

Low Carbon Pulse - Edition 17

GLOBAL DEVELOPMENTS IN PROGRESS TOWARDS NET-ZERO EMISSIONS



Welcome to Edition 17 of Low Carbon Pulse – sharing significant current news on progress towards net-zero emissions globally. This Edition covers the period from Monday May 3, 2021 to Sunday May 16, 2021 (inclusive of each day).

Please click [here](#) for the previous edition of Low Carbon Pulse. Please also click [here](#) and [here](#) for the first two articles in the **Shift to Hydrogen Series (S2H2): Elemental Change** series: the S2H2 series provides a narrative and perspective on hydrogen generally. The first feature in the **Hydrogen for Industry (H24I)** feature series has been delayed a little, but will be published this week.

The week-ahead:

- **International Energy Agency (IEA) - getting the message out:**

Over the last two weeks or so, the *IEA* has been promoting the publication of its long awaited Global Roadmap to Net Zero by 2050 (**IEA Roadmap**). The *IEA Roadmap* is to be published on May 18, 2021. Please click [here](#) for materials released by the *IEA* to promote its publication and to explain the basis of some thinking applied in modelling.

- **First UK ETS auction – awaiting price point:**

The coming week sees the first UK ETS auction, and as such the first time that it will be possible to benchmark the relative prices of the UK ETS to the EU ETS. The first auction will take place on Thursday 19 May 2021. The UK ETS will have an initial cap of 155.7 mtpa (for 2021) with that cap reducing to 117.6 mtpa by 2030.

As the dust settles after the Leaders' Summit, some reflections on CH₄:

- **CH₄ reduction key theme:** [Edition 15](#) of Low Carbon Pulse provided a summary of the key outcomes from the Leaders' Summit. Edition 16 noted key themes emerging from the Leaders' Summit, including action on methane (**CH₄**).
- **Global warming potential of CH₄:** The global warming potential (**GWP**) of CH₄ is greater than for CO₂, and the concentration of CH₄ in the atmosphere has been increasing: CH₄ has 84 times the GWP of CO₂ by mass over a 20 year period. The principal human activities that give rise to CH₄ are the production and use (including fugitive emissions arising on production and use) of energy

carriers from fossil fuels and other carbon intensive feedstocks, agriculture and farming, including raising of livestock (for meat and dairy) and production of rice using paddy fields, and the decomposition of organic waste (including waste water and putrescible organic matter in landfills). It is estimated that CH₄ is responsible for up to 30% of the increase in temperature arising from GHG emissions since pre-industrial times. It appears that the rate of increase in the concentration of CH₄ in the atmosphere has risen in the last 20 years, in particular since 2006.

- **UN Report affirmatory:** In a recent UN report - [Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions](#) - these dynamics are recognised. The report concludes that the reduction in CH₄ emissions in the near to medium term (with a halving of CH₄ emissions possible by 2030) is affordable, using proven technology. The UN estimates that a halving of the CH₄ emissions by 2030, and their ongoing reduction, will avoid a 0.3°C increase in the average global temperature by 2045.

Lone Star Blackout Analysis:

- **Background:** Edition 9 of Low Carbon Pulse reported on the power blackouts experienced during the week of February 14, 2021 in Texas, US (the **Lone Star State**). While early days, the prognosis at that time was that the cause of the power blackouts was the unavailability or reduced availability of fossil-fuel-fired electrical energy generation capacity, not the unavailability of wind, or the failure of wind, farms. At the time, the Ashurst Global Towards Net-Zero GHG emissions team advocated an increased in installed wind capacity to guard against any reoccurrence.
- **The cause of the blackout:** A [report](#) from the Electric Reliability Council of Texas (**Ercot**) confirms that the most significant cause of the blackouts was the unavailability of gas-fired electrical energy generation capacity - caused by shut-down or reduced availability, due to a shortage of natural gas. The contribution to the power blackout as a result of loss of wind (and solar) electrical energy generation capacity has been found by *Ercot* to be relatively insignificant. The impact would have been less significant still, had cold temperature packages been purchased and in use on the wind-turbines.
- **If not right first time, correct the capacity factors and try again:** An initial report from *Ercot* released in early April took the nameplate capacity of gas-fired generation and wind-farm capacity as the basis for the assessment of the cause of blackouts. This initial report did not apply a capacity factor to the nameplate capacity of the installed wind-farms, and as such suggested the wind farm capacity played a more significant role in the blackouts than was in fact the case: the test applied should have been what actual electrical energy that installed wind-farm capacity could have generated during the period of severe weather (which goes to the capacity factor).

Installed nameplate capacity of a wind farm is never used for the purposes of determining the ability of the wind-farm to generate electrical energy, rather that ability of the wind-farm to generate electrical energy is determined by the average power generated divided by the peak rate power: for example, if a 10 MW turbine generates electrical energy at an average of 4 MW, the capacity factor of that turbine is determined as 4 / 10 or 40%.

See: [Texas grid operator confirms gas, not wind, the biggest culprit in blackouts](#)

Germany increases rate of GHG reductions:

- **55 by 30:** Edition 16 of Low Carbon Pulse reported that on April 21, 2021 the EU Commission had reached provisional agreement on the European Climate Law, including to reduce GHG emissions by 55% by 2030 (**55 by 30**), compared to 1990 levels. While **55 by 30** has grabbed the headlines, the European Climate Law addresses also what is needed to achieve net-zero GHG emissions by 2050. [Edition 9](#) of Low Carbon Pulse reported on increased litigation seeking to require governments to increase the rate of reduction in GHG emissions. One the relevant governments was the German government.
- **55 by 30 response to judgment of constitutional court:**

On April 30, 2021, the German constitutional court determined that one of the policy settings, reflected in Germany's Climate Protection Act (intended to reflect Germany's commitments under the Paris Agreement), was unconstitutional in part because it did not deal with GHG emissions arising after 2030.

The constitutional court said that the provisions of the Climate Protection Act:

"irreversibly off-load[ed] major emissions reduction burdens onto periods after 2030 ... For this target to be reached, the reductions still necessary after 2030 will have to be achieved with ever greater speed and urgency. These future obligations to reduce emissions have an impact on practically every type of freedom because virtually all aspects of human life still involve the emission of greenhouse gases and are thus potentially threatened by drastic restrictions after

2030. Therefore, the legislator should have taken precautionary steps to mitigate these major burdens in order to safeguard the freedom guaranteed by fundamental rights".

In response to this determination, the German government has acted. On 7 May 2021, the German government announced increased GHG reduction targets as follows: 65% GHG emission reduction by 2030 and 85-90% by 2040, both compared to 1990 GHG emissions, and net-zero GHG emissions by 2045. This is a move from the previous 55% reduction in GHG emissions by 2030, and as such moves Germany clearly ahead of the **55 by 30** reflected in the European Climate Law, and moves Germany to a position comparable with the UK, albeit a little behind where the UK is currently.

The challenge for Germany is how to achieve these revised targets. Japan has a like challenge, in fact a greater challenge, having increased its GHG emission reduction target from 26% to 46% by 2030 compared to 2013. A start for Germany is to accelerate the rate at which Germany tenders for the installation of renewable electrical energy capacity: this it has already done with solar photovoltaic capacity, and off-shore wind capacity, with capacity to be auctioned to be increased from 1.9 GW to 6 GW for photovoltaic, and from 2.9 GW to 4 GW, during 2021.

Generally, and as noted in previous Ashurst publications, for the last 15 to 18 months, it has been apparent that countries have realised that there is a need to accelerate the rate of GHG emission reductions, and the primary responsibility for this falls on the developed countries.

See: [Germany forced by court ruling to set world-leading net zero targets: Can it reach them?](#)

Northern Europe continues to cooperate at all levels:

- **Fortum and Uniper combine efforts:** On May 10 2021, it was announced that two northern European giants, Fortum (Finland) and Uniper (Germany) have decided to cooperate strategically on "Nordic hydroelectric, physical trading optimisation, wind and solar developments, and hydrogen". The plan will allow Fortum to concentrate on hydroelectric operations, with Uniper to concentrate on wind and solar development, in each case operating the assets of both corporations in their respective areas of concentration.

See: [Fortum and Uniper reaching first milestones in strategic "One Team" cooperation](#)

- **Efficient development of renewable electrical energy development is key:** The combination of Fortum and Uniper is an exciting development recognising both the scale of the development required and the shared markets in which each corporation is to compete. Emerging themes across renewable electrical energy capacity development appear to be efficiency and flexibility, including in the eyes of those developing policy settings. Edition 14 of Low Carbon Pulse noted the importance of renewable energy efficiency in the context of achieving GHG emission reduction targets.

India H2 Alliance on the road:

[Edition 14](#) of Low Carbon Pulse reported on the establishment of the India H2 Alliance (**IH2A**), and its six-point agenda. On May 3 2021, it has been reported that the **IH2A** has provided its agenda to the Government of India (consistent with the principles reported on in Edition 14), critically to develop a domestic Bharat H2 supply chain and 10 hydrogen valleys.

See: [India H2 Alliance submits six-point hydrogen agenda to Indian Government](#)

Increased focus of the mining sector:

- **The quiet achiever:** For some time the mining and resources sector has been something of a quiet achiever in progress towards net-zero emissions. The importance of mining and resources sector to the world economy is known, but this importance is not always recognised.

The mining and resources sector has a strong sense of its importance and scale, and its responsibilities. This is often missed, possibly because the mining and resources sector tends to get on with the task, rather than talk about the task.

- **Increased visibility of the quiet achiever:** In a recent address, Anglo American CEO, Mr Mark Cutifani stated clearly the importance of the mining and resources industry to the world economy: in the context of a global population of 7.6 billion people, progressing to 9 billion, "the simple fact is that the world cannot survive without mining and [its contribution] to ... every aspect of modern life. In fact 45% of the world's economic activity is driven by the mining sector" having regard to both direct and indirect sales of commodities and products derived for produced from them.

Mr Cutifani went on to say that: "When we talk about life-of-mine plans were are ... now [also] starting to focus on the life-of-community plans, and how we can create 100 [year futures] for those communities based in the infrastructure".

The importance of the mining and resources industry is only going to increase. In addition to increased demand arising from population growth, the mining and resources sector needs to expand existing sources, and to develop new sources of, copper, cobalt and nickel and lithium (and precious metals gold and silver, and rare earth metals), and graphite, to allow the shift to the use of BEVs

and BESSs and other metals and minerals and catalysts to allow the development of electrolyzers (principally iron and steel at the moment) to produce Green Hydrogen.

There is a helpful (and complete) publication from the *IEA* that outlines [The Role of Critical Minerals in Clean Energy Transitions](#). (The full form publication is well-worth a read.) The *IEA*'s Executive Director, Mr Fatih Birol has been active of late in communicating the need to avoid bottlenecks arising in the extraction and supply of Critical Minerals.

For those familiar with a number of industries, these dynamics are likely to provide impetus to the recovery and recycling of E-waste to derive some metals. Reflecting on this, it is not a surprise to the Ashurst Global Towards Net-Zero GHG Emissions team that the EU is considering mandating of the recovery of metals and minerals from E-waste so as to provide an increased level of assurance around security of supply.

- **The cost of achieving goals – corporate and global:** On May 11, 2021 it was [reported](#) that Wood MacKenzie released a report stating that the level of capital investment required by the mining industry is USD 1.7 trillion over the next 15 years so as to ensure that it is possible to achieve the *Stabilisation Goal* under the Paris Agreement. To achieve the *Stretch Goal* a higher level of capital investment is required.

As a reminder, under the Paris Agreement the *Stabilisation Goal* and *Stretch Goal* are to commit to hold: "the increase in global average temperature to well below 2°C above pre-industrial levels [*Stabilisation Goal*] and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels [*Stretch Goal*] ...".

- **The mining and resources industry is going some heavy lifting:** As is the case with many other sectors, the mining and resources sector is doing some heavy lifting.

In addition, mining and resources corporations are committing to achieving net-zero GHG emissions so as to match the expectations of investors, and so doing ensuring that they are able to access the level of capital investment necessary to enable them to extract and to deliver commodities necessary to achieve net-zero GHG emissions: supply of resources is directly linked to supply of capital, and both are necessary to achieve net-zero.

- **Not quite plain sailing:** In the case of Vale this includes the use of a wind assisted ore carrier: the carrier is a very large ore carrier (a VLOC with load capacity of around 325,000 tonnes).

See: [Vale set to receive first-ever wind-powered ore carrier](#)

Japan continues to progress:

Previous editions of Low Carbon Pulse have noted that the Government of Japan and corporations in Japan appear to be in lock-step in making progress towards reductions in GHG emissions. Japanese corporations are continuing to make progress as the following news items indicate.

- **Hydrogen power and propulsion:** On May 6, 2021 it was announced that Japan Engine Corporation (*JEC*), Kawasaki Heavy Industries (*KHI*) and Yanmar Power Technology (*YPT*) have formed a consortium to pursue jointly the development of power and propulsion systems using hydrogen for coastal and ocean-going vessels. Hydrogen storage and delivery systems will be developed at the same time.

See: [Japanese trio to jointly develop hydrogen-fueled marine engines](#)

- **KHI scales-up LHG carrier:** On May 7, 2021 *KHI* announced that it has developed the world's largest liquid hydrogen gas (*LHG*) containment system: *KHI* has received approval from Classification Society, ClassNK, for a 40,000 cubic metre containment system, i.e., a tank. To be liquified, the temperature of gaseous hydrogen has to be chilled to a temperature of minus 253°C, at which temperature it is 1/800th its original volume. (This contrasts with natural gas, which has to be cooled to a temperature of minus 161°C, at which temperature it is 1/600th its original volume, and is liquefied natural gas (*LNG*).

A challenge in carrying any liquified "energy carrier" is the production of boil-off gas (*BOG*) caused by the liquified energy carrier converting back into its gaseous state. *KHI* is reported to have developed a new insulation system that maintains the temperature of minus 253°C consistently in the containment systems, and as such mitigates *BOG*.

Edition 2 of Low Carbon Pulse reported on the development of the Suiso Frontier (launched in December 2019) by *KHI*. Suiso being Japanese for hydrogen. The Suiso Frontier has a 1,250 cubic metre containment system. As such the new containment system represents a 38,750 cubic metre increase in capacity, a colossal increase in LHG carrier capacity. *KHI* is working to develop an LHG carrier with 4 tanks or 160,000 cubic metres of carriage capacity. *KHI* anticipates that the LHG carrier will be commercialised by the mid-2020s.

This is another event that illustrates the level of momentum that has been achieved, and reinforces that the momentum is increasing. The development of a 160,000 cubic metre LHG carrier creates a

volumetric capacity comparable with a medium sized LNG carrier, but in terms of the energy "in the liquid", depending on the heating value of the LNG being carried, the capacity could be comparable to two of the world's largest current LNG carriers. This development packs a punch.

See: [Kawasaki Develops Cargo Containment System for Large Liquefied Hydrogen Carrier with World's Highest Carrying Capacity—AiP Obtained from ClassNK](#)

- **JERA sold on ammonia as energy carrier:**

Ahead of the announcement of the tie-up between JERA and Yara (see below) JERA was signalling in The Japan Times that it was moving close to material commitment to the use of ammonia as an energy carrier. This was flagged by JERA as early as November 2020 when it announced its plans to transition its coal-fired power stations to ammonia.

This is consistent with the development of a [Roadmap for Fuel Ammonia](#), and the activities at various ports around Japan planning the development of ammonia import facilities.

See: [Japan Onahama port to examine ammonia, hydrogen imports](#)

- **Woven City – City of the Future:** On May 10, 2021 it was announced that Japanese corporations ENEOS and Toyota Motor Company have combined resources to consider how they may work together to help in the development of Susono City, Shizuoka Prefecture, Japan – "the city of the future" or the Woven City. In a statement about the combination of ENEOS and Toyota to develop the Woven City, Toyota indicated that the plan is to test the basis of the development and implementation of a hydrogen-based supply chain, in and around (and, if you will, woven into the fabric of) the Woven City.

See: [ENEOS and Toyota Come Together to Make Woven City the Most Hydrogen-Based Society](#)

BESS round-up

- **All BESSed up:** One of the successes over the last five years in the renewable energy sector has been the development of big batteries – battery energy storage systems (**BESSs**). [Edition 10](#) of LCP gave some examples of jurisdictions in which BESSs are being used or planned, and why. [Edition 13](#) of LCP provided an overview of the on and off-grid uses to which BESSs may be put.

In Hawaii a big battery project is to proceed with the development of the 185 MW / 565 MWh *Kapolei BESS* on the island of Oahu, with Plus Power to design and construct the *BESS* for Hawaiian Electric Co, with completion of the construction schedule to coincide with the closure of the AES Corporation coal-fired power station in 2022.

A policy setting issue arose in the context of the approval of the *Kapolei BESS*: while the Hawaii Public Utilities Commission has approved the development of the *Kapolei BESS* it has done so knowing that the *BESS* will be charged by electrical energy from coal-fired power stations, not renewable energy sources: the thinking around *BESSs* has been that renewable electrical energy is to charge them for later dispatch, not that a *BESS* is charged by non-renewable electrical energy. Effectively, the *Kapolei BESS* has been approved, in the words of the Commission "to provide further assurance that the "lights will stay on" [on] the retirement of the AED coal plant in 2022 ...".

In the context of the approval of the *Kapolei BESS*, the Commission also approved the terms of power purchase agreements under which coal-fired power stations will supply electrical energy to Hawaiian Electric Co to charge the *BESS*.

See: [Hawaii approves massive battery storage project to help end coal power](#)

- **Battery of batteries:** On May 4, 2021 it was announced that Mitsubishi Power Americas, Inc. and Powin LLC have been awarded a contract to develop 640 MW of *BESS* capacity on two sites in California so as to assure integrity and to enhance stability of the grid, and to provide flexibility across the grid. *BESSs* will be installed at Southern Power's Kern County 205 MW Garland Solar Facility, 88 MW / 352 MWh of energy storage capacity, and at the 204 MW Tranquility Solar Facility, 72 MW / 288 MWh of energy storage capacity. The *BESSs* are expected to be installed and on-line during 2021.

See: [Mitsubishi, Powin providing battery storage retrofits to California solar project](#)

- **Ready-made hall decked with batteries:** On May 7, 2021 it was announced that Greenspot plans to make use of the existing generation hall and related infrastructure at the decommissioned Wallerawang coal-fired power station just outside Lithgow, Central Western, New South Wales, Australia, to house a big battery. The AU\$ 500 million **Wallerawang 9 Battery BESS Project** will have *BESS* capacity of 500 MW / 1,000 MWh.

See: [Work underway to repurpose Wallerawang power station into battery and industrial zone](#)

CCS / CCUS round-up:

- **Dutch Government provides grants in form of subsidy:** On May 8, 2021 it was widely reported that the Dutch Government has granted a subsidy of around USD 2.4 billion (or €2 billion) to allow

the development of carbon capture and storage at the Port of Rotterdam (**Rotterdam CCS Project**).

The *Rotterdam CCS Project* involves the capture of CO₂ emitted from facilities and refineries located within, and in the vicinity of, the Port of Rotterdam, with the captured CO₂ to be delivered into disused sub-seabed structures from which oil and natural gas have been extracted.

The subsidy from the Dutch Government will cover the additional costs incurred by businesses undertaking activities that give rise to GHG emissions not currently captured, but which are to be captured by those businesses. This method of grant funding is reasonably well-established in Europe, and is predicated on the environmental benefit of capturing CO₂.

The Port of Rotterdam is to provide the infrastructure to consolidate and to transport the captured CO₂ and to deliver it into storage. It is anticipated that the *Rotterdam CCS Project* will achieve completion and become operational in 2024.

The allocation of €2 billion to the *Rotterdam CCS Project* leaves another €3 billion of committed funding from the Dutch Government to be allocated in 2021 for technologies that will assist The Netherlands achieve its GHG emission reduction goals.

It is becoming increasingly clear that governments have a key role to play in the development of CCS / CCUS: see Edition 2 of Low Carbon Pulse outlining the Northern Lights Project – the Norwegian Government is providing USD 1.8 billion of funding for the USD 2.7 billion project.

- **Peterhead CCS Project – more demand for Acorn CCS services:** On May 12, 2021 Equinor and SSE announced the development of a new 900 MW gas-fired power station, at Peterhead, Scotland (**Peterhead Power Station**). The *Peterhead Power Station* is to be installed with carbon capture technology to allow the capture and storage of CO₂ arising from the oxidation of natural gas used to fire the *Peterhead Power Station* (**Peterhead CCS Project**). The *Peterhead CCS Project* will have the capacity to capture and to store (on an intermediate basis) up to 1.5 mtpa of CO₂.

As reported, in the context of the policy settings of the UK Government, capture of this mass of CO₂ annually would represent 15% of the target to capture 10 mtpa of CO₂ by 2030. It has been noted by SSE that the CO₂ captured by the *Peterhead CCS Project* is ideally placed to make use of the Acorn CCS Project (see [Edition 14](#) of Low Carbon Pulse).

Both the *Acorn CCS Project* and the *Peterhead CCS Project* have secured funding from the UK Government: from the Industrial Decarbonisation Challenge Fund, as part of Scotland's Net-Zero Infrastructure program.

See: [Equinor teams up with SSE for Scottish carbon capture and storage project](#)

E-fuel / Future fuel round-up:

- **BP, Iberdrola and Enagas** have agreed to undertake a feasibility study to firm-up plans to develop a 20 MW electrolyser project in Castellon, Valencia, Spain. The electrolyser would be located at BP's refinery in Castellon, and would be powered by renewable electrical energy from a 40 MW photovoltaic facility. The BP refinery currently produces and uses the greatest quantity of hydrogen within the Valencia region. The Green Hydrogen produced by the electrolyser would displace the grey hydrogen currently produced from a biofuel production process at the BP refinery.

See: [Bp teams up with Iberdrola, Enagas on green H2 project at Spanish refinery](#)

- **Integrated PV and electrolyser:** On May 3, 2021 Nel SA and First Solar announced that they have agreed to develop an integrated power plant control and supervisory control and data acquisition (SCADA) system as the first step to developing an integrated photovoltaic solar powered electrolyser system. This will provide a one-stop shop for developers of Green Hydrogen projects.

See: [First Solar, Nel to develop integrated PV-hydrogen power plants](#)

- **Aqua nomenclature:** Edition 16 of Low Carbon Pulse reported on AquaDuctus, which is part of the AquaVentus project: on April 26, 2021 Shell, RWE, Gasunie and Gascade announced the signature of a declaration of intent (**DoI**) in respect of the AquaDuctus project to transport up to 1 mtpa of Green Hydrogen produced in the North Sea directly into northern Europe from 2035. AquaDuctus' delivery of Green Hydrogen into northern Europe will deliver Green Hydrogen into the shore-based infrastructure planned for northern Europe, and detailed in previous editions of Low Carbon Pulse.

On May 4, 2021, Offshore Wind Biz [reported](#) on the scope and scale of the entire [AquaVentus](#) project – which is intended to use renewable electrical energy from 10 GW of off-shore wind projects in the North Sea to produce up to 1 mtpa of Green Hydrogen by 2035.

The key elements of the AquaVentus project are detailed in the following table.

AQUA	KEY ELEMENTS / STAGES OF THE AQUAVENTUS PROJECT
AquaPrimus	refers to a pilot project to produce Green Hydrogen located on the island of Hegoland in the German sector of the North Sea, which project will be developed to increase capacity
AquaSector	refers to pilot scheme to achieve a "special area of energy production" for the use to produce Green Hydrogen
AquaDuctus	refers to the development of pipelines to haul green hydrogen from off-shore production to the mainland on northern Europe
AquaPortus	refers to the ongoing and incremental development of port infrastructure on the island of Hegoland to allow the expansion of Green Hydrogen production

- **ARENA open the hydrogen funding tray:** On May 4, 2021 the Australian Federal Government established organisation, ARENA (Australian Renewable Energy Agency), announced grant funding of a little over AU\$100 million for three Green Hydrogen projects:
 - ATCO is to receive AU\$ 28.7 million in respect of the development of its Clean Energy Innovation Park (**CEIP**), Waarradarge, Western Australia, at which a 10 MW electrolyser will be developed to produce up to 4 tonnes of hydrogen a day with the Green Hydrogen produced to be blended with natural gas;
 - Australian Gas Infrastructure Group (**AGIG**) is to receive AU\$ 32.1 million in respect of the development of a 10 MW electrolyser at AGIG's Murray Valley Hydrogen Park, Wodonga, Victoria, with the Green Hydrogen produced to be blended with natural gas; and
 - Engie Renewables is received AU\$ 42.5 million in respect of the development of its 10 MW electrolyser to produce Green Hydrogen which will be combined with nitrogen to produce Green Ammonia for the existing Yara Fertiliser facility in the Pilbara, Western Australia (this links to the MOU with JERA: see below - "Yara and JERA leading the way from WA to Tokyo Bay").

Elsewhere in the world:

- **Alberta, Canada:** ATCO and Suncor are reported to be considering the development of a clean hydrogen project to produce up to 300,000 tonnes per annum of clean hydrogen. It is anticipated that 85% of the hydrogen produced would be used to displace fossil fuels currently used at the Suncor Edmonton Refinery; and
See: [Suncor and ARCO Partner on a Potential World-Scale Clean Hydrogen Project in Alberta](#)
- **Punggol, Singapore:** Engie was appointed by Singapore's JTC Corporation to build, own and operate the underground District Cooling System for the Punggol District of Singapore.
See: [ENGIE wins project for the design of District Cooling System in Punggol Digital District in Singapore](#)
- **Amping up:** On May 4, 2021 Amp Power Australia Pty Limited, understood to be the wholly-owned subsidiary of Amp Energy (a leading Canadian energy company), has expanded into South Australia to develop the Renewable Energy Hub of South Australia (**REHSA**). The REHSA is reported to be an integrated photovoltaic and wind development with a BESS. The REHSA includes the Spencer Gulf Hydrogen Energy Ecoplex, part of the South Australian Government's Hydrogen Action Plan.
See: [Amp makes massive South Australia solar, battery, green hydrogen play](#)
- **First of a kind gas-fired power station in Australia:** On May 5, 2021 it was announced that EnergyAustralia (one of Australia's big three integrated power companies) is proceeding to develop its 300 MW Tallawarra B peaking dual-fuel hydrogen and natural gas fired power plant. Tallawarra B will commence commercial operation fired by natural gas, but will upgrade over-time to be fired by Green Hydrogen. The New South Wales Government (the State in which Tallawarra B is located) has provided funding in the amount of AU\$83 million (USD 64 million) for the Tallawarra B development.
- **Plug and SK ready to play:** On May 5, 2021, dynamic hydrogen energy companies, Plug Power Inc and SK Energy announced a joint venture to develop a business across PRC, South Korea and Vietnam, including the manufacture of fuel cells in South Korea. (SK Energy has an existing relationship with Bloom Energy, Inc. – see [Editions 3](#) and [4](#) of Low Carbon Pulse.)
See: [Plug Power and SK Group Complete \\$1.6 billion Capital Investment to Build Hydrogen Economy in Asian Markets](#)
- **Queensland continues to be a popular destination:** On May 6, 2021 it was reported that Edify Energy (one of Australia's premier renewable electrical asset developers) plans to develop a 10 MW

hydrogen electrolyser at the Lansdown Eco-Industrial Precinct being promoted and developed by Townsville City Council, in northern coastal Queensland, Australia. It is anticipated that Edify Energy will install solar capacity and a battery to provide behind the meter electrical energy to provide renewable electrical energy for the electrolyser.

Edify Energy's plans are clear: "Edify proposes to transform renewable energy (from the on-site solar facility) into hydrogen ... to produce green hydrogen, which can then be utilised for ... transport – trucks, locomotives and buses – for a domestic market, or potentially injected into the existing or new gas networks for domestic or export markets". The development of the electrolyser at Townsville is the first stage in a plan to develop up to 1 GW of Green Hydrogen production capacity.

See: [Edify Energy Lodges Development Application for Hydrogen Plant](#)

- **Green Hydrogen from Floating Wind:** On May 6, 2021 it was reported that Hyundai Heavy Industries (**HHI**) is to develop a 100 MW Green Hydrogen production complex. This development is consistent with the road-map that *HHI* released in March 2021, which included the development of a hydrogen supply chain.

The 100 MW Green Hydrogen production complex will produce Green Hydrogen from sea-water with the renewable electrical energy to be sourced from an off-shore floating wind field (**Donghae-1 Floating Field**). The 200 MW *Donghae-1 Floating Field* is being developed by the Korea National Oil Corporation, Korea East-West Power, in a consortium including Equinor. The 200 MW *Donghae-1 Floating Field* project is part of the Korean Green Deal, and is effectively the first stage of a multi-stage development of the 6 GW off-shore floating wind field outlined below: see – "Off-shore wind fields off ROK rock".

See: [Hyundai Heavy pursues green hydrogen project in Sea of Japan](#)

- **Great Gulf highly prospective:** On May 7, 2021 it was announced that Fusion Fuel Green (**FFG**) and Consolidated Contractors Group (**CCG**) signed a Collaboration Agreement on May 6, 2021 to provide plant design (using *FFG* technology) and construction (using *CCG* resources) to develop Green Hydrogen and Green Ammonia production capacity within the Greater Gulf region and in so doing displace current use of hydrogen derived from hydrocarbons, in the refining and petrochemical facilities across the region.

See: [Fusion Fuel Green PLC Announces Partnership with CCC to Develop Green Hydrogen Demonstrator Plant in Middle East](#)

- **Yara and JERA leading the way from WA to Tokyo Bay:** On May 11, 2021, Yara International ASA (world leader in ammonia production) and JERA Co, Inc, (the largest power generation corporation in Japan, matching about 30% of total electrical energy load in Japan) announced that they had signed a memorandum of understanding (**MOU**) to work together on the production and delivery of, and supply chain development for, Blue Hydrogen and Green Hydrogen. This initiative is aligned with the policy settings of the Japanese Government, including a 46% reduction in GHG emissions by 2030 (compared to 2013) and the use of up to 3 mtpa of ammonia by 2030.

The Yara website reports that the *MOU* provides for:

- Supply and development of new ammonia demand in Japan, including for power generation;
- Sequestration of captured CO₂ at Yara's ammonia plant in the Pilbara, Western Australia, enabling the production and supply of Blue Ammonia to JERA;
- New clean (blue and green) ammonia project development; and
- Optimisation of ammonia logistics in Japan.

- **Chile hot again:** On May 12, 2021, it was announced that US corporation Tramo, and two Austrian corporations, Austria Energy Group and Oekowind, signed a memorandum of understanding for the development of a project in Chile to produce of Green Hydrogen and Green Ammonia, with the headline being the production of up to 1 mtpa of Green Ammonia. The renewable electrical energy would be provided by a 2 GW wind farm.

In addition to the 2 GW for the Green Hydrogen and Green Ammonia project, it is reported that Chile is considering a number of other renewable projects having combined installed capacity of 2 GW: Gabriela (220 MW), Ghungnam (709 MW photovoltaic and 300 MW of concentrated solar), Pelequén (175 MW), Planta Solar Sol del Loa (640 MW) and Solar La Pampina (160 MW).

- **More hydrogen hub funding:** On May 14, 2021, as part of the Queen's Speech (in which the agenda and program of Her Majesty's Government is outlined), the UK Government indicated that it was providing GBP 240 to allow the development of a hydrogen production fund and the Holyhead hydrogen hub.

See: [The Hydrogen Stream: Massive hydrogen/green ammonia project in Chile, hydrogen atlas for Germany](#)

- **Beautiful one day, "purefect" the next:** A previous edition of Low Carbon Pulse reported on the combination between Wildfire Energy and Pure Hydrogen. Pure Hydrogen continues to roll-out its business in Queensland with the execution an agreement with the Gladstone Area Water Board for the supply of water to Pure Hydrogen's large-scale hydrogen production facility located in Gladstone, Queensland – the Project Jupiter Hydrogen project.
- **Oakajee is OK:** [Edition 8](#) of Low Carbon Pulse reported on the proposed development of a Green Hydrogen hub at Oakajee in Western, Australia, within a Strategic Industrial Area. On May 14, 2021, the WA Government confirmed that Oakajee is an ideal location for the development of the Green Hydrogen hub.

See: [Initial results confirm Oakajee as ideal site for green hydrogen](#)

Wind round-up:

- **Construction starts commences off Taiwan:** On May 5, 2021 it was announced that the commencement of the installation of jacket foundations was started on Ørsted's Greater Changhua off-shore wind field project, off Taiwan: the project comprises two fields, Changhua 1 and 2a, with the fields developed as one project.

See: [Foundation Installation Starts at Ørsted's Greater Changhua OWF](#)

- **UK modifies policy settings – termination now a risk:** On May 7, 2021 the UK announced that the fourth round of the Contracts for Difference (**CfD**) scheme will be open to applications in December 2021.

At the same time, the UK Government (Department for Business, Energy and Industrial Strategy), published its [response](#) to the consultation process on the changes to the standard *CfD* contract and the Supply Chain Plans (**SCP**).

In the UK context:

- a *CfD* is a private law contract between a **Generator** (being the entity developing a low carbon electricity facility) and the Low Carbon Contracts Company (**LCCC**). Under the *CfD* the Generator is paid the difference between the **strike price** (being a price on which the *CfD* was awarded) and the **reference price** (being a price reflecting the price for electricity in the UK).
- a *SCP* is required both to participate and to be awarded a *CfD*.

In response to the changes to the rules applicable to *SCPs* there have been calls for clarification, critically arising from the right of the *LCCC* to terminate. This clarification may be expected well-ahead of the December 2021 allocation.

- **Off-shore wind fields off ROK rock:** Edition 9 of Low Carbon Pulse outlined the backing given to the world's largest off-shore wind field development: the USD 43.2 billion 8.2 GW by the Government of the Republic of Korea (**ROK** or **South Korea**).

On May 7, 2021, the President of South Korea, Mr Moon Jae-in committed to provide funding to the first stage of a USD 32 billion, 6 GW floating off-shore wind field, off-shore of Ulsan in the south of the country.

The development of the floating off-shore wind project will equate to half of the off-shore wind capacity to which the Government is committed by 2030. It has been reported that 80% of the electrical energy produced will be used to satisfy electrical load currently satisfied by fossil fuel fired electrical energy generation, 20% will be used to power electrolyzers to produce Green Hydrogen.

See: [South Korea unveils 6GW floating ambition](#)

- **Milestones no longer millstones:** In the first week of May 2021 it was widely reported that each of six off-shore wind projects in the UK have passed their respective Milestone Requirement, being a key milestone in the prescribed process to the award of a *CfD*: the six projects are Dogger Bank A, B and C (see [Editions 4](#) and [5](#) of Low Carbon Pulse, being the three phases of the 3.6 GW Dogger Bank Wind Field project), Sofia (see [Edition 13](#) of Low Carbon Pulse, the 1.4 GW project), and Seagreen (the 454 MW, Total and SSE Renewables project, on final development to have 1.075 GW of installed capacity) and Forthwind (the 12 MW project developed by Forthwind Limited off Scotland).
- **EDF to enter the Australian renewable market:** EDF announced its first wind-farm in Australia: for EDF a relatively modest 280 MW wind farm purchased from Goldwind and Lacour located in Queensland. It is reported that EDF intends to develop a portfolio of renewable energy projects in Australia, including *BESSs*. Globally, EDF has plans to increase its current planned renewable energy capacity by 2030 from 28 GW to 60 GW.

See: [French nuclear giant EDF unveils first wind and battery project in Australia](#)

- **Poseidon in good shape:** On May 11, 2021 it was reported that Zephyr Vind (a Swedish corporation, wholly-owned by Norwegian corporation, Zephyr) plans to develop the Poseidon floating

off-shore wind field (**Poseidon Project**) with installed capacity of up to 1 GW (or around 5.5 TWh of generated electrical energy a year) over two fields, Poseidon North and South.

The *Poseidon Project* will be located around 40 km off-shore Gothenburg, Sweden. The public consultation process for the *Poseidon Project* commenced on May 11, 2021 and ends on June 23, 2021, after which it may be expected that applications for permits will commence.

See: [1+ GW Offshore Wind Farm Plan Emerges in Sweden](#)

- **Wind development on US Federal land approved:** On May 11, 2021 it was widely reported that the Biden Administration gave Federal approval for the USD 3 billion 800 MW Vineyard off-shore wind field project (**Vineyard Project**), south of Martha's Vineyard, off Cape Cod, Massachusetts (See [Edition 13](#) of Low Carbon Pulse).

The *Vineyard Project* is the first project to achieve approval for development in Federal sea-waters.

- **Taiwan ramps up off-shore wind field program:** On May 12, 2021 it was reported that Taiwan has released its draft policy in respect of the third round of off-shore wind developments. The headlines are that in 2022, 2023 and 2024 the Bureau of Energy will auction 3 GW off-shore wind field capacity, for delivery of electrical energy from 2026 to 2031 at a rate of 1.5 GW a year.

If these policy settings are achieved, it is expected that by 2031 around 14.7 GW of off-shore wind field capacity will have been installed.

See: ['Taiwan's new policy can turn it into a major regional offshore wind hub'](#)

Renewables record across Californian grid record:

On April 24, 2021 at 2.30 pm on a Saturday afternoon, the California Independent System Operator has reported that 95% of the load across the Californian grid was matched by renewable electrical energy.

This outcome is consistent with experience in Australia, record levels of renewable energy are dispatched when load is lower, typically on the weekend, Saturday afternoons in particular, and at optimal times for solar generation. So it was on April 24, 2021 in California.

Solar round up:

- **Solar development on US Federal land approved:** On May 3, 2021 the Biden Administration stated that it had approved the development of the Crimson Solar project on Federal land west of Blythe, California. The USD 550 million Crimson Solar project is to be developed by Recurrent Energy, and on development will deliver renewable electrical energy to Southern California Edison.

See: [U.S. approves massive solar project in California desert](#)

- **South Korea – 2 GW tender:** On May 3, 2020 it was reported that the South Korea Energy Agency has commenced the tender process to procure up to 2 GW of photovoltaic projects across the peninsula. Each preferred project will be awarded with a 20 year contract to sell renewable electrical energy to a power distributor. This is the first of two tenders to be undertaken in 2021.

See: [South Korea kicks off 2 GW PV tender](#)

- **Ørsted homestead:** On May 4, 2021 it was reported that Ørsted had completed the first utility scale solar and battery storage in the US: the 460 MW solar and the 40 MW battery, as part of the Permian Energy Center project, in Andrews County, Texas. The Ørsted solar and battery facility is "located on a 3,600 acre site alongside existing oil and gas installations and will supply growing West Texas' demand for electricity". With the completion of the facility, Ørsted now has on-shore renewable electrical energy capacity of 2.1 GW, and a further 1.9 GW under construction.

Ørsted's Chief Operations Officer, Onshore, Mr Neil O'Donovan said: "Permian Energy Center is a significant milestone for Ørsted making it the first developer to operate the full spectrum of new renewable energy technologies at utility scale in the US – on-shore and off-shore wind, solar pv, and storage."

See: [Ørsted completes US solar and battery storage facility](#)

- **Algeria 1 GW PV tender:** On May 6, 2021 it was reported in pv magazine that Algeria is to run a tender in June and July 2021 to procure 10 lots of 100 MW of photovoltaic capacity.

- **KAS in SA:** On May 11, 2021 it was announced that ACWA Power a corporation based in the Kingdom of Saudi Arabia is to develop a concentrated solar power (**CSP**) project 30 km from Postmasburg in South Africa's Northern Cape – the **Redstone CSP Project**, and that the Project had achieved financial close. The *Redstone CSP Project* comes within the South African Renewable Energy Independent Power Producers' Procurement Program (**REIPPPP**).

See: [Saudi power company to build R11.6 billion solar tower plant in Northern Cape](#) and [SA's largest renewable energy project Redstone CSP achieves financial close](#)

- **Tashkent tariff tumble:** On May 12, 2021 bids were opened on the IFC run procurement of the Uzbekistan Government's Sherabad-1 solar procurement. UAE-based Masdar submitted the lowest bid for the planned 200 MW Sherabad-1 Project. At US cent 1.8045/kWh it was the only bid below US 2 cents per kWh. The level of the bid is consistent with other low or record low bids on solar procurements during 2021 to date around the world, reflecting the continued fall in the cost of renewable electrical energy, in particular solar electrical energy.

See: [Masdar submits lowest bid for Uzbekistan's Sherabad PV solar project](#)

Port and Land Transport round-up

- **Port of Los Angeles moving to BEVs and FCEVs:** On May 6, 2021 it was announced that a Letter of Intent (**LoI**) had been signed by Nikola Corporation and the Port of Los Angeles for the supply of Total Transportation Services using 100 Nikola BEVs (30 by 2022) and FCEVs (70 by 2023).

See: [Nikola and Total Transportation Services Inc. Sign LOI for 100 Nikola Trucks](#)

- **Port of Antwerp shifting to FCEV:** On May 6, 2021 it was announced that Air Liquide, DATS 24 and Port of Antwerp intend to deploy 300 hydrogen-powered trucks (and for these purposes to develop hydrogen support infrastructure) by 2025.

This initiative is part of the broader HyTruck initiative to put on the roads of Belgium, western Germany and The Netherlands 1,000 hydrogen-powered trucks. (In [Edition 5](#) of Low Carbon Pulse, reporting on European Hydrogen Week, noted the initiative to deploy 100,000 hydrogen-powered trucks and 1,000 hydrogen refuelling stations.)

- **Volvo and Daimler back-into FCEV:** In the context of closer ties between two of the world's largest truck makers, there appears to be a complete meeting of minds: by the end of the current decade, FCEV will start to displace diesel as the preferred power and propulsion for heavy goods vehicles / trucks. Volvo anticipates that by the end of the decade half of its European sales will be of BEVs and FCEVs: the truck maker anticipates a 50 /50 split between the two technologies. Both Volvo and Daimler are aiming to be net-zero by 2040. Volvo and Daimler have established a joint venture, Cellcentric, to produce fuel cells. The production of FCs is expected to commence in 2025.

This transition is required, indeed the transition is likely to be accelerated as policy settings respond to the realisation that the world carbon budget needs to anticipate the growth in road freight transport (anticipated to double globally by 2050), and to mandate transition to BEVs and FCEVs.

- **North Sea Port can see for miles:** On May 11, 2021 it was announced that a new Green Hydrogen project is planned within North Sea Port area at Terneuzen: Virya Energy and VoltH2 Terneuzen are reported to have signed a cooperation agreement to develop a 25 MW electrolyser to produce up to 3,600 tonnes of Green Hydrogen annually.

The development is intended to allow the area at Terneuzen to be move to carbon neutrality in its operations, and to supply Green Hydrogen to hydrogen infrastructure facilities within the vicinity of the Port.

The North Sea Port is a 60 km cross-border port area that extends from Vissingen on the North Sea coast in The Netherlands, 32 km in land to Ghent in Belgium.

The North Sea Port is something of a hub: Ørsted plans to develop its SeaH2land 1 GW hydrogen facility (with renewable electrical energy provided from 2 GW of off-shore wind capacity) within the North Sea Port area and ArcelorMittal plans to install a new blast furnace (blast furnace B) at its Ghent steel-mill, on the Ghent -Terneuzen Sea Canal which is to use green and circular fuels only. Arcelor-Mittal already uses world leading technology at its Steelanol project: this project captures carbon-rich gases from blast furnaces and converts those gases into bioethanol.

- **Hyundai capacity committed:** On May 13, 2021 it was reported widely that Hyundai Motor Group is committed to the development of FCEV, and the facilities to produce them. Hyundai has indicated that it is committed to investing up to USD 7.4 billion by 2025 in the US.
- **US Postal Service delivery commitment:** On May 13, 2021 is was reported widely that the US has committed that at least 75% of the vehicles procured by the US Postal Service should be electric or otherwise net-zero emission vehicles. It is expected that this commitment will result in the US Postal Service spending USD 8 billion on the procurement of electric or otherwise net-zero emission vehicles.

The author of Low Carbon Pulse is Michael Harrison. This Edition 17 was first published on May 18, 2021, and was published again on May 19, 2021 to correct three typographical errors

Key Contacts

We bring together lawyers of the highest calibre with the technical knowledge, industry experience and regional know-how to provide the incisive advice our clients need.



Michael Harrison
Senior Partner, Energy, Resources and Infrastructure
M +65 9728 8562 /+61 439 512 384/
+61 414 968 707
michael.x.harrison@ashurst.com



Richard Guit
Global Co-Head, International Projects
T+65 6602 9153
M+65 9728 7943
richard.guit@ashurst.com



Daniel Reinbott
Partner
T +65 6416 9529
M +65 9728 8672
daniel.reinbott@ashurst.com



Peter Vaughan
Partner
T +61 8 9366 8173
M +61 412 909 489
peter.vaughan@ashurst.com



Dan Brown
Partner
T +61 7 3259 7149
M +61 401 564 654
dan.brown@ashurst.com



Paul Curnow
Partner
T +61 2 9258 5738
M +61 434 074 591
paul.curnow@ashurst.com



Michael Burns
Partner
T +44 20 7859 2089
M +44 7717 840 646
michael.burns@ashurst.com



Anna-Marie Slot
Global Environmental, Social and Governance Partner
T +44 20 7859 3724
M +44 7788 710 892
anna-marie.slot@ashurst.com



Antony Skinner
Partner
T +44 20 7859 1360
M +44 7917 635 974
antony.skinner@ashurst.com



David Wadham
Office Managing Partner, Tokyo
T +81 3 5405 6203
M +81 90 4828 5191
david.wadham@ashurst.com

Keep up to date

Sign up to receive the latest legal developments, insights and news from Ashurst. By signing up, you agree to receive commercial messages from us. You may unsubscribe at any time.

[Sign up here](#)



www.ashurst.com



This publication is not intended to be a comprehensive review of all developments in the law and practice, or to cover all aspects of those referred to. Readers should take legal advice before applying the information contained in this publication to specific issues or transactions. For more information please contact us at Level 11, 5 Martin Place, Sydney NSW 2000 T: +61 2 9258 6000 F: +61 2 9258 6999 www.ashurst.com.

© Ashurst LLP 2021. Design Ref R004486