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Coal power rebound threatening net zero goals

A rebounding economy and high gas prices have pushed coal fired power generation to an all-time, threatening net zero goals according to a recent report. **Junior Isles**

The amount of electricity generated worldwide from coal was surging towards a new annual record in 2021, undermining efforts to reduce greenhouse gas emissions and potentially putting global coal demand on course for an all-time in 2022, says a new report.

According to the International Energy Agency's (IEA) latest annual market report, global power generation from coal is expected to jump by 9 per cent in 2021 to an all-time high of 10 350 TWh, after falling in 2019 and 2020.

The IEA said record demand for coal in power generation was driven by the economic recovery from the pandemic. This caused electricity demand to outstrip supply from renewable energy and low carbon energy. The record-breaking increase in natural gas prices also added to consumption, making it cheaper and more profitable for utility companies to burn coal in their power stations.

Overall coal demand worldwide – including uses beyond power generation, such as cement and steel production – is forecast to grow by 6 per cent in 2021. That increase will not take it above the record levels it reached in 2013 and 2014. But, depending on weather patterns and economic growth, overall coal demand could reach new all-time highs as soon as 2022 and remain at that level for the following two years, underscoring the need for fast and strong policy action.

In 2020, global coal demand fell by 4.4 per cent, the largest decline in decades but much smaller than the annual drop that was initially expected at the height of the lockdowns early in the pandemic, the report shows. Regional disparities were large. Coal demand grew by 1 per cent for the full year in China, where the economy began recovering much earlier than elsewhere, whereas it dropped by nearly 20 per cent in the US and the European Union, and by 8 per cent in India and South Africa.

"Coal is the single largest source of global carbon emissions, and this year's historically high level of coal power generation is a worrying sign of how far off track the world is in its efforts to put emissions into decline towards net zero," said IEA Executive Director Fatih Birol.

Keisuke Sadamori, Director of Energy Markets and Security at the IEA, added: "The pledges to reach net zero emissions made by many countries, including China and India, should have very strong implications for coal – but these are not yet visible in our near-term forecast, reflecting the major gap between ambitions and action. Asia dominates the global coal market, with China and India accounting for two-thirds of overall demand. These two economies – dependent on coal and with a combined population of almost 3 billion people – hold the key to future coal demand."

In China, where more than half of

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Climate change drives large-scale changes in energy and utilities sector, says Capgemini report

Energy and utility organisations that have implemented new energy models are reporting multiple benefits, according to a new report from the Capgemini Research Institute.

The report, titled 'Remodeling the future: How energy transition is driving new models in energy and utilities', says new energy models are transforming the entire energy and utilities sector, as mitigating the impact of climate change has become its *raison d'être*.

Climate change and investor demand are principal drivers of change. Almost 70 per cent of energy and utility organisations (68 per cent) say that mitigating the impact of climate change is driving their shift towards new ways of doing business, 63 per cent cite investor demand as the impetus for change. While just 44 per cent of executives are guided by profitability as the leading driver for a shift to new models, the potential benefits for the bottom line are clear.

According to Capgemini, however, the sector remains in a state of transition and while the critical need to transform is apparent, there are very few organisations currently implementing new energy models. For instance, while 64 per cent of organisations plan to implement energy storage solutions in the future, just 19 per cent are already doing so. Further, just 18 per cent of those surveyed say they have a global strategy with well defined goals and target timelines.

In November research from CDP, the World Benchmarking Alliance and ADEME (the French Agency for Ecological Transition) found almost all companies across the electric utilities sector are set to exceed their 1.5°C warming scenario budgets. It says 98 per cent companies in the electric utilities sector are set to exceed their carbon budgets.

Overall the companies assessed will exceed their total carbon budget by 57 per cent up to 2035. Just three out of 50 companies (Ørsted, EDP and AES Corporation) have emissions targets that align with the IEA's 1.5°C warming scenario. Only Ørsted is projected to stay within its carbon budget between now and 2035.

Given their continued reliance on fossil fuels, the climate performance of 35 companies in this sector is expected to decline in the near term. To be fully aligned with a 1.5°C pathway, 78 per cent of companies' electricity generating capacity needs to come from renewables by 2030. Currently, only eight companies are investing at these levels. There are no companies in the sample with a zero carbon portfolio and for 34 companies, coal accounts for more than 10 per cent of their capacity.

The sector has performed well on pursuing a Just Transition, with European headquartered companies demonstrating the highest levels of best practice on planning for and mitigating the social impacts of their low-carbon transition on workers, communities and affected stakeholders.

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global coal fired electricity generation takes place, coal power is expected to grow by 9 per cent in 2021 despite a deceleration at the end of the year. In India, it is forecast to grow by 12 per cent. This would set new all-time highs in both countries, even as they roll-out impressive amounts of solar and wind capacity.

While coal power generation is set to increase by almost 20 per cent this year in the United States and the European Union, that is not enough to take it above 2019 levels. Coal use in those two markets is expected to go back into decline next year amid slow electricity

Skrekas says the national climate law is of "historical importance"

demand growth and rapid expansion of renewable power.

Last month Greece became the latest country in Europe to announce a timeline for ending coal fired power generation.

Greece is to introduce its first climate law, pledging to cut its reliance on coal within six years as part of a move to a carbon net zero economy by 2050.

The law comes after the country suffered devastating wildfires this year when summer heat soared that was attributed partly to global warming.

"The national climate law is of historic importance… in order to deal with the climate crisis and achieve climate neutrality by 2050," said Kostas Skrekas, Environment and Energy Minister.

The law foresees an intermediate target of reducing greenhouse gas emissions by 55 per cent by 2030.

As part of its plans Greece will phase-out production of lignite, a particularly polluting form of coal, within the next six years. The decision will be reconsidered by 2023 with an eye to accelerating an exit.

Greece is one of the EU countries that relies most heavily on coal for energy and has been a laggard within the EU in cutting emissions. Germany has cut its emissions 38 per cent from 1990 levels, according to UN data, while Greece has cut its emissions by less than 19 per cent over the same period.

■ Last year (2021) will surpass the 2020 record, with 290 GW of new renewables capacity installed, despite rising prices for some components and transport, highlights the IEA's 'Renewables' report. According to the IEA, which revised and raised its projections, 4800 GW of installations will be available by 2026, which means 60 per cent more than in comparison with 2020 and the equivalent of the current power capacity from nuclear and fossil energies together. Photovoltaics will account for more than 50 per cent of this increase, and offshore wind will triple its capacities.

Revised TEN-E rules will boost hydrogen

- New EU rules for cross-border energy infrastructure
- IEA calls for more ambitious and concrete hydrogen policy efforts

Junior Isles

Revised rules of the Trans-European network for Energy (TEN-E) Regulation have been introduced to support the European Green Deal and look set to provide a much needed boost for hydrogen.

On December 14, 2021, the European Union's Council, Parliament, and Commission agreed in principle on new EU rules for cross-border energy infrastructure and future Projects of Common Interest (PCIs) under the TEN-E framework. The agreement comes after the European Commission tabled a proposal for renewing the regulation in 2020, with an aim to modernise the existing regulation and fully align it with the objectives of the Green Deal.

Key elements of the political agreement include a strengthened framework for the cross-border cooperation to accelerate the implementation of offshore grids as a key element of the energy transition, a strengthened focus on infrastructure categories such as smart electricity grids, a widened scope to include hydrogen networks as well as a mandatory sustainability assessment for all eligible projects.

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

The revised rules also bring new provisions on support for projects connecting the EU with third countries, Projects of Mutual Interest (PMIs), that contribute to the EU's energy and climate objectives in terms of security of supply and decarbonisation.

The new rules came as the International Energy Agency (IEA) called for more ambitious and concrete hydrogen policy efforts from governments across Europe and beyond to bridge a wide gap between the current market trajectory and the projects needed to meet net zero targets.

Speaking at the S&P Global Platts Hydrogen Markets Europe Conference in late November, Jose Bermudez, the IEA's energy technology analyst for hydrogen and alternative fuels, said that under the IEA's net zero scenario, hydrogen demand of around 90 million mt/year in 2020 would roughly double by 2030, with a six-fold increase by 2050. However, under current trends, the IEA expects the market to reach just 105 million mt/year by 2030, with most growth limited to traditional sectors, or to rise to 120 million mt/year by that date if existing government pledges are met. The EU has a target to produce 10 million tonnes of renewable hydrogen by 2030, though vast quantities of new renewable power capacity will be required.

Bermudez said carbon auctions and contracts for differences could play a potential role in developing the hydrogen market, but almost no such schemes have come into force yet.

Nuclear and gas still not seen as "green" by EU climate chief

Gas and nuclear were likely to have "amber" status, meaning they would not be in the "green" category with wind and solar power, but would feature in the EU taxonomy, the EU's ambitious labelling system for green investment, according to a EU official.

At the time of writing, the European Commission was expected to publish the draft taxonomy – the second delegated act – on 31 December, allowing a few weeks of consultation with experts and governments. The final proposals may be published on 12 January and could only be blocked by a super-majority of 15 EU member states.

It will describe the sustainable criteria for renewable energy, car manufacturing, shipping, forestry and bioenergy and more, and include a "technology-neutral" benchmark at 100 grams of CO_2/kWh for any investments in energy production.

The EU taxonomy is a green classification system that is intended to guide investors to projects that are in line with Europe's goal of net zero emissions by 2050 and better protection of the environment.

Both gas and nuclear were expected to feature in the next part of the EU's "taxonomy for sustainable activities", following a period of intense political bargaining between the Commission President, Ursula von der Leyen; the French president, Emmanuel Macron; and Germany's new chancellor, Olaf Scholz.

The first two chapters of the sustainable taxonomy, the so-called 'first delegated act', were passed on 9 December and came into force on 1 January 2022. But in a meeting of member states on 29 November the project nearly faltered.

The EU described nuclear as "a stable energy source" needed "during the transition to gas". EU climate chief Frans Timmermans also acknowledged "nuclear and transition gas play a role in the energy transition", but stressed that this "does not make them green".

An EU diplomat, speaking anonymously, explained to *EUobserver* that a French-led group of 13 member states tried to block the first list "out of principle" because the commission had not agreed to include nuclear and gas in the green taxonomy.

France and Finland pushed for nuclear to be "fully part of the taxonomy". Ten other mainly eastern European countries want gas included. Sweden joined the group because the new rules endanger its forestry sector.

Sebastien Godinot, a senior economist at WWF and member of the EU's Sustainable Finance Platform, said: "The commission must deliver a science-based taxonomy regulation that excludes fossil gas, nuclear, and factory farming. Otherwise, the credibility of the taxonomy is ruined."

Some argue the Commission may have no choice but to compromise with regards gas and nuclear – supporting member states on one side, and countries opposing these on the other – while also being mindful that investors and experts from its Sustainable Finance Platform will reject a system containing contradictory political concessions.

Institutional investors have already signalled they want a taxonomy based on science, not political compromise.

Finland's OL3 prepares to start-up, 12 years late

Finland's long-delayed Olkiluoto 3 (OL3) nuclear reactor has started powering up and will start producing electricity at the end of this month, some 12 years later than originally scheduled. Regular electricity production is scheduled to begin in June.

The Nordic country's nuclear safety authority, STUK, gave permission last month "for making the reactor critical and conducting low power tests," Finnish electricity producer TVO said in a statement. Construction of the 1600 MWe EPR began in 2005. Completion of the reactor was originally scheduled for 2009 but the project has had various delays and setbacks.

Other EPR builds in France and the UK have also been beset with delays, with Hinkley Point in southwest England pushing back its planned electricity production by half a year to mid-2026.

OL3 was built under a fixed-price turnkey contract by a consortium of Areva and Siemens who have joint liability for the contractual obligations until the end of the guarantee period of the unit.

Once low-power tests are completed, the reactor's power will be gradually increased and further commissioning tests conducted. STUK will oversee the most significant tests on site and check the results of the commissioning tests. During the power tests, permits issued by STUK are required for power levels of 5 per cent, 30 per cent and 60 per cent. Electricity production starts at a power level of 30 per cent.

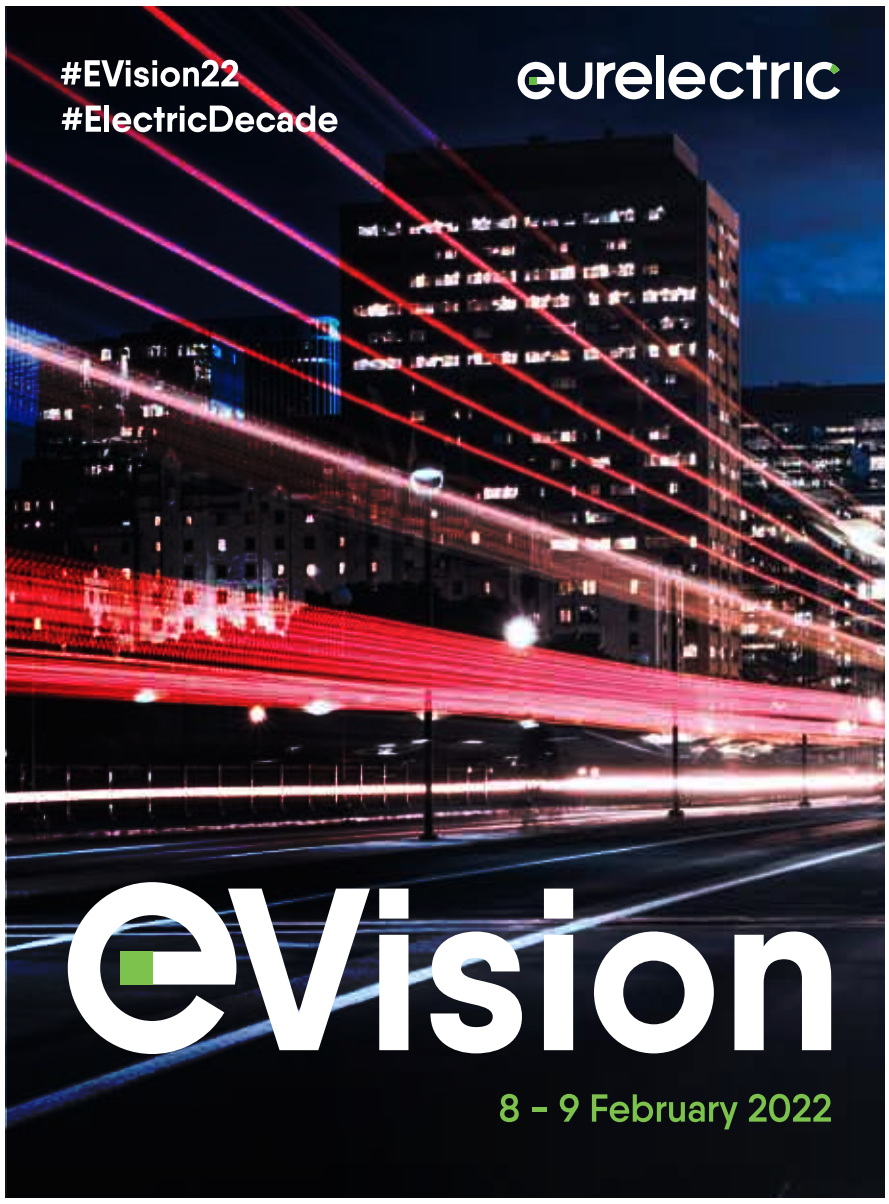
Olkiluoto 3, which will run alongside two existing reactors at Eurajoki on the west coast, was the first nuclear power station to be procured in Europe after the 1986 Chernobyl disaster.

"We are now moving step-by-step with a safety-first attitude towards the moment we have waited for a long time," said TVO Senior Vice President for Electricity Production Marjo Mustonen. "The preconditions for the start-up of the reactor have been fulfilled, and soon we will be able to realise our promises on Finland's greatest act for the climate."

STUK said the preconditions for criticality and low-power tests have been met and the commissioning tests performed before first criticality show that the plant operates as planned. It noted the commissioning tests also included re-tests carried out after modifications were made to certain plant systems.

The final go-ahead came as the Ministry of Economic Affairs and Employment (TEM) announced it is launching legislative preparations aimed at a comprehensive reform of the country's Nuclear Energy Act. It said the future use of nuclear energy – including new technologies such as small modular reactors – requires "appropriate and up-to-date legislation".

The revised draft legislation is expected to be submitted for consultation during 2024. The government's proposal to Parliament is due at the end of the next parliamentary term, with the law entering into force in 2028.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Canada 'can reduce unabated fossil use by 2050'

■ Coal use to disappear ■ Long-term oil use raises concerns

Janet Wood

Canada can reduce its unabated fossil fuel use by 62 per cent by 2050, even as electricity and oil demand grows, according to a new report from the Canada Energy Regulator (CER). Electricity use could rise by 45 per cent as Canadians transition to electric vehicles, according to the CER. The report predicts low-cost wind and solar power will be used to meet the rise in demand.

"Our projections show that Canadians use far fewer fossil fuels in the future," said CER Chief Economist Darren Christie. "By 2050, coal nearly disappears and the use of fossil fuels made from oil declines, especially gasoline and diesel for transportation."

The CER also looked, for the first time, at what Canada's electricity system might look like in a net zero world. In these scenarios, the emissions from the electricity sector drop dramatically, with battery storage playing a significant role alongside immense growth in wind and solar.

Canadian crude oil production growth is expected to peak in 2032, the CER says. But the concern is that use will fall slowly, because Canada's oil sand production facilities are long-lived and have low operating costs once built. Dale Marshall, national climate programme manager at Environmental Defence Canada said: "In 30 years, if our oil production is at the same level it is today, we're in serious trouble."

Marshall expressed disappointment over the CER forecast.

He said: "I think that the projections are unrealistic and overly pessimistic, in terms of what we might be seeing in terms of climate action in Canada and around the world."

Ben Brunnen, Chief Economist for the Canadian Association of Petroleum Producers, said Canadian oil and gas producers can invest in emission reduction technologies while still growing production to meet global demand. "I would actually expect that the Canadian oil and gas industry would potentially have a more favourable growth profile, compared to what CER is indicating," he said.

The International Energy Agency said in October that global demand for fossil fuels could peak by 2025. However, the IEA also said oil demand is likely to remain at three-quarters of current levels by 2050, which would not allow countries to meet their international climate targets.

Meanwhile, Ontario Power Generation has selected GE Hitachi Nuclear Energy as the technology partner for a new nuclear plant at Darlington. GEH will work with OPG to deploy a BWRX-300 small modular reactor that could be complete as early as 2028. "We are thrilled to be selected by OPG as a technology partner," said Jay Wileman, President & CEO, GEH.

Ecuador launches tenders for power generation, transmission line

Ecuador has launched three new tenders for power generation and transmission projects. On offer is the chance to compete for concessions to build and operate a 400 MW combined cycle gas fired plant, 500 MW of new non-conventional renewables and a 290 km transmission line.

The Ministry of Energy and Non-Renewable Natural Resources said it had received interest from domestic and foreign investors in the tenders.

The renewables package, the so-called Bloque ERNC, is for 500 MW worth of proposals for wind, solar, small hydroelectric and biomass plants across Ecuador. According to the tender website, the ministry has allocated 150 MW for 30-year concessions for small-scale hydro. It will offer 25-year concessions for 200 MW of wind power and 120 MW of solar PV. It will offer 25-year concessions for 30 MW of biomass or biogas-based plants. The sites chosen will depend on resource availability. The ministry has its own portfolio of 29 hydro, wind and solar projects to choose from, but said the investors can propose their own in this tender process.

The initiative, which should see contracts awarded in December 2022, is expected to attract investment totalling $875 million. The tenders for the gas fired plant and the transmission lines follow a different timetable.

French investment aids Chile's wind and hydrogen development

French independent power producer Total Eren has begun studies to develop a green hydrogen project in Magallanes, Chile. It will include up to 10 GW of installed wind capacity. The project includes a desalination plant, an ammonia plant and up to 8 GW of electrolysis capacity, as well as port facilities for delivering the green ammonia to domestic and overseas markets.

Total Eren has purchased land in Magallanes for the project. It plans to start work in 2025 and produce hydrogen by 2027.

Total Eren's Global Executive Vice-President and Business Development Head, Fabienne Demol, said: "We are delighted to present this large-scale green hydrogen project, a pioneering initiative that we are proud to officially launch today in Chile's Punta Arenas.

"We would like to thank the Ministries of Energy and Education of Chile, the University of Magallanes, our shareholder, TotalEnergies, for their continuous support and ambitious vision for the deployment of green hydrogen worldwide, as well as our teams in Chile and in France, which are key to this project's development."

Meanwhile, France's Engie has won environmental permits from the Antofagasta Region Environmental Assessment Commission for a 57 turbine, 353 MW wind project in Chile. The Lomas de Taltal project will also include a 20 km, 220 kV transmission line. Construction is expected to start in 2022, with completion scheduled in 2024.

Biden Administration drives investment away from fossil fuels

■ Federal agency buying power primes low-carbon supply chain
■ Coal investment overseas halted as domestic interest fades

Janet Wood

US federal government agencies must achieve net zero emissions by 2050, according to a new executive order signed by President Joe Biden. To make the agencies more adaptive and resilient to climate change, they are expected to use carbon-free electricity by 2030, with at least half of it locally supplied.

Another goal calls for government's 600 000 vehicles to be zero emissions by 2035. Greenhouse gas emissions across all federal operations should fall by 65 per cent by 2030.

The Biden administration expects the federal government's purchasing power to support supply chain growth in electric vehicles and batteries, and create jobs in manufacturing and engineering.

Gregory Wetstone, President and Chief Executive of the American Council on Renewable Energy commented: "This directive will help catalyse the development of thousands of megawatts of new pollution-free power, leading to a cleaner grid and more good-paying jobs for American workers."

The Biden administration has also ordered an immediate halt to funding projects overseas that feature a coal-burning power plant. In a message sent out to embassies and State Department facilities around the world, President Biden made it clear that a major policy shift is underway, according to Bloomberg.

This is the first time that State Department analysts have had to consider climate change and carbon emissions in determining which projects to support. Until now the selection of projects has not considered the impact of carbon-intensive energy, even though backing for such plants runs into the billions each year.

The new policy will also affect infrastructure such as terminal facilities. Exports of US coal have remained steady for years and increased in 2021, with most going to India, Brazil, South Korea and Japan. Projects for import terminals that can handle coal may now be halted. Bloomberg said projects overseas where the US was hoping to create terminal facilities capable of handling liquified natural gas may also be ended.

The decision puts the export of coal and its facilities on the same track as the US domestic industry, where the coal market peaked in 2008. In that year, coal generated over half the electricity consumed in the US, but by 2020 that percentage had dropped to just 19 per cent and the decline continues. Nearly 20 GW of coal generation was shut down in the last two years.

Part of that capacity has been replaced by natural gas but solar and wind have also been expanding and in 2019, the amount of electricity produced from renewables exceeded that from coal for the first time.

Venezuela blackout blamed on 'attackers'

An 'attack' on Venezuela's national electricity system left sectors of Caracas and at least 15 other Venezuelan states without power in mid-December.

Nestor Reverol, Vice President of Public Works and Services and Minister of Electric Energy, said in a brief message on official television that "we have received a new attack on the national electricity system, specifically in El Guri", the reservoir in the south of the country on which much of Venezuela's electricity generation depends.

The blackout hit central and western states like Carabobo, Aragua, Lara and Yaracuy between 3 am and 5 am, according to *Reuters*. Supplies began to be restored in the capital, Caracas, from the early morning.

Venezuela was plunged into an electricity crisis in late 2009 after years of disinvestment and mismanagement in the sector, according to critics and analysts.

In 2019, the country suffered three national blackouts, some lasting up to three days, which authorities also attributed to attacks on the system by "saboteurs" and opponents of President Nicolás Maduro's government.

Australia going major on hydrogen

- Government looks to fast-track Desert Bloom project
- Australia needs eight-fold increase in renewables to support hydrogen plan

Syed Ali

The Government of the Northern Territory (NT) in Australia has awarded 'Major Project Status' to the A$15.0 billion ($10.7 billion) Desert Bloom green hydrogen project, to fast-track the approval process as the country strives to become a hydrogen exporter.

The Desert Bloom hydrogen project is a staged commercial-scale green hydrogen operation developed to produce renewable energy for Territory Generation's Tennant Creek Power Station – with a view to ultimately produce hydrogen for export markets.

When complete, the project is expected to deliver around 410 000 tonnes per annum of hydrogen for the domestic and international export markets.

The 400 MW first phase will be backed by A$1.0 billion from Sanguine Impact Investment. Territory Generation will purchase electricity from the facility. Hydrogen production from the first phase is slated to start in 2023, with full production planned to start by 2027.

The next steps include the NT government working with Desert Bloom Hydrogen to develop the staged project, including identifying suitable land in Central Australia to harness solar energy and ensuring adherence to standard best practice regulatory processes and approvals.

According to a recent report, Australia will need to dramatically increase its renewables capacity if it is to pursue a path of producing green hydrogen for export. The draft Integrated System Plan (ISP) 2022, an industry blueprint updated every two years and released last month by the Australian Energy Market Operator, has detailed how the grid serving eastern Australia will change to meet emissions reduction and market goals.

The report notes the transformation of the grid has already "outpaced all expectations", with Australia installing five times the amount of large-scale renewables in 2019 on a per capita basis than the European Union. Installed renewables capacity of the National Electricity Market now totals almost 60 GW, generating about 180 TWh of electricity annually. However, it also said that capacity would need to rise as much as eight-fold further should the country seek to be a hydrogen superpower.

Certainly, there is a burgeoning number of hydrogen projects, which is driving renewables. In December Acciona Energia signed a memorandum of understanding (MoU) with Stanwell-led CQ-H2 consortium to supply power to the proposed 3 GW Central Queensland Green Hydrogen (CQ-H2) project.

Swiss commodities trading group Trafigura also recently said that construction of the world's largest hydrogen electrolyser, to be built in Port Pirie, Adelaide, South Australia, could begin in little more than a year. An engineering study into the A$750 million, 440 MW electrolyser to produce 100 tonnes per day of green hydrogen, is now underway.

Such green hydrogen projects will accelerate the closure of fossil fuelled plants. The ISP report notes that Australia's coal fired power plants are likely to shut at almost three times the rate currently announced, with Victoria's brown coal fleet to be closed in just over a decade and the main electricity grid becoming coal-free by 2043, according to the market operator.

In early December, the Australian Labor party also unveiled a new emissions policy, under which it aims to boost to 82 per cent the renewables share of National Electricity Market (NEM) generation, up from 68 per cent under the current government's projections.

Support for Indonesia's clean energy programme

The Asian Development Bank (ADB) has approved a $600 million results-based loan to help state-owned power company Perusahaan Listrik Negara (PLN) improve the reliability and resiliency of electricity services in the western and central regions of Java island and promote the use of clean energy.

The Sustainable and Reliable Energy Access Program will enhance access to sustainable and reliable energy in western and central Java island said ADB Senior Finance Specialist Daniel Miller.

To achieve sustained and higher economic growth, annual electricity generation in Java will need to reach 259 TWh by 2030. Meeting that demand requires strengthening Java's power grid and transitioning to a low-carbon economy, with the ability to integrate more renewables in the power grid.

In late November, PLN said it would call for tenders for 21 new renewable energy generation projects over the next 10 years. The estimated combined generation capacity of the planned projects is 1.2 GW, and is set out in the 2021-2030 electricity procurement plan (RUPTL).

Indonesia plans to build power plants with a capacity of up to 41 GW over the next 10 years, including 21 GW of renewables generating capacity and 19.6 GW of fossil fuel-based generating capacity. The plan is expected to deliver 51.6 per cent of additional renewable generating capacity.

The country has set its goal for achieving net zero emissions by 2060. Earlier that month, Indonesian finance minister Sri Mulyani Indrawati said that the country could retire coal-fired power generation by 2040 if it gets enough financial assistance from the international community.

- Tidal energy pioneer Nova Innovation has won funding that could deliver the first ever tidal turbine array in Indonesia. Innovate UK has awarded £200 000 ($269 000) to Nova's FLITE (Feasibility of Larantuka and Indonesian Tidal Energy) project that will deliver a feasibility study for a 7 MW tidal array in Larantuka Strait.

Philippines approves impact studies for big-ticket power projects

The Philippines Department of Energy has approved applications to conduct grid impact studies for several big-ticket power projects.

The projects include San Miguel Corp's 12-unit 6492 MW liquefied natural gas plant in Barangay Tanza, Navotas and its 300 MW Sangali LNG project in Zamboanga City. San Miguel President Ramon Ang confirmed the projects, saying it is "the plan for next 25 years".

Prestige Power Resources Inc. also received the go-ahead to conduct a study on its 600 MW Tabangao LNG power plant in Leyte.

The 1200 MW offshore wind project of Giga Ace 7 Inc. and the 1248 MW Manila Bay wind plant of Gigawind5 Inc. also secured approvals to conduct grid impact studies. Other wind power projects that received approval from the DOE are a 475 MW plant being developed by ACX3 Capital Holdings Inc. in Lucena , as well as wind farms in Tayabas (275 MW) and Camarines Sur (500 MW).

With time running out on current global efforts to fight climate change, the Philippines is proceeding with its adaptation and mitigation programmes without waiting for the annual $100 billion climate financing pledge made by developed countries to materialise.

Kepco to boost green power generation ten-fold by 2026

Korea Electric Power Corp. (Kepco) plans to raise power generation capacity from renewable energy sources to 1.1 GW over the next five years. Under its mid- and long-term business plan recently submitted to the government, South Korea's sole electricity retailer will increase its own renewable energy production by 10 times from 133 MW currently to 1102.9 MW by 2026.

The move is part of the utility's effort to stem mounting losses but will also help the country meet its climate goal. In November, South Korea finalised a decision to reduce its greenhouse gas emissions by 40 per cent from 2018 levels by 2030. President Moon Jae-in said that South Korea will expand its use of renewable energy as the nation vows to go carbon neutral by 2050.

"Carbon neutrality becomes an international norm that no one can resist," Moon said, adding that solar power generation on water is one of the promising future energy resources. He said the government will help build more floating solar power generating facilities nationwide.

Kepco's plan requires the state-run utility firm to install solar panels in schools and public spaces from next year to secure 95 per cent of its target renewable energy supply from solar power over the next five years. The company will also launch a pilot project to turn salinised arable land to a solar farm from 2023, while carrying out offshore solar power projects in connection with offshore wind power.

The announcement came as German energy major RWE AG said it has inked a pact with Ulsan Metropolitan City to develop up to 1.5 GW of floating offshore wind projects off the coast of South Korea's Ulsan City. The country's goal is to scale-up offshore wind capacity up to 12 GW and achieve 30 per cent of renewables in the energy production mix by 2030

Song Chul-ho, Mayor of Ulsan Metropolitan City, explained: "South Korea is transforming its energy mix from nuclear power and coal to renewable energy. Our regional goal is that Ulsan City becomes carbon neutral by 2050. To reach this, we have to harness the good wind resources off the Ulsan coast."

- Hyosung Heavy Industries (Hyosung) has selected Innio Jenbacher's 'ready for hydrogen' engine technology for the first pilot power plant project in the APAC region that will be fuelled by 100 per cent hydrogen. The pilot hydrogen power plant will be built at the Hyosung Chemical Yongyeon Plant in Ulsan, South Korea. It will run on hydrogen produced as a byproduct at the chemical plant that is normally sold off to an industrial gas company. The project is expected to achieve commercial operation in 3Q 2022 and complete the demonstration by end of 2022.

Poland funds green ambitions

■ Financing in place for major onshore site ■ Two contracts for difference auctions by 2027

Janet Wood

The European Bank for Reconstruction and Development (EBRD) is to lend Poland €38.9 million to build two wind farms, Grajewo and Sulmierzyce, totalling 63.1 MW. The other funder is DNB ASA, Norway's largest financial services group. Denmark's export credit fund is providing guarantees.

Poland's transition to low-carbon generation is gaining momentum, as it aims to increase the renewable proportion of its final energy consumption from 12.2 per cent at the end of 2019 to 23 per cent by 2030.

The next six months are expected to see major contracts signed for the 1.2 GW Baltic Power offshore wind farm, which is due to be completed in 2026, according to its owner, a joint venture between Poland's PKN ORLEN and Canadian Northland Power. "Key contracts for the project will be signed within the next six months, and the key contractors will begin selecting and working with new partners, including local suppliers," said Jarosław Broda, President of the Baltic Power Management Board. Almost 600 representatives of 369 companies and institutions attended a supply chain meeting at the start of December, the developers said.

The European Commission has already given Poland State Aid clearance to continue an existing scheme to support electricity production from renewable sources, who receive a variable premium on top of the market price. The measure will continue for the period 2022-2027, and the European Commission said, "the aid is necessary to further develop energy generation from renewable sources and to help Poland meet its environmental targets, set at European and national level". New companies in the market include Eni SPA, which signed an agreement with Copenhagen Infrastructure Partners to extend their existing offshore wind partnership to the Polish seas.

The Polish Energy Regulatory Office (ERO) has also offered Contracts for Difference to 5.9 GW of wind capacity, some of which could be operational by 2025. They include the 1 GW Baltica 3 and 1.5 GW Baltica 2 offshore projects, developed by Ørsted and PGE, and to the 350 MW FEW Baltic II offshore project, developed by Baltic Trade and RWE subsidiary Invest Sp. z o. o., the 370 MW B&C-Wind project developed by Ocean Winds, Equinor and Polenergia's Bałtyk II and Bałtyk III projects with a combined capacity of 1440 MW, and the 1.2 GW Baltic Power project developed by PKN Orlen and Northland Power.

Two more CfD auctions, each for 2.5 GW, are planned in 2025 and 2027.

UK energy crisis highlights renewables investment

■ Contracts for Difference for renewables, open door for new interconnectors

■ Gas and system costs raise prices

Janet Wood

The UK has opened its fourth renewables tender, with Contracts for Difference (CfD) on offer for 12 GW of capacity – more than the previous three rounds combined. UK energy regulator Ofgem is also set to hold a third investment round for interconnectors next year, aiming to bring connections between Great Britain and its neighbours to at least 18 GW. But the major investment in new capacity for the next decade is being made as the UK's consumers face an energy crisis, with sharply rising energy bills this winter.

The CfD auction will support major offshore wind development including floating offshore wind, along with tidal stream projects and other emerging technologies. The allocation round will close on 14 January 2022 and the results are expected in late spring. It is a major step towards delivering the government's plan for 40 GW of offshore wind by 2030.

Launching the auction, Kwasi Kwarteng, Secretary of State at the Department for Business, Energy and Industrial Strategy, said: "Our biggest ever renewables auction opening today will solidify the UK's role as a world-leader in renewable electricity, while backing new, future-proof industries across the country to create new jobs."

RenewableUK CEO Dan McGrail said: "More than 16 GW of wind could be ready to compete and over 23 GW of renewables overall. We could see investment of over £ 20 billion in this round".

Britain currently has 7.4 GW of electricity interconnectors with Ireland, France, Belgium, the Netherlands and Norway. A new investment round in the middle of 2022 will target interconnectors that can connect by 2030. "Our next investment round for interconnectors will bring forward the investment we need, creating green jobs and unleashing the full potential of the UK's world leading offshore wind industry, while also protecting customers by capping costs," said Ofgem's Networks Director Akshay Kaul.

The major investment plans came as rising gas prices and balancing costs have caught out two dozen energy suppliers, which have gone out of business. Ofgem has been blamed for allowing often thinly capitalised and poorly hedged companies to operate in a bid to boost competition.

Energy UK Chief Executive Emma Pinchbeck said: "The industry has long been calling for a more sustainable regulatory and policy environment – not only to avoid situations like the present one, but because suppliers need to drive the innovation in products and services to help customers get the best of the green energy transition."

Kwasi Kwarteng said: "By generating more renewable energy in the UK, we can ensure greater energy independence by moving away from volatile global fossil fuel prices, all while driving down the cost of new energy."

Denmark invests in wind, carbon capture

Vattenfall AB has taken the final investment decision on Denmark's 344 MW Vesterhav Syd and Vesterhav Nord offshore wind farms. Now the Danish government wants to add up to 3 GW of new offshore wind capacity to be developed before 2030. The plans were published in the Finance Act 2022, with the first tender for 2 GW of offshore wind capacity before 2030.

Currently, Denmark plans to add up to 7.2 GW of offshore wind capacity by 2030. It wants to develop an 'energy island' in the North Sea to host more offshore wind connections by 2040.Recently the Danish Minister of Climate, Energy and Utilities, Dan Jørgensen, and the Belgian Minister of Energy, Tinne van der Straeten, signed a Memorandum of Agreement to establish an offshore grid connection between Denmark and Germany, including the planned energy island.

Meanwhile, the CO_2 storage project known as Project Greensand has won €26 million from the Danish Energy Agency. "Carbon capture storage is one of the steps needed to reach the ambitious climate goals in Denmark, and we as a consortium are very proud to be allowed to contribute to that through this project," said David Bucknall, Chief Executive of Project Greensand consortium leader INEOS Energy.

EU's hydrogen industry hits 750 projects

The European Commission's newly published Hydrogen and Decarbonised Gas Package aims for an EU market for hydrogen by 2030.

Executive Vice-President for the European Green Deal, Frans Timmermans, said: "Europe needs to turn the page on fossil fuels and move to cleaner energy sources. This includes replacing fossil gas with renewable and low carbon gases, like hydrogen. Today, we are proposing the rules to enable this transition and build the necessary markets, networks and infrastructure."

The new rules will ease tariffs and allow low-carbon gases to access the existing gas grid. They also create a certification system.

The EU sees an important role for hydrogen in decarbonisation. To help deliver its Hydrogen Strategy it set up a European Clean Hydrogen Alliance, which has now announced a pipeline of over 750 European industrial hydrogen projects.

Among them, BP is planning a new production facility in the UK, HyGreen Teesside, which could deliver up to 500 MW of hydrogen production by 2030. The UK also plans a £9.4 million ($12.7 million) hydrogen storage and production facility at Whitelee, its largest onshore windfarm.

In Belgium, Engie and Equinor have announced the H2BE project to produce hydrogen from natural gas, with gas transmission system operator Fluxys.

In Spain, a joint-venture between Iberdrola and H2 Green Steel plans to build a €2.3 billion 1 GW electrolyser.

Ireland to build gas power to "cover transition"

The Republic of Ireland is ready to bring forward several new gas fired power plants over the next decade. Minister for the Environment Eamon Ryan will layout a policy to build 2 GW of gas generation to supplement and act as backup for wind energy. The policy would likely see between four and seven new gas fired plants.

The new gas plant would be in addition to about 15 GW in the form of offshore and onshore wind farms and solar farms. With the closure of the coal fired Moneypoint station and other fossil fuel plants, the overall volume of gas being used will remain almost at current levels.

The Republic of Ireland expects to see electricity demand increase over the next decade, including for major new data centres. In addition, it is planning on electrification of the transport fleet as well as more reliance on electricity for home heating.

The Commission for the Regulation of Utilities said that "additional gas fired generation is vital for the successful delivery of Ireland's 2030 renewable electricity and climate targets".

The Republic will also invest in interconnection to connect it directly to the EU's internal electricity market (IEM), of which it remains a member although it is currently only linked via the UK, which departed the IEM when it left the European Union.

Middle East and Africa set for solar PV capacity boost

- MENA to add 20 GW over five years
- Multi-megawatt plans for Armenia and Ghana

Nadia Weekes

Nearly 20 GW of solar power is expected to be added over the next five years in the Middle East & North Africa (MENA) region, according to a report by the Arab Petroleum Investments Corporation (Apicorp).

Total installed renewable energy capacity in MENA has surpassed 10.6 GW, almost doubling over a decade, driven by wind, solar and hydropower.

Solar alone is estimated to have added 1.5 GW of capacity in 2020 and 3 GW in 2021.

Jordan will add 600 MW of new solar photovoltaic (PV) capacity and export the electricity it generates to Israel under a partnership agreement between the two countries and the United Arab Emirates (UAE). In return, Israel will supply up to 200 million cubic metres of desalinated water to Jordan.

Israel has a target to generate 30 per cent of its energy from renewable sources by 2030, and reach net zero carbon emissions in the energy sector by 2050.

Further east, Masdar has signed an agreement with the government of Armenia to develop a 200 MW solar PV plant. The Ayg-1 project will be developed on a design, finance, build, own and operate (DFBOO) basis. The project company will be 85 per cent owned by Masdar, with government-owned investment vehicle the Armenian National Interests Fund (ANIF) holding 15 per cent.

In July, the Armenian government announced that Masdar was the winning bidder for the project, having submitted a tariff of 2.9 cents per kilowatt-hour in a competitive process.

In neighbouring Azerbaijan, the European Bank for Reconstruction and Development (EBRD) has said it stands ready to boost investment in the green economy.

Under its 2019-2024 strategy, Azerbaijan is committed to a green economic transition. It has a target to generate 30 per cent of its total electricity from renewables by 2030.

According to Kamola Makhmudova, EBRD Head in Azerbaijan, a letter of intent signed in 2017 between the EBRD and Azerbaijan's Ministry of Energy stipulates the establishment of an independent energy regulatory agency to support renewable energy and market liberalisation.

Meanwhile, the Bui Power Authority (BPA) has unveiled plans for the construction of eight solar power plants with a total capacity of 259 MW in Ghana.

BPA has also earmarked sites for the projects, including Yendi in the Northern Region, Buipe and Sawla in the Savannah, and Zebilla and Bolgatanga in the Upper East Region.

The earmarked sites are located close to Ghana Grid Company substations. Construction of the facilities is expected to start in the first quarter of 2022.

UAE's industrial giants pledge to use hydrogen to decarbonise

- Decarbonisation roadmap supports net zero strategy
- Potential for CCUS and exports to be explored

Nadia Weekes

Abu Dhabi National Oil Company (ADNOC) and GE Gas Power have announced a cooperation initiative to develop a decarbonisation roadmap involving the reduction of carbon emissions from gas turbines used to power ADNOC's operations.

Under the terms of the initiative, ADNOC and GE will explore using hydrogen and hydrogen-blended fuels for power generation. They will also evaluate introducing ammonia as a fuel to power ADNOC's GE gas turbines, and integrating carbon capture solutions at the oil company's power generation facilities.

"ADNOC's initiative with GE reinforces our commitment to support the UAE's goal to achieve net zero carbon emissions by 2050 and our ongoing commitment to decarbonising our operations," said Ahmed Omar Abdulla, Senior Vice President, Refining & Petrochemical Asset Management, ADNOC.

"Working together with GE to develop sustainable solutions for power generation also furthers our ambitions to progress hydrogen as a future fuel and will leverage our industry-leading capabilities in carbon capture and storage," he added.

"Energy-intensive industries such as oil and gas, smelters, petrochemicals, aviation and others will play an important role in the UAE's energy transition," said Joseph Anis, President and CEO of GE Gas Power Europe, Middle East and Africa. "Hydrogen and hydrogen-blended fuels, ammonia, and carbon capture solutions offer pathways to near-zero carbon emissions from gas power generation without compromising on the reliability of electricity supplies – this is critical for industrial growth."

GE Gas Power has also signed a memorandum of understanding with Emirates Global Aluminium (EGA), the largest industrial company in the UAE outside oil and gas.

EGA has 33 GE natural gas turbines at Jebel Ali and Al Taweelah, with a total power generation capacity of 5.2 GW. Electricity generation accounts for a significant proportion of EGA's total greenhouse gas emissions.

The two companies have agreed to explore options for replacing natural gas with hydrogen and hydrogen-blended fuels for combustion in EGA's GE turbines. They will also investigate the potential to integrate carbon capture, utilisation and storage into EGA's power plants.

In a parallel development, the French government has said it plans to accelerate green hydrogen development in the UAE, following the country's commitment to fully decarbonise its economy by mid-century.

Under the Hydrogen Leadership Roadmap it revealed at COP26 in Glasgow late last year, the UAE aims to support domestic decarbonisation through hydrogen whilst also becoming a key global export hub by targeting a 25 per cent market share by 2030.

Meanwhile, a high-level official at the neighbouring Sultanate of Oman has estimated that a future national economy powered by hydrogen could attract investment in the region of $34 billion in green projects by 2040.

Dr Abdullah al Abri, Head of Energy Renewal in the renewable and alternative energy unit of Petroleum Development Oman (PDO), said the new hydrogen economy will create jobs and position the country among the top-three clean hydrogen producers.

An 18-month feasibility study underpinning the National Hydrogen Economy Strategy focused, among other things, on the business opportunities available in the hydrogen space and on the feasibility of hydrogen derivatives such as ammonia, methanol, dimethyl ether (DME) and their products.

The study also covered issues at the upstream end of hydrogen production, midstream stage (fuel transport and storage), as well as other aspects of the supply chain.

The hydrogen economy also creates opportunities such as blending hydrogen with natural gas for power and enhanced oil recovery operations; the use of hydrogen as feedstock for industry and fuel for transport; the production of new and enhanced chemicals from hydrogen; and export.

Al Abri forecasts the hydrogen economy will require 1 GW of renewables capacity by 2025, rising to 10 GW by 2030, and to 30 GW by 2040.

Grid collapse plunges Zimbabwe into blackout

Zimbabwe's electricity grid collapsed mid-December, plunging most of the country into a blackout.

The Zimbabwe Electricity Supply Authority (Zesa) said the grid problem was caused by refurbishments at the Kariba Dam, which resulted in three units being taken out.

The resulting drop in generation resulted in power shortages. "Customers are advised to use the available power sparingly to minimise the effects of load shedding," the power utility said in a statement.

Electricity shortages have plagued Zimbabwe for decades.

Egypt and Jordan to double capacity of electricity line

Jordan and Egypt have agreed to double the capacity of an electricity line linking the two Middle Eastern nations, as both look for power export markets.

In a joint statement last November, energy ministers from the two countries said they intend to raise the capacity of the line to carry 1000 MW, up from the present 500 MW.

The project is scheduled to be ready by the end of 2024, according to Director General of the National Electric Power Company (NEPCO) Amjad Rawashdeh, who explained that technical committees are evaluating options before going ahead with the best plan of action.

The Jordanian-Egyptian power grid – which Rawashdeh described as "a success story for pan-Arab cooperation" – will be capable of transferring power to other countries including Iraq and Saudi Arabia.

Jordan and Egypt have exchanged electrical energy since 1999. The Jordanian electrical network is connected to the Egyptian electrical network through a 400 kV submarine cable. It extends across the Gulf of Aqaba, with a length of 13 km and a capacity of 550 MW.

Jordanian Energy Minister Saleh Al Kharabsheh said Jordan plans to issue tenders early in 2022 to link its network with neighbouring Iraq. Separately, there are plans to link the Jordanian network with Syria and Saudi Arabia.

Jordan also agreed with the Lebanese and Syrian governments to export at least 150 MW of Jordanian electricity to Lebanon.

In a separate development, Lebanon's Prime Minister Najib Mikati said he has asked for Egypt's help in acquiring natural gas to generate urgently needed electricity. On a recent visit to Egypt, Mikati is said to have made requests for energy and electricity, as well as food and medicine.

Under an agreement announced in September, Egypt will supply natural gas to Lebanon via a pipeline that passes through Jordan and Syria to help boost Lebanon's electricity output.

Lebanon is grappling with crippling economic and fuel crises, and has struggled with meagre supplies of state-generated power for months.

Utilities gear-up for energy transition

- RWE to invest up to €15 billion by 2030
- Enel increases planned investment in networks by €10 billion

Junior Isles

Several major European utilities have recently made significant investments as they prepare to operate in the changing energy landscape.

In December, RWE announced that it is planning to invest up to €15 billion ($16.93 billion) gross in its domestic core business by 2030 as the German energy major sees potential in the home market to accelerate the expansion of its renewables operations.

To take advantage of the growth potential in ground-mounted solar and onshore wind power, the company will open seven new offices in major cities across the country and hire 200 new employees who will be involved in the development of local solar and wind projects.

The announcement comes shortly after the new German government presented a plan to considerably speed up the installation of new green power capacities, setting a target of 200 GW solar and at least 30 GW of offshore wind by 2030.

It follows a similar move from Enel in late November. The Italian energy giant said it expects to triple its total renewable capacity to around 154 GW by 2030.

Between 2021 and 2030 the company expects to mobilise €210 billion of investment, including €170 billion of direct investment by the Enel Group. The latter includes around €70 billion of spending on renewables, the same as in the previous plan, to add about 84 GW of capacity, including 9 GW of storage, taking Enel's consolidated installed renewable capacity to 129 GW by 2030. This is targeted mainly at countries where Enel has an integrated or potentially integrated presence such as Italy, Spain, Romania, the US, Brazil, Chile, Colombia and Peru.

The planned investment in infrastructure and networks has been increased by €10 billion compared to the previous plan to €70 billion.

Utilities are increasingly investing in grid infrastructure to accommodate renewables.

Germany's other utility giant E.On said it plans to spend €22 billion ($24.77 billion) through 2026 on the expansion of its electricity grid and invest about €2 billion to advance digitalisation to support the energy transition.

Investments in energy networks will be raised by €1 billion annually in the next five years to prepare for the expansion of green electricity as the company's networks are expected to integrate 35 GW to 40 GW of additional renewables capacity in this period, E.On said.

- Norwegian energy company Equinor ASA has agreed to acquire a 45 per cent stake in UK battery storage developer Noriker Power Ltd with an option to buy the entire company at a later stage. Noriker, which has developed and built over 250 MW of storage in the UK, has a near-term pipeline of over 500 MW in battery storage, hybrid energy and stability service projects.

NuScale merger will accelerate SMR commercialisation

US company NuScale Power plans to merge with publicly traded investment fund Spring Valley Acquisition Corp to create a new "first of its kind" energy company to accelerate the commercialisation of NuScale's small modular reactor (SMR). The new publicly listed company, named NuScale Power Corporation, will be 60 per cent-controlled by NuScale's current majority owner Fluor Corporation. The deal is set to raise as much as $413 million and would give NuScale a total value of $1.9 billion, including debt.

NuScale's proprietary NuScale Power Module is a pressurised water reactor with all the components for steam generation and heat exchange incorporated into a single unit, capable of generating up to 77 MWe. In 2020, it became the first – and to date, only SMR – to receive standard design approval from the US Nuclear Regulatory Commission. The company offers plant configurations of four, six and 12 power modules under the recently announced VOYGR name.

NuScale is currently working with Utah Associated Municipal Power Systems to deploy a NuScale VOYGR power plant in 2029, on a site at the US Department of Energy's (DOE's) Idaho National Laboratory. It has also been working to develop its customer pipeline beyond the USA, and has some 19 Memoranda of Understanding or agreements in 11 countries.

"NuScale is building the next generation of nuclear power technology that is safer, more versatile and more cost-efficient than ever before… now is the right time to accelerate and expand our efforts to bring our trailblazing SMR technology to more customers around the world," said NuScale President and CEO John Hopkins. "Spring Valley will be a highly complementary strategic partner for NuScale as we enter this next phase of growth..."

Iberdrola suffers US setback

Iberdrola's plans for expansion in the US have been dealt a blow by the regulator of the State of New Mexico, which has blocked the purchase of PNM Resources through its subsidiary Avangrid.

Avangrid's acquisition of PNM would have created one of the largest companies in the North American power sector, with ten regulated utilities in six states (New York, Connecticut, Maine, Massachusetts, New Mexico and Texas) and the third largest wind power operator in the country, with a presence in 24 states.

The deal valued at about $8.3 billion was approved by five of the six states but New Mexico vetoed the move, claiming that the risks exceed the benefits promised to state taxpayers.

Iberdrola expressed "disappointment" at what it called an "unfair" decision and indicated its intention to appeal to the New Mexico Supreme Court.

Pat Vincent-Collawn, President and CEO of PNM Resources, said the regulator had not taken into account "the merits of the agreements reached by the parties and also rejected the request to hear oral arguments".

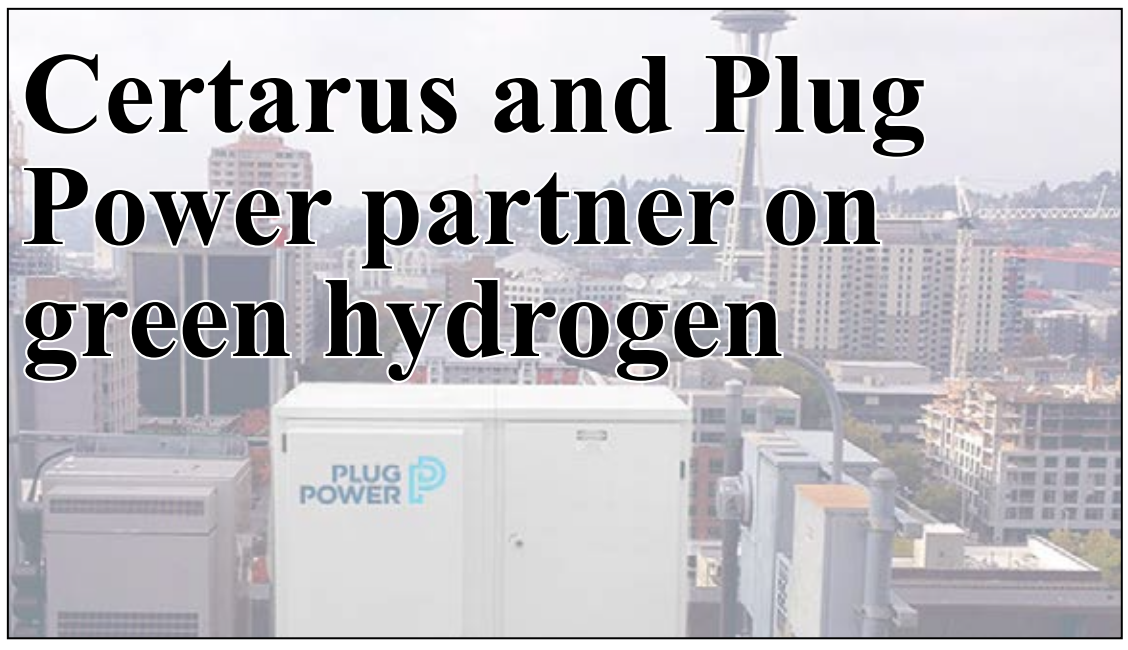
He said in a statement: "We presented an agreement that would strengthen New Mexico's future by partnering with a global company to meet the challenges of climate change while ensuring affordable and reliable service for PNM customers for years to come."

As well as appealing the decision to the Supreme Court, Avangrid could also consider withdrawing its bid for PNM or submitting another bid.

Avangrid has two main business lines: Avangrid Networks, which owns and operates eight electricity and natural gas utilities and serves more than 3.3 million customers in New York and New England; and Avangrid Renewables, which owns and operates a portfolio of renewable energy generation facilities in the US.

Iberdrola, through Avangrid, expects to invest more than $20 billion (€17 668 million) in all its US businesses by 2025, which will result in 9 GW of onshore wind, 2.6 GW of solar and 1.6 GW of offshore wind capacity.

Certarus and Plug Power partner on green hydrogen



Plug Power is looking to increase its activity in the hydrogen market through an agreement with Certarus (USA) Ltd, a US transporter of compressed natural gas.

The two companies have entered into a long-term supply and logistics agreement to further scale and expand the infrastructure needed to accelerate the adoption of green hydrogen. They will leverage their collective expertise in hydrogen production, mobile energy distribution and related technologies to enhance the North American supply chain.

Plug Power will provide Certarus with up to 10 tons of green hydrogen per day from its North American hydrogen production network with initial deliveries expected in Q1 2022. Certarus' integrated logistics platform and fleet of compressed gas delivery trailers will safely move hydrogen directly from production locations to Plug Power's and Certarus' end users. These end users include leading mining, power generation, natural gas midstream and industrial energy users.

The companies will also partner on the supply of equipment from Plug Power to cost-effectively serve these customers' needs.

"We are building out a green hydrogen ecosystem, with the goal to deliver 500 tons per day of green hydrogen by 2025 and 1000 tons per day by 2028," said Andy Marsh, CEO of Plug Power. "The partnership with Certarus is a meaningful step in building out the green hydrogen ecosystem to serve large energy sectors and in providing Plug Power the ability to flex and scale our overall delivery capabilities."

Plug Power has deployed over 50 000 fuel cell systems for e-mobility, more than anyone else in the world, and has become the largest buyer of liquid hydrogen.

Oil and gas majors cutting emissions but mainly through divestment

While some of the largest oil and gas producers have lowered their carbon emissions in line with sustainability goals, a report from GlobalData notes that a large portion of those reductions come from divestments.

According to the data and analytics company, global methane production will increase by 8 per cent by 2026, and more needs to be done to ensure methane emissions do not rise with it.

Miles Weinstein, Energy Transition Analyst at GlobalData, said: "When emissions are reduced by divestment, those emissions have not disappeared but simply moved around. Emission intensity has been reduced in many cases, but, in the face of increasing production, more efforts will be necessary to meet national and international climate targets. After all, the oil & gas industry is responsible for around a quarter of methane emissions globally."

GlobalData's latest report, 'Methane: The Low-Hanging Fruit of Emissions Reduction', reveals that Hilcorp Energy has been the largest methane emitter among upstream operators for the third year in a row, with reported methane emissions at 3.4 Mt-CO_2e in 2020, and has the highest emission intensity among top emitters, at 11 Mt-CO_2e per barrel of oil equivalent per day. Meanwhile, Energy Transfer, a midstream company, is the largest emitter overall with 6.1 Mt-CO_2e.

The US is the second-largest methane emitter just behind Russia.

Americas

Next step for 2.6 GW Coastal Virginia wind

In December, Siemens Gamesa and Dominion Energy announced the next step on the 2.6 GW Coastal Virginia offshore wind power project in the USA. It has been agreed that Siemens Gamesa will supply 176 units of its SG 14-222 DD wind turbine with a 10-year service agreement. This is subject to customary conditions, including governmental planning.

Closure of the agreement is expected by Q1 2023, with installation of the project off the coast of Virginia scheduled to start in 2024. Completion of the project is scheduled for 2026.

The prototype of the SG 14-222 DD offshore wind turbine was installed in November 2021 in Denmark and is currently producing power. It is the world's largest installed offshore wind turbine and has a current pipeline of 12 GW in firm orders, preferred supplier agreements, and preferred bidder statuses.

Nordex wins 110 MW wind order in Chile

Statkraft has placed an order with the Nordex Group for 19 N163/5.X wind turbines for Chile. The order also includes a 3-year Premium Service contract. The Delta4000 wind turbines are for the 110 MW Torsa project. This wind farm will be built in central Chile to the south of Santiago de Chile.

The turbines will be supplied in spring 2022 on tubular steel towers with a hub height of 148 m. On completion, Torsa will supply 300 GWh annually.

Torsa is the second order the Nordex Group has received from Statkraft in South America. At the end of 2020, Statkraft placed an order with Nordex Group for supply and installation of 91 N163/5.X turbines for the 518.7 MW "Ventos de Santa Eugenia" project in Brazil.

Bruce nuclear plant Unit 3 to be refurbished

A fuel channel and feeder replacement (FCFR) contract for Bruce Power's Unit 3 valued at $300 million was awarded in December to Candu Energy, a member of the SNC Lavalin Group, and Shoreline Power Group, a joint venture between SNC Lavalin, Aecon, and United Engineers & Constructors.

The scope of work under the contract includes all necessary planning and execution activities for the reactor refurbishment. Planning will commence at the start of 2022 for the outage scheduled to start in 2023. The work involves removal and replacement of the reactor-related components – 480 fuel channels and calandria tubes, 960 end fittings. The contract also calls for removal and replacement of 980 feeder pipes. Completion is scheduled for 2026.

The joint venture is also responsible for the operations of the robotic tooling required for the work, and the management and training of the full workforce.

Nordex to supply 196 MW Texas wind farm

Nordex has signed an agreement with Swift Current Energy to supply 41 N149/4.X wind turbines for the Castle Gap Wind Project in Central Texas. Both parties have also signed a service contract covering five years of operations and maintenance.

The 196 MW Castle Gap Project will use Nordex Delta4000 turbines. Nordex will supply the turbines on tubular steel towers with a hub height of 108 m. Delivery and installation of the turbines is scheduled for summer 2022 with commissioning of the turbines planned for the end of the same year.

Brazil orders largest LNG-to-power complex

Siemens Energy has secured an order for the turnkey construction of the 1.7 GW combined cycle power plant UTE GNA II in the integrated LNG-to-power project GNA II, located at Port of Açu, in the Brazilian state of Rio de Janeiro. Construction of the plant is already underway.

The plant will see the first application of the HL class gas turbine in Brazil and will be the most efficient thermal power plant in Latin America, according to Siemens Energy.

Total project amount is approximately €1 billion.

Siemens Energy will supply three HL-class gas turbines, one steam turbine, four generators, and three HRSGs, in addition to I&C controls. Siemens Energy will also supply long-term O&M of the plant, including advanced remote monitoring and diagnostics by the Remote Operation Centre, located in Jundiaí, São Paulo.

Asia-Pacific

TotalEnergies wins order solar plus storage

Between 2022 and 2025, TotalEnergies will develop a series of PV and energy storage projects in New Caledonia in the southwest Pacific with an installed capacity of 160 MW and 340 MWh of energy battery storage capacity. The first PV power plant of 30 MW is scheduled to come on stream in 2023.

TotalEnergies also has a 25-year renewable PPA for the industrial operations of mining and metallurgy consortium Prony Resources New Caledonia.

Andritz to supply equipment for Nenggiri

Andritz has signed a contract with TNBPG Hydro Nenggiri, a wholly owned subsidiary of TNB Power Generation, to supply the complete electro- and hydro-mechanical equipment for the new 300 MW Nenggiri Hydroelectric Project in Kelantan, Malaysia.

Commissioning is scheduled for the middle of 2026. The contract is valued at over €100 million.

The scope of supply for the whole project includes two Francis turbines, complete mechanical and electrical balance of plant and hydromechanical equipment, and the high voltage switchyard.

Aboitiz to build Pangasinan solar farm

Aboitiz Power has awarded an EPC contract to JGC Philippines for its $90 million 94 MW solar farm installation in Pangasinan, Philippines. Construction will start immediately. It is scheduled to be commercially operational by Q4 2022.

The Pangasinan solar facility, to be sited in the 196-hectare Cayanga property in the town of Bugallon, will be the Aboitiz group's second utility-scale development in this technology sphere, after its 59 MW project in San Carlos City, Negros Occidental.

China orders GE 9HA gas turbines

GE and Harbin Electric Corporation have won a contract from Guangdong Energy Group for two GE 9HA.01 gas turbines for its Guangdong Huizhou combined cycle power plant. The plant will burn up to 10 per cent by volume of hydrogen blended with natural gas when it starts operation.

The gas turbines will be the first to burn hydrogen blended with natural gas in mainland China.

The project is expected to be operational in 2023, providing 1.34 GW. Harbin Electric Corporation will provide steam for the industrial process of the chemical complex in Huizhou.

These will be the first localised 9HA.01 manufactured by General Harbin Electric Gas Turbine in mainland China. The joint venture was formed in 2019 between GE and Harbin Electric as a joint effort to focus on heavy duty gas turbine localisation.

Europe

Faroe Islands aims for 100 per cent renewables

SEV1, the power company serving the Faroe Islands, has selected Hitachi Energy to supply an e-mesh PowerStore Battery Energy Storage (BESS) 2 solution to help achieve energy independence based on 100 per cent renewable generation by 2030.

The selected BESS solution is rated at 6 MW / 7.5 MWh for a new project integrating the 6.3 MW Porkeri Wind Farm into the local grid of the southernmost island, Suðuroy. The Porkeri site is the first wind farm on Suðuroy and part of a project expected to produce 20 GWh of energy annually.

In 2018, 49 per cent of power generation came from renewable sources. To maximise these investments, SEV sought to add a BESS solution for greater reliability and resiliency. In addition to integrating the wind farm, the BESS also reduces both diesel consumption and CO_2 emissions, while improving power quality. The system can also be used for black start and islanding operations.

Approval for Vesterhav offshore wind projects

Vattenfall has awarded Siemens Gamesa a contract to supply wind turbines for the 344 MW Vesterhav offshore wind projects in Denmark. The projects consist of the 176 MW Vesterhav Nord wind farm using 21 SG8.0-167 DD offshore wind turbines, and the 168 MW Vesterhav Syd wind farm using 20 of the same model.

The projects will be located 10 km off the west coast of Denmark and are scheduled for completion in 2023. A three-year service agreement, with both projects being served from the Port of Hvide Sande, is also included.

Marc Becker, CEO of the Siemens Gamesa Offshore Business Unit, said: "Receiving the go-ahead for both Vesterhav projects is extremely satisfying, and we are excited to deliver domestically in Denmark once again. Adding 344 MW of capacity to the grid, powered by winds found in the waters of the Danish North Sea, is another welcome contribution to fighting the climate emergency."

Wärtsilä energy storage for the Netherlands

Wärtsilä will supply a 25 MW/48 MWh energy storage system to GIGA Storage BV in the Netherlands to help stabilise the electric grid. This will be Wärtsilä's first energy storage project in the Netherlands and it will be the country's largest system to date. The system is scheduled to start operations in October 2022. The Wärtsilä energy storage system will be co-located with wind and solar assets at the Widnet smart grid, located at the Wageningen University & Research test centre in Lelystad. Eneco, a leading energy provider in the Netherlands, will utilise the battery to make its energy services more sustainable and add more renewable energy to the grid.

The battery will be the first large-scale energy storage project based on lithium iron phosphate (LFP) chemistry in Europe.

International

Hitachi Energy wins subsea network order

Hitachi Energy has secured an order from Samsung C&T Corporation to connect Abu Dhabi National Oil Company's (ADNOC's) offshore operations to the onshore power grid in the UAE.

The project will comprise two HVDC power links connecting two clusters of offshore oil and gas production facilities to the mainland power grid 140 km distant. Hitachi Energy will use its HVDC Light technology and MACH™ digital control platform.

Hitachi Energy will supply four converter stations. Also included in the order are system studies, design and engineering, supply, installation, supervision, and commissioning. Hitachi Energy has a long-term life-cycle service agreement.

With a combined capacity of 3200 MW, the two HVDC links will be the most powerful power-from-shore solution in the Middle East and North Africa (MENA) region. It is also the first HVDC power-from-shore solution outside Norwegian waters.

Saudi orders 2 GW electrolyser

A 2 GW electrolyser supply order for a huge green hydrogen project in Saudi Arabia was placed in December 2021 by Air Products with thyssenkrupp Uhde Chlorine Engineers, a joint venture between thyssenkrupp and Industrie De Nora.

The contract calls for the joint venture to engineer, procure and fabricate the plant based on thyssenkrupp's 20 MW alkaline water electrolysis module.

In summer of 2020, Air Products teamed up with ACWA Power to build a $5 billion green hydrogen-to-ammonia complex in Neom, a cross-border city on the Red Sea coast in the northwestern Saudi province of Tabuk. The facility will produce hydrogen to be synthesised into carbon-free ammonia for export exclusively by Air Products to global markets. The commencement of production is planned for 2026.

EDF Renewables to build South African wind farms

EDF Renewables has won a contract to construct three wind projects with a total capacity of 420 MW in South Africa. The contract includes the Coleskop, San Kraal and Phezukomoya wind farms, each of 140 MW capacity.

EDF Renewables will partner with H1 holdings and Gibb-Crede to develop the projects as part of the fifth tender of the Renewable Energy Independent Power Producer Procurement scheme.

State-owned electric utility Eskom will purchase electricity from the wind power plants. EDF expects to complete financing by Q4 2022, with construction likely to be completed in two years.

Hydrogen

Snam commits to hydrogen future, US sets up clean energy office

- Europe's largest gas pipeline operator plans to transport decarbonised gas by 2050
- New US office commits $20 billion to fund clean energy demonstration projects

Gary Lakes

Keen to take a leading role in Europe's transition to clean energy, Italy's Snam, the largest gas pipeline operator in Europe, has committed some €23 billion to investments in hydrogen infrastructure from now until 2030, the company said in November.

The company has expressed its plan to transport entirely decarbonised gas – hydrogen and biomethane – throughout Italy and to the rest of Europe by 2050, making Italy an important hub for the transition away from fossil fuels. Snam has allocated 50 per cent of its 2020-2024 budget of €7.4 billion to replace and develop infrastructure that is compatible with the movement and storage of hydrogen. The company already asserts that 70 per cent of its pipeline network is capable of transporting hydrogen.

In a talk unveiling the company's plan for the next decade, CEO Marco Alvera, who has written several books on hydrogen, said in November that Snam would "play a key role in a decisive decade for the energy transition" with the aim to seize new growth opportunities in Italy as well as internationally.

Alvera's comments followed the purchase of a 49.9 per cent stake in Eni's gas pipelines that carry Algerian gas from North Africa to Italy. The purchase was made for the purpose of eventually transporting hydrogen and green ammonia produced in Algeria to Italy and other countries in Europe. Snam will pay Eni €385 million for nearly half ownership in the 2700 km pipeline system that currently transports gas to Italy. Algeria supplies Italy with about 30 per cent of its annual gas demand.

A vast solar power generation system has been envisaged for North Africa with the plan calling for electricity generated by the solar stations to be transmitted to Europe. Current thinking calls for solar power to be used to run electrolysers that would create hydrogen gas and then possibly green ammonia for export. Snam plans to invest €3 billion to repurpose the pipeline.

Snam also plans to invest €12 billion to upgrade its 33 000 km pipeline in Italy. Furthermore, the company has entered a partnership with Italian firm De Nora that will build an electrolyser factory with a capacity to produce 1 GW for hydrogen conversion.

Another €5 billion will be invested in energy storage by 2030 and developing an international green energy storage platform. According to company information, Snam's storage facilities are already capable of storing 100 per cent hydrogen. Snam operates nine storage sites across Italy and more than 41 000 km of pipelines in Italy, Greece, France, Austria, the UK and the UAE.

Besides De Nora, Snam has entered into a number of partnerships designed to share expertise that will move the hydrogen agenda forward. The company is working with railway operators FS Italiane and Ferrovie Nord, traction suppliers Alstom, energy and utility suppliers Eni, A2A and Hera in order to develop refuelling infrastructure that will make hydrogen mobility by rail possible in Italy. Snam is also working with industrial firms and power generation companies like Tenaris and Edison.

Meanwhile, the US has established the New Office of Clean Energy Demonstrations with funding amounting to more than $20 billion. The office is mandated to help deliver on US President Joe Biden's climate agenda and set up numerous clean energy programs across the US. Those projects include clean hydrogen, carbon capture, grid-scale energy storage, small modular reactors and other innovative forms of clean energy production.

"Demonstration projects prove the effectiveness of innovative technologies in real-world conditions at scale in order to pave the way towards widespread adoption and deployment," the Department of Energy said in a December 21 statement announcing the establishment of the office, which was made possible by Congress passing the Bipartisan Infrastructure Law.

"The Office of Clean Energy Demonstrations will move clean energy technologies out of the lab and into local and regional economies across the country, proving the value of technologies that can deliver for communities, businesses and markets," Jennifer Granholm, Secretary of Energy, said in the statement.

A large portion of the funding will go towards project developing green hydrogen. Some $9.5 billion is allocated for establishing four regional green hydrogen hubs plus manufacturing and recycling programmes, all of which are meant to demonstrate and commercialise the new technology. The demonstrations are intended to unlock millions and billions of dollars in follow-on investment.

Many of the projects will be located in rural and low-income regions that have been targeted by Biden's Justice 40 initiative which aims to deliver 40 per cent of clean energy investment benefits to disadvantaged communities and those hardest hit by climate change.

According to the statement, the office will "consistently engage environmental justice groups, labour, and communities to help shape program development and execution."

Gas

Gas market dynamics put future of East Mediterranean gas in question

The future of East Mediterranean gas is under debate as questions continue to cloud the future of global gas markets.

Gary Lakes

The future of East Mediterranean gas is under debate. The surge in gas prices has brought speculation about the future demand for gas in a world that is planning to make an energy transition that will phase out fossil fuels by 2050. But what if this transition does not go smoothly and the world finds that it needs more gas and needs it for a longer period of time than currently envisaged?

Questions surrounding the future global gas markets have been bandied about since the coronavirus pandemic brought deep cuts in demand for hydrocarbons, and they have been hanging over the East Mediterranean like a Sword of Damocles. The known gas resources in the East Med have yet to be developed fully and most of the resources believed to exist in the region have yet to be discovered.

For now, its appears that gas will be in demand for at least the next three decades after which the world is meant to be operating at net zero carbon emissions. The recent price increases in gas and especially the situation between the EU and Russia over gas supplies is an example of a situation that could repeatedly pop-up during the course of the switch to renewable energies.

Egypt, which several years ago had basically shut down its LNG exports because of low prices, is now exporting at full capacity – around 12 million tons/year – in order to take advantage of current high prices. Egypt's gas industry is well developed and over the last six years has received a significant production boost after the discovery of the Zohr field in 2015. Current gas production in Egypt is between 6.5 and 7.0 billion ft^3 per day.

Since Zohr, Egypt has been promoting itself as a regional energy hub, the idea being that it would import gas produced in Israel and Cyprus, and re-export it as LNG or, as Cyprus, Israel and Greece have been suggesting, export East Med gas through a 2000 km subsea pipeline that would land in Greece and carry on to Southeast and Central Europe. Egyptian President Abdel Fattah el Sisi has proposed that this pipeline run across northern Egypt as far as the Libyan border and cross to Crete and then Greece from there.

The pipeline projects are viewed by many as unlikely, especially in a climate where long-term gas projects, especially pipelines, are being questioned as being worthy of investment. Funding for hydrocarbon projects is under close scrutiny and it is doubtful that more gas pipeline projects will be added to the existing list.

For the time being, it looks like future East Med gas production that is not distributed regionally will be exported through Egypt's LNG facilities. And, it remains to be seen if global gas markets will warrant the investment in exploration and development of the gas resource targets offshore Cyprus and Lebanon.

Israel already has gas resources estimated at around 1 trillion m^3. Production from the Tamar field is going to meet domestic needs, as is some of the gas from the giant Leviathan field. But Leviathan is also exporting to Egypt for re-export. Further development of Leviathan will depend on decisions yet to be made by operator Chevron, the US giant. Greece's Energean is also developing the Karish and Tanin fields and that gas will be available for the Israel market next year.

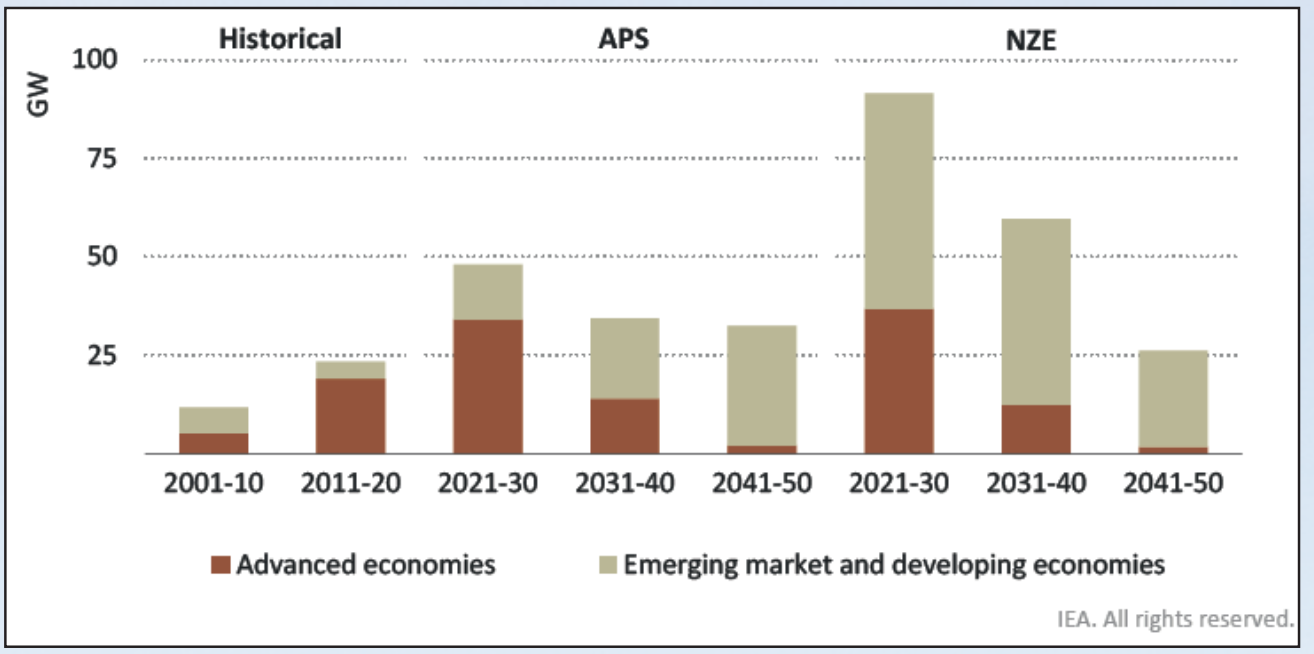
Meanwhile, the Israeli government announced last month that it will halt further offshore gas exploration and shift attention to developing renewable energies, with Energy Minister Karine Elharrar saying: "Gas can wait."

In Cyprus, gas has been waiting for a long time. ExxonMobil launched during Christmas week an appraisal well for its January 2019 Glavcos-1 discovery well. Glavcos-2 is expected to confirm the estimated 5-8 tcf gas resource and lead to further exploration. This is the first well drilled offshore Cyprus by licensed companies since the start of the coronavirus pandemic. Cyprus' Aphrodite field, with a 4.5 tcf resource, was discovered in December 2011 and still lies undeveloped. Prior to the pandemic, there had been talk of plans to ship the gas to Egypt via a subsea pipeline for re-export as LNG. Chevron, which is also operator for Aphrodite, has yet to decide on that field's future.

What will become of Lebanon's energy sector is anyone's guess. One obstacle after another has appeared that has held the country back.

One licensing round has been completed and two blocks awarded, but a well drilled by the Total/Eni/Novatek group proved un-commercial and another planned well was cancelled due to the pandemic. In November, the Lebanese Petroleum Authority announced a closing date of June 15, 2022, for its second licensing round. This might prove successful, but the financial crisis, the internal politics, and an ongoing maritime border dispute with Israel might not allow the round to be as successful as it could be under different circumstances.

Annual average coal power plant retirements in the Announced Pledges and Net Zero Emissions by 2050 scenarios



World Energy Outlook 2021, © IEA/OECD, Figure 1.16, page 58

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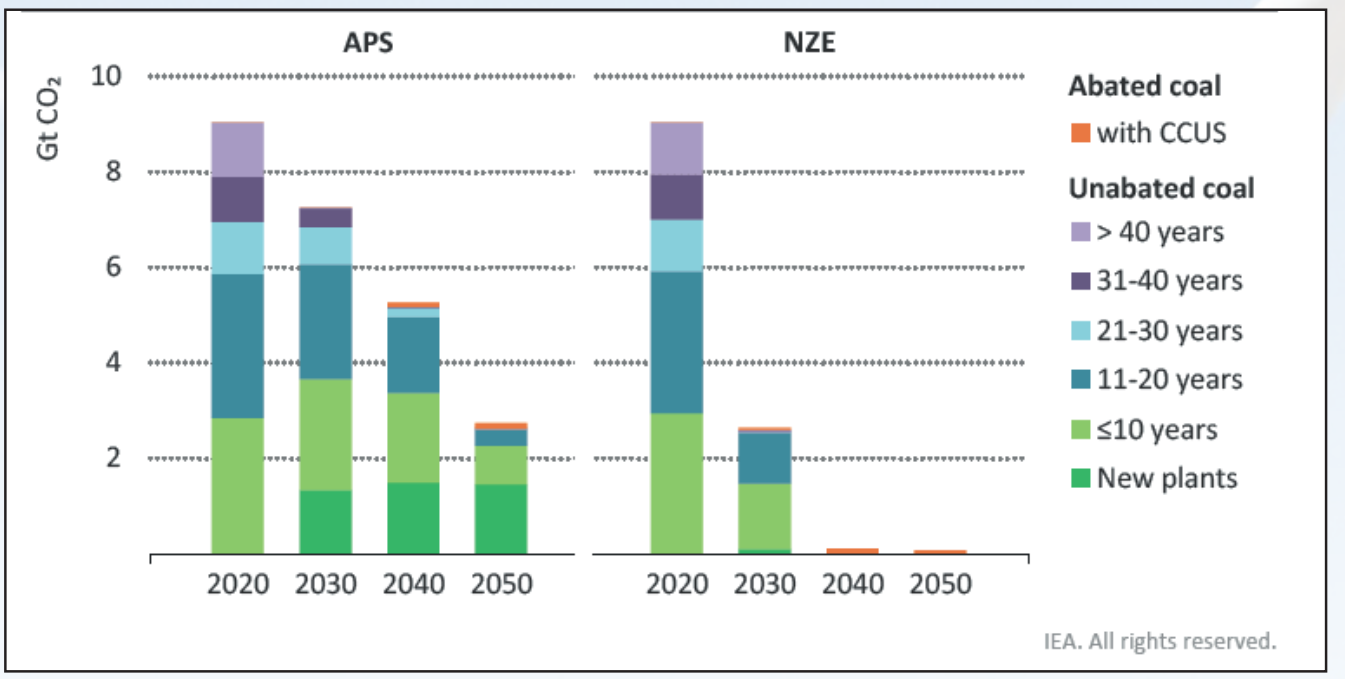
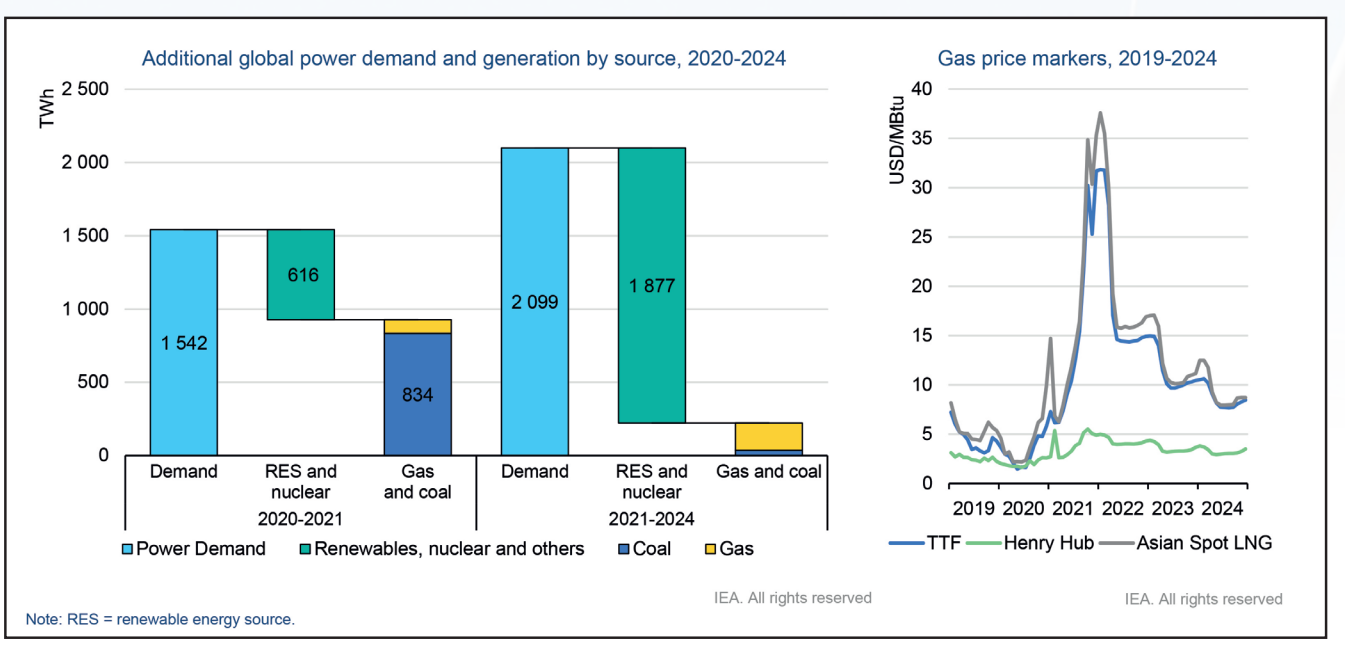
CO_2 emissions from coal-fired power plants by age and scenario



World Energy Outlook 2021, © IEA/OECD, Figure 3.14, page 130

As low-carbon sources meet most but not all additional power demand, gas and coal fill the gap



Coal21 report, © IEA/OECD, page 14

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Industry Perspective

Waste-to-energy: the missing piece of the taxonomy puzzle

The waste management sector can contribute to at least three of the six objectives of the EU taxonomy but the current plan overlooks a cornerstone of sustainable waste management: dealing with residual waste. Waste-to-energy has a vital role to play here, say CEWEP's (Confederation of European Waste-to-Energy Plants) **Dr. Ella Stengler** and **Maxime Pernal.**

In 2018, the European Commission published its action plan on financing sustainable growth. It set a strategy to attract investment in sustainable activities, including through the creation of a European framework evaluating the sustainability of various economic activities. Such a framework is known as a 'taxonomy'.

On June 22, 2020, the Regulation on the establishment of a framework to facilitate sustainable investment was published in the EU *Official Journal*. This regulation creates the EU taxonomy, basing its sustainability assessment on six objectives:

1. Climate change mitigation
2. Climate change adaptation
3. The sustainable use and protection of water and marine resources
4. The transition to a circular economy
5. Pollution prevention and control
6. The protection and restoration of biodiversity and ecosystems.

To be labelled as sustainable, an activity should substantially contribute to at least one of these objectives, without doing significant harm to any of the five others ("Do No Significant Harm" principle, DNSH).

The activity also needs to fulfil technical screening criteria that are developed by the Platform on Sustainable Finance – an expert group composed of representatives from the financial sector, various industries, and NGOs – and adopted in delegated acts. Without these delegated acts, the framework is an empty shell: to assess the sustainability of their portfolios, investors and companies need to assess the activities they finance, insure or conduct against the technical criteria published in the delegated acts.

A first delegated act, covering the two climate objectives and encompassing around 70 activities, was published in the *Official Journal* of the EU on 9th December 2021. A draft complementary delegated act covering gas and nuclear energy was scheduled for December 22, 2021, and a delegated act covering objectives 3 to 6 is expected in 2022.

But waste management is one piece missing in the taxonomy. The waste management sector can contribute to at least three of these objectives (climate change mitigation, circular economy and pollution prevention) and has therefore been partially covered by the first delegated act and by the first draft of activities proposed by the Platform for the second delegated act.

The first delegated act acknowledges the contributions to climate change mitigation that can be achieved in the higher steps of the waste hierarchy: material recovery of non-hazardous waste, anaerobic digestion of biowaste, composting. At the lower end of the hierarchy, it recognises the positive contribution of landfill gas capture in closed landfills. As for the activities to be covered in the next delegated act, the Platform proposed to note the contribution of material recovery (both non-hazardous and hazardous waste) and of phosphorus recovery from sewage sludge to the transition to the circular economy, and of hazardous waste treatment to pollution prevention and control. The lower end of the waste hierarchy was also covered, with the inclusion of the remediation of legally non-conforming landfills and abandoned or illegal dumps as contributing to pollution prevention and control.

So far, the work accomplished on the taxonomy has however overlooked a cornerstone of sustainable waste management: dealing with residual waste, the waste that despite all efforts cannot be prevented, reused or recycled. Large disparities in waste management systems still exist between EU Member States: while some Member States like Germany recycle 67 per cent of their municipal waste and landfill virtually none of it, others like Romania landfill 76 per cent and recycle 11 per cent of their municipal waste. In 2019 in Spain, 12 million tonnes of municipal waste were landfilled.

The EU's best performers in waste management combine a high level of recycling with an appropriate level of waste-to-energy (WtE) so that non-sorted waste and residues from sorting and recycling processes can be safely treated and their energy recovered. In order to reach the 2035 targets of minimum 65 per cent recycling and maximum 10 per cent landfilling of municipal waste, many Member States that still rely heavily on landfills will need investments in all of the other levels of the waste hierarchy. The taxonomy would be an ideal framework to provide investors and public authorities with clear criteria for sustainable residual waste treatment activities. The move towards more high quality recycling is also leading to an increase in residual, non-recyclable waste streams. This waste must be treated in dedicated installations, to avoid waste transports to third countries where environmentally sound management is not guaranteed. This is the role of waste-to-energy.

As acknowledged in the European Commission's Communication on the role of Waste-to-Energy in the Circular Economy, the WtE sector is a key element of an integrated waste management system and fully belongs in a circular economy as it treats residual, non-recyclable waste. It is therefore disappointing that neither the Commission nor the Platform on Sustainable Finance have proposed any guidance for the treatment of the unrecyclable residual waste to the countries that will need to develop this aspect of their waste management system.

Dr Stengler: So far, the work accomplished on the taxonomy has overlooked a cornerstone of sustainable waste management

The legal feasibility of including WtE activities in the taxonomy has been demonstrated by a legal analysis from PwC (provided technical criteria are developed and adopted). In practice, the sector contributes to the three objectives highlighted earlier (1, 4 and 5).

With regard to climate change mitigation, WtE substitutes fossil fuel by producing energy from non-recyclable waste which would otherwise have been landfilled (emitting climate potent methane). As a significant part of the waste treated is biogenic, around half of the energy produced is renewable. The combustion process also allows the recovery of metals embedded in the waste, which leads to further greenhouse gas emission savings. The mineral part of bottom ash can be recovered and used as aggregates, leading to further emission savings.

Waste-to-Energy also helps to enable the transition to a circular economy, by treating non-recyclable waste in the most sustainable way possible, in line with the waste hierarchy and best available techniques. High-quality recycling can only be achieved if there is an outlet for rejects from sorting and recycling facilities. This has been highlighted by the recycling industry.

While the Platform proposal includes treatment of hazardous waste for pollution prevention, there are also contaminated wastes that are not classified as hazardous but still need thermal treatment to destroy the pollutants and pathogens (e.g. POP-containing wastes, some healthcare waste). For these wastes, WtE plants contribute to pollution prevention and control: they allow the material cycle to remain free of pollutants.

To be included in the taxonomy, an activity must do no significant harm. With regards to WtE, this means that installations are planned, designed and operated so that they are in line with the waste hierarchy, hence considering waste prevention and recycling efforts. The Taxonomy Regulation (Art. 17(1)(d)(i)) indicates that an activity is significantly harmful to the transition to a circular economy if this activity leads to a "significant increase in the generation, incineration or disposal of waste". The Regulation does not define further what a "significant increase" means and on which level this should be interpreted (local, national, European).

As for additional capacities, the WtE sector explicitly stated that new investments should only happen in well justified cases, in line with local and national waste management plans taking into account the EU waste targets and potential waste prevention and recycling measures.

The ongoing discussions on taxonomy are an ideal opportunity to develop guidelines for the treatment of non-recyclable waste in the most sustainable way possible, in line with the waste hierarchy and best available techniques, while ensuring that proper safeguards are in place.

Missing this opportunity will delay investments in WtE when they are needed, which will lead to incomplete waste management systems. Many countries will lack outlets for the rejects from their sorting and recycling facilities and rely instead on treatments lower in the hierarchy, or send non-recyclable waste to regions with lower environmental standards. This will hamper the achievement of the European waste management targets and, more importantly, be detrimental for both the circular economy and the environment.

This is why CEWEP, together with European associations representing the whole waste management value chain, calls on the European Commission and the Platform on sustainable finance to develop technical screening criteria for the inclusion of WtE in the taxonomy.

Pernal: the WtE sector is a key element of an integrated waste management system and fully belongs in a circular economy

Dr. Ella Stengler, is the Managing Director at the Confederation of European Waste-to-Energy Plants (CEWEP); Maxime Pernal is Policy Officer, CEWEP.

Coal rebound puts climate change on the ropes

Rapid economic recovery is driving global coal power generation to a record high and overall coal demand to a potential all-time high this year, further jeopardising climate goals.

TEI Times looks at the key findings from the International Energy Agency's '*Coal21*' report.

The amount of electricity generated worldwide from coal was surging towards a new annual record in 2021, undermining efforts to reduce greenhouse gas emissions and potentially putting global coal demand on course for an all-time high next year, the International Energy Agency said in its latest annual 'Coal21' market report published in December.

Commenting on the findings, IEA Executive Director Fatih Birol, said: "Coal is the single largest source of global carbon emissions, and this year's [2021] historically high level of coal power generation is a worrying sign of how far off track the world is in its efforts to put emissions into decline towards net zero. Without strong and immediate actions by governments to tackle coal emissions – in a way that is fair, affordable and secure for those affected – we will have little chance, if any at all, of limiting global warming to 1.5 °C."

Coal had faced a difficult outlook for 2020, even before the pandemic: demand was being squeezed by a mild winter in the Northern Hemisphere, low natural gas prices and strong renewables growth. When electricity demand and natural gas prices plummeted as the Covid-19 crisis escalated, coal fired power generation shouldered the brunt of the impacts, said the IEA. Reduced industrial activity also hit coal demand, although in a more limited way. In the early months of the crisis, a double-digit annual decline in global coal demand looked plausible. But economic recovery in China came sooner and stronger than initially expected, with year-on-year growth resuming as early as in April 2021.

Global electricity consumption was expected to rebound 6 per cent in 2021, exceeding the 2019 level, as economic recovery around the globe and adverse weather conditions boosted demand at the same time that renewable power generation was lower than expected due to meagre rainfall and weak wind in some regions. In the report, China's electricity demand growth for 2021 is estimated at 10 per cent, reflecting the country's strong economic recovery as well as a cold snap in the north and a warmer-than-average summer.

With economic recovery following elsewhere and a cold snap in December 2020 in Northeast Asia, global coal demand fell by 4.4 per cent in 2020 – the largest decline in many decades but less than initially expected. The report notes that the regional disparities were large. Coal demand grew by 1 per cent in China in 2020 but dropped by nearly 20 per cent in the US and the European Union – and by 8 per cent in India and South Africa.

The declines in global coal fired power generation in 2019 and 2020 led to expectations that it might have peaked in 2018 "but 2021 dashed those hopes", states '*Coal21*'. With electricity demand outpacing low-carbon supply, and with steeply rising natural gas prices, global coal power generation was on course to increase by 9 per cent in 2021 to 10 350 TWh – a new all-time high. However, coal's share of the global power mix in 2021 is expected to be 36 per cent – five percentage points below its 2007 peak.

In 2020, the decline in worldwide electricity consumption (-0.5 per cent) and low natural gas prices caused coal fired generation to drop 3.8 per cent (-380 TWh), which reduced consumption of both steam coal (-3.6 per cent to 5 735 Mt) and lignite (-13 per cent to 621 Mt).

In the US and the EU, coal power generation is forecast to increase by almost 20 per cent in 2021 but will not reach 2019 levels. By contrast, estimated growth of 12 per cent in India and 9 per cent in China will push coal power generation to record levels in both countries.

The IEA says China's influence on coal markets is difficult to overstate, noting that its power generation, including district heating, accounts for one-third of global coal consumption. China's overall coal use is more than half of the global total. Coal demand in China is underpinned by fast growing electricity demand and the resilience of heavy industry.

This is despite a decade of strong and sustained efforts to diversify the country's power mix – during which China has expanded hydro, wind, solar and nuclear power capacity by more than any other country in the world – and intensive switching from coal to natural gas in the residential heating and light industrial sectors. China is also the world's largest coal producer and importer, with domestic price swings from supply-demand imbalances immediately impacting international markets.

For 2022-2024, global power demand is expected to increase by approximately 2099 TWh (annual average growth of 2.4 per cent), of which a large share (91 per cent) will be covered by additional renewable electricity generation. The IEA says it expects a gap of more than 220 TWh to be filled by coal and gas fired power generation.

"With forward prices pointing to a gas price drop, we expect gas to meet most of the remaining demand while coal fired power generation stays stable over the period," stated the report.

Beyond 2021, the IEA says global coal consumption is set to revert to the pattern seen over the previous decade: declines in advanced economies offset by growth in some emerging and developing economies. After its brief rebound in the US and EU in 2021, coal demand will resume its decline through 2024. This is mostly driven by the power sector where slow electricity demand growth and rapid expansion of wind and solar PV are eating into coal power generation.

In addition, a big part of the recent switching from natural gas to coal will reverse as gas prices retreat from their highs. At the same time, countries such as Vietnam, the Philippines and Bangladesh, where very strong growth in coal demand had been expected a few years ago, are now set to show more modest increases as they shift more towards sources of electricity that are less carbon intensive.

However, global coal trends will be shaped largely by China and India, which account for two-thirds of global coal consumption, despite their efforts to increase renewables and other low-carbon energy sources. In China, coal demand growth is expected to average less than 1 per cent per year between 2022 and 2024. In India, stronger economic growth and increasing electrification are forecast to drive coal demand growth of 4 per cent per year. India's growing appetite for coal is set to add 130 million tonnes (Mt) to coal demand between 2021 and 2024.

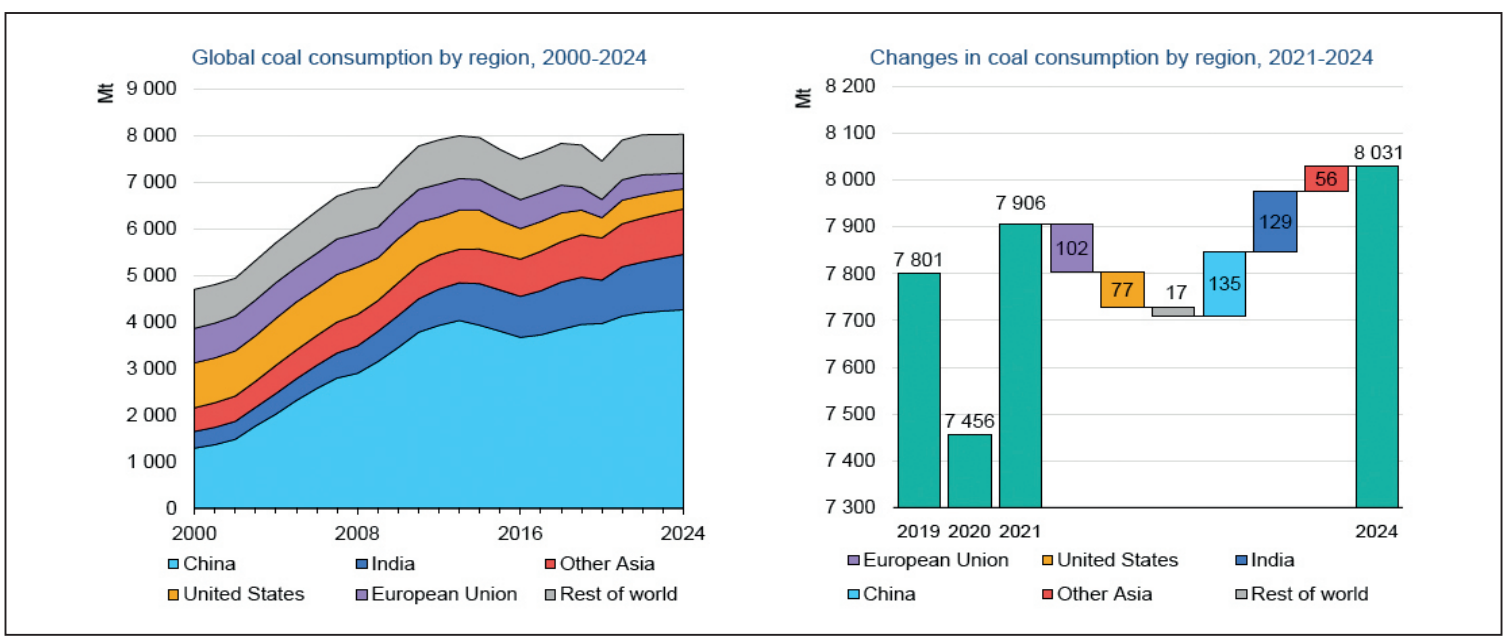
These trends are worrying for the battle against climate change. The IEA notes that while momentum behind net zero has grown, "the era of declining emissions is moving further away".

It stated: "The pledges to reach net zero emissions made by many countries, including China and India, should have very strong implications for coal – but these are not yet visible in our near-term forecast, reflecting the major gap between ambitions and action." Japan, Korea and China have also committed to stop public funding for building new coal power projects abroad, severely limiting the possibilities for expanding coal fired generation in many countries.

New commitments during COP26, such as the Global Coal to Clean Power Transition Statement to accelerate the transition from unabated coal power generation, put additional pressure on coal.

The IEA says the coal power generation rebound in the US and Europe in 2021 is therefore "a blip", and coal demand will resume its decline in both regions. However, Asia dominates the global coal market, with China and India clearly holding the key to future coal demand.

The report concludes that the fate of coal depends on how quickly and effectively countries move to implement their net zero commitments. And the level of coal demand in a net zero carbon economy will depend on how successful efforts are to deploy carbon capture, utilisation and storage (CCUS) technologies.



Plateauing of coal consumption resumes. *IEA 'Coal21 report. All rights reserved*

Hydrogen makes progress with plastics

Making use of hard to recycle plastics could be one way of reducing plastic waste, while supporting the UK's hydrogen strategy. **Junior Isles** looks at how Peel NRE is progressing with plans to roll-out plastics-to-hydrogen technology.

Eliminating non-recyclable plastic is one of the biggest challenges facing the waste management sector. According to government data, in the UK alone in 2016 (the latest government data available) the amount of plastic waste going to landfill was 53 400 tonnes. But although this remains a significant problem, technology could soon be demonstrated that would address the issue, while supporting the UK's plans to grow the hydrogen economy.

Just over six months ago Peel NRE, part of Peel L&P, announced that it is planning to develop a waste plastic-to-hydrogen facility at Rothesay Dock on the north bank of the River Clyde, West Dunbartonshire. The facility will be the second in the UK to use pioneering technology developed by Powerhouse Energy Group plc, after plans for a similar facility at Peel NRE's Protos site in Cheshire were approved in 2019.

Like Protos, the latest £20 million facility will take non-recyclable plastics, destined for landfill, incineration or export overseas, and use them to create a local source of sustainable hydrogen. The hydrogen will be used as a clean fuel for buses, cars and HGVs, with plans for a linked hydrogen refuelling station on the site.

The project is one of a number of low carbon "waste-to value projects" the company is developing as part of a clean energy portfolio that includes renewables, i.e. wind, solar projects.

Peel NRE's plastics-to-hydrogen projects will play a significant role in the UK's Hydrogen Strategy announced in August last year, when the government said it will work with industry to meet its ambition for 5 GW of low carbon hydrogen production capacity by 2030. This is the equivalent of replacing natural gas in powering around 3 million UK homes each year as well as powering transport and businesses, particularly heavy industry.

Richard Barker, Development Director at Peel NRE, said: "Plastic is often demonised, but we have seen how essential it is in industries like healthcare. We do need to recycle as much of this plastic as possible and also get as much value from unrecyclable, end-of-life plastic."

While the company is working on the disposal of several residual waste projects, Barker says the key focus is bringing forward the plastics facility development at Protos. "It has been a couple of years in gestation but we've rolled out a concept that brings together various forms of technology – some established, some emerging such as the plastics-to-hydrogen."

Barker notes that the idea is to have a grouping of technologies, that are "symbiotic and co-located to benefit from each others' presence. He explained: "The plastics park comprises two plastics recycling facilities [PRFs] – one (PRF1) is a purely sorting facility that will separate out various polymer types and at the end produce recyclers that are suitable for the next recycling stage (PRF2) or to go off-site. PRF2 does some additional sorting to improve the quality of the recyclers that are captured. These then go through a series of washing lines… so they are recovered into their base polymer type to eventually go back into plastics production. The idea is then to use the poorer quality feedstock that cannot be recycled in the plastics-to-hydrogen facility."

The plastics-to-hydrogen facility at Protos can process around 13 500 t/annum of plastics to produce about 2 t/day of hydrogen. It uses PowerHouse Energy's DMG (distributed Modular Gasification) technology, which is essentially a pyrolysis process where the material is melted and boiled so it becomes vapour. Gasification is carried out at around 1000°C with the help of an oxidising agent but without introducing any oxygen or air into the process. The operation takes place in a slight vacuum but although there is a little air in the chamber, the product is not being burned.

The temperature, oxidising agent and the residence time of the gases in the chamber are controlled to produce either hydrogen gas or a methane-rich gas. When looking to produce electricity, the methane content would be increased so it can be burned in a reciprocating gas engine.

According to PowerHouse Energy the technique is a far cheaper way of producing hydrogen than steam methane reformation (SMR), which is currently the only industrial scale technique for hydrogen production. The company says that its DMG has a smaller footprint and is more efficient than electrolysers, noting that DMG vessels could be loaded on to a lorry. It also noted that their small size would make them easier and faster to permit – taking in the order of months as opposed to years.

Computer generated image of the Protos plastics-to-hydrogen facility

The Protos site, which sits on about 1.8 acres (approx. 7300 m^2), also hosts a hydrogen fuelling station, so arriving trucks could potentially be refuelled with hydrogen. It is big enough to refuel about 80 vehicles and about 1 MW of electricity. This is sufficient electricity to power the facility and the plastics park, with the surplus going to the local grid.

"By co-locating a refuelling station, we can help to kick-start the infrastructure needed to support the rollout of hydrogen vehicles which will be an important part of our journey to net zero," said Barker

The Dunbartonshire site will be slightly bigger, sitting on a roughly 3 acres site due to a larger plastics processing facility. "It's more of a standalone; it doesn't have the benefit of a plastics park wrapped around it, so will have to process more of its own," noted Barker. "But the [plastics-to-hydrogen] units are the same size."

Hydrogen from the facility will be shared between the refuelling station and the local market. Barker noted: "Glasgow city council is looking to convert its diesel fleet to hydrogen, and has already gone some way to doing that. So we would be compressing the hydrogen and tankering it out on trailers."

The planning application for the Dunbartonshire project has been submitted and is expected to be determined some time this year. "Beyond that," said Barker, "we're unlikely to be doing anything substantive until we're sure of the outcome of the first [Protos] project."

Commenting on the schedule for Protos, PowerHouse Energy stated: "As a first-of-a-kind project, Protos is being designed to allow it to be commissioned in stages. This measured approach will place the plant gradually into full test, and subsequently, full operation. One of the initial tests will be the thermal conversion chamber (TCC) and syngas production. Earlier in our delivery schedule, this test will provide PowerHouse Energy and investors alike, great confidence that a high quality and consistent syngas product is able to be produced.

"Following TCC and syngas production we then test power generation, and finally hydrogen production, before we declare that we are complete and operational. This final announcement is forecast for 2023."

Construction of front-end facilities and site infrastructure is already underway and the project is, as Barkers puts it "top of everyone's priority".

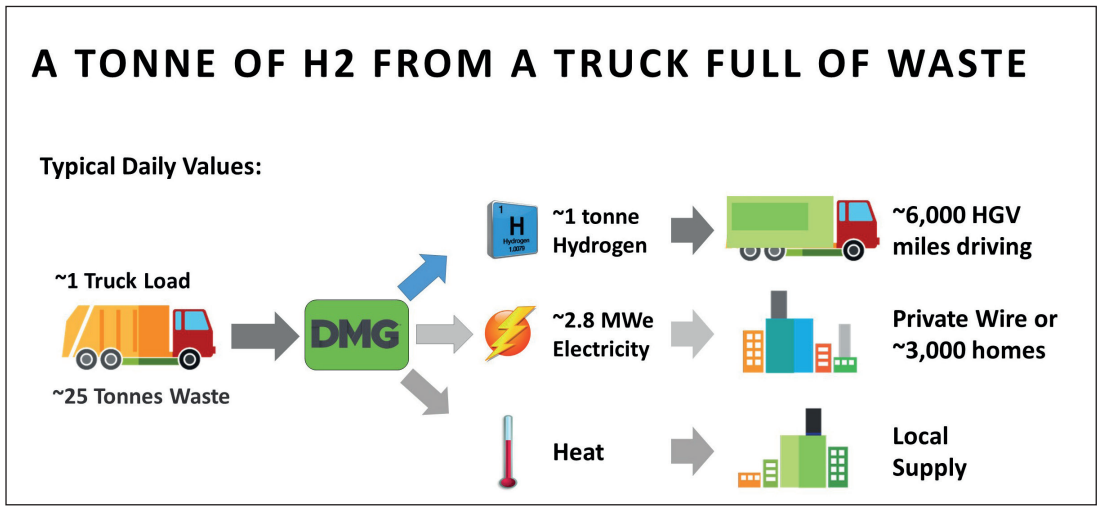
Although still a work in progress, Barker says lessons have already been learned from Protos. "You're always learning with these projects. For example, we've learned about the front-end processing capacity but once the [Protos] project is fully constructed and up and running, we'll be undertaking a review of the project. So that's why we wouldn't want to start too soon on the second project."

These first two projects are the start of what is likely to be a long-term relationship between Peel NRE and PowerHouse Energy. The two companies have signed a collaboration agreement to develop 11 waste plastic-to-hydrogen facilities across the UK over the next few years, with the option of exclusive rights for a total of 70 facilities.

Commenting on where the additional facilities might be, Barker said: "The locations depend on the nature of the land surrounding the various sites. What we're looking for is sites that are located either close to the source of the feedstock or close to the [hydrogen] end-user. Although the economics will still work, there are commercial benefits from being in those two areas. We will be using some of our land but equally they could be built on third-party land – most likely close to industrial areas and large cities, where people are."

Barker says the aim is to roll-out these projects "as rapidly as possible after the first one; hence the reason for going into planning on the second". He concluded: "We have a number of other sites that could potentially be utilised, where we've got existing waste management consent in place, so we could just re-purpose the site."

A tonne of hydrogen from a truck full of waste



Junior Isles

Never the twain shall meet

Despite the war on coal in the drive to net zero, the end days of the black stuff are still some way off. Borrowing from Mark Twain one might quip: 'reports of its death have been greatly exaggerated'.

Certainly, the recent annual coal report from the International Energy Agency (IEA) made sobering reading. The Paris-based organisation said global power generation from coal was set to jump by 9 per cent in 2021 to an all-time high of 10 350 TWh, after falling in 2019 and 2020.

According to the IEA, rapid economic recovery is driving global coal power generation to a record high in 2021 and overall coal demand to a potential all-time high as soon as 2022. It says the economic rebound in 2021 has pushed up electricity demand much faster than low-carbon supplies can keep up. The steep rise in natural gas prices also increased demand for coal power by making it more cost-competitive.

The IEA warned that the level of coal use could remain at the historical high for the next two years. As we move into a new year, such unsettling news underlines the urgent need for policy action.

Commenting on the findings, the IEA's Executive Director Fatih Birol, said: "Coal is the single largest source of global carbon emissions, and this year's [2021] historically high level of coal power generation is a worrying sign of how far off track the world is in its efforts to put emissions into decline towards net zero. Without strong and immediate actions by governments to tackle coal emissions – in a way that is fair, affordable and secure for those affected – we will have little chance, if any at all, of limiting global warming to 1.5°C."

Coal's comeback underlines the challenge world leaders face in making the transition to clean energy, especially in countries like India and China, which, according to the report, account for two thirds of global coal consumption. Notably, China and India led calls that resulted in weakened ambition to end coal fired power at the COP26 climate summit in Glasgow. But although coal was granted a stay of execution at the summit, it is clear that it is living on borrowed time.

"The climb-down on a global agreement to phase-out coal made headlines, but the COP26 messaging was clear enough: coal's days are numbered. As a result, finance and insurance costs for coal will climb even higher. Alternatives to coal-based power and industrial applications that are both scalable and affordable will take time to roll out. But a global carbon market will eventually accelerate the competitiveness of low-carbon solutions in both the power and steel sectors. The consequences for coal are clear," said Wood Mackenzie Research Director, Robin Griffin.

Meanwhile, financial institutions continue to pull back. Just last month HSBC Holdings plc set out its policy to phase-out the financing of coal fired power and thermal coal mining by 2030 in EU and OECD markets, and worldwide by 2040.

In recognition of the rapid decline in coal emissions required for any viable pathway to 1.5°C, the policy will mean HSBC phasing out finance to clients whose transition plans are not compatible with the bank's net zero by 2050 target.

The thermal coal phase-out policy, which will be reviewed annually based on evolving science and internationally recognised guidance, is a key part of executing on HSBC's October 2020 ambition to align its financed emissions – the greenhouse gas emissions of its portfolio of clients – to net zero by 2050 or sooner.

The policy includes short-term targets to help drive measureable results in advance of the phase-out dates. A science-based financed emissions target will be published in 2022 to reduce emissions from coal fired power in line with a 1.5°C pathway.

HSBC stressed that given the nine-year timetable to phase-out coal in EU/OECD markets, new finance to clients in these markets will be declined where thermal coal makes up more than 40 per cent of a client's total revenues (or more than 30 per cent of total revenues by 2025), unless the finance is explicitly for the purpose of clean technology and infrastructure.

It noted, however: "HSBC is not applying these criteria in non-EU/OECD markets today, as we will evaluate client transition plans according to their alignment to HSBC's net zero by 2050 target and worldwide coal phase-out date of 2040."

Given the bank's substantial footprint across Asia, with the region's heavy reliance on coal today and its rapidly growing energy demand, HSBC says it recognises it has a critical role to play in helping to finance the region's energy transition from coal to clean energy. HSBC will expect its clients to lay out credible transition plans for the next two decades to diversify away from coal fired power production to clean energy, and from coal mining to other raw materials, including those vital to clean energy technologies.

Group Chief Executive, Noel Quinn, said: "We want to be at the heart of financing the energy transition, particularly in Asia. This is where we can have the biggest impact to help the world achieve its target of limiting global warming to 1.5°C. We have a long history and strong presence in many emerging markets that are heavily reliant on coal for power generation. We are committed to using our deep relationships to partner with clients in those markets to help them transition to cleaner, safer and cheaper energy alternatives in the coming decades.

"Tackling climate change is a strategic priority for HSBC, our investors and our stakeholders."

While Asia's transition from coal is essential if the world is to have any hope of reversing climate change, there are still fears that the climate benefits of record coal plant cancellations in Asia will be lost if a planned $358 billion expansion of Asian gas infrastructure goes forward. According to a recent briefing from Global Energy Monitor (GEM), there are plans in the region for 285 GW of new gas fired power plants, 452 million tonnes per annum (mtpa) of liquefied natural gas (LNG) import capacity, and 63 000 km of gas pipelines. This expansion would double the region's gas power capacity and triple its pipeline capacity, while increasing the world's 910 mtpa of LNG import capacity by 50 per cent.

There is little doubt such gas expansion undermines Asian countries' pledges to achieve net zero emissions by mid-century. According to GEM, even if just half of the proposed gas plants in Asia are built (143 of 285 GW) with an operating lifetime of 30 years, it will postpone the net zero power system by decades.

"The coal bust is at a risk of becoming a gas boom in Asia," said Robert Rozansky, GEM's LNG research analyst. "Asia's gas build-out would be a $358 billion bet on assets that are – or soon will be – uncompetitive against ever cheaper renewable power."

This may well be the case but there will always be those willing to take such risks – the countries that will address their needs today and worry about tomorrow when it comes. For now, rumours of any imminent end to coal power and fossil fuel may well be premature but one thing is certain: fossil fuel generation and net zero targets are incompatible and 'never the twain shall meet'.

Cartoon: jemsoar.com