



Welcome to the **ninth edition** of **P₂N₀** covering the drive to reduce greenhouse gas (**GHG**) emissions to net-zero (**NZE**). The **tenth edition** of **P₂N₀** will be published during the first week of April 2024, and will include significant news items arising during March 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.

Access previous editions of **P₂N₀** by clicking [here](#).

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Edition 9: covering significant news items arising from February 1, to February 29, 2024.

HEADLINES FROM FEBRUARY 2024

After a quieter **January 2024**, **February** marked an increase in more significant news items, in particular regulatory news from the **European Union (EU) - Brussels Sprouts Legislative Wings**.

The following matters seem to us to be the most news-worthy in the context of progress towards net-zero:

- **EU Carbon Certification Removals Framework:** On **February 20, 2024**, the **Council** and **European Parliament** reached provisional political agreement to establish a **certification framework** in respect of the removal of carbon, carbon farming and the use of carbon in products.

The key elements of the provisional political agreement are that there will be an open ended definition of carbon removal (as is the case with the **Intergovernmental Panel on Climate Change (IPCC)** in the context of the work done on **Article 6** of the **Paris Agreement**), permanent carbon storage, temporary carbon storage from carbon farming, temporary carbon storage in longer lasting products, and soil emission reduction from carbon farming. Certification is to be undertaken on the basis of additionality, long-term storage, quantification of carbon captured and sustainability.

- **White Hydrogen – you can hear about it, but no see it:** On **February 19 and 20, 2024**, there was a good deal of news coverage understood to arise from a yet to be published **US Geological Survey** report, estimating that there is up to **5 trillion metric tonnes** of natural or white hydrogen (and to some gold hydrogen) underground. In the context of the estimates for the mass of hydrogen required to achieve Net Zero Emission (**NZE**), the estimates range from **350 to 600 million metric tonnes** by 2050. **Edition 2** of **P₂N₀** reported on the white / natural hydrogen.

- **Important Projects of Common European Interest (IPCEI):**

On **February 15, 2024**, the **European Commission (EC)** approved, under the **EU State Aid** rules, the provision of up to **€6.9 billion** in funding support (**IPCEI Hy2Infra**) from Member States, which is expected to result in the investment of up to **€5.4 billion** from the private sector.

The designation of **IPCEI** will allow the provision of support from Member States to allow the development and deployment in respect of 33 projects including: **1.** 3.2 GW of large-scale electrolysers (16 companies designated); **2.** new and repurposed hydrogen transmission and distribution pipelines, approximately 2,700 km (11 companies designated); **3.** Large scale hydrogen storage facilities, at least 370 GWh (three facilities, all in Germany); and **4.**

receiving terminals, and relating port infrastructure for liquid organic hydrogen carriers (LOHC) to receive and to handle up to 6,000 metric tonnes of liquid hydrogen a year (two terminals). The following [link](#) (to the EC press release) provides details of the projects.

IPCEI Hy2Infra is the third round of **IPCEI** designations to support the development of hydrogen: the first round was in July 2022, **IPCEI Hy2Tech**, providing support for the development of hydrogen technologies for end users, and the second round was in September 2022, **IPCEI Hy2Use**, providing support for the development of the application and use of hydrogen by the industrial sector. Each of the first and second rounds were reported on at the time by the author.

- **International Energy Agency (IEA) marks 50th birthday:** On **February 13 and 14, 2024**, the **IEA** marked its 50th birthday with a Ministerial meeting in Paris, France aimed at supercharging the empowerment of the **IEA** to continue its works to advance global clean energy. The sessions at the Ministerial meeting focused on energy transition, and an affordable, secure and sustainable energy future. On **February 27, 2024**, a further meeting of the great and the good took place in Paris to discuss the commitments made at **COP-28**. The meeting is a precursor to the publication a special report of the **IEA** – see the [Clean Energy Market Monitor – March 2024](#).
- **Net-Zero Industry Act (NZIA) progresses:** On **February 6, 2024**, the **EC** reported (at <https://ec.europa.eu>, under [Commission welcomes political agreement to make clean technology manufacturing in the EU resilient and competitive](#)) on the progress made in reaching political agreement among the **Council** (comprising the Member States) and the **European Parliament**. Following this agreement, the NZIA will be approved by each of the **Council** and the **European Parliament**, and then progress to enactment.

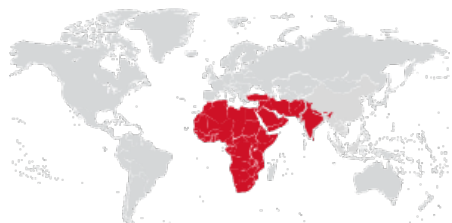
The key headline from the political agreement is the (much covered) target of technologies manufactured within the **EU** to match or to exceed 40% of the demand for those technologies within the **EU**. In addition, the **NZIA** will provide a simplified regulatory regime for technologies, allow for the acceleration of capture and storage of CO₂, and provide a clear line of sight to access markets for net-zero products.

- **And finally from the busy corridors of Brussels ...** on **February 28, 2024**, the **European Parliament** passed the [Nature Restoration Law](#), providing policy settings to restore **20%** of the land and seas of the **EU** by **2030**. The Nature Restoration Law is rightly described as ground breaking (or is that ground restoring), providing for afforestation and reforestation, expansion of marine protected areas, peatland rehabilitation, river and stream rewilding, sustainable agricultural practices, urban green space practices, and wetland restoration,

Late news: At the risk of the following being old news for the purposes of the tenth edition of **P₂N₀**, on **March 1, 2024**:

- the **EC** published a [Proposal for a Council Decision on the position to be taken on behalf of the European Union in the Energy Charter Conference](#) – effectively not to oppose proposed amendments to the [Energy Charter Treaty \(ECT\)](#) As reported previously, a number of countries have withdrawn from the **Energy Charter Treaty**, most recently the UK on **February 22, 2024** (see <https://www.gov.uk>, under [UK departs Energy Charter Treaty](#)). It is likely that the **EU** and **all Member States** (some already have withdrawn) will withdraw from the **ECT**; and
- the **IEA** reported that during **2023** record levels of **CO₂** were emitted to the climate system at **37.4 Giga-tonnes** (or **37.4 billion metric tonnes**), an increase of **410 million metric tonnes** from 2022. One of the reasons for the increase was a reduction in the generation of electrical energy using hydroelectric capacity as a direct result of the drought conditions experienced in a number of countries during 2023. (See [Major growth in clean energy limited the rise in global emissions in 2023](#) and [CO₂ Emissions in 2023](#).)

NEWS FROM AROUND THE WORLD



Africa, Middle East and South Asia

Egypt continues to look to develop H₂ projects: On **February 29, 2024**, it was reported widely that, on **February 28, 2024**, **Egypt** had signed a further seven memorandums of understanding to pave the way for the development of Green Hydrogen and renewable electrical energy projects within the **Suez Canal Economic Zone**. If the seven projects proceed to development, as reported this will result in a total capital investment of **USD40 billion**.

Abu Dhabi cleaning up: On **February 21 and 22, 2024**, it was reported widely that Abu Dhabi, through government-owned **Emirates Water and Electricity Company (EWEC)**, is to source **60%** of its electrical energy needs from renewable and clean sources of power by **2035**, having committed to **50%** by **2030**.

Algeria and Germany declare intent: On **February 7, 2024**, it was reported widely that **Algeria** and **Germany** had signed a **Declaration of Intent** to provide a framework to guide cooperation to develop production and transportation infrastructure within **Algeria** for the purposes of the production, and export, of Green Hydrogen to Europe. It is understood that the use of the **South H₂ Corridor** to transport Green Hydrogen by pipeline to Germany is being discussed. This continues the initiatives of **Germany** around the world to develop multiple sources of Green Hydrogen.

Oracle powers ahead: On **February 6, 2024**, it was reported widely that **Oracle Energy Ltd** had concluded the feasibility study for its **400 MW** Green Hydrogen and Green Ammonia project in **Sindh, Pakistan**. As reported, the project targets a Green Hydrogen production capacity of **55,000 metric tonnes** a year, with renewable electrical energy sourced from **800 MW** of photovoltaic solar and **500 MW** of on-shore wind of installed capacity, and a **450 MWh** of battery energy storage.

This project has been on the radar of the author since it was first announced, and, like many Green Hydrogen and Green Ammonia projects, it is making steady progress, with patient and persistent sponsors.

Government of India Offshore Wind Farm (OWF) Tender: On **February 5, 2024**, the **Ministry of New and Renewable Energy**, through the **Solar Energy Corporation of India**, commenced the bid process for **4 GW** of offshore wind field development, with four areas open for bids, each of **1 GW**, and each off the cost of the **State of Tamil Nadu**. The **Government of India** is not offering any funding support for the development of the OWFs, rather each developer is to contract directly with off-takers of electrical energy. It is understood that bids must be submitted by **May 2, 2024**.



Americas

USD 150/MWh strikes the gong: On **February 29, 2024**, the **State of New York** closed its **Round 4 OWF solicitation re-bid tender** process, awarding **1.7 GW** of installed capacity to **Equinor** (Empire Wind) and to **Eversource-Orsted** (joint venture, Sunrise Wind). The price of **USD 150/MWh** provides a healthy price reset. The successful bidders will now progress to negotiate 25 year Offshore Wind Renewable Energy Certificate Purchase and Sale Agreements.

South Fork Wind complete: On **February 20, 2024**, the final wind turbine (11 of 11) was installed on the first off-shore wind field completed in the **US State of New York**. The completion of the installation of the wind turbines on this **132 MW fixed bottom project** is good to see.

Rare-Earths Find: On **February 9, 2024**, UNICLAD (at www.uniclad.com) reported that over **2 billion metric tonnes** of rare earths¹ had been found by **American Rare Earths Inc**, in the **State of Wyoming**, US. The immediate headline is that this find, on development, would make the US the world’s largest producer of rare earths.

Edition 8 of P₂N₀, (under **Clean H₂ CI Production**) reported that: “On **December 22, 2023**, the **US Treasury Department** and **Internal Revenue Service** published draft proposed regulations in respect of **Section 45V Credit for Production of Clean Hydrogen** and **Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities and Energy Properties**”. And that comments were sought on the draft proposed regulations by **February 26, 2024**, with a public hearing proposed for **March 25, 2024**.

Tier	Lifecycle GHG emissions Rate (kg of CO ₂ -e of H ₂)	Applicable Percentage of USD 0.60 (%)	Available Tax Credit (USD / kg of H ₂)	Investment Tax Credit Rate - % of the cost of facility or modification
1	0 – 0.45	100	3	6
2	0.45 – 1.5	33.4	1	2
3	1.5 – 2.5	25	0.75	1.5
4	2.5 – 4	20	0.6	1.2

Throughout the last couple of weeks of **February, 2024**, there was considerable reporting. The best example that that the author came across was provided by **hydrogeninsight** at <http://hydrogensight.com>, under **Too strict or not enough? Draft guidance for US clean hydrogen tax credit draws tens of thousands of comments** on **February 27, 2024**, providing balance. As reported, over **30,000 comments** were received in respect of **Section 45V Credit for Production of Clean Hydrogen**. [For those wishing to consider the comments received, please click [here](#).]

It seems likely that the consideration of the comments by the **US Treasury Department** and **Internal Revenue Service** will take some time.



APAC

China to construct 750 km H₂ pipeline: On **February 29, 2024**, it was reported widely that the **Zhangjiakou Kangbao to Caofeodian** hydrogen pipeline is to commence construction during 2024. The pipeline will transport hydrogen from the point of production to the **port city of Caofeodian**, with the route of the pipeline including the cities of **Chengde** and **Tangshan** in **Hebei province**. The development, and route, of the pipeline may be seen as ideal – via cities with domestic demand for hydrogen, to a port city from which hydrogen may be exported in time.

¹ **Rare earth materials and minerals** include Cerium (Ce), Dysprosium (Dy), Europium (Eu), Erbium (Er), Gadolinium (Gd), Holmium (Ho), Lanthanum (La), Lutetium (Lu), Neodymium (Nd), Praseodymium (Pr), Promethium (Pm), Samarium (Sm), Scandium (Sc), Terbium (Tb), Thulium (Tm), Ytterbium (Yb), and Yttrium (Y).

Critical metals and minerals include Cobalt (Co), Copper (Cu), Lithium (Li), Nickel (Ni), and **rare earth materials and minerals**. See the **World Energy Forum** publication [Securing Minerals for the Energy Transition](#).

Green Hydrogen projects progress in Malaysia: On **February 26, 2024**, it was reported widely that the **SEDC Energy**, owned by the **State of Sarawak, Malaysia**, is progress with the development of a **Hydrogen Hub**, in Bintulu, and two large scale Green Hydrogen production projects:

- the first, the **H2biscus** project (announced previously and involving development with **Lotte, POSCO** and **Samsung Engineering**) with the Green Hydrogen to be combined with nitrogen to produce Green Ammonia, and
- the second, the **H2ornbill** (announced previously and involving **Eneos** and **Sumitomo**) to be used to produce the liquid organic energy vector methylcyclohexane, exported to Japan first in 2020.

The source of the renewable electrical energy required to power the electrolyzers to produce the Green Hydrogen is yet to be determined. As reported, **SEDC Energy** and **Gentari** will develop common infrastructure for **H2biscus** and **H2ornbill**.

Australia and South Korea committed to progress on CO₂: On **February 26, 2024**, **The Korea Times** (at <https://m-koreatimes-co-kr>, under [Korea, Australia agree to prepare promptly cross-border CO₂ transport](#)) reported that agreement has been reached at a meeting between Ministers Ahn Duk-geun and Madeleine King to proceed to clear the way for a “bi-lateral carbon capture and storage project”.

Australia gears up for 82% renewables by 2030: During **2024**, the **Australian Federal Government** plans to tender for the installation of up to **10 GW** in new photovoltaic solar and wind capacity, with **6 GW** to be tendered during Q2, and **4 GW** to be tendered in Q3 or Q4 under the **Capacity Investment Scheme**. The **Australian Federal** and **State Governments** are working in a coordinated way, which the deadlines for bids in the States of South Australia and Victoria closing on **February 23, 2024**.

Vietnam spring roll out: On **February 22, 2024**, Vietnam rolled-out its **Hydrogen Strategy**. The **Strategy** outlines a plan to develop between **100,000** and **500,000 metric tonnes** of production capacity by **2030**, and between **10 and 20 million metric tonnes** by **2050**. The **Strategy** is agnostic as to **Blue** or **Green Hydrogen**, and is open to domestic and export market use. In the context of the domestic market, the **Strategy** is targeting the **10% of final energy demand** in Vietnam to be met by hydrogen. Given the dynamics in Vietnam, it is possible to see the use of hydrogen primarily across the transport sector and to decarbonize difficult to decarbonize industries.

Carbon capture system world first: On **February 16, 2024**, it was reported widely that **Seatrium** is develop a carbon capture system for installation on a **liquefied petroleum gas** and **petrochemical** carrier of **Solvang**, the **21,300 m³ Clipper Eris**. The carbon capture system (which uses established amine technology) will capture up to **70%** of **CO₂** emissions arising on combustion of fuel in the main engine of the **Clipper Eris**.

Also on **February 16, 2024**, it was reported, in the **New Scientist** (at www.newscientist), that the **Sounion Trader** (a container vessel) had completed testing of an onboard carbon capture system, capturing around one metric tonne of **CO₂** a day. Typical, heavy fuel oil gives rise to three metric tonnes of **CO₂** for each tonne combusted. It is hoped that the scaled-up technology deployed on the **Sounion Trader** will capture up to **95%** of **CO₂** emissions arising on combustion.

IEA Regional Cooperation Centre set up in Singapore: On **February 13, 2024**, the **IEA** and **Singapore** announced the establishment of the **IEA Regional Cooperation Centre** to be **located** in **Singapore**. The executive director of the **IEA**, **Fatih Birol**, stated the centre “will allow us to [increase significantly] the IEA’s engagement with South-east Asia, which is one of the most dynamic and fastest growing regions in the world and will be critical to the energy transition”.

China firms up Carbon Market: In early **February 2024**, the **China State Council** released the new regulation to provide a framework for a market to trade emissions. As reported, the new regulation will become effective on **May 1, 2024**². It is hoped that the new regulation will give rise to an open and transparent, and more effective market.

The existing framework came into force since February 1, 2021, with the emission trading market going live in July 2021 (and was reported on previously by the author). The existing framework was “big news” in 2021, applying to more than **4 Giga-tonnes** (4 billion metric tonnes) of GHG emissions each year. By the end of 2023, the existing framework applied to around **5.1 Giga-tonnes** (5.1 billion metric tonnes) of **GHG** emissions a year.

While the market is considered to have run smoothly since July 2021, it was neither national nor regulated. Under the new regulation, the **Department of Ecology and Environment** will oversee the national carbon emission allowance registration agency and the national carbon emission trading institution which will develop a centralized and unified trading of carbon emission rights. Future Editions of **P₂N₀** will follow the implementation of the interim regulation.

By way of reminder: Edition 8 of **P₂N₀** reported as follows: “**PRC voluntary carbon credit market reboot:** On **January 22, 2024**, the **South China Morning Post** (at www.scmp.com), under [Climate change: China’s voluntary carbon-credit market reboots in “milestone” for emissions goals](#)) reported that China’s voluntary carbon market had recommenced trading on **January 22, 2024**. As reported, trading in respect of the **China Certified Emission Reduction** scheme now “allows enterprise to purchase carbon credits to offset emissions, not just businesses currently covered under China’s compulsory national carbon trading market, known as the national Emissions Trading Scheme”.

During **February 2024**, the good folk at **The Oxford Institute for Energy Studies** published [China’s policy pendulum shifts back toward environmental protection, but will bureaucracy get in the way?](#) The publication is timely.

CCS / CCUS in Indonesia: On **January 30, 2024**, **Presidential Regulation 14 (PR 14)** of **2024** was signed. **PR 14** provides a dual track **CCS / CCUS** regime, which the team at Baker Botts has been tracking every step of the way.

The team at **The Straits Times** (at <https://www.straitstimes.com>), under [Indonesia issues CCS rules allowing 30 per cent carbon storage from overseas](#)) provides the perspective of exporters of **CO₂**.

On **February 15, 2024**, **Singapore** and **Indonesia** signed a **Letter of Intent (LoI)** providing framework to develop a bi-lateral agreement between **Singapore** and **Indonesia** to allow the export of **CO₂** from Singapore to Indonesia. The link to the [press release](#) from **Ministry of Trade and Industry** of Singapore in respect of the **LoI** is helpful.

CCS in Singapore: On **March 1, 2024**, it was reported widely that **ExxonMobil** and **Shell** are working with Singapore (having signed a memorandum of understanding (**MOU**) with **Singapore Economic Development Board**), to develop a cross-border carbon capture and storage (**CCS**) project. As reported, **ExxonMobil** and **Shell** have established a consortium, **S-Hub**, for the purposes of the development of the **CCS** project. On development, the **CCS project** will capture and store permanently **2.5 million metric tonnes** of **CO₂**.

² The new regulation is an interim regulation – **Interim Regulation on the Administration of Carbon Emissions Trading**. It was adopted by the **State Council** on **January 5, 2024**, and on **January 25, 2024**, was promulgated to take effect on **May 1, 2024**. The interim regulation prescribes the **Department of Ecology and Environment** as the competent authority.



Europe and the UK

OWF tender season has kicked-off:

- On **February 26, 2024**, the **Netherlands Enterprise Agency (RVO)** foreshadowed that it intends to come to market in **April 2024** for geotechnical work for the **Ballonplatt** and **Huibergat** areas in the **Dutch sector** of the **North Sea**;
- On **February 28, 2024**, the **Network Agency** offered **three OWF areas**, with circa **5.5 GW** of installed capacity in the **German sector** of the **North Sea**. Those wishing to bid must submit tenders by **August 1, 2024**;
- On **February 28, 2024**, **The Crown Estate** gave notice to confirm that **Round 5** of its seabed leasing tender process up to **4.5 GW** of **floating OWF projects** in the **Celtic Sea** is to proceed, with **three OWF areas** to be offered; and
- On **February 29, 2024**, the **RVO** offered **two OWF areas**, with circa **4 GW** of installed capacity, **2 GW** in each area, in the **Ijmuiden Ver Wind Farm Zone** in the **Dutch sector** of the **North Sea**. Those wishing to bid, must do so by **March 28, 2024**.

EC approves German funding:

- On **February 26, 2024**, the **EC** approved the provision of **€1.3 billion** of grant funding by **the Federal German Government** to **ArcelorMittal** to decarbonize steel production in **Germany**. As reported, the grant funding will allow the development of a direct-reduced iron (**DRI**) plant and three electric arc furnaces (**EAFs**) at two existing steel mills, (in Bremen and Eishehhtenstadt), the **EAFs** replacing blast and basic oxygen furnace technologies.
- On **February 24, 2024**, the **EC** approved the provision of **€4 billion** of funding support under **15 year** contracts for differences (**CfDs**), characterized (and named) as two-way carbon contracts for differences (or **CCfDs**) or climate protection contracts. Readers of **P₂N₀** will know that the Netherlands uses a similar policy setting.

In context, the current price for emissions permits under the **EU ETS** is around **€60 per emission permit**, representing **one metric tonne of CO₂-e** emitted. This is not a price point that will provide sufficient incentive to decarbonize: the price point of emissions permits needs to be considerably greater. Indeed given current dynamics in the **EU ETS** market for emissions permits it seems likely that other policy settings will be needed to ensure decarbonization.

To encourage acceleration of decarbonization, the **German Federal Government** wants to incentivize industrial emitters to decarbonize sooner than they would otherwise, and the amount payable under the climate protection contracts will compensate emitters for the difference between the cost of decarbonization and the cost of emissions permits. The climate protection contracts will be awarded through auctions, the first of which is expected during 1H.

Germany moves to CCS: On **February 26, 2024**, [draft amendments](#) to the **Carbon Dioxide Storage Act**, a **Carbon Management Strategy**, and **long-term strategy for negative emissions** were published by the German **Federal Ministry of Economic Affairs and Climate Action**. Together, these documents outline a comprehensive plan for **capture and storage permanently offshore** of **CO₂** arising from activities in **Germany** over the long-term. This represents pragmatic policy setting, and is a welcome development.

Germany gives more than a hint: On **February 12, 2024**, the **German Federal Government** announced that it had allocated **€3.5 billion** to its **H2Global** hydrogen procurement initiative. The funding is allocated to **Hint.Co**, a buyer

and a seller of hydrogen: in effect, **Hint.Co** is a wholesale buyer, and a wholesale seller, of hydrogen, allowing the **German Federal Government** to develop supply side, and then make sufficient hydrogen available to demand side, at the right price to ensure the transition to hydrogen. The author has long advocated a role for government as wholesale buyer and seller of hydrogen as the best means for the development of supply and demand side in tandem.

TotalEnergies takes control of its H₂ value chains: On **February 8, 2024**, it was reported that **TotalEnergies** (working with containment system specialist **GTT** and naval architect **LMG Marin**) has received approval in principle from **Bureau Veritas** for a **150,000 m³** liquid hydrogen (**LH₂**) carrier. This is exciting development. One of the challenges with the development of the hydrogen market is the means of carriage of **LH₂** by sea – **LH₂** carriers of an appropriate size are needed. Now both **Kawasaki Heavy Industries** and **TotalEnergies** are developing appropriately sized **LH₂** carriers.

By way of background:

A 160,000 m³ **LH₂ carrier** equates to around **11,200 metric tonnes** of **LH₂** (one m³ of **LH₂** has a mass of 70 kg). Each metric tonne of **LH₂** has a useable energy content of around 33 MWh or 113 MMBtu, and as such each **LH₂** cargo comprises around **372,960 MWh** (372.96 GWh) or around 1.270 TBtu.

By contrast, a 160,000 m³ **LNG carrier** equates to around **74,450 metric tonnes** of **LNG** (one m³ of **LNG** has a mass of around 465 kg), each metric tonne of **LNG** has a useable energy content of 15.23 MWh or 52 MMBtu, and as such each **LNG** cargo comprises around **1,133,873.50 MWh** (or 1133.87 GWh) or around **3.870 TBtu**.

Because of the differing **energy density** of **LH₂** and **LNG**, an **LH₂** carrier of 480,000 m³ would be required to carry an equivalent heating value of **LH₂** to a 160,000 m³ **LNG** carrier.

European Hydrogen Bank (EHB) auction receives 132 bids: On **February 8, 2024**, bids for the award of contracts to supply hydrogen under the first auction undertaken by the **EHB** closed. It has been reported widely that over **132 bids were received**, in aggregate tendering for the provision of hydrogen from **8.5GW** of deployed electrolyser capacity with hydrogen production capacity of approaching one million metric tonnes a year. The identities of the successful tenderers will be announced in early **April, 2024**, with contracts for differences to be signed by **November 2024**.

By way of reminder: the auction process will result in the award of contracts on the basis of bids to provide hydrogen at a fixed price per kg (under a contract for difference). The auction has a ceiling fixed price per kg of €4.50.

On **February 29, 2024**, **hydrogensinsight** reported that the second auction to be undertaken by the **EHB** is to be delayed from the 1H of 2024, to some point during 2H of 2024.

There is a lot going on underground:

- On **February 7, 2024**, **Uniper** (at <https://www.uniper.energy>, under [Uniper to develop hydrogen storage capacities by 2030](#)) announced plans to develop between **205** and **600 GWh** of hydrogen storage capacity using salt caverns located across the States of **Lower Saxony** and **North-Rhine Westphalia**.
- On **February 21, 2024**, it was reported widely that **Gasunie** and **Storag Etzel** had agreed to work together to test the feasibility of developing the Etzel salt dome, **Lower Saxony**, to provide up to **1 TWh** of hydrogen storage, commencing with a pilot project, **H2CAST**, involving two smaller salt caverns.

By way of reminder: **Gasunie** is developing its **HyStock** hydrogen project in the Netherlands, and is planning its **HyPerLink**, to and from the **Port of Wilhelmshaven**.

- On **February 21, 2024**, it was reported widely that **Securing Energy for Europe (SEFE)** intends to invest **€500 million** to repurpose underground natural gas storage facilities (and related infrastructure) to store hydrogen, two of the natural gas storage facilities being in **Lower Saxony**.
- On **February 26, 2024**, **RWE** continued the permitting process to allow it to use a salt mine for hydrogen storage located in the Arnsberg district in the State of **North-Rhine Westphalia**.

Spain to provide funding support for 10 H₂ projects: On **February 7, 2024**, **hydrogeninsight** (at <https://www.hydrogeninsight.com>, under [Spanish government poised to spend €900 m on ten green hydrogen projects in coming weeks](#)) reported that the **Spanish Government** intends providing funding support for ten hydrogen projects as part of its plan to make **Spain** “a global benchmark in decarbonization from renewable hydrogen”. As reported the ten projects cover the hydrogen value chain, with production and transportation being the focus, with technology development receiving funding support too.

As reported previously by the author, **Spain** has earmarked **€3.1 billion** to support the development of the **renewable hydrogen** value chain across **Spain**, and a number of the ten projects secured funding support at **Important Projects of Common European Interest**.

EC coherence reaches new heights: On **February 6, 2024**, three milestone publications were published by the **EC**:

- The **EC assessment of pathways to 90% reduction in GHG by 2040** was published in its [Impact Assessment Report](#) (605 pages in length). The **Report** accompanies the **EU GHG** reduction target (a **55% reduction by 2030**), on the road to carbon neutrality by 2050, and provides the basis for the implementation of the commitment of the **EU** to achieve a **90% reduction by 2040**.

The **Report** provides impact assessments of different levels of net **GHG** emissions in 2040 and the associated sectoral pathways bridging 2030 to climate neutrality by 2050. The **Report** makes fascinating reading.

The **Climate Law** of the **EU** requires the **EC** to make a legislative proposal within six months after the completion of the first **NDC** stock take under the **Paris Agreement**, the stock take having been completed at the end of **COP-28**.

By way of reminder: **Edition 8** of **P₂N₀** (under “**Reductions and Removals in the EU**”) reported that “On **January 18 and 19, 2024**, there was considerable coverage of the prospect of the **EU** establishing a carbon [**CO₂**] removal target of **10%**, to complement a reduction target of **90% by 2040**. This coverage continued during the balance of January. On **January 29, 2024**, it was reported that on **February 6, 2024**, the **EC** would publish a report on **industrial carbon management**, including the prospect of the trading of **CO₂**. **Edition 9** of **P₂N₀** will cover the report”.

- The **EC adopted its Industrial Carbon Management strategy** through its [Industrial Carbon Management Communication](#) (a very manageable read at 27 pages). Among, other things, the **Communication** provides details of **CO₂** removal technologies, and how those technologies may contribute to the **90% reduction in GHG emissions by 2040**, and progress to **carbon neutrality by 2050**.

The **Net-Zero Industry Act** proposes that at least **50 million metric tonnes** of **CO₂** storage capacity are developed by **2030**. The **Impact Assessment Report** contemplates that around **250 million metric tonnes** of storage will be required by **2040**.

- The **EC Joint Research Centre (JRC) published its CO₂ transport report** [Shaping the future CO₂ transport network for Europe](#) (a manageable read at 89 pages). Among other things, and at its core, the publication, in light of, and informed by, the **Impact Assessment Report**, provides an assessment of the requirements for the development and deployment of **CO₂** transportation infrastructure across the **EU** so as to ensure that **CO₂** captured and removed can be transported for storage permanently.

The size and the shape of the task is known (**50 million metric tonnes** by **2030** and **250 million metric tonnes** by **2040**), on the road to achieve carbon neutrality by 2050. The means of achieving the task is being developed, but the publication provides a clear sense of the development of a **EU wide CO₂** transportation network.

Individually, the **Report**, **Communication** and **Publication** make fascinating reading. Together, they provide a considerable increase in the commonwealth of knowledge, and they provide further emphasis (if any were needed) that **CCS / CCUS** are essential to capture and to remove **CO₂** as part of an integrated plan to avoid, reduce and remove **GHG** emissions, and to progress to **carbon neutrality** by **2050**. For the author, the documents represent the apogee of **CO₂** thinking so far. It is fair to say that the reception from those involved in **CCS** and **CCUS** has been universally positive.

Providing context to the **Report, Communication and Publication** is [European Climate Investment Deficit report](#), published by the **Institute for Climate Economics** published on **February 21, 2024**. The headline from the report is that to achieve the current 55% reduction in **GHG** emissions by 2030, each year, circa **€813 billion** is required. It is estimated that around **€407 billion** is being invested each year, a **€406 billion gap**. Ordinarily, the author does not include news items of this kind (i.e., on costs and pricing), but this report is cogent, and as such it is included.

In the context of **CCS / CCUS**, another publication worthy of the attention of the reader is the **CO₂ Value Europe** publication, [The Contribution of Carbon Capture & Utilisation Towards Climate Neutrality in Europe – A Scenario Development and Modelling Exercise](#).

Germany powers ahead: On **February 4, 2024**, the **Federal German Government** finalized its plan to provide funding support (in the form of subsidies over 20 years) of up to **€16 billion** (from the **Climate Transformation Fund**) to allow the development and deployment of up to **10GW** of “hydrogen-ready” **gas-fired power plants** across **Germany**. **Edition 2** of **P₂N₀** reported on the plans to up to **23.8 GW** develop hydrogen-ready capacity. The finalized plan contemplates, and provides funding support for, **10GW** of hydrogen ready capacity. It is understood the tenders for funding will commence during **1H of 2024**.

EU ETS driving transition: On **February 4, 2024**, **Nikkei Asia** (at <https://asia.nikkei.com>, under [First China-built bio methanol ships aims to set sail in Q2](#)) reported that:

“The first bio methanol container ship built by a Chinese company [the first of 14 vessels ordered by X-Press Feeders] is set to depart from Shanghai for Rotterdam in the second quarter, as the industry moves toward cleaner fuels following a new European Union rule requiring large shippers [to] submit emission [permits to match their GHG emissions]”.

By way of reminder: **Edition 8** of **P₂N₀** outlined, under (“**EU Emission Trading System (ETS) extends to maritime sector**”) that from “**January 1, 2024**, the **EU ETS** extended to cover vessels with a gross tonnage of **5,000 metric tonnes** (or more) departing from and arriving at ports in the **EU**: 100% of the mass of **GHG** emissions arising during docking at port and while on the water within the **EU** and 50% of the mass of **GHG** emissions arising on trades to and from the **EU** will be subject to the **EU ETS**. On **January 30, 2024**, the **Official Journal of the EU** published **Commission Implementing Decision (EU) 2024/411** detailing the administrative authorities for the shipping companies impacted by the application of the **EU ETS**. Again, it is privilege to follow the implementation of policy settings that were hatched only relatively recently”.

While it is not the intention to cover each order for an alternative fuel dual fuel vessel, it is clear that the shipping sector is responding to the policy settings in the **EU**. In passing, however, it is noted that since the start of 2024, 23 vessels with dual fuel, heavy fuel oil and methanol, have been ordered. For those interested, there is an **Alternative Fuels for Shipping Insights (AFI)**. This is a link to the [AFI](#). Each vessel deployment an alternative fuel is added to the **AFI**.

During **February 2024**, the **World Shipping Council (WSC)** launched its **Green Balance Mechanism (GBM)**. The **WSC** has floated the concept of global **GHG** pricing before. The **GBM** is outlined at www.worldshipping.org, under [Delivering net zero by 2050: Introducing Green Balance Mechanism](#).

The **WSC** notes that global “climate regulations are necessary to make it possible for carriers to operate on green fuels, and to incentivize fuel and energy providers to invest in new production capacity”. Conceptually, the **GBM** takes forward a notion floated by the **WSC** previously (in 2022): there is a **GHG** price, the **GHG** price is collected, and transferred to the **Green Balance Fund (GBF)**, with allocations from the **GBF** to vessels using **Alternative Fuels**. This is a variation on the mechanics of the **EU ETS** applied to the global maritime sector.

HELPFUL PUBLICATIONS AND DATA BASES

The most noteworthy publications read by the author during **February 2024** are as follows:

- **OIES CCS analysis:** During **February 2024**, the good folk at **The Oxford Institute For Energy Studies** published [Capture Carbon, Capture Value: An Overview of CCS Business Models](#). The publication is a helpful addition to the commonwealth of knowledge in this developing area.

- **World Bank drops to scale:** During **February 2024**, **The World Bank** (in association with other leading organizations) published [Scaling Hydrogen Financing for Development](#). The **publication** provides an excellent perspective on the progress that needs to be made to scale up the development of hydrogen production capacity, and the role for debt finance in that scaling up.

To provide context and to frame thinking, to produce **1 million metric tonnes** of hydrogen, requires **10 GW** of electrolyser capacity, **20 GW** of renewable electrical energy capacity, and a capex of around **USD 30 billion**.

- **EC Frames the Next Frontier:** On **February 19, 2024**, the **EC** published [The Next Frontier for Climate Change Science – Insights from the authors of the IPCC 6th Assessment Report on the knowledge gaps and priorities for research](#) (an Independent Expert Report). The publication is excellent for those seeking a clear and concise summary of the key aspects of climate change, and the initiatives required to address and then to redress it.
- **ASEAN readiness for CCS / CCUS:** On **February 9, 2024**, the **ASEAN Centre for Energy** published its [Strategic Report on the ASEAN Readiness for CCT and CCU Technologies Towards Carbon Neutrality](#). The publication is excellent, and is one of the publications that the author carries around in hardcopy. One of the key findings in the publication is that **CCS / CCUS** provide a means to lengthen the lives of coal-fired fleets, thereby allowing **ASEAN** countries with coal-fired power generation to capture **CO₂** and in so doing make progress in achieving their **NDCs** and progress towards **NZE**. This is a theme that the Baker Botts team has seen develop over relatively recent times.
- **Sustainable Bioenergy Potential:** During **February, 2024**, the **International Renewable Energy Agency (IRENA)** published [Sustainable bioenergy potential in Caribbean small island developing states](#). The **publication** provides a helpful and informed assessment of the bioenergy potential. The **publication** sits alongside [Sustainable bioenergy pathways in Latin America: Promoting bioenergy investment and sustainability](#), separately and together well-worth a read.

Also, during **February 2024**, **IRENA** published [Renewables Readiness Assessment: Solomon Islands](#) and [Green hydrogen for sustainable industrial development: A policy toolkit for developing countries](#). Both publications are helpful and timely.

- **Reducing the cost of capital:** During the first week of **February, 2024**, the **IEA** published [Reducing the Cost of Capital – Strategies to unlock clean energy investment in emerging and developing economies](#). The **publication** provides a wide ranging consideration of possible strategies and is well-worth a read for those active in emerging and developing markets. It is excellent, including focusing on some of the essentials.
- **CDR Brief:** On **February 7, 2024**, the good folk at **CDR.fyi** published [Trending on Track? – CDR.fyi 2023 Year in Review](#). The publication answers the question that it poses, and is well-worth a read.

By way of reminder: during the first week of **January 2024**, the **WEF** published [Carbon Dioxide Removal: Best-Practice Guidelines, January 2024, White Paper](#). The **White Paper** provides a high-level overview, and is a helpful point of reference.

- **H₂ Technology Brief:** In early **February 2024**, the **UNECE** published its [Technology Brief – Hydrogen](#). The **Brief** provides a helpful summary of the hydrogen value chain, including a clear and concise diagrammatic representation of the value chain on **page 2** of the **Brief**.
- **The Road from COP-28:** During late **January 2024**, **world hydrogen leaders** (in association with **Renewables Now**) published [The Road from COP28: Investment Trends in MENA's Hydrogen Sector in 2023](#). The publication provides a high-level perspective on initiatives and progress in **Egypt, Jordan, Morocco, Oman, Saudi Arabia** and the **UAE**. The conclusion that the “**MENA region boasts strategic advantages for renewable hydrogen exports**” while known, is supported by the publication.

By way of reminder: On **December 20, 2023**, the **WEF** published [Enabling Measures Roadmap for Low-Carbon Hydrogen Middle East and North Africa](#). The **Publication** provides a helpful and informed perspective.

A DEEPER DIVE

Concepts and products explained:

We are conscious that we refer to a number of concepts in **P₂N₀**. We thought that it might help if we included a section in each edition of **P₂N₀** explaining those concepts. In this edition, we pick up on **methanol (CH₃OH)**. **Methanol** is known as both a fuel and a feedstock. As a fuel, **methanol** has received increased attention since 2021, in particular, in the context of the new build dual fuelled ocean-going vessels, capable of being powered and propelled by **methanol**.

As identified, a key risk for these ocean-going vessels is the availability of **methanol**. Among other things, this has resulted in owners of these ocean-going vessels contracting for off-take of **methanol** produced by new **methanol** production projects that are dedicated to produce methanol for those owners.

Types of methanol:

As with a number of fuels and feedstocks, **methanol** has a number of prefixes:

- **Green Methanol**, i.e., **e-methanol** and **renewable** (or biogenic) **methanol**; and
- **Non-Green Methanol** or **Non-Renewable Methanol** (produced from reforming natural gas or gasifying coal).

Production and Colour:

Green Methanol:

- **e-methanol**:
 - is produced commercially by the use of **renewable electrical energy** to electrolyse **H₂O** to derive **H₂** and **O₂** with the **H₂** combined with **biogenic CO₂** (being **CO₂** captured from **biomass**) to produce **CH₃OH** and **H₂O**. (If **non-biogenic CO₂** is used, the methanol produced is said to be **Blue Methanol**); and
 - can be produced, as yet not commercially, using co-electrolysis of **H₂O** and captured **CO₂** to derive **H₂** and **O₂** and **CO**, and catalysing captured **CO₂** and **H₂ / CO** (synthetic gas or syngas) to produce **CH₃OH** and **H₂O** or using direct electrochemical conversation of **H₂O** and captured **CO₂** to produce **CH₃OH** and **O₂**.

Each of these processes uses **renewable electrical energy** and **electrolysis**.

- **renewable methanol** or **bio-methanol** is produced by the reforming or gasification of **biomass** feedstock to derive **syngas** is **bio methanol** or **e-bio methanol** (if **renewable electrical energy** and **electrolysis** are used);

Non-Renewable Methanol:

Non-Renewable Methanol can be **Blue, Grey** or **Brown Methanol**.

- **Blue Methanol** is produced by the steam reforming of **natural gas** to produce **Blue Hydrogen**, with the **CO₂** arising captured, and the **Blue Hydrogen** combined with **biogenic** or **non-biogenic CO₂** to produce **CH₃OH**;
- **Grey Methanol** is produced by the steam reforming of **natural gas** to produce syngas to produce **CH₃OH**; and
- **Brown Methanol** is produced by the gasification of coal to produce syngas to produce **CH₃OH**.

Close to 98% of all methanol produced each year (around 100 million metric tonnes) is **Grey Methanol** or **Brown Methanol**. By 2050 it is estimated that up to **500 million metric tonnes** of methanol may need to be produced to achieve **NZE**, which would give rise to up to **1.5 giga-tonnes** of **CO₂** emissions arising if **Non-Renewable Methanol**.

Chemistry and characteristics:

On combustion, methanol gives rise to **CO₂** emissions. While **CO₂** arises, if that **CO₂** can be captured, it is possible to achieve a **closed loop**. **Methanol** is in liquid form at room temperature, allowing it to be transported and stored using established and existing infrastructure.

Edition 10 of **P₂N₀** will provide a deeper dive into the drier territory of disclosure and reporting.

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