another challenge is that companies operating in a competitive industry can be a little reluctant to share best practices and measurable outcomes from their IA and AI programmes. And in a sector where lines of business compete for scarce resources a joined-up, integrated approach towards digital transformation can be difficult to achieve.

Finally, the industry can have fears about loss of control over what is an essential service if too much work is taken away from human experts and given to digital workers instead. However, as many utilities have now discovered, a digital worker can operate 24 hours a day, 365 days a year with higher levels of productivity, accuracy, security and speed than their human counterparts.

The electricity industry has come a long way since the first electricity generating stations were opened in 1882. But thanks to climate change, ageing infrastructure and legacy systems, it has now reached an inflexion point where it needs to start doing things differently, and that will include the adoption of smart technology platforms built around IA and AI.

Tony McCandless is Blue Prism's Chief Technology Officer for Europe, Middle East and Asia.

Did COP26 alter Asia's decarbonisation path?

While many Asian countries have not delivered the hoped for level of climate commitment, COP26 revealed there is a growing momentum that will accelerate over the next few years – allowing the region's scorecard to dramatically improve, says **Joseph Jacobelli.**

The 2021 UN Climate Change Conference (COP26) generated a tsunami of news articles and often great analysis. But did COP26 alter Asia's decarbonisation path? It did. Some of the agreements will result in an accelerated decarbonisation in the region.

For energy industry participants in Asia, the world's biggest energy consuming and polluting region, the takeaways are two-fold and both of these bring critical momentum to the energy transition in the region. One is the reinforced Asian governments' policy commitment to net zero. Another is the expansion of financing channels for clean energy projects, including the role of financial institutions and the carbon markets, in developing economies, including those in Asia.

Governments' policy commitment is absolutely crucial for a nation's path to decarbonisation. This is true for Asian countries as it is true for any jurisdiction around the world. The private or business sector cannot drive decarbonisation alone.

The flood of news and analysis highlighted that the region's governments did not come through with the level of expected commitments. This was indeed a disappointment. At the same time, what was less emphasised is the momentum – a momentum that will accelerate over the next few years – allowing the region's scorecard, which is currently not great, to dramatically improve.

One conclusion, by Bloomberg, a financial information provider, regarding the post-COP26 climate talks' global scorecard, is that if all of the various nations execute on their commitments, then emissions could be slightly lower than originally forecasted by 2030. The same is true for Asian countries. Given the regional and global "peer pressure", some of the disappointments, including Australia and India, are highly likely to up their games over the next few years.

The Asian scorecard shows that 13 out of 15 key economies in the region pledged an end to deforestation, with only India and Thailand failing to do so. Eight out of 15 committed to net zero by 2050, while another three – China, Indonesia, and Sri Lanka – will do so by 2060. The outliers were Mongolia, the Philippines and Singapore, which actually has not provided any targets yet; albeit Singapore is most likely to pledge a target in the near future. On quitting the use of coal, Asia did not do well with only six out of 15 pledging to do so. It was a similar conclusion for commitments to cutting methane emissions with only seven of the 15 economies saying that they will be addressing this.

In terms of domestic net zero emissions from a legislative perspective, Japan and South Korea so far are the only two countries in the region that have legislated their commitments, based on data compiled by Energy & Climate Intelligence Unit as of early November 2021. Another eight nations have draft documents, which will become law soon. There remains only five key economies, which are still discussing their targets and do not have draft plans as yet; they are Bangladesh, Mongolia, Pakistan, the Philippines, and Singapore.

Within the next five years not only will more Asian governments more actively participate in the global climate action but some, such as Australia, China, and Singapore, could make some leaps forward.

Australia has signed up to net zero emissions by 2050 but the federal government has been a recalcitrant participant in the global climate action dialogue and went to COP26 with an extremely lightweight plan. The bulk of the transition hinges on newer technologies as well as technologies that do not yet exist. Many domestic experts have rightly been critical of the existing plan but domestic momentum is continuously growing. Continued positive climate action on the part of many individual states such as New South Wales means that sooner or later the federal government will adopt more sensible and realistic strategies.

Chinese authorities will certainly look at clearing the path for a progressive reduction in the use of coal fired generation. This is currently expected to drop by over 60 per cent by 2050. The decline will likely be significantly sharper. The missing link is an acceleration in the construction of alternative energy sources and solutions as well as other pieces of the energy transition puzzle, including energy storage, digital technologies and solutions for energy, and yet-to-be commercialised renewable energy technologies for example.

Singapore did not fix a clear deadline on net zero emissions timing, but local commentators correctly stated that it is not an issue of will but one of capacity pointing to the city-state's limited land area. A leap forward here is highly likely, as the government carefully assesses the different options available. These range from importing massive amounts of clean energy from countries in the region including Indonesia and Laos, carbon capture and storage, green hydrogen, and many others.

Last month *The Energy Industry Times (Nov. 2021, page 14)* highlighted that Asia accounts for about half of the world's total electric power production but that almost nine-tenths is from developing economies in the region. This translates into trillions of dollars of investment over the next three decades to ramp-up installed generation capacity. This provides a clear and present opportunity to ensure the majority is from zero carbon energy. For this, climate finance is absolutely critical and at COP26 this saw significant tailwinds through a series of financial commitments as well as the unlocking of carbon finance.

The promises are many. One is the Climate Finance Delivery Plan, which warrants for an annual $100 billion from developed countries devoted to supporting developing countries' climate finance. Another is the Taskforce on Access to Climate Finance, which sees a vow of about $134 billion in capital grants to the most climate vulnerable countries. Another is the Glasgow Financial Alliance for Net Zero (GFANZ). It comprises the commitment of $130 trillion in private capital towards economies' net zero transition. The financial institutions involved in GFANZ include banks, asset managers, asset owners, insurers, financial services providers, and investment consultants. These institutions will align their capital to net zero. Even if only a small portion of all of these different pledges are executed, it will be a critical source of climate finance for clean energy projects in developing Asia.

Another expansion of financing channels for clean energy projects in developing and developed Asia alike is the carbon markets. At COP26, a deal on Article 6 of the 2015 Paris Agreement was finalised. It comprises an agreement on how emissions reduction units (or carbon credits) will be traded. The discussions were ongoing for several years and included many areas of contention. For example, at COP26 nations agreed on how to prevent carbon double counting. The rule is now that when Nation A generates a carbon credit, it will be allowed to decide whether it will sell it to others or whether it will count it towards Nation A's own climate target. The Article 6 deal will result in a boom in carbon trading and this will probably be centred in Asia.

Joseph Jacobelli is a well-respected clean energy business executive, analyst, and author with over 30 years' experience in Asia. He runs a family office and direct investments advisory firm Asia Clean Tech Energy Investments. In 2021, he published: "Asia's Energy Revolution: China's Role and New Opportunities as Markets Transform and Digitalise".

Key Asian countries' COP26 commitments
Source: Author, November 2021. Data from Al Jazeera (2021). Infographic: What Has Your Country Pledged at COP26? [online] www.aljazeera.com. Available at: https://www.aljazeera.com/news/2021/11/14/infographic-what-has-your-country-pledged-at-cop26 [Accessed 23 Nov. 2021].

Country	End deforestation	Net zero target date	Quit coal	Cut methane emissions
Australia	Yes	2050	No	No
Bangladesh	Yes	2030	No	No
China	Yes	2060	No	No
India	No	2070	No	No
Indonesia	Yes	2060	Yes	Yes
Japan	Yes	2050	No	Yes
Malaysia	Yes	2050	No	No
Mongolia	Yes	No target set	No	No
Pakistan	Yes	2050	No	Yes
Philippines	Yes	No target set	Yes	Yes
Republic of Korea	Yes	2050	Yes	Yes
Singapore	Yes	No date set	Yes	Yes
Sri Lanka	Yes	2060	Yes	No
Thailand	No	2050	No	No
Vietnam	Yes	2050	Yes	Yes
Total	13/15	8/15	6/15	7/15

The ‘clear’ path to low cost zero emissions hydrogen

A process has been developed and field-tested, which enables hydrogen to be produced from abandoned oil wells at a cost that makes it immediately competitive with natural gas per unit of energy. Proton Technologies’ **Grant Strem**, explains.

Hydrogen (H_2) has become a focus of energy transition conversations for good reason; when used it does not directly produce carbon dioxide emissions. This has created a buzz around the element. As with past energy system transitions, broad implementation of methods to capture, transport, and use hydrogen will require education and expanded demonstration to accelerate implementation.

Further improvements to techniques and cost structures will need investment, but the economic prize for implementing large improvements is enormous. Early implementers of the best improvements can obtain significant market share.

The historically higher cost to produce hydrogen compared to natural gas, however, has caused reluctance to adopt this clean energy vector despite millions of deaths globally per year from air pollution. Though it is the most abundant element in the universe, the primary complication is that hydrogen must be energetically separated from other compounds like water (H_2O) through concentrated inputs of other resources. Thus, current large-scale hydrogen production methods are costly, complex, and often reliant on carbon intensive processes.

In 2015 while working as a geologist, alongside Dr. Ian Gates, who was at the time the Department Head of the Petroleum and Chemical Engineering Faculty at the University of Calgary, we realised an opportunity existed to patent and commercialise a new hydrogen production method. Patents, simulations, lab demonstrations and field demonstrations soon followed, and in 2016 Proton Technologies was created to proliferate the production of clean, low-cost hydrogen from oilfields, leaving not only the original carbon behind, but extra carbon.

Coined ‘Clear H_2’, Proton’s process is significantly defined in its ability to be a carbon-negative process. Clear hydrogen comes from a process that can sequester significant external sources of CO_2 as carbonate rock, from direct air capture for example. This is important because without some energy sources having a carbon intensity below zero, there is no possible way for future energy systems to achieve net zero. The ability to sequester and negate emissions can create a price premium for clear hydrogen derived products like electricity, steel, ammonia, synthetic fuels, and glass.

Proton’s first asset is a test field in Kerrobert, Saskatchewan, Canada. Proton plans to divert some of its hydrogen to supply electricity to the power grid

Proton’s process leverages previously expensed infrastructure. Most big old oilfields are near existing roads, power lines, pipelines, and even towns full of skilled trades who can directly transition to clear hydrogen production. Rather than spending a fortune to abandon trillions of dollars in infrastructure built up over the last century, existing energy infrastructure can be repurposed for clean, low cost energy, thereby removing any requirement for new ecological disturbances or fresh water.

When oilfields are abandoned, they still are generally more than half-full, but the remaining oil is not extracted due to commercial or technical constraints. The remaining hydrocarbons are Proton’s fuel supply, and the pore space within the oilfield is the reaction vessel – below the geological seal which is the reason the oil deposit accumulated there in the first place. Proton’s process includes injecting oxygen, and optionally CO_2, into a well-bore which triggers hydrogen-liberating reactions. The resulting hydrogen is separated and kept, and the carbon is locked as solid carbonate within the pore space of the oil field.

The reactions within the reservoir might be first conceptualised as a spherical zone where at the centre partial oxidation reactions occur; and in various temperature and composition rinds beyond there are many other reactions: water gas shift, gasification, aquathermalysis, pyrolysis, reverse methanation, carbonate creation, and myriad others. The injection process is cyclic, and convection, buoyancy and concentration gradient all play roles in the hot, complex chemical dance. In short and on a net basis, CO_2 and O_2 go into the system, and H_2 comes out.

The process has been tested at Proton’s own oil field in Saskatchewan, Canada. The facility was constructed in 2011 at a cost exceeding CAD$250 million ($195 million), and by 2017 it was shut in and Proton was the fifth owner. It was connected to the electricity grid and Proton plans to divert some of its hydrogen to supply electricity to the power grid through its 20-year contract with the local utility. Baseload electricity can be very low cost and clean since hydrogen can be made at lower cost than natural gas per unit of energy.

First a turbine uses a small portion of the produced hydrogen to power a cryogenic air separation unit. When air is cooled below -180°C, the oxygen becomes a liquid. This high purity liquid oxygen can be separated, and warmed; which increases its pressure. This highly pressured oxygen can use the venturi effect to pull in additional CO_2 upstream of the injection wells. The combined gases must only exceed the reservoir pressure to be injected. Some of the injected CO_2 can be self-sourced and frozen directly out of the produced gas stream, and some of it can be externally sourced in order to get below zero on carbon intensity of the produced hydrogen. The air separation unit also provides nitrogen, which can be used to make NH_3 (ammonia). Having all the cold fluids around opens further doors; like data centre cooling, or passively pre-chilling hydrogen down toward -180°C so that further temperature reduction to make subcooled liquid hydrogen is only a modest energy step.

These factors all enable cost structures that are attractive. Generally, clean hydrogen is assumed to cost more than $1/kg in long-range forecasts that include significant economy of scale and improvements. Proton believes that for large projects, it can get into a levelised cost range below $0.50/kg right away, and with significant likely further cost savings. This makes hydrogen roughly competitive with the cost of natural gas per unit of energy; and in districts where carbon taxes exist, the advantages of hydrogen fuel are even more pronounced.

Proton believes that roughly 10 per cent of western Canada’s hydrocarbon resources can supply 10 per cent of the world’s energy supply for 50 years. A region with low cost clean electricity and fuel at large scale can provide significant benefits to other energy intensive businesses, enabling a new, clean, competitive industrial ecosystem.

Proton Technologies is ‘clearly’ a thought leader in the transition to clean energy. While the company currently has one operational facility in Western Canada, it has begun a licensing programme that now includes clients across Europe, Pacific Asia, and the Middle East. Licensees can use their own sites to produce H_2 using Proton’s process.

Clear hydrogen, or carbon-negative hydrogen, will become a critical component of the global movement to decarbonise the energy industry by turning oil and gas resources and infrastructure into sources of clean, low-cost energy. Whether it is used in turbines that provide baseload power to the electric grid for electric vehicles and appliances, or whether the hydrogen is directly used by fuel cells or heavy industry, clear hydrogen is expected to proliferate globally, rapidly.

Transitioning to “clean” energy sources will forever create a certain level of bipartisan jargon, with stakeholders on either side struggling for authority. Clear hydrogen is not only an opportunity to produce low-cost, clean energy, it is also an opportunity for compromise and cooperation on the idea that our world can improve, and we should embrace that improvement, together.

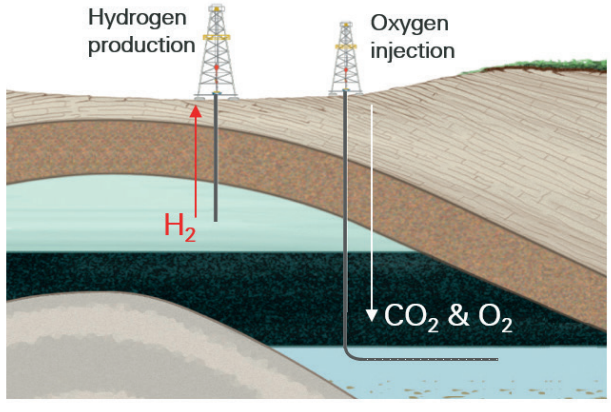
Grant Strem is Chairman & CEO of Proton Technologies.

Proton’s unique hydrogen production approach

Process description

- Mainly existing infrastructure/disturbance
- Negative emissions
- **Step 1** Utilize existing oil & gas reserves and infrastructure
- **Step 2** Inject oxygen into the reservoir
- **Step 3** Downhole chemical reactions oxidize residual oil and generate H2
- **Step 4** Recover H2 in-situ at the surface with existing H2 separation technologies, or designed filters
- **Step 5** Sequester CO2, capture and transport H2 leaving carbon emissions underground

Process overview



Junior Isles

Empathy for carboholics

Greta Thunberg and other climate change activists are to some extent justified in expressing disappointment over the outcome of the Glasgow COP26 climate summit. But let's not forget, the road to success is paved with failure.

At the conclusion of the two-week UN meeting of global heads, COP26 President Alok Sharma was on the brink of tears after having failed to agree more decisive language on the phase-out of coal – a failure that many have latched on to as the defining outcome of the meeting.

A few days into the conference, more than 40 countries had agreed to phase-out their use of coal fired power generation, boosting hopes of a deal to "keep 1.5(°C) alive". More than 20 countries – understood to include the US, as well as the UK and Denmark – had also agreed to stop funding any fossil fuel development overseas by the end of 2022, and divert the estimated £5.85 billion ($8 billion) per year saved into clean energy investment instead. But at the last minute, as is often the case at COP summits, the language was watered down.

The final document dropped wording calling for the "phase-out" of coal fired power, replacing it with "phase down". It also said "inefficient" fossil fuel subsidies would be phased out. COP agreements are no stranger to the vague language sometimes needed to get everyone on board.

Meanwhile, some also noted there were no new commitments on moving away from gas and oil, the other two main fossil fuels. Arab countries, many of which are major oil and gas producers, had opposed the fossil fuel language in the previous draft.

"If we are to successfully transition to the energy system of tomorrow, we cannot simply unplug from the energy system of today," Sultan al-Jaber, Chief Executive of Abu Dhabi state oil company Abu Dhabi National Oil Co (ADNOC), said. "We cannot just flip a switch."

India – supported by China and other developing countries still dependent on carbon – was also not yet ready to sign any document that committed it to completely phasing out coal.

Yet changes to wording at the ninth hour, although hard to swallow, reflect the world we live in. Some countries prioritise energy security over environment. "No COP will impose real restrictions on fossil fuels, the fossil countries always block such ideas," said Tomas Kåberger, a professor at Chalmers University of Technology, Sweden.

Julian Kettle, metals and mining vice chair at Wood Mackenzie was not surprised at the final text either. He said: "The uncomfortable truth is that while coal is an unwelcome guest at the decarbonisation table, we will still need coal fired power to ensure an orderly transition to a low carbon world."

Although short on detail, the intent of the COP26 statement is clear. The event saw the publication of a Global Coal to Clean Power Transition Statement. At its core is a call for the rapid scale-up of technologies and policies to achieve a transition away from unabated coal power generation in the 2030s (or as soon as possible thereafter) for major economies, and in the 2040s (or as soon as possible thereafter) globally.

Some experts argue, however, that technology alone will not get us there. Julian Allwood, a professor of engineering and environment at the University of Cambridge wrote in the *FT* that technology will not solve the problem of climate change because it cannot be scaled sufficiently in time.

"Every technological solution discussed at COP26 depends on just three resources: nelectricity (non-emitting electricity generated by hydropower, renewables or nuclear fission), carbon capture and storage (CCS) or biomass. The total demand for those resources required by the plans discussed at COP26 cannot be met."

Offering some numbers, he said on average the world has "4 kWh/day of nelectricity per person, growing at 0.1 Wh/day annually. But the COP26 plans require 32 (range 16-48). We currently have 6 kg of CCS per person per year, growing at 0.1 kg/year annually, but the COP26 plans require 3600 (range 1400-5700)."

Allwood described COP26 as "a triumph for the high-emitting sectors, but a disastrous failure for the billions of people who will suffer". He added: "No political or business leader at COP26 had climate mitigation as their primary goal. I am sure they and their advisers would respond to my criticisms by saying that they betray a lack of ambition. But it is hardly ambitious if a doctor advises an alcoholic to keep drinking because the government has plans to develop liver-repair technology in future."

Dr Steve Smith, Executive Director, Oxford Net Zero also drew parallels between governments and those with a penchant for the devil's brew.

"If governments were a room full of alcoholics, they now recognise that they can't fix the problem by just cutting back a bit. They need to stop completely. That is progress, but currently they're still on a bottle of whisky a day. Action needs to match ambition."

The Glasgow Climate Pact – the main political outcome of COP26 – requests governments to revisit and strengthen their (nationally determined contributions (NDCs) before the end of 2022 to bring these in line with the Paris Agreement's temperature goal. To keep 1.5°C within reach, it will be essential that governments return to the table with significantly enhanced offers ahead of COP27, which will take place at Sharm El-Sheikh, Egypt, in 2022.

More could have been achieved in Glasgow but to call COP26 a disastrous failure is a matter of perspective.

Commenting on the outcomes of the summit, Fatih Birol, Executive Director at the Paris based International Energy Agency said: "Some of the judgements are a bit on the pessimistic side. We don't see Glasgow as a failure. COP26 issued a lot; to portray it as a failure is not helpful and not accurate. It provided significant momentum for the transformation of the global energy sector."

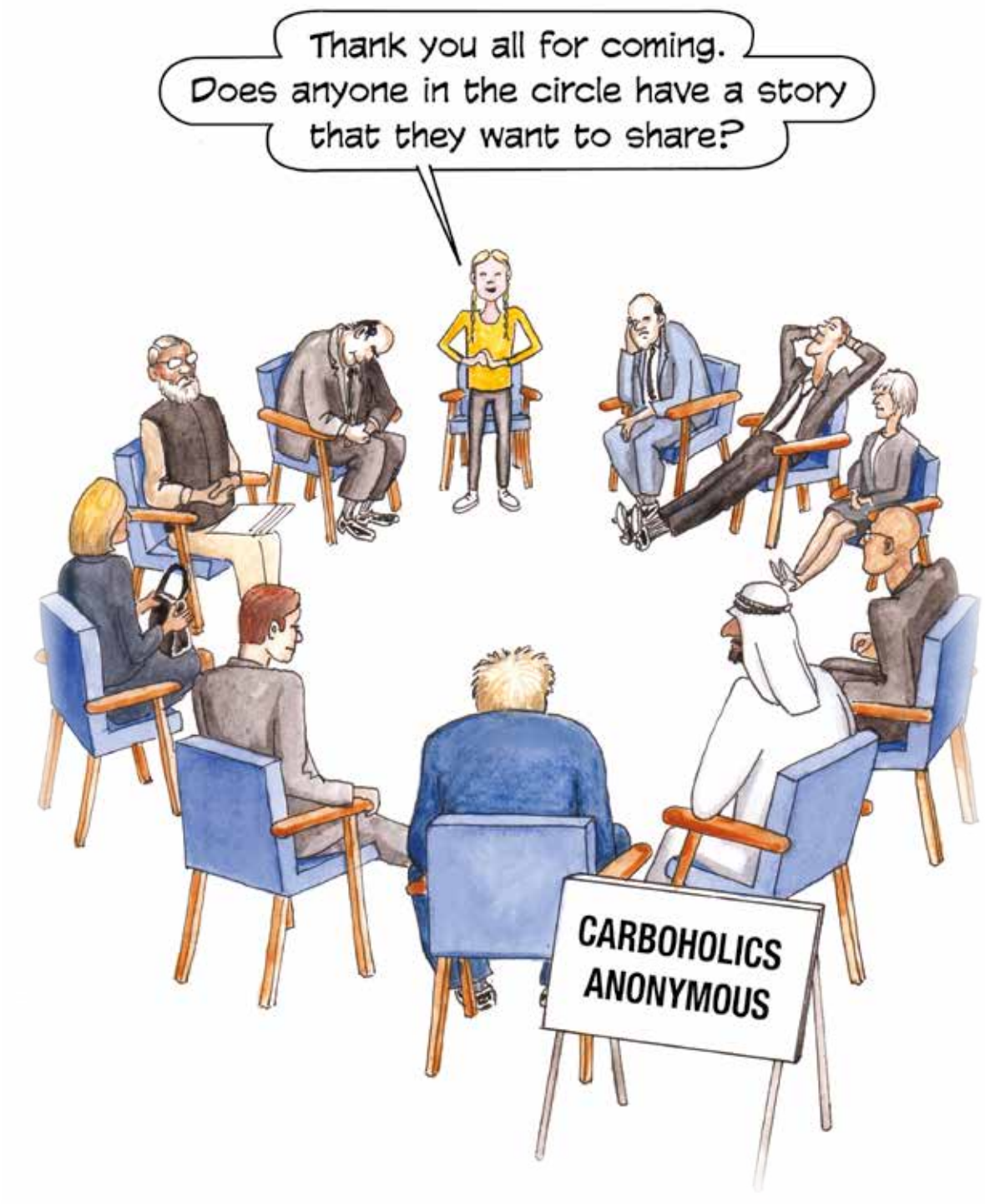
Birol cited several notable achievements. He noted that the countries accounting for more than 90 per cent of the global economy made net zero commitments "by 2050 or thereafter". He called targets tabled by India, which committed to net zero by 2070, "impressive" and of "critical importance". Birol also said the Methane Pledge, signed by more than 100 countries, was "a major achievement that could make a vital difference" in the short-term.

Still, it is not enough. If all the pledges made at COP26 are realised and implemented in a timely manner, the IEA predicts that the global temperature rise will still be 1.8°C.

But it is important to stress the positives. International collaboration to the extent seen at COP26 could allow goals to be met in a timely manner and at much less expense. Most noteworthy of the collaboration agreements struck during the gathering was a joint declaration signed by the US and China to work together on tackling climate change. Cooperation between the world's two biggest economies could provide the vital leadership that is needed to turbocharge progress.

Most governments are finally realising that the current path leads to ruin and that increased ambition now has to be matched by immediate action. Climate activists have an important role to play in keeping up the pressure on world leaders but at the same time would do well to acknowledge that although the achievements made at COP26 are insufficient, the steps are nevertheless significant.

We should always remember it's all too easy to criticise and preach to the struggling alcoholic on the need to reform. Going cold turkey, however, is unfortunately sometimes not an option for some. Perhaps we should not celebrate COP26 with a tipple but let us at least acknowledge that every step forward is an important one for the reforming carboholic.



Cartoon: jemsoar.com