



Welcome to the **third edition** of **P2N0** covering the drive to reduce greenhouse gas (**GHG**) emissions to net-zero (**NZE**). In addition to **P2N0**, it is anticipated that articles on matters relevant to **NZE** will be published quarterly. At the moment, we anticipate publishing articles on **Carbon Capture Utilization and Storage** (during Q4 of 2023) and **Carbon Credits and developing Voluntary Carbon Markets** (during Q1 of 2024).

P2N0 identifies significant news items globally, reporting on them in short form, focusing on policy settings and project developments. **P2N0** will not cover news items relating to climate change generally, M&A activity, or that are negative.

Content:

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- **News from around the World:**
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- **Helpful publications and data bases** (pages 10 and 11).

Edition 3: September 1, to September 30, 2023 (covering news items arising during this period)

HEADLINES FROM SEPTEMBER 2023

During September 2023:

September was a “news-rich” month, with the following matters seeming to us to be the most news-worthy in the context of progress towards net-zero.

- **Net Zero Roadmap 2023 drops:** On **September 26, 2023**, the **International Energy Agency (IEA)** published its [Net Zero Roadmap: A Global Pathway to Keep the 1.5OC Goal in Reach, 2023 Update](#). The first **Net Zero Roadmap** was published in 2021, and was a landmark publication. The **2023 Update** is the third edition of the landmark publication, and is as helpful as the first two editions.
- **IPCC AR6 Synthesis Report Climate Change 2023 drops (with a thud):** The **International Panel on Climate Change** has published its **AR6 Synthesis Report**. The [Summary for Policymakers \(SfP\)](#) provides a helpful (and powerful) synopsis of the full report: given the length of **P2N0** a summary of the key findings would not do the **SfP** justice. Suffice it to say, the **SfP** (and the full form report) make compelling, and weighty, reading.
- **Global Hydrogen Review 2023 drops:** On **September 22, 2023**, the **IEA** published its [Global Hydrogen Review 2023](#). As with all **IEA** reports, the **Global Hydrogen Review 2023** provides an excellent perspective on current progress and trends, and is well-worth printing, binding and preserving for on-going reference.

The key issue remains the achievement of the imperative of the development of hydrogen supply and demand in tandem, with supply a little ahead of demand. This is a consistent, and global, thematic. See an *Energy Intelligence* article entitled [Green Hydrogen Markets Start to Take Shape](#) for a more developed discussion on the dynamics of the hydrogen market.

- **Climate Week NYC:** As is the case each year, **Climate Week NYC** took place in the same week as the **UN General Assembly**.

During **Climate Week NYC** (September 17 to 24, 2023), the following announcements were made, and publications dropped:



1. **Bloomberg Philanthropies** announced, on **September 20, 2023**, that a further **USD 500 million** would be provided to **Beyond Carbon** to continue work “towards shuttering all remaining U.S. coal plants, quadrupling the amount of clean energy on the grid, and halving gas use by 2030”;
2. **Denmark** published, on **September 20, 2023**, a white-paper entitled [Green Hydrogen is Danish Hydrogen](#) providing a sense of the scale and scope of the intentions of Denmark to develop into a leading Green Hydrogen producer, and exporter; and
3. **US Department of Treasury Secretary**, Janet Yellen, announced [nine principles](#) of net-zero financing and investment. The principles are voluntary, and are stated to underscore the importance of the commitment of financial institutions to net-zero.

In the same week as **Climate Week NYC**, the **Glasgow Financial Alliance for Net Zero (GFANZ)** published guidance defining (for consultation) four key financing principles for energy transition (and net zero): **1. Climate Solutions**: Activities and enterprises that develop and scale climate solutions; **2. Aligned**: Enterprises that are aligned with a 1.5°C pathway (and net zero); **3. Aligning**: Enterprises that are committed to progress to a 1.5°C pathway; and **4. Managed phaseout**: The accelerated, and managed, phaseout of high-emission assets.

- **TNFD launched**: Among other things¹, **Edition 1** of **P2N0** stated: “On **September 18, 2023**, the **Taskforce for Nature-related Disclosures (TNFD)** framework will be launched. Following the road well-travelled, including by the **Taskforce Climate-related Financial Disclosures**, together they will provide a comprehensive framework to assess climate-related and nature-related disclosures. The fact that progress has been made across the **ISSB**, the **CSRD** and the **TNFD** in a relatively short period of time provides cause for cautious optimism”.

On **September 18, 2023**, the [Taskforce on Nature-related Financial Disclosures \(TNFD\) Recommendations](#) were launched. As expected, the publication does not disappoint, providing clear and crisp guidance in respect of the recommended disclosures on **Governance, Strategy, Risk and Impact Management and Metrics and Targets**, being the four pillars, with 14 indicators for reporting across sectors, and recommendations that are sector specific. (In addition, the good folk at **WBCSD** have published CTI.v4.0 ([Circular Transition Indicators V4.0](#)).

There now exist recommendations and guidance for the market to adopt a method driven, and technically sound, basis for disclosing and reporting on nature-related financial matters. The **TNFD** and **Science Based Targets Network (SBTN)** frameworks are integrated, with **SBTN** applied alongside **TNFD** recommendations and principles. The **TNFD** and **SBTN** have eight shared outputs, and the further releases from **SBTN** will be aligned with **TNFD**.

¹ **European Sustainability Reporting Standards**: On **June 9, 2023**, the **European Commission (EC)** published the **European Sustainability Reporting Standards (ESRS)**. As reported, the **ESRS** would soften some of the provisions anticipated as likely to be contemplated by the **Corporate Sustainable Reporting Directive (CSRD)** of the **European Union**.

On **July 31, 2023**, the **EC** adopted the **ESRS**. The **ESRS** must be used by corporations that are the subject of the **CSRD** (it is estimated over 50,000 corporations will be subject to the **CSRD**). The **EC** website states that:

“The [ESRS] cover the full range of environmental, social and governance issues, including climate change, biodiversity and human rights. They provide information for investors to understand the sustainability impact of the companies in which they wish to invest. They also take account of discussions with the [ISSB] and the [GRI] in order to ensure a very high degree of interoperability between the EU and the global standards to prevent unnecessary double reporting by companies”.

The headlines are that the **ESRS** must be adopted by each **Member State** (of the EU) during 2023, with reporting under the **CSRD** to be mandatory from 2024, with first reports based on **CSRD** due in 2025. Given that it is necessary for a corporation to demonstrate that climate change risk is not material, it is expected that most corporations the subject of the **CSRD** will report. One of the key features of the **CSRD** is that corporations must report on the climate risks that may be material to its business, and the climate risks to which its business may give rise (so called, **double-materiality** reporting). In contrast, under **ISSB** materiality is financial.

- **Narrowing the narrative on removals:** From **September 10 to 14, 2023**, the **Article 6.4 Supervisory Body (SB.6.4)** discussed their draft concept notes and draft standards in respect of **Article 6.4** of the **Paris Agreement**, and the draft recommendation in respect of **Activities involving removals under the Article 6.4 mechanism**. As noted for some time, the definition of **activities involving removals** for the purposes of **Article 6.4** of the **Paris Agreement** will be defining for a number of reasons, including for the operation of the **Article 6.4 mechanism** and for the creation of carbon credits under it (and by governments based on it). The next meeting of **SB.4** will take place **October 30, 2023, to November 2, 2023**, during which it is hoped that definitive progress will be made ahead of COP-28.
- **G20 Declaration:** On **September 9 and 10, 2023**, the **G20 Leaders' Summit** took place in New Delhi, India, at the end of which the [G20 New Delhi Leaders' Declaration](#) was made, with the first preamble referencing **One Earth, One Family, and we share One Future**. Under **Section C** of the **Declaration**, headed **Green Development Pact For A Sustainable Future**, among other things, the following matters were recognized: "... Support the acceleration of production, utilization, as well as the development of transparent and resilient global markets for hydrogen produced from zero and low emission technologies and its derivatives such as ammonia ...", "... pursue and encourage efforts to triple renewable energy capacity globally through existing targets and policies, as well as demonstrate similar ambition with respect to other zero and low-emission technologies including abatement and removal technologies ...", "For countries that opt to use civil nuclear, [to] collaborate on [together voluntarily] and mutually agreed terms ... ", and "Recognize the role of grid interconnections, resilient energy infrastructure and regional/cross-border power systems integration ...". The **Declaration** represents progress.
- **UNFCCC Advance Version of Synthesis Report:** On **September 8, 2023**, the United Nations Framework Convention on Climate Change (**UNFCCC**) published its [synthesis report on the technical dialogue on global stocktake](#). Among other things, the **synthesis report** notes:
 - The need to phase out the use of fossil fuel produce and use, unless with carbon capture;
 - The need to increase the rate of deployment of renewable electrical energy;
 - The need to cease deforestation, and deploy afforestation and reforestation; and
 - "While CO₂ removal cannot serve as a substitute for deep emissions reduction, methods of CO₂ removal can [reduce further] net CO₂ or GHG emission in the near term, counterbalance residual emissions from hard-to-abate sectors, and achieve and sustain net-negative CO₂ or GHG emissions in the long term, given sufficient ambition".
- **National Energy Technology Laboratory (NETL) CO₂ and FPV guidance:** On **September 7, 2023**, the **US NETL** released:
 - an updated version of its [CO₂ T Com Transport Cost Model](#) (and its [user model](#)), which provides a helpful tool to calculate the capital and operating costs of the transportation of CO₂ using pipelines; and
 - an analysis of the potential for the deployment of floating photovoltaic solar (**FPV**) capacity across Southeast Asia, concluding that potential for FPV was between 477 GW and 1,046 GW (or 0.477 TW and 1.046 TW). The analysis is contained in [Enabling Floating Photovoltaic \(FPV\) Deployment: FPV Technical Potential Assessment for Southeast Asia](#).
- **EU Green Deal Governance Farmwork:** On **September 6, 2023**, the good folk at **Bruegel** published [A new governance framework to safeguard the European Green Deal](#) (at <https://www.bruegel.org>). The proposed governance framework recognizes that the implementation of the **EU Green Deal** is going to be challenging, and that the governance framework of the **EU** has not been upgraded for the purposes of the implementation of the **EU Green Deal**. The good folk at **Bruegel** propose that: **1.** By 2030 all GHG emissions should be the subject of emissions trading; **2.** Preparation should start for an **EU Green Investment Plan** providing basis for on-going

funding support; **3.** A European Energy Agency should be established providing basis for the development of policy evaluation and preparation; **4.** Climate and energy governance matters should be elevated to heads of state, with Special European summits, to increase policy coordination and political ownership; and **5.** Transmission network development and operation should be determined on the basis of cost minimization.

- **Alternative fuels to power and propel container carriers:**

Editions 1 and 3 of P₂N₀ reported on the increase in the greening of the maritime sector including on **July 12, 2023**, that **A.P. Moller Maersk** had announced that it had taken delivery of its first container carrier to be powered and propelled using green methanol: the 2,100 TEU box-ship was delivered at the **Hyundai Mipo Dockyard**.

On:

- **July 16, 2023**, **OCI** completed the bunkering of the box-ship: loading 1,000 metric tonnes of **OCI HyFuels**, being ISCC certified green methanol. The bunkering took place at the **Odfjell Terminal Korea (OTK)**, located at the Port of Ulsan. The bunkering with green methanol was a world first;
- **July 27, 2023**, a second world first took place in Singapore, with the Singapore registered tanker, MT Agility, bunkering the box-ship with 300 metric tonnes of ISCC certified green methanol;
- **August 21, 2023**, the box-ship bunkered as it passed through the **Suez Canal**; and
- **August 28, 2023**, the box-ship was bunkered at the Port Rotterdam.

The methanol bunkered box-ship sailed to **Copenhagen, Denmark**, for its official naming (on September 14, 2023) by its designated godparent, **Ursula von der Leyen**, the **President of the European Commission**.

On **September 14, 2023**, the methanol bunkered box-ship was named the **Laura Maersk**. The **Laura Maersk** will commence operations in the Baltic Sea in **October 2023**.

Also on **September 14, 2023**:

- **AP Moller Maersk** announced that it has established a methanol dedicated corporation to produce and to supply methanol from biomass or biogenic captured CO₂ combined with hydrogen; demand side, assuring itself of supply.
- **OCI Global** (the supplier of the methanol for the maiden voyage of the **Laura Maersk**), announced plans to double its production capacity of green methanol to supply green methanol to the shipping industry; supply side, anticipating the demand side.

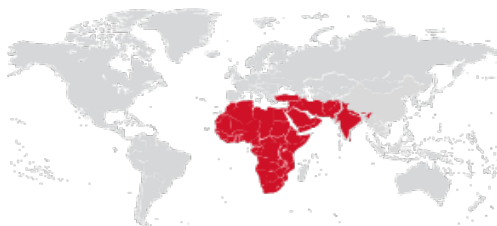
As of **September 14, 2023**, it was estimated that around **125 container ships** were on order that will have dual fuel capacity, methanol and heavy fuel oil.

On **September 20, 2023**, **Fincantieri** announced that **MSC** had confirmed two orders for alternatively fueled ships, making it six ships in a **€3.6 billion** program. While at sea, **Explora V** and **Explora VI** will use **biogas** and **synthetic gas** and **methanol** (with capacity for carbon capture). While in port, they will use fuel cell technology for power and propulsion.

On **September 24, 2023**, **NI Ferry** announced that **Wartsila** is to provide the engines and power plant to power and to propel the “world’s first methanol fuelled hybrid RoRo vessels”; the RoRo vessels being 147 m long NewMax class ships. The vessels to be operated by **Stena Line** on its ferry routes.

And finally, during **September 2023**, **Lloyds Register Maritime Decarbonisation Hub** published [The future of maritime fuels – What you need to know](#), which provides a helpful summary of the current state of play.

NEWS FROM AROUND THE WORLD



Africa, Middle East and South Asia

Manu River Union Region potential: On **September 25, 2023**, the **International Renewable Energy Agency (IRENA)** published [Renewable Energy Market Analysis, Manu River Union Region](#). **Cote d'Ivoire, Guinea, Liberia and Sierra Leone** comprise the **Manu River Union Region**. The economy of each country is commodities driven. The publication considers the existing sources of energy within the Region, and the projected growth in demand for energy, outlining how best to develop energy capacity throughout the Region, critically, through the development and use of renewable electrical energy.

West to North African H2 pipeline continues to follow a pathway: On **September 21, 2023**, **hydrogeninsight** (at <https://www.hydrogeninsight.com>, under [Morocco plans 5.600 km hydrogen pipeline from Nigeria, passing through 11 West African states](#)) provided an update on plans to develop a hydrogen pipeline to run parallel to the planned **USD 25 billion** natural gas pipeline (**Nigeria – Morocco Gas Pipeline** or **NMGP**). Morocco, through its National Office of Hydrocarbons and Minerals, is providing leadership on the development of both pipelines, in respect of which feasibility studies are understood to be underway. On the same day, the good folk at **hydrogeninsight** published [How easy will it be for green hydrogen projects in developing nations to export to Europe? Part 1: Getting financed](#). The piece, provides a good overview.

ADNOC announces CCS project: On **September 11, 2023**, **The National News** (at <https://www.thenationalnews.com>, under [How the UAE is advancing efforts to strengthen its carbon capture commitment](#)) reported that **ADNOC** had announced the development of a **1.5 million metric tonne a year** CO₂ capture and storage project. The CO₂ will be captured from the Habshan gas processing plant.

Egyptian and Indian interests align on Green Hydrogen: On **September 14, 2023**, **Global Flow Control** (at <https://globalflowcontrol.com>, under [Egypt to Sign \\$16 Billion Green Hydrogen Investment Deal with Indian Firms](#)) reported that Egypt was close to contracting with **ACME Group** and **Ocior Energy**, with **ACME** to develop a **USD 12 billion** Green Hydrogen industrial complex in **Ain El-Sokhna** (to produce up to 2.2 million metric tonnes of Green Hydrogen a year), and **Ocior** to develop **USD 4 billion** of Green Hydrogen production capacity, within the **Suez Canal Economic Zone (SCZone)**.

Israel to develop green transmission and transportation infrastructure: On **September 7, 2023**, **The Jerusalem Post** (at <https://.jpost.com>, under [Israel to build hydrogen pipeline to Gulf countries, Europe – energy minister](#)) reported that the **National Infrastructure Energy and Water Minister** had announced that Israel is to develop “green electricity transmission and a hydrogen pipeline”.

ACWA Power and Eni align: On **September 4, 2023**, it was reported widely that **ACWA Power** and **Eni SpA** had signed a memorandum of understanding to develop jointly a Green Hydrogen project within the MEA region. **ACWA Power** is the world's largest private sector developer of desalination capacity, and a leading renewable electrical energy developer, with a portfolio of renewable energy and Green Hydrogen projects around the world.



Americas

DOE considering loan for lithium mining project: On **September 29, 2023**, it was reported widely that the **US Department of Energy** (through its Loan Program Office) is considering the provision of a **USD 1 billion loan** to allow the development of the world scale **Thacker Pass lithium mine** by **Lithium Americas Corp.**

NEL ASA announces new electrolyser gigafactory: On **September 27, 2023**, it was reported widely that **NEL ASA** is to develop a **4 GW** alkaline and PEM electrolyser manufacturing facility in Plymouth Charter Township, Michigan, US.

DNV North America Energy Transition Report: On **September 25, 2023**, **DNV** published [Energy Transition North America 2023](#). The publication is excellent, rich in data and information, and perspective as to the next 30 years. The key findings of the publication are: **1.** The IRA has accelerated energy transition; **2.** Grid and renewable electrical energy investment is a USD 12 trillion opportunity through 2050; **3.** The energy transition is not progressing at a rate sufficient to achieve net-zero by 2050; and **4.** Around 1.3 gigatonnes of GHG emissions will continue to be emitted annually across the North America in 2050.

California brings action against hydrocarbon producers: On **September 15, 2023**, the **State of California** brought an action against a number of major hydrocarbon producers, and the American Petroleum Institute. While other States and cities have brought actions against hydrocarbon producers previously, the action brought by the State of California may be regarded (justifiably) as the most significant action brought so far, globally.

The [Complaint](#) (detailing the action, which is for Abatement, Equitable Relief, Penalties and Damages), makes interesting reading for lawyers and non-lawyers whatever one's views on the merits of the actions comprised in the **Complaint**.

California legislates disclosure and floating OWF:

- On **September 12, 2023**, it was reported widely that the lower house of the legislature of the State of California passed a bill to require corporations and organizations (private and public) that undertake activities in California, and have annual turnover of more than USD 1 billion, to report their **Scope 1, 2 and 3 emissions**. If approved by the Senate of the State Assembly of California, the bill will progress to the desk of the Governor of the State.
- On **September 15, 2023**, it was reported widely that the Senate of the State Assembly of California had approved [Bill AB 1373](#), with the expectation that the Governor of the State will assent to the Bill on or before **October 14, 2023**. The Bill provides for up to **25 GW** of offshore wind field capacity to be developed off the coast of California by **2045**.

23 GW of OWF capacity planned offshore Brazil: On **September 14, 2023**, it was reported widely that **Petrobras** had consolidated plans to develop offshore wind field capacity, with those consolidated plans involving the development of OWF to install up **23 GW** of capacity. The consolidated plan is reflected in applications made by **Petrobras** to commence the environmental approval and licensing process in **ten areas off the coast of Brazil**.

1 GW of BESS queued in Chile: On **September 7, 2023**, **Energy Storage** (at <https://www.energy-storage.news>, under **Developer Flexen puts 1 GW of standalone BESS into interconnection queue in Chile**) reported that **Flexen** had announced **three BESS projects** with a combined electrical energy storage capacity of **1 GW** into the queue for connection across the Chilean grid, in the north, in the Santiago region, and the Bio Bio region.

SK Big Green: On **September 2, 2023**, it was reported widely that **SK ecoplant** (part of the SK Group) had obtained approval in respect of land use to enable it to develop its proposed **USD 15 billion Green Hydrogen** project in **Canada**: as reported, **SK ecoplant** has obtained approval in respect of 1,080 km² of Crown Land, to allow it to develop wind farms with up to **4GW** of capacity to power electrolysers to produce up to **180,000 metric tonnes** of Green Hydrogen

a year. The Green Hydrogen produced will be combined with nitrogen to produce Green Ammonia, and when fully developed, up to one million metric tonnes of Green Ammonia will be produced annually.



APAC

COSCO to develop green methanol supply chain: On **September 21, 2023**, **motorship** (at <https://www.motorship.com> under [COSCO Shipping in first green MeOH supply chain MOU](#)) reported that **COSCO** had announced the development of a **Green Methanol Industrial Chain (GMIC)**. The **GMIC** “encompasses the production, transportation, refuelling, and certification of green methanol for ships.” The **GMIC** reflects the impetus that has been developing around the use of green methanol as a dual fuel and, ultimately, a replacement fuel for heavy fuel oil. Just as **A.P. Moller Maersk** has developed its production and supply chain globally, so too is **COSCO**. While early days, there is continued cause of optimism, which will increase as carbon capture technology is developed and deployed.

Mitsubishi Power Hyogo: On **September 20, 2023**, it was reported widely that **Mitsubishi Power** had powered up the **HydrogenPro** (alkaline) electrolyzers at its **Takasago Hydrogen Park** located in **Hyogo Prefecture, Japan**.

Australia opens consultation on GoO scheme: On **September 20, 2023**, the **Federal Government of Australia** opened consultation in respect of its **Guarantee of Origin (GoO) scheme**: see <https://consult.decew.gov.au>, under [Australia’s Guarantee of Origin Scheme: consultation on scheme design, emissions accounting and renewable electricity certification](#). The **GoO scheme** has been developed over time, and is well thought out, with a stated approach to accounting and embedded emissions (contemplating CBAM). The consultation period runs through **November 14, 2023**.

China’s first biogas to hydrogen facility commences production: On **September 18, 2023**, **Grandblue Environment** commenced production of hydrogen from biogas at its facility located in the **Nanhai District, Foshan City, Guangdong**. The facility will produce around **2,200 metric tonnes** of hydrogen a year from biogas. While the scale of the production facility may not be world scale, the potential for hydrogen production from biogas is highly prospective: biogas is derived from the organic fraction of food waste, a feedstock in great supply across the urbanised areas of China.

CCS value chain being assessed: On **September 12, 2023**, it was reported widely that **Kawasaki Kisen Kaisha (K Line)**, **Sumitomo, Toho Gas**, and **Woodside Energy** had signed a memorandum of understanding to assess a carbon capture, transportation and storage chain between **Japan** and **Australia**. As reported, the assessment will consider the capture of CO₂ in the **Chubu region**, and the liquefaction of the CO₂ and its transportation to Australia for storage.

Japan plans to import hydrogen: On **September 11, 2023**, **hydrogeninsight** (at <https://www.hydrogeninsight.com>, under [Japanese steelworks to replace blast furnace with “hydrogen supply base”](#)) that Japanese steelmaker **JEE** is to close its Keihin blast furnace in Kawasaki and to repurpose the site to import, and to distribute, hydrogen and ammonia.

Singapore to import green electrons: On **September 8, 2023**, **The Straits Times** (at <https://www.straitstimes.com>, under [Singapore to start imports of renewable energy from Indonesia within 5 years](#) and [Sarawak in talks to supply 1 GW renewable energy to S’pore by 2032: Sarawak Energy](#)) reported on plans for Singapore to import:

- **2 GW** of low-carbon electrical energy (to match up to 15% of the load of Singapore, and 50% of Singapore’s low-carbon electricity import target of 4 GW) from Indonesia.

The **Energy Market Authority (EMA)** of Singapore announced on **September 8, 2023**, that it had given approval, conditional, for five projects, in combination, to import up to **2 GW** of low-carbon electrical energy from Indonesia.

As reported, the five projects are being developed by **Adaro Solar International, EDP Renewables Asia, Keppel Energy, Pacific Medco Solar, and Vanda RE**; and

- **1 GW** of renewable electrical energy (to match up to 7.5% of load in Singapore, and 25% of Singapore’s low-carbon electricity import target of 4 GW), from Sarawak, Malaysia.

Sarawak Energy Berhad (SEB) announced that it was in advanced negotiations with a consortium, led by Sembcorp Industries, to supply renewable electrical energy from its hydroelectric power plants via a 700 km submarine high voltage direct current (**HVDC**) cable.

Singapore digs deep: On **September 4, 2023**, **The Straits Times** (at <https://www.straitstimes.com>, under [New study will assess Singapore’s geothermal energy potential, sites for power plants: EMA](#)) reported that the **EMA** of Singapore is seeking to undertake a study to assess “how Singapore can harness geothermal energy for power generation, as well as identifying suitable locations for building geothermal power plants”. In addition, the study will assess the potential for the storage of carbon dioxide. It will be interesting to follow this thinking as it develops.

Osaka Ammonia Ecosystem: On **September 1, 2023**, it was reported widely that **IHI Corporation, Kansai Electric Power Co., and Mitsui Corporation** have agreed to undertake a study jointly to assess whether, and, if so, how, to develop hydrogen and ammonia system to provide a supply chain within **Osaka, Japan**. As reported, the study will include the use of hydrogen and ammonia within the **Kansai** and **Setouchi** regions.

Electrical energy explained:

Electrical Energy – Gigawatts, Megawatts and Kilowatts			
GW	1 billion watts	GWh	1 billion-watt hours
MW	1 million watts	MWh	1 million-watt hours
KW	1 thousand watts	KWh	1 thousand-watt hours
<p>Calculating number of GWh: What is the generation capacity of the generation facility in MWh / GWh?</p> <p>Using a simple example: 1,000 MW (or 1 GW) of nameplate capacity is converted into a number of hours of generation capacity, 8,760 a year (24 x 365) multiplied by actual generation capacity (expressed as a percentage), say 95% gives rise to the following calculation:</p> <p>1,000 MW x (8,760 x 95%) 8,322 = 8,322,000 MWh divided by 1,000 for GWh = 8,322 GWh</p> <p>OR</p> <p>1 GW x (8,760 x 95%) 8,322 = 8,322 GWh</p>			
1 GW			
2.47 million photovoltaic panels (based on panel with circa 405 watts)		310 wind turbines (based on turbine size of 3.25 MW)	



Europe and the UK

Germany and UK coalesce: On **September 26, 2023**, the **German and UK Governments** announced the establishment of the UK-Germany **Hydrogen Partnership**. As announced, the **Hydrogen Partnership** is intended “to enhance closer co-operation on hydrogen technology and infrastructure development to promote mutual trade and investment opportunities.” The establishment of the **Hydrogen Partnership** was marked by a **Joint Declaration of Intent**. For

further detail, click on <https://www.gov.uk>, under [UK and Germany partner to further advance hydrogen developments](#).

The **Hydrogen Partnership** comprises the **Department of Business and Trade** and **Department for Energy Security and Net Zero** from the UK, and the **Ministry of Economic Affairs and Climate Action** of the Federal German Government.

France CfD program: In late **August** / early **September 2023**, it was reported widely that the **French Government** had announced plans to tender the award of contracts for differences (**CfDs**), commencing in 2024 and continuing through 2026. As reported, the **CfDs** will be awarded in respect of the production of low-carbon hydrogen, effectively to cover the cost difference between the cost of production of low-carbon hydrogen and the cost of production of grey hydrogen. The term of the **CfDs** will be 15 years.

On **September 20, 2023**, the French Government published drafts of the tender process for the **CfDs** and confirmed that the **CfDs** would be worth up to **€4 billion**. From the drafts, it is apparent that hydrogen production powered by renewable electrical energy and zero emission electrical energy (i.e., nuclear energy) will be eligible to participate in the tender process. From reporting in late September, it is understood that **€700 million** will be allocated during 2024.

European Council (EC) and Parliament (EP) align further on green washing: On **September 19, 2023**, it was reported widely that the **EC** and **EP** had reached agreement (at a political, in principle, level), to enhance the rights of consumers by amending the [Unfair Commercial Practices Directive \(UCPD\)](#) and the [Consumer Rights Directive \(CRD\)](#) to ensure that they are responsive to the changed, and changing environment, of the energy transition, and the claims that are accompanying the transition, so called **green transition claims**.

In passing, it is noted that during **September 2023** the Australian competition regulator (the **ACCC**) published [draft guidance](#) for corporations making any environmental or sustainability claim. Corporations that follow the guidance may be expected to avoid non-compliance with Australian Consumer Law.

BECCS methodology in the works: On **September 20, 2023**, it was reported widely that during **October 2023** **Brax** and **Stockholm Energi** (each developing projects to deploy **bioenergy carbon capture and storage** or **BECCS**) intend to publish a methodology to be applied at their respective projects for the purposes of supporting the issue of carbon credits. **P₂N₀** will follow developments.

CCS licensees revealed: Edition 1 of **P₂N₀** reported as follows:

NSTA awards 20 CCS licenses: On **May 18, 2023**, the UK **North Sea Transition Authority (NSTA)** **announced** that it had awarded 20 licenses, to 12 corporations, in the UK's first carbon storage licensing round. The licensing of carbon storage capacity is to allow acceleration of the capture of CO₂¹ and its storage permanently.

On **September 15, 2023**, the **North Sea Transition Authority** issued a press release (at <https://www.nstauthority.co.uk>, under [Net zero boost as carbon storage licences accepted](#)) identifying the 14 corporations that had accepted the award between them of 21 licences. The full list of the [corporations](#) is set out in the press release. This marks a further significant step for the UK in the development of CCS in the North Sea.

TotalEnergies Green Hydrogen procurement: On **September 14, 2023**, it was reported widely that **TotalEnergies** is to run a tender for **500,000 metric tonnes** a year of Green Hydrogen to displace its use of grey hydrogen at its refineries across Europe. This is a prime example of demand side committing to a feedstock, allowing supply side to match that demand: to produce **500,000 metric tonnes** of Green Hydrogen, **10 GW of renewable energy capacity** is required to power around **5 GW** of electrolyser capacity, requiring an investment of **€14 billion** (in today's money). Also on **September 14, 2023**, **TotalEnergies** announced (at <https://totalenergies.com>, under [TotalEnergies and Air Liquide joint Forces on Green Hydrogen to Decarbonise the Normandy Platform](#)) that it had signed an agreement, with **Air Liquide**, for the "long-term supply of green and low carbon hydrogen to the **TotalEnergies** refining and petrochemical platform in Normandy", by **Air Liquide**.

ICIS publishes helpful RED III summary: On **September 13, 2023**, the good folk at the **Independent Commodity Intelligence Services (ICIS)** published a helpful page summary of **RED III** (at <https://www.icis.com>, under [ICIS](#)

EXPLAINS: RED III and its implications for hydrogen). In passing, while it is noted that **RED III** represents good progress, progress to provide certainty on certification of e-fuels or renewable fuels of non-biological origin (RDNBO) remains to be finalised.

AR5 CfD tender becalmed for OWF: On **September 8, 2023**, it was reported widely that in the UK Government's **Allocation Round 5 (AR5)** no offshore wind developments had been successful in the award of contracts for differences (**CfD**), with both fixed bottom and floating offshore wind not being awarded **CfDs**. In contrast, in **AR4** held in 2022, **7 GW** of offshore wind capacity was awarded **CfDs**. Notwithstanding the becalmed OWF sector, **CfDs** were awarded in respect of **3.7 GW** of capacity, including in respect of **1.9 GW** of **photovoltaic solar projects** and **1.5 GW** of **on shore wind farm projects**.

H2 Green Steel closes in on FID: On **September 7, 2023**, it was reported widely the **H2 Green Steel** had raised **€1.5 billion** in equity funding for the development of its Boden iron and steel works (**Boden Plant**): comprising 700 MW of electrolyser capacity to produce Green Hydrogen, the Green Hydrogen to be used to provide high-heat temperature to produce **direct reduced iron (DRI)**. As reported previously by the author, **H2 Green Steel** has forward sold the clean / green steel to be produced at the **Boden Plant**, including to **Cargill, Mercedes-Benz, Scania** and **ZF**. It is understood that a final investment decision on the **Boden Plant** is expected before the end of 2023.

RWE gets approval for GET-H2 Nukleus: On **September 6, 2023**, it was reported widely that **RWE** had obtained approvals to allow it to develop the first two 100 MW electrolysers at its gas-fired power station at Lingen (**Lingen H2 Plant**). It is understood that the development of the **Lingen H2 Plant** is conditional on the commitment of sufficient funding support.

By way of background: On **January 31, 2023**, **RWE** announced that it had ordered **two 100 MW proton exchange membrane (PEM) electrolysers** from **Linde Engineering** (in turn being procured by **Linde** from **ITM Power**) for the **GET-H2 Nukleus** production facility in **Lingen, Northern Germany**.

HELPFUL PUBLICATIONS AND DATA BASES JULY AND AUGUST

The investment case for CCS: On **September 25, 2023**, the **Global CCS Institute** published **[The Investment Case for CCS: Policy Drive and Case Studies](#)**. The publication is excellent and well-worth a read.

Green Hydrogen as an enabler: On **September 20, 2023**, the **International Renewable Energy Agency (IRENA)** published **[Green Hydrogen: a key enabler to broaden the potential renewable power solutions in hard-to-abate sectors](#)**. Depending on the perspective of the reader, the publication is a good primer, or a helpful reminder.

Standardizing Hydrogen Certification: During the week beginning **September 18, 2023**, **H2 Global Stiftung** and **Hydrogen Europe** published **[Standardizing Hydrogen Certification: Enhance Traceability, Transparency, and Market Access](#)**, which provides a policy brief in respect of the need for, and the benefits of, "globally harmonized standards and certification processes across the hydrogen value chain". The publication is excellent.

GWEC and IRENA publish ahead of ClimateWeekNYC: On **September 18, 2023**, the **Global Wind Energy Council (GWEC)** and **International Renewable Energy Agency (IRENA)** published **[Enabling Frameworks for Offshore Wind Scale-up: Innovations in Permitting](#)**. The publication identifies eight solutions to enable the development and deployment of OWF capacity more effectively: **1. One Stop Shops** for all approvals and permits; **2. Stakeholder Consultation**; **3. Mandated Lead Times**, consistent with 1; **4. Digital Training Courses** for those involved in approvals and permitting; **5. Digital and Searchable Databases**; **6. Alignment of Land and Ocean Use** guidance to be provided by government; **7. Emergency Clearing Mechanisms** to fast-track any disputes arising in respect of approvals and permits, and **8. Energy Infrastructure Permits** to be granted on clear basis. The publication is well-worth a read.

Breakthrough Agenda 2023: On **September 14, 2023**, the **International Energy Agency (IEA)**, **International Renewable Energy Agency (IRENA)** and the **UN Climate Change High Level Champions** published the **[Breakthrough Agenda Report 2023](#)**. The report is an excellent, providing a summary of progress across the key sectors

of agriculture, buildings, cement and concrete, energy and power, hydrogen, iron and steel, and road transport. The report is well-worth a read.

WoodMac Energy Transition Outlook Report: On **September 14, 2023**, **Wood Mackenzie** published its [Energy Transition Outlook](#) report. As with previous Energy Transition Outlook reports from Wood Mac, the report analyses three pathways, 2.5°C, 2°C and 1.5°C. The key finding is that the 1.5°C pathway “is still possible ... much depends on actions taken this decade”. The report is well-worth a read.

DNV Maritime Forecast to 2050: On **September 7, 2023**, **DNV** published its [Energy Transition Outlook 2023 - DNV Maritime Forecast to 2050](#). The publication is excellent, providing (the usual) clear perspective of **DNV**, including detail on **ships in operation** and **ships on order**, with 51.3% of ships on order to be powered and propelled by LNG (40.3%), methanol (8.1%), LPG (2.34%), and battery and hybrid (0.8%), rather than by conventional heavy fuel. If the publication is read with the naming of the **Laura Maersk** (the world’s first dual fuel container ship) and the successful testing recently by TotalEnergies of on-board carbon capture, while the shipping industry has a long route to travel to decarbonisation it is travelling the route at an ever-increasing rate of knots.

Financing Clean Energy in Africa: On **September 7, 2023**, the **International Energy Agency (IEA)** published [Financing Clean Energy in Africa – World Energy Outlook Special Report](#), representing the combination of work of the **African Development Bank Group** and the **IEA**. The analysis contained in the publication is based on the **Sustainable Africa Scenario** in the IEA’s [Africa Energy Outlook 2022](#) report.

The key headline from the publication is that the cost of the development of clean energy projects across Africa is two to three times greater than the cost of development in developed economies. The publication concludes that by 2030 two-thirds of spending on energy projects in Africa should be on clean energy projects. The publication provides case studies and scenarios to illustrate how clean energy projects may be developed for lower costs and at the rate needed.

Geely makes the case for Green Steel subsidy: On **September 5, 2023**, **Transition Asia** published [Green Steel Subsidy Accelerates China’s Auto Decarbonisation – Case study of China’s leading automaker – Geely Automotive](#). The key takeaway is that “subsidies can help the Chinese auto industry and drive the country forward in becoming a world leader in the low carbon industry.” While there is nothing new in this key takeaway, the publication may be regarded as a green light to the provision of subsidies within China to produce green steel.

Rystad provides route map: On **September 4, 2023**, **RystadEnergy** published [CO₂ sets sail: Carbon shipping on the rise as emitters search for large-scale storage options](#). The headline from the publication is that “Based on planned carbon capture projects, we predict that more than the 90 million tonnes per annum (tpa) of CO₂ will be shipped by the end of the [current] decade, volumes requiring 48 terminals to handle the import and the export of the gas”. The publication is excellent.

Author:



MICHAEL HARRISON*

Partner

michael.harrison@bakerbotts.com

Other Contacts:



JASON BENNETT

Partner

jason.bennett@bakerbotts.com



RICHARD GUIT

Partner

richard.guit@bakerbotts.com



LEWIS JONES

Partner

lewis.jones@bakerbotts.com



DANIEL REINBOTT

Partner

daniel.reinbott@bakerbotts.com



ANDREW ROCHE

Partner

andrew.roche@bakerbotts.com



MARK ROWLEY

Partner

mark.rowley@bakerbotts.com

* Michael Harrison is the author of **P₂N₀**. Any errors are Michael's. **P₂N₀** is written early each Saturday morning. In writing **P₂N₀**, Michael sources from original material. If a news item is covered broadly, the words **reported widely** connote that at least two publications have covered that news item. If there is only one source that is not the original material, that source is named.

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