NEWS AND VIEWS ON THE DRIVE TOWARDS NET-ZERO GHG EMISSIONS

Welcome to the **twenty-second edition** of **P_2N_0** providing our take on the key news and themes arising during 2024.

On **January 19**, **2025**, the **twenty-third edition** of **P_2N_0** will be published, covering key news items arising during the first two weeks of January 2025.

For clarity and emphasis, **P_2N_0** does not cover news items in a negative way, recognizing the need for the facts and the best science to be front and center. As such, **P_2N_0** does not provide negative opinion.

Access previous editions of **P_2N_0** by clicking **here**.

INTRODUCTION:

A number of themes applied or emerged during 2024 (all covered by news items in this **Edition 22** of **P_2N_0**).

- **Age of electricity**: Throughout 2024, one of the key themes that emerged as anticipated is the increase in supply and demand of electrical energy with each of the flagship reports making predictions on increased supply and demand.

- **Carbon Dioxide Removal** (**CDR**) and **Carbon Capture and Storage** (**CCS**): In order to achieve net-zero **CDR** and CCS together need to remove and avoid around 15 giga-tonnes of **CO2** emissions. In this context, the operationalization of **Article 6** of the **Paris Agreement** and enhanced commitments of government to **CCS** is welcome.

- **Critical materials** (**metals**, **minerals,** and **rare earths**) (**CM_3**): Alongside the anticipated increase in electrical energy supply and demand sits the need to increase the production and supply of **CM_3**.

- **Digital and Energy Infrastructure**: With the development of **Generative AI** there will be an increase for electrical energy for data centres, and more broadly the need to develop energy infrastructure. In addition, the development and augmentation of transmission capacity remains a focus in some areas of the world.

- **Photovoltaic solar stepped changes**. A more difficult market for offshore wind field development emerged during 2024. To counter this, the development of photovoltaic capacity continued globally, in many countries accelerating.

A constant theme is the need for government fiscal incentives and funding support (including through concessionary funding, CfDs, and grants) to facilitate decarbonization and energy transition.

- During **January 2024** the headlines captured **-** carbon capture and storage (**CCS**) and carbon dioxide removal (**CDR**), the rate of progress of the development and deployment in China, the EU ETS and EU funding support:

    - **After AR 6 comes AR 7**: The **Intergovernmental Panel on Climate Change** (**IPCC**) met in Istanbul, Turkey, to settle the program for the **Seventh Assessment Report** (**AR 7**). The meeting of the **IPCC** was the first plenary session of the seventh cycle of the work of the **IPCC**.

      As was the case with the **Sixth Assessment Report**, **AR 7** will involve development of **three Working Group (WG) Reports** – **WG I** on **Physical Science Basis**, **WG II** on **Impacts and Adaptation, and Vulnerability**, and **WG III** on **Mitigation of Climate Change**; and a **Synthesis Report**, to be released by 2029.

      For the first time in an assessment report, **AR 7** will include a **Methodology Report on carbon dioxide reduction (CDR)**, **carbon capture and storage** (**CCS**) and **carbon capture and utilization** (**CCU)**, along with **Special Reports on Climate Change and Cities** and a **Methodology Report on Short-loved Climate Forcers**.

- **CCS Stars Aligning**: The highly anticipated **Indonesian** **Presidential Regulation No 14/2024** was signed on **January 30**, **2024**. The regulation provides for storage of CO_2 arising from multiple sources within Indonesia and contemplates the import of CO_2 for storage.

  The team at **The Straits Times** (at **https://www.straitstimes.com**, under **Indonesia issues CCS rules allowing 30 per cent carbon storage from overseas**) provided a perspective of exporters of **CO_2**. In **February 2024**, **Singapore** and **Indonesia** signed a **Letter of Intent** providing a framework to develop a bi-lateral agreement between **Singapore** and **Indonesia** to allow the export of **CO_2** from Singapore to Indonesia.

  On **March 1**, **2024**, it was reported widely that **ExxonMobil** and **Shell** were working with Singapore (having signed a memorandum of understanding (**MOU**) with **Economic Development Board** (**EDB**)), to develop a **CCS** project. As reported, **ExxonMobil** and **Shell** have established a consortium, **S-Hub**, to develop a **CCS** project. On development, the **CCS project** will capture and store permanently **2.5 million metric tonnes** of **CO_2**.

- **China continues to lead the way**: During **January 2024**, the **National Energy Administration** (**NEA**) for China reported that during 2023 **217 GW** of photovoltaic solar capacity had been installed across China, and installed thermal capacity increased by **58 GW**.

  As noted in **Edition 14** of **P_2N_0**, by **July 2024**, **China** achieved its target to develop and deploy 1,200 GW of renewable electrical energy by 2030, five and half years ahead of schedule in June 2024. In the context of progress to net zero emissions, the **NEA** indicated that coal consumption would peak in, and decline after, 2025. China invested around **USD 365 billion** in 2024, more than Africa, the EU, India, Latin America, Southeast Asia, and the US combined.

  Pausing to reflect: In Q3 of 2020, China committed to achieve net zero by 2060, and as noted above, to install 1,200 GW of photovoltaic solar and wind capacity by 2030. By the end of 2024, China had around 1,320 GW of installed photovoltaic solar and wind capacity.

- **State Funding**: During **2024**, the **European Commission** (**EC**) approved the provision of State Aid by member states to support funding to develop decarbonization / energy transition across the EU. This started in early January 2024 and continued. For example:

  - On **January 8**, **2024**, the **EC** approved a **€2.9 billion French State aid scheme** to support investment in green industries; and
  - On **January 31**, **2024**, the **EC** approved **€550 million Italian State aid scheme** to support investment in use of hydrogen in industrial processes.

- **EU Emission Trading System** (**ETS**) **applied to maritime sector**:

  - 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**.

- **Electricity 2024**: On **January 24**, **2024**, the **International Energy Agency** (**IEA**) published **Electricity 2024 – Analysis and forecast to 2026**. The headlines from the publication were that:

- Over 2024, 2025 and 2026 the demand for electrical energy is going to increase, and that the increased demand will be matched by new renewable and nuclear electrical energy capacity for the most part.
- Low-emission or no emission sources of electrical energy are forecast to account for almost half of the world's electricity generation by 2026, up from 39% in 2023.

- During **February 2024**, the key news items related to - **EU** funding support (under the **Important Projects of Common European Interest** (**IPCEI**) **policy setting**) and **State Aid**, the **NZIA** (the **EU** equivalent of the US CHIPS and Science Act), acceleration of procurement of renewable energy capacity in India, China's expanded carbon market and world scale hydrogen transmission pipeline, the planned development of hydrogen production capacity in Malaysia, and the hydrogen strategy for Vietnam:
  - 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 was expected to result in up to an additional **€5.4 billion** of "matching investment" from the private sector. The following **link** (to the EC press release) provides details of the projects.

    IPCEI Hy2Infra was the third round of **IPCEI** designated support for hydrogen development: 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.

    The funding approvals and commitments continued throughout 2024 including as follows:

    - On **April 8**, **2024**, the **EC** published a list of 166 **Projects of Common Interest** (**PCI**) and **Projects of Mutual Interest** (**PMI**). Each of the **166 PCIs** and **PMIs** is eligible to apply for financing under the **Connecting Europe Facility**, with calls for applications made during the second half of **April 2024**, with applications to be submitted by the end of **October 2024**. By way of a quick summary, 85 of the projects are electrical energy projects (consistent with the **European Grid Action Plan**), offshore and smart electrical energy grid projects, 65 projects are hydrogen projects, and 14 are CO_2 network projects. On **October 23**, **2024**, the **EC** announced funding for 85 projects intended to contribute to achieving net-zero across member states of the **European Union**. As reported, the funding announced totals **€4.8 billion**. The full list of the projects can be found **here**.
    - On **May 28**, **2024**,, the **EC** announced the approval of the **fourth round of IPCEI** (see **http://ec.europa.eu**, under **Commission approves up to €1.4 billion of State aid by seven Member States for the fourth Important Project of Common European Interest in the hydrogen value chain**) that under **IPCEI HyMove**, Estonia, France, Germany, Italy, the Netherlands, Slovakia, and Spain, are permitted to provide up to **€1.4 billion** of funding support for **13 projects**, to be undertaken by **11 corporations**, across the **seven EU Member States**.
    - **German Governments commit to €4.6 billion of funding support**: On **July 16**, **2024**, it was reported widely that the Federal and State Governments of Germany had agreed to provide funding support in respect of 23 green hydrogen projects given **IPCEI** status.
    - **EU Calls for Applications – Energy Infrastructure Projects of Common** (**PCI**) and **Projects of Mutual Interest** (**PMI**) **– Hydrogen –** the **Second List**: On **September 1**, **2024**, the **EC** **announced** that it was seeking applications for **Energy Infrastructure Projects** under the **Trans-European Network for Energy (TEN-E) Regulation**. Applications were due by:

- **November 18**, **2024**, in respect of electrical energy storage and transmission projects and hydrogen and electrolyser projects; and
- **December 18**, **2024**, in respect of CO_2 storage and transport projects, and smart electrical energy and smart gas grids.

Also during **February 2024**, the **EC** approved the provision of:

- **€1.3 billion** of grant funding by the **Federal German Government** (**FGG**) to **ArcelorMittal** to decarbonize steel production in **Germany**. As reported, the funding would allow the development of a direct-reduced iron (**DRI**) plant and three electric arc furnaces (**EAFs**) at two existing steel mills (the **EAFs** to replace blast and basic oxygen furnace technologies).
- **€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** by the **FGG**. The Netherlands uses similar instruments.

Staying in Germany:

- On **February 4**, **2024**, the **FGG** 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**.
- On **February 12**, **2024**, the **FGG** announced that it had allocated **€3.5 billion** to its **H2Global hydrogen procurement initiative** to **Hint.Co**, a wholesale buyer, and a seller of hydrogen. This will allow the development of hydrogen supply side to match demand side, at a price point to allow transition to the use of hydrogen.
- On **March 14**, **2024**, the **FGG** launched the first round of bids to incentivize German industry to transition to lower, low or no GHG emission processes. The **CCfDs** or **climate protection contracts** are intended to accelerate the transition (by providing a positive incentive), with a clear recognition that the price on carbon under the **EU ETS** is not sufficient (as a negative incentive).

  On **October 18**, **2024**, it was reported widely that the **FGG** had awarded around **€1 billion** in funding support to **five industrial corporations** to adopt the use of hydrogen to reduce GHG emissions arising from the processes and technologies used by those corporations.

- **Staying in Europe**:
  - The first **European Hydrogen Bank (EHB)** auction received **132** bids from **17 countries** for the award of contracts to supply hydrogen under the first auction undertaken by the **EHB**.

    Ahead of schedule in late **March 2024**, the seven successful bidders were **announced**. Through the auction process the **EU** agreed to provide **€720 million** in funding (from the Innovation Fund) to bridge the gap between the cost of the production of renewable hydrogen and equivalent fossil fuel.

    As reported, bid prices ranged from €0.37 per kg to €4.5 per kg (€4.50 per kg being the cap on the bid price). The bid prices of successful bidders were low, surprisingly so, with the lowest bid being €0.37 a kilogram of renewable hydrogen. What is telling about the successful bid prices was that they were similar. Following agreed award for each project, each developer / sponsor must sign a grant agreement by **November 2024**, and commence supply of the renewable hydrogen within five years. Six of the seven

projects have signed their respective grant agreements, while the El Alamillo H2 project withdrew from the scheme. Click here for a list of the six projects.

On **December 3**, **2024**, the **EHB** launched its second auction, with **€2 billion** to be allocated to producers of green hydrogen (and other green vectors) [1].

- 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** for the **Net-Zero Industry Act** (**NZIA**). Following this agreement, the NZIA will be approved by each of the **Council** and the **European Parliament**, and then progress to enactment.

  The **NZIA** was approved by the **European Parliament** in **April 2024**, and entered into force on **June 29**, **2024**. **Net-Zero Technology projects** can apply for recognition of their project as a "**Net-Zero Strategic Project**" status through a **dedicated portal**.

- **India accelerates across the renewable sector**: Two of the key themes of 2024 were the progress that China continues to make in developing and deploying renewable electrical energy capacity at a consistent pace (having developed and deployed **1,350 GW** of renewable electrical energy capacity by the end 2024), and the acceleration of the progress of India to develop and to deploy **500 GW** of renewable energy by 2030. By **October 2024** India had installed around **210 GW** of renewable electrical energy capacity.

  The following news items from throughout 2024 illustrate the acceleration of progress in India:

  - **Government of India Offshore Wind Field (OWF) Tender**: In early **February 2024**, the **Ministry of New and Renewable Energy**, through the **Solar Energy Corporation of India** (**SECI**) commenced the bid process for **4 GW** of OWF development, across four areas (off the coast of the State of Tamil Nadu), each area with scope to install up to **1 GW**. The **Government of India** did not offer any funding support for the development of the OWFs, rather each developer is to contract directly with off-takers of electrical energy.
  - **SECI procuring green ammonia**: On **June 10**, **2024**, it was reported widely that the Indian state-owned enterprise, **SECI**, is undertaking a reverse auction process to procure **540,000 metric tonnes** of green ammonia a year. As reported, the green ammonia is to be used for domestic purposes and will be delivered to 11 delivery points across India.
  - **India approved first two offshore wind field developments**: On **June 20**, **2024**, the Indian cabinet approved the development of the first two offshore wind field developments, which together will have **1 GW** of installed capacity. It is understood that the subsidy to be paid for the development of these two offshore wind fields is approximately **USD 820 million**.
  - **Second Tender for GH_2**:

[1] **Edition 17** of **P_2N_0** reported that "**Terms and conditions for second auction by EHB published**: On September 27, 2024, the European Commission published **Invitation Fund IF24 Auction**, Terms and Conditions. Under the terms and conditions of the second auction, up to **€1.2 billion** of funding support will be provided, with successful bidders awarded fixed amount for each kg of renewable hydrogen to be produced and supplied into the European Union from the European Economic Area, with that funding support to be provided under contracts that will have terms of up to 10 years. The second auction will open on December 3, 2024. By way of reminder, **Editions 1**, **2**, **5**, **9** and **11** of **P_2N_0** reported on the development of the auction process by the EHB.

- On **July 5**, **2024**, the **SECI** issued a **Notice Inviting Tender** in respect of the supply of green hydrogen produced from green hydrogen production facilities in India. The invitation to tender is in respect of up to **450,000 metric tonnes** of green hydrogen a year, offering up to US 60 cents a kilogram in the first year of production with the price declining in the second and third years. This follows the same model as that used in the first tender for green hydrogen. The tender was over-subscribed with 14 corporations bidding to provide a combined 625,000 metric tonnes.

- On **July 31**, **2024**, **SECI** issued a **Request for Selection (RfS) Document** in respect of the development of **2 GW** of **photovoltaic solar capacity** and **1 GW** / **4 GWh** of **BESS** to be connected to the grid. In global terms, this is world scale procurement. The **RfS** contemplates a 25-year term offtake contract under a **BOO** model.

- **Love me tender suite**: Throughout **August 2024** there was a good deal of activity at Indian State level, providing a positive indication that progress develop and deploy renewable electrical energy:

  - **Uttar Pradesh**: On **August 12**, **2024**, **Uttar Pradesh** issued a **Request for Selection (RfS) Document** in respect of the development of **300 MW** / **1.4 GWh** of standalone **BESS**;

  - **Maharashtra**: On **August 16**, **2024**, **Maharashtra Electricity Distribution Company** issued a **Request for Selection (RfS) Document** in respect of the development of **300 MW** / **600 MWh** of standalone **BESS**. The **RfS** contemplates a 12-year term offtake contract under a **BOO** model; and

  - **Gujarat**: On **August 30**, **2024**, **Gujarat Urja Vikas Nigam Ltd** issued a **Request for Selection (RfS) Document** in respect of the development of **400 MW** / **800 MWh** of standalone **BESS**. The **RfS** contemplates a 12-year term offtake contract under a build, own, operate (**BOO**) model.

- **China making and meeting markets**:

  - In **January 2024**, the **China State Council** released a new regulation to provide a framework for a market to trade carbon emissions. As reported, the new regulation came into effect on May 1, 2024. The original framework came into force since **February 1**, **2021**, with the emission trading going live in **July 2021**. The original framework was "big news" in 2021, applying to more than **4 giga-tonnes** of GHG emissions each year. By the end of **2023**, the original framework applied to around **5.1 giga-tonnes** of GHG emissions.

    While the market is considered to have run smoothly since commencement in 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.

  - On **February 29, 2024,** it was reported widely that the **Zhangjiakou Kangbao** to **Caofeodian** hydrogen pipeline was 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, may be seen as an ideal – the pipeline running via cities with domestic demand for hydrogen, to a port city from which hydrogen may be exported.

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

- 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.

- **Vietnam spring roll out**: During **February 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 domestic or export market. In the context of the domestic market, the **Strategy** is targeting the **10% of final energy demand** in Vietnam to be met by hydrogen.

- During **March 2024**, the key news items were:

  - **UK Government allocated GBP 1 billion + in Allocation Round 6** (**AR6**): On **March 6 / 7**, **2024**, the **UK Government** (Department of Energy Security and Net Zero) announced that it has allocated over **GBP 1 billion** to provide funding under **CfDs** to subsidize the cost of renewable electrical energy, with up to **GBP 800 million** allocated for under **AR6**.
    The new budget (announced on **July 31**, **2024**) increased funding for renewable energy to **GBP 1.5 billion**. The budget comprised **GBP 1.1 billion towards offshore wind**, **GBP 185 million towards established technologies** such as onshore wind and solar, and **GBP 270 million towards emerging technologies** such as floating offshore wind and tidal.

    On **September 3**, **2024**, under the first auction under **AR6** the **UK Government** (**Department for Energy Security and Net Zero**) announced the award of **CfDs**. As reported CfDs were awarded as follows: **1.** East Anglia Two (964 MW) and East Anglia Three (160 MW); **2.** Inchcape (288 MW); **3.** Moray West (74 MW); and **4.** Ørsted was awarded two CfDs, one in respect of the development of the 1.08 GW Hornsea 3 OWF project and the 2.4 GW Hornsea 4 OWF project.

    In addition to the CfD awarded in respect of OWF capacity, CfDs were awarded in respect of **3GW** of photovoltaic solar capacity, and an average strike price of **£50.07** and **990 MW** of onshore wind capacity, with an average strike price of **£50.90 MWh**.

  - **Italian Government launched €1.1 billion fund to develop manufacturing capacity**: On **March 11**, **2024**, it was reported widely that the **Italian Government** had launched a **€1.1 billion fund** to provide funding to subsidize the development of energy transition manufacturing capacity. As reported, the focus is to subsidize the development of electrolyser production capacity. The **EC** approved the funding support on **March 8**, **2024**.

  - **Synthetic methane and e-methane production – coming together**:

    - On **March 10**, **2024**, **Nikkei Asia** (at **https://asia.nikkei.com**, under **Japan and Oman to mass produce e-methane in decarbonization push**) reported that **Hitachi Zosen** was to work with **Oman LNG** to produce **synthetic methane** or **e-methane** from the combination of hydrogen and carbon dioxide.

- On **March 19**, **2024**, it was reported widely that **Engie**, **Mitsubishi Corporation**, **Osaka Gas**, **Sempra Infrastructure**, **TES**, **Toho Gas**, **Tokyo Gas** and **TotalEnergies** intended to establish the **e-NG Coalition**.

- On **March 21**, **2024**, a positive final investment decision was taken in respect of the development the first on-shore liquid gas receiving terminal in Germany – the **Hanseatic Energy Hub**. The **Hanseatic Energy Hub** will import and re-gasify **synthetic methane** or **e-methane**.

- **Qualifying Advanced Energy Project Tax Credit (48(C))**: On **March 29**, **2024**, the **US Department of Energy** (**DOE**) and the **Inland Revenue Service** (**IRS**) announced **USD 4 billion** of tax credits in respect of more than **100 projects** across **35 US States** to accelerate domestic clean energy manufacturing and to reduce GHG emissions at industrial facilities. The tax credits are to be applied for **Clean Energy Manufacturing and Recycling** (in the amount of **USD 2.7 billion**), **Critical Materials Recycling, Processing and Refining** (USD 800 million), and **Industrial Decarbonisation** (USD 500 million).

- During **April 2024** the key news items related to co-firing of coal and ammonia by JERA, court cases requiring governments and corporations to do more to address GHG emissions, the coming into effect of the EU Renewable and Natural Gas Directive and Regulations, and the US EPA regulations on GHG emissions reductions.

  - **JERA coal and ammonia co-firing: On April 1**, **2024**, **JERA commenced co-firing of coal and ammonia at its Hekinan coal-fired power station**. As reported, the co-firing was part of a test program, which will complete on **June 19**, **2024**.
    On **June 26**, **2024**, **JERA**, working **IHI**, completed successfully the testing of co-firing coal and ammonia (80% coal / 20% ammonia mix). The **Japan Times** (at **www.japantimes.co.jp**, under **Jera ends ammonia co-firing trial with positive results**) reported that: "Jera said results were positive, confirming that nitrogen oxides levels were no higher than when firing coal alone, sulphur oxides were reduced by 20%, and generation of nitrous oxide, which has a strong greenhouse effect, was below detection threshold".

  - **Courts rule**: During **April 2024** two court cases were headline news:

    - On **April 2**, **2024**, it was reported widely that the appeal of the decision made in May 2021 was underway. In May 2021, the **District Court in The Hague**, in the Netherlands, delivered its judgment in a case brought against **Royal Dutch Shell plc** (**RDS**) by Mileudefensie (et al). The judgment required **RDS** to reduce the net CO_2 emissions of the **RDS** group by at least 45% by 2030, compared to 2019. The required reduction was across Scope 1, 2, and 3 emissions, not in respect of each Scope. The judgment was founded on **RDS** owing a duty of care to all Dutch citizens.

      On **November 12**, **2024**, the **Court of Appeal** in **The Hague** ruled in favour of **RDS**. While the **Court of Appeal** found that corporations have a duty to mitigate climate change through a reduction in GHG emissions, the obligation of **RDS** is not an absolute obligation to reduce its GHG emissions globally by 45% by 2030, compared to 2019 levels. Attached is a **link** to the decision of the **Court of Appeal**.

    - On **April 9**, **2024**, the **European Court of Human Rights** (**ECHR**) found in favour of a claim made by older Swiss women that policy settings in Switzerland were not addressing effectively the increased risk to them of death from heatwaves as a result of climate change. The judgment of the **ECHR** found that the

Government of Switzerland had not addressed the risk and had violated the human rights of the claimants. Attached is a **link** to the decision of the **ECHR**.

- **European Parliament adopts Renewable and Natural Gas** (**RNGH**) **Directive**: On **April 11**, **2024**, the **European Parliament** adopted the **RNGH Directive** and the **RNGH Regulation** (aka the **Decarbonised Gas and Hydrogen Package**). Having been approved by the **European Parliament**, the **Directive** and the **Regulation** was approved by the European Council and came into effect 20 days after being published in the **Official Journal of the EU** (**OJ**) on the 15th of July, 2024.

  The **Directive** and the **Regulation**, and the **TEN-E Regulation** will govern the development and repurposing of natural gas networks across the EU. The good folk at **The Oxford Institute for Energy** published a paper entitled **From natural gas to hydrogen: what are the rules for the European Gas Network decarbonisaton and do they ensure flexibility and security of supply**.

- **EPA and CCS**: On **April 25**, **2024**, the **US Environmental Protection Agency** (**EPA**) released a new regulation under which coal-fired power generators are required to reduce **GHG** emissions by 90% by 2039. For these purposes, coal-fired generators may use carbon capture and storage to capture CO_2.

  When the draft regulation was published in **May 2023** it contemplated the capture of CO_2 and co-firing of clean hydrogen to achieve the reduction target of 90% by 2039. By not including co-firing in the new regulation, the EPA appeared to recognize the uncertainty about available hydrogen, and its price.

  In **October 2024**, the US **Supreme Court** rejected requests filed by 27 US States for emergency relief to halt the application EPA regulation while litigation continues in lower courts.

- **CMM mining and production in focus**: Sitting alongside the anticipated increase in demand for electrical energy, is the anticipated demand for **CMM** and the need to develop supply chains for **CMM** that are assured, at a sustainable price. This theme was accompanied by a number of events and publications, including:

  - **UN Panel on Critical Energy Transition Minerals launched**: On **April 26**, **2024**, the **United Nations** launched its **Panel on Critical Energy Transition Minerals** with a **speech** from the **UN Secretary General**. Information on the Panel is to be found at **https://www.un.org**, under **The UN Secretary General's Panel on Critical Energy Transition Minerals**. The key point to note is that it is estimated (conservatively) that the demand for critical minerals will grow by three and a half times by 2030. The **Panel** comprises Government and Intergovernmental Actors, and Non-State Actors.

  - **Critical Mineral and Rare Earth Mapping**: On **May 7, 2024**, the **Federal Government of Australia** announced its intention to undertake a comprehensive mapping program of critical minerals within Australia, onshore and offshore. **Geosciences Australia** (a Federal Government Agency) will coordinate and lead the program. The announced budget for the program is **AUD 600 million** over 10 years. This marked a further initiative by the **Federal Government of Australia** recognizing the need for government to provide funding to assist and to support progress to net-zero emissions.

  - **Critical Minerals – front and centre stage**: On **May 17**, **2024**, the **IEA** published its **Global Critical Minerals Outlook 2024**.

In addition:

- during **August 2024**, the **IEA** published **Can government partnerships support responsible and reliable critical mineral supply chains?** The publication provides an excellent summary of the state of play, and a treasure trove of links to source materials, including **European Union and the Democratic Republic of Congo**, **United Kingdom and Zambia** and **United States and Japan;** research from **Natural Resource Governance Institute** on State-State Mining Partnerships and Their Implications; **Critical Minerals Policy Tracker**; **Extractive Industries Transparency Initiative (EITI) Standard**; **EU Critical Raw Materials Act** and **EU Global Gateway Strategy**.

- during **October 2024** the good folk at **BloombergNEF** published their flagship **Transition Metals Outlook 2024**. While the findings in the publication are not revelatory, the headline is that over the near to medium term aluminium, copper and lithium will face supply shortfalls, some as soon as within the next 12 months. Based on the analysis of the **BloombergNEF** team, recycling of metals and minerals needs to become an integral part of the supply chain for critical metals, both from a supply side perspective and lowering lifecycle GHG emissions.

- During **May 2024**, the key news items were:

  - **High Court of Justice in London**: On **May 3**, **2024**, the **English High Court** found that the climate action plan of the UK Government did not provide sufficient information to support the conclusion that the implementation of it will achieve the climate targets of the UK: "It is not possible to ascertain from the materials provided presented … which of the proposals and policies would not be delivered at all, or in full". The **judgment** of **Sheldon**, **J** is well worth a read.

  - **Japan progresses H_2 use and CO_2 capture**: On **May 17**, **2024**, the **House of Councilors of Japan** enacted:

    - **Hydrogen Society Promotion Act 2024** (**HSPA**), providing a framework to assess applications and the award of subsidies. At the time, it was understood that the first auction would provide funding support for up to 1 million metric tonnes a year of ammonia: likely sufficient for one or two projects. The funding support will be sourced from funds raised by the **GX Bond**, under which around **USD 20 billion** was raised. On **October 23**, **2024**, the **HSPA** came into effect.

      At the same time, the Japan Organization for Metals and Energy Security (**JOGMEC**) and Ministry of Economy, Trade and Industry (**METI**) went live with webpages dedicated to the **HSPA**, and details of the support scheme under the **HSPA** were released, being three forms of support, two financial, one administrative: **1.** Contracts for Difference (**CfDs**) (for a 15-year terms), with the Government to enter into **CfDs** to cover the delta between the clean hydrogen and clean ammonia and a reference price for grey hydrogen and ammonia; **2.** Support for FEED and EPC costs for share infrastructure; and **3.** Exemptions from approvals and permits that might otherwise be required. If seeking either or both means of financial support, support must be sought by a consortium that includes both a supplier of clean hydrogen or ammonia, and the end user of the clean hydrogen or ammonia.

- **CCS Business Act 2024** (**CCS Act**) provides for the implementation of CCS in Japan. The **CCS Act** provides for the tender of exploration rights and for the award of storage rights in respect of storage areas in which CO_2 may be stored permanently. The **CCS Act** contemplates that licences will be issued to allow exploration of storage areas and the storage of CO_2 in those areas, a two-licence regime.

  The **CCS Act** follows the announcement of the national emissions trading scheme of Japan (**GX-ETS**) in 2023. On **April 22**, **2024**, it was announced that the **GX-ETS** would accept voluntary carbon credits under it. The acceptance of voluntary carbon credits reflects the nature of the **GX-ETS** – a **pledge and review scheme**.

- **NEO 2024 published**: On **May 21**, **2024**, New Energy Outlook 2024 (**NEO 2024**) was published by **BloombergNEF**. **NEO 2024** outlines two climate scenarios **Net Zero Scenario** (the **NZS case**) and an **Economic Transition Scenario** (the **Base Case**). The **NZS Case** contemplates that peak demand for natural gas and oil and coal will be reached by 2025 and will decline steeply after 2050.

- **Implementation Agreement between Singapore and Ghana**: On **May 27, 2024**, it was reported widely that Singapore had signed an **Implementation Agreement** with **Ghana** for the purposes of cooperation in respect of carbon credits. (On **December 8**, **2023**, Singapore signed an **Implementation Agreement** with Papua New Guinea for the same purpose.) This continued the forward-thinking initiatives of the Government of Singapore, anticipating the operationalisation of Article 6 of the Paris Agreement.

- **US releases policy statement on Voluntary Carbon Markets**: On **May 28**, **2024**, the **US Departments of Treasury**, **Energy and Agriculture** released a Joint Statement of Policy and Principles for Responsible Participation in Voluntary Carbon Markets. The Joint Statement was signed by each Department Secretary and John Podesta, Senior Advisor to the President for International Climate Policy, Lael Brainard, National Economic Advisor, Ali Zaidi, National Climate Advisor. Also, the White House (at **https://www.whitehouse.gov**, under **Fact Sheet: Biden-Harris Administration Announces New Principles for High-Integrity Voluntary Carbon Markets**) affirmed the initiative. The **Voluntary Carbon Markets Joint Policy Statement and Principles** brings it all together.

- **China CO_2 emissions dip in March**: On **May 28, 2024**, **The Straits Times** (at **www.straitstimes.com**, under **Have CO2 emissions in China peaked? A 3% fall in March gives reason for hope**) reported that the carbon emissions arising in China during March 2024 fell by 3%, following "a 14-month surge" in carbon emissions. The dynamics in China continue to fascinate: demand for electrical energy in China continues to increase, with a year-on-year increase of 7.4% to the end of March 2024, with 90% of that increased demand matched by ever increasing photovoltaic solar and wind development and deployment.

- **FGG continues to define CO_2 and H_2**: On **May 29**, **2024**, the **Cabinet of the FGG** adopted principles for its Carbon Management Strategy, and a draft of Carbon Storage Act, and a draft of the Hydrogen Acceleration Act. The adoption of these principles and the draft Acts may be regarded as material progress towards the development of CCS capacity.

- During **June 2024** the following news items captured the attention of headline writers and those writing editorials:

- **China greens desert**: In the first week of **June 2024**, it was reported widely that China had "gone live" generating electrical energy from a **3.5 GW photovoltaic solar farm** located in the desert region of **Xinjiang Province**. As reported, the farm will generate a little over **6 TWh** of renewable electrical energy a year. In other words, a little less than the electrical energy supply required to match the load of Luxembourg. This is the third solar wind farm developed in China at (or above) installed capacity of **3 GW** and continues the roll-out of renewable electrical energy capacity across China.

- **IEA World Energy Investment report**: On **June 6**, **2024**, the **IEA** published its **World Energy Investment** report. The report is one of the flagship reports from the **IEA** each year. The key theme from the report is that photovoltaic solar may be regarded as the leading technology used to deploy renewable electrical energy (and electrical energy as a whole), and that this will continue. It is estimated that over **USD 500** billion will be invested in photovoltaic solar during 2024, with the majority of the investment in China.

  Also, during **June 2024**, the **IEA** published a **World Energy Outlook Special Report** entitled **Strategies for Affordable and Fair Clean Energy Transitions**. The publication is welcome - affordability is an ever present concept in progress to net-zero. The publication explores affordable energy transition, investment and resulting bills and policies that promote affordability (across the entire cost chain), price shocks, and the impact on affordability.

- **Lazard Levelized Cost of Energy + (LCOE+) Analysis**: In **June 2024**, the good folk at **Lazard** published the 17th edition of their flagship publication, **Levelized Cost of Energy +**. As always, the publication is well-worth a read, and likely will be a publication to dip into, until the next edition is published.

- **Global Carbon Project, N_2O budget**: On **June 10**, **2024**, the good folk at the **Global Carbon Project**, developers of the **Global Carbon Atlas**, published the **N_2O Budget 2024** or **Global Nitrous Oxide Budget**. CO_2, CH_4 and N_2O are often referred to as the **big three GHG emissions** or the **well-mixed GHG emissions**.

- **Climate finance in slow time and Article 6 glide-path:**

  - **Not so good in Bonn**: On **June 13**, **2024**, the **Bonn Conference**. The **Bonn Conference** provides the basis for preparation and progress ahead of each COP, this year **COP-29**. See the communique from the **Bonn Conference**. One of the key issues is the provision of climate finance: during 2022, developed countries provided **USD 100 billion** in climate finance (after two years of not doing so) to developing countries, and progress on climate finance was the most challenging issue at **COP-29** - see **Edition 21** of **P_2N_0**.

  - **No better in Italy**: At the **Group of Seven** (**G7**, comprising Canada, France, Germany, Italy, Japan, the UK and the US) meeting in Italy from **June 13** to **June 15**, **2024**, the provision of **climate finance** did not receive the hoped for airtime. See the communique from the **G7 meeting**.

  As noted **Edition 21** of **P_2N_0**, **COP 29** was book-ended by informed consensus to operationalize **Article 6** and hard-fought consensus to a compromise on **climate finance**.

- **German Government announces results of offshore wind field auctions**: On **June 22**, **2024**, the **Federal German Government** announced the results of the auction for **2.5 GW** of offshore wind field capacity. The successful bidders were, **Offshore Wind One GmbH** (owned by TotalEnergies), awarded a contract to develop

area **N-11.2**, with the potential to install up to **1.5 GW** of capacity, and **EnBW Offshore Projektgesellschaft 1 GmbH**, awarded a contract to develop area **N-12.3**, with the potential to install up to **1 GW** of capacity. **N-11.2** and **N-12.3**.

- **Air Liquide welcomed to Baytown, Texas**: On **June**, **24**, **2024**, **Air Liquide** announced (at **https://www.airliquide.com**, under **Decarbonization: Air Liquide selected for invest up to 850 MUSD in largest low-carbon oxygen production in the Americas**) that it planned to invest up to **USD 850 million** to build, own and operate four **Large Modular Air separation units** (and ancillary infrastructure) under a long-term offtake agreement with **ExxonMobil**.

- **Polaris FID**: On **June 26**, **2024**, **Shell** announced (at **https://www.shell.com**, under **Shell to build carbon capture and storage projects in Canada**) that it had taken a positive **final investment decision** (**FID**) to capture **650,000 metric tonnes** of CO_2 arising annually from its refinery and petrochemical facilities located in **Scotford**, in the **Canadian Province of Alberta**. At the same time as the taking of **Polaris FID**, **ACTO EnPower** and **Shell** agreed to proceed to develop the **Atlas Carbon Storage Hub** to provide storage for the captured CO_2 from the **Polaris project**.
- **World's Largest Green Hydrogen, Ammonia and Methanol Integrated Project**: On **June 29**, **2024**, it was reported widely that a **USD 4.2 billion Green Hydrogen-Ammonia-Methanol Integrated Project** is to be developed by **Sungrow Hydrogen** in **Jilin**, **China**, to produce **110,000 metric tonnes** of green hydrogen and **600,000 metric tonnes** of green ammonia / green methanol a year. The project is to be developed in stages, with the first stage involving the development of **800 MW** of renewable electrical energy capacity (comprising photovoltaic solar and wind), a **45,000 metric tonnes** a year green hydrogen production facility, a **200,000 metric tonnes** a year green ammonia facility, and a **20,000 metric tonnes** a year green methanol production facility.

  Jilin, **China** has become something of a paradigm for those looking to understand what a decarbonized city may look like. This was emphasized further on **July 11, 2024**, with **hydrogeninsight.com** providing an **update** on the **USD 900 million Da'an Wind and Solar Green Hydrogen and Ammonia Integrated Demonstration Project**. The **Da'an Project** (part of the **Jilin West Clean Energy Chemical Industry Park**) will be the world's largest green hydrogen and ammonia synthesis report, which will produce **32,000 metric tonnes** of green hydrogen and **180,000 metric tonnes** of green ammonia.

- During **July 2024** there was a good deal of news ahead of the northern hemisphere summer holiday season:

  - **World Bank to provide USD 1.5 billion**: On **July 1**, **2024**, it was reported widely that the **World Bank** was to provide up to **USD 1.5 billion** in funding to support the development, in **India**, of green hydrogen production, and renewable electrical energy (including use of **battery energy storage system** (**BESS**)), and to encourage private sector investment across each of these areas. This is the **Second Low-Carbon Energy Programmatic Development Policy Operation**, complementary to the **First Low- Carbon** funding round (which also provided up to **USD 1.5 billion** of funding support) to which the **World Bank** committed in **June 2023**.

  - **No drift in US Policy Settings**: On **July 1**, **2024**, the **IEA** published its **United States 2024 – Energy Policy Review** in partnership with the **Federal Government of the US**. The **Review** shines a light on the energy policy settings in the US, concluding the US: "has put in place significant energy and climate policy reforms designed

to put the country on a pathway towards a clean, secure and affordable energy system for a new zero economy while promoting equity and high-quality jobs". The **Executive Summary** provides a succinct report card.

- **China continues scaling up of renewable capacity**: On **July 4**, **2024**, it was reported widely that the **Three Gorges Renewable Group** is to develop a **16 GW electrical energy hub**, the cost of which is likely to be a little over **USD 11 billion**. The electrical energy hub, to be located within **Inner Mongolia**, will provide electrical energy to **Beijing**, **Hebei**, and **Tianjin**, and will comprise **8 GW of photovoltaic solar capacity**, **4 GW of wind capacity** and **4 GW of coal-fired capacity** (and **200 MW** of solar thermal, and **500 MWh** of **BESS**).

- **FGG to tender for H_2 ready electrical energy generation capacity**: On **July 6**, **2024**, it was reported widely that the **FGG**, by the end of 2024 or early 2025, will tender for works to construct, or to modify, **12.5 GW** of gas-fired power stations so that they are ready to use H_2. As reported, there will be two tenders, each for **5 GW** of new hydrogen-ready gas-fired power stations: (1) to modify **2GW** of existing gas-fired power station capacity, and (2) to develop **500 MW** of H_2 fired power stations, and for **500 MW** of H_2 storage capacity.

- **FGG tender for green H_2**: On **July 11**, **2024**, it was reported widely that **Fertiglobe** had been successful in the auction process to procure green hydrogen into Europe. As reported, under the **H2Global Foundation** initiative, **Fertiglobe** is to receive **€397 million** in respect of the supply of green ammonia to Europe. The supply is to commence in 2027 with the supply of **19,500 metric tonnes**, increasing to **397,000 metric tonnes** by 2033, at a delivered contract price of **€1,000 a metric tonne**.

- **bp Energy Outlook 2024**: During **July 2024**, the good folk at **bp** published **bp Energy Outlook 2024 edition**. Each edition of this publication is awaited eagerly, providing a targeted assessment of themes and trends. Consistent with other flagship reports, the **bp publication** states that if current trends continue, we are going to exceed a $2^{O}C$ increase in global average temperatures by 2040, and as such the objectives of the Paris Agreement will not be achieved. Key to this assessment is that the mass of CO_2 emissions continues to increase, rather than to peak.

- **US Hydrogen Hubs**:

  - On **July 17**, **2024**, it was **announced** that the **US State of California** had launched its **Hydrogen Hub** (**ARCHES**). The launch follows the execution by the US **Department of Energy** (**DOE**) and **ARCHES** of a cooperation agreement for the development of a clean, renewable **Hydrogen Hub** in California, which includes the **USD 1.2 billion** of funding announced in 2023.

  - On **July 24**, **2024**, the **Pacific Northwest Hydrogen Association** (**PNWH2**) executed a cooperation Agreement with the US **DOE**.

  - In early **August 2024**, the **Appalachian Hydrogen Hub** (**ARCH2**) was awarded funding for initial planning and development activities across the US States of **Ohio**, **Pennsylvania,** and **West Virginia**. This represents the continuation of the roll-out of the **Regional Clean Hydrogen Hubs Program** managed by the US **Department of Energy** (**DOE**).

- **Shanghai to install 29 GW of offshore wind field capacity**: On **July 22**, **2024**, **offshorewind.biz** (**at https://offshorewind.biz**, **under Shanghai Plans to Install 29 GW of Offshore Wind Capacity**) reported

that Shanghai plans to install **29.3 GW of offshore wind field capacity** with the intention of supplying **100 TWh** a year of green electrical energy to the **City of Shanghai**.

- **Hottest in July**: During the week beginning **July 22**, **2024**, there was considerable reporting on the fact that Sunday July 21, 2024, at 17.09^{O} Celsius or 62.76^{O} Fahrenheit, and Monday July 22, 2024, at 17.15^{O} Celsius or 62.87^{O} Fahrenheit, were the two hottest days by the average surface temperature around the globe since measurements began in 1940. For the source information, **pulse.climate.coperinus.eu**.)

- **ERCOT Q2 47% renewable**: In the final week of **July 2024**, it was reported widely that **ERCOT** (Electricity Reliability Council of Texas) had matched **47%** of electrical energy load within the **US State of Texas** from clean energy sources. This capacity to dispatch this level of renewable electrical energy has been achieved in a relatively short period of time. In an article by **Renew Economy** (at **reneweconomy.com.au**, under **Learnings from the Texas grid, and why it's been able to add so much solar and battery storage**), the success of ERCOT in connecting solar and BESS is analyzed.

- **European Hydrogen Backbone** (**EHB**) **developing**:
  - **EnBW €1 billion commitment**: On **July 23**, **2024**, **EnBW** (**German TSO**) **announced** that it intends to invest **€1 billion** in expanding the core national hydrogen pipeline system, which will form part of the **EHB**.

  - **Enagás closing in on €4.9 billion commitment**: On **July 31**, **2024**, the Spanish Government approved, provisionally, the development of a national hydrogen pipeline network, and two hydrogen storage facilities, and, as part of the **EHB**, hydrogen pipeline infrastructure with France and Portugal.

- **EU to promote €5 billion to develop wind manufacturing**: On **July 31**, **2024**, it was reported widely that the **European Investment Bank**, working with **Deutsche Bank**, has developed a **€5 billion** initiative to support increased manufacturing capacity within the EU to enable the supply to the wind power industry.

- During **August 2024** the following matters were significant news items:

  - **Methane regulation release**: On **August 4**, **2024,** the **EU Methane Regulation** went live. As number of articles and publications have covered the **EU Methane Regulation**.

    Two articles worthy of recommendation are those penned by:

    - Alex Kerr, Partner in the Global Projects Group at Baker Botts, and entitled **EU Methane Regulation: A Problem for the LNG Industry?;**

    - The Oxford Institute for Energy Studies, and entitled **The EU Methane Regulation – What will be the impact on LNG Imports?**

- **Methane a key focus**: The increasing levels of methane in the climate system have been marked, and the policy settings to address them would appear to be emerging recognizing that the concern about increasing methane levels is not new[2]. The **IEA** has stated consistently that to limit the increase in global average temperatures to 1.5^{O} C methane emissions from fossil fuel operations must be reduced by 75% by 2030. In the words of the IEA, further action from countries and corporations is needed. The good folk at **Top Science** published **Human activities now fuel two-thirds of global methane emissions** on **September 10**, **2024**, the fourth such publication from the **Global Carbon Project**.

Some facts and stats about methane (CH_4)

The levels of **CH_4** in the atmosphere are increasing, currently reported at **1929 ppb**. **Sixty per cent** (**60%**) of **CH_4** emissions arise from human activities, with agriculture, forestry, and other land uses (**AFOLU**), extraction and production of fossil fuels, and the decomposition of the organic fraction of waste disposed of to landfill (typically, landfill gas (**LFG**) gives rise to 48% CO_2 and 48% CH_4) being the main contributors. See **Global Methane Budget** for more information.

While the lifespan of a CH_4 molecule is between seven and twelve years, considerably less than the 100 years of a CO_2 molecule, each molecule of CH_4 absorbs more radiative heat and as such has a greater global warming potential than a molecule of CO_2. It is estimated that CH_4 is responsible for between 20% and 30% of average climate temperature increases since pre-industrial times, with CH_4 emissions having doubled since pre-industrial times.

Because of these factors, the avoidance and reduction of the emission of CH_4 to the climate system offer a route to near to medium term mitigation of climate change.

While it is relatively straightforward to track the levels of CH_4 in the climate system, it is necessary to monitor activities from which CH_4 emissions arise (including fugitive emissions along the entire supply / value chain), and then to introduce policy settings and laws and regulations to avoid and to reduce CH_4 emissions arising.

It is recognized that avoiding and reducing CH_4 emissions from AFOLU is likely to prove most challenging, and why there is a focus through the OGDC and why the capture of LFG from existing landfills, and the separation of CO_2 and CH_4, and the production of H_2 from the CH_4 is now the subject of pilot projects. This is in addition to the long-standing policy setting in many countries of achieving zero waste to landfill.

- **Taiwan awards 2.7 GW of OWF capacity**: At the end of the first week of **August 2024**, following an auction process, **Taiwan** awarded five **OWF** projects, with combined project installed capacity of **2.7 GW**. The five projects are: 1. **Copenhagen Offshore Partners (Formosa 2**, **600 MW)**; 2. **Corio Generation** / **TotalEnergies** (**Formosa 3**, **360 MW**); 3. **Enervest** (**Deshuai**, **240 MW**); 4. **Shinfox Energy** (**Youde**, **700 MW**); and 5. **Synera Renewable Energy** (**Formosa 6**, **800 MW**).

[2] **Edition 15** of **P_2N_0** recounts the **Global Methane Pledge** as follows: "Ahead of **COP-26** in **Glasgow**, **Scotland**, in **November 2021**, the **EU** and the **US** signed the Global Methane Pledge to reduce CH4 emissions by one third by 2030. 158 participants have now signed the Global Methane Pledge (with the details of the countries that have pledged listed at **www.globalmethanepledge.org)**" and reported that: "On **August 7**, **2024**, the **World Economic Forum** published **Global Methane Pledge: which countries are cutting emissions?** The publication provides a light-touch in noting that more needs to be done."

- **Successful bidders announced for 5.5 GW of OWF capacity**: On **August 12**, **2024**, **Luxcara** and **RWE** were announced as the successful bidders for OWF capacity in the German sector of the North Sea. **Luxcara** was awarded area **N-9-3** (with up to **1.5 GW** of capacity), and **RWE** was awarded areas **N-9-1** and **N-9-2** (each with up to **2 GW** of capacity).

- **The Philippines and Singapore align around Article 6**: On **August 15**, **2024**, the **Philippines** and **Singapore** signed a memorandum of understanding (MOU) in respect of **Article 6** of the **Paris Agreement**. This reflects the continued cooperation between the countries in respect of climate change and environmental matters, also it reflects Singapore's continued focus on the development of bilateral agreements to allow it to realise the benefits of the operationalization of **Article 6**.

- **Dutch auction**: On **August 20**, **2024**, **h2-view** (at **https://www.h2-view.com**, under **Dutch Government to hold $1billion hydrogen auction in October**) reported that the **Dutch Government** was to commence an auction for the procurement of green hydrogen on **October 15**, **2024**, and conclude the auction process by the end of October. The auction will provide up to **€998** million in subsidies to allow the development of 200 MW of electrolyser production capacity. As reported previously in **Edition 14** of P_2N_0, it is contemplated that the subsidies will provide up to 80% of the capital cost of the development of the capacity.

- **Texas = Energy transition in real time**: On **August 22**, **2024**, **reneweconomy reported** on the continued demonstration of fitness for purpose of electrical energy transmission grid in Texas. The reporting from **reneweconomy** notes that average rate of penetration of photovoltaic solar and wind generation in Texas is 31%, with a peak instantaneous penetration of 71%: during the week ending **August 23**, **2024**, gross load across Texas achieved a record peak of **86 GW**, with net-load also at a record peak of **70.9 GW**. The key takeaway is that even at these peak level prices, in real time, the price stayed tethered to USD 45 MWh during day-time hours. As the sun sets, load was matched by natural gas, nuclear and coal-fired power generation.

  As the grid in Texas continues to develop, expect more BESS, considerably more BESS. Whether Texas or California is leading the way in comparison to each other, one thing is for sure, they are leading the way.

- **FGG plans CCS / CCUS funding program**: On **August 23**, **2024**, the **FGG** announced plans to provide up to **€3.3 billion** to fund decarbonization initiatives across German industries. In context, Germany is committed to achieving net-zero GHG emissions by 2045, and German industry has not been decarbonizing at a rate consistent with this target. The use of CCS / CCUS is now recognized as an integral part achieving this target. As reported, from the launch of the program in **September 2024** German corporations and other organizations will have three months to propose projects for funding support.

- **Linde takes FID on Blue Hydrogen project**: On **August 27**, **2024**, **Linde** took a positive final investment decision in respect of the development of a **USD 2 billion** blue hydrogen project in **Alberta**, **Canada**. The blue hydrogen production facility will supply blue hydrogen to **Dow**, with the blue hydrogen to be used by **Dow** to produce plastics.

- During **September 2024**:

  - There was a free flow of news about **Data Centres** and **generative AI**:

- On **September 4, 2024**, the reported headline from a **Morgan Stanley study** was that the development of data centres is likely to result in a further **2.5 billion** metric tonnes of CO_2 by 2030, with carbon capture and storage a key element in addressing the increased emission of CO_2.

- On **September 7**, **2024**, it was reported widely that **STT Telemedia** intends to invest **USD 3.2 billion** to expand its data centres across India. Among other things, this is in response to Generative AI applications.

- On **September 12**, **2024**, it was reported widely that the **UK Government** had designated data centres as **Critical National Infrastructure** (**CNI**). Being designated as **CNI** means that data centres will have the same status as emergency services and utilities companies, including to ensure continued operation.

  "Data centres are the engines of modern life; they power the digital economy … ".

- On **September 13**, **2024**, it was reported widely that **Oracle** intends to develop **1 GW** of dedicated nuclear electrical energy capacity to assure **Oracle** of the supply of electrical energy for to a giga-scale data centre. **Oracle** intends to develop and deploy three **Small Modular Reactors** (**SMRs**) for this purpose. As reported, **Oracle** has 162 cloud data centres globally, with the largest of those centres having 800MW capacity.

- On **September 30**, **2024**, it was reported widely that **Google** intends to invest **USD 1 billion** in the development of a new data centre (and related infrastructure) in **Thailand**.

- **Singapore expands green electron imports**: **On September 5**, **2024**, it was reported widely **Shell Eastern Trading (400MW)** and **Singa Renewables** (**1 GW**) had been given "conditional approval" by the **Energy Market Authority (EMA)** in respect of the proposal to import up to **1.4 GW**. This continues the grant of conditional approvals, intended to facilitate engagement with regulators to obtain approvals and licences that would allow the import of renewable electrical energy into Singapore.

  For more detail, see the **EMA** announcement at **https://www.ema.gov**, under **Singapore and Indonesia Make Substantive Progress on Electricity Imports**), which provides coverage of five other Indonesian-based projects, each covered by **P_2N_0** previously.

- **CO_2 transport and storage licences grants proposed**: On **September 6**, **2024**, the **UK Government** (Department for Energy Security and Net Zero) gave notice of proposal to grant carbon dioxide transport and storage licences to **Liverpool Bay CCS Limited** and **Net Zero North Sea Storage Limited**.

- **IEA** published:

  - The **2024 Breakthrough Agenda Report**: This report has become one of the key annual reports, covering power, hydrogen, road transport, iron and steel, cement and buildings, and the progress being made or that needs to be made compared to the previous report: the purpose of the report is stated to "galvanise public and private action … to make [transition across these priority sectors] quicker, cheaper and easier for all".

    The consideration of iron and steel and cement are particularly timely: iron and steel and cement (and the concrete resulting) are required, and as such they need to be decarbonized, with the sourcing of raw

material, its transportation to the point of production, production, and transportation of finished product to the point of use of these two industries accounting for up to 20% of GHG emissions.

Links to the **first** (**2022**) and **second** (**2024**) **Breakthrough Agenda Reports** are attached.

- **State of Energy Policy 2024**: This publication is a first for the **IEA**. This publication may be regarded as complementary to the **2024 Breakthrough Agenda Report**. The publication provides an overview of the development of policy settings across the energy sector, and as such energy transition between June 2023 and September 2024. The publication provides an overview of over 50 policy settings across 60 countries. The publication is tied to the **IEA Energy Policy Inventory**, which, in turn, ties into to the **IEA** report **Tracking Clean Energy Innovation Policies**.

  Towards Common Criteria for Sustainable Fuels: This publication focuses on how to characterise sustainable fuels (being fuels derived from feedstocks that are sustainable), including liquid biofuels, biogases, hydrogen, and hydrogen-based fuels. The analysis in this publication is built on the foundation provided by the **IEA** **Net Zero Emissions by 2050 (NZE) Scenario**, contained in **Global Energy and Climate Model**. The publication provides a perspective that takes in the current policy settings globally, including in respect of hydrogen and hydrogen based and derived fuels, more than half of which provide for GHG emission intensity of less than 33 gCO_2-eq per MJ.

- **Oman pre-qualifies applicants for wind power projects**: On **September 16**, **2024**, it was reported widely that **Nama Power and Water Procurement Company** (**PWP**) has released a **list** of pre-qualified applicants for the purposes of the participation in the five wind power projects: **1**. Dohor II Wind IPP, **2**. Duqm Wind IPP, **3**. Jaalan Bani Bu Ali Wind IPP, **4**. Mahoot I Wind IPP, and **5**. Sadah Wind IPP. As will be noted for those who click on the link, the names of the pre-qualified applicants speak volumes from the process being run by PWP.

- **KSA renewable energy procurement**:

  - On **September 24**, **2024**, the **Saudi Power Procurement Company** (**SPPC**) released a **request for qualification** (**RfQ**). The **RfQ** is the sixth procurement undertaken by the **SPPC**, as part of the **National Renewable Energy Programme** (**NREP**). As reported, five projects are contemplated: **1**. the **1.5 GW Dawandi Wind IPP**, to be located in Riyadh; **2**. the **1.4 GW Najran Photovoltaic IPP**, to be located in Najran; **3**. the **600 MW Samtah Photovoltaic Solar IPP**, to be located in Jizan; **4**. the **600 MW Ad Darb Photovoltaic Solar IPP**, to be located in Jizan; and **5**. the **400 MW As Sufun Photovoltaic Solar IPP**, to be located at Hail.

  - On **October 23**, **2024**, the **SPPC** announced the bidders that had been shortlisted for the fifth round:

Name	Shortlisted Bidders	Bid prices
2 GW Al-Sadawi Project	Masdar and KEPCO consortium; SPIC Huanghe Hydropower Development Limited and EDF consortium	USD 0.0129 per kWh USD 0.0131 per KWh
1 GW Al-Masaa Project	Al Jomaih Energy and Water Company and TotalEnergies consortium	USD 0.0136 per KWh USD 0.0131 per KWh

	SPIC Huanghe Hydropower Development Limited and EDF consortium	
400 MW Al-Henakiyah2 Project	Masdar and Nesma Renewable Energy consortium SPIC Huanghe Hydropower Development Limited, EDF KEPCO consortium	USD 0.0151 per KWh USD 0.0140 per KWh
300 MW Rabigh2 Project	Al Jomaih Energy and Water Company, TotalEnergies and KEPCO consortium Masdar and Nesma Renewable Energy consortium	USD 0.0178 per KWh USD 0.0189 per KWh

To provide some perspective on the roll-out of **KSA** **Future Investment Initiative**, at the end of **October 2024**, **31.2 GW** of renewable electrical energy projects had been tendered for development, of which **6.16 GW** of installed capacity has been developed and deployed and grid-connected, **12.74 GW** of renewable electrical energy capacity is under development, and a further **12.3 GW** of planned renewable electrical energy capacity is under tender. It is understood that by the end of 2024, **44.4 GW** of renewable energy projects will have been tendered, and that around **20 GW** of new renewable electrical energy capacity development will be tendered year on year, with the plan to have **130 GW** of installed capacity by 2030.

The rate of progress within the **KSA** is marked, and the tender process at scale is yielding some of the lowest if not the lowest price points for renewable electrical energy globally. These price points are a function of many things, but critical among them are clear policy settings, and creditworthy off-take.

- During **October 2024**:

  - **UK went all in on CCS**: On **October 4**, **2024**, the Prime Minister, Chancellor of the Exchequer, and Minister for Energy Security and Net Zero Secretary together announced that the UK Government (Department for Energy Security & Net Zero) has committed to provide support of **£21.7 billion** over the coming 25 years to underpin the development of CCS / CCUS sites around the UK, starting with funding for the **East Coast Cluster** (in the North East of England) and **Hynet** (in the Northwest of England) to commence in 2028. Among other things, the funding support will allow the production of blue hydrogen.

    The **East Coast Cluster** and **HyNet** both include Track 1 transport and storage systems. This announcement is consistent with policy settings of the previous UK Government. For further detail click through to the following link: **https://www.gov.uk** at **Government reignites industrial heartlands 10 days out from International Investment Summit**.

  - **IEA** was "all in" on publications:

    - On **October 2**, **2024**, publishing its **Global Hydrogen Review 2024**. As with previous **Global Hydrogen Reviews** from the **IEA**, the publication is weighty, the weightiest yet, at 295 pages. In a rare event, the **IEA** cautions the application of regulatory requirements in both the EU and the US:

      "Extra requirements for electricity used to produce electrolytic hydrogen, such as additionality, temporal and spatial correlation, should be applied cautiously."

The publication provides a helpful update on the progress of the development of green hydrogen projects, with **final investment decisions** (**FIDs**) taken in respect of around **6.5** GW of green hydrogen production capacity in the last 12 months alone, with **FIDs** now at around **20 GW**.

- On **October 9**, **2024**, publishing its **Renewables 2024 – Analysis and forecast to 2030**. As with previous **Renewables** annual reviews from the **IEA,** the publication provides a comprehensive overview of the rate and scale of the development of renewable electrical energy globally.

  As with the **BloombergNEF** **Energy Transition Factbook**, **Renewables 2024** is anchored to the **COP-28** commitment to tripling the development and deployment of renewable electrical energy capacity by 2030.

  The headline from **Renewables 2024** was that renewable electrical energy capacity is expected to increase **2.7 times** by **2030**, and as such short of **3 times** (or tripling). It is clear that countries need to do more.

- On **October 16**, **2024**, publishing its flagship publication, **World Energy Outlook 2024** (**WEO 2024**). Continuing the publication of publications and reports ahead of COP-29, **WEO 2024** is alongside **BloombergNEF** flagship publication, **Energy Transition Fact Book** and **IRENA's** **Delivering on the UAE Consensus Tracking progress toward tripling renewable energy capacity and doubling energy efficiency by 2030** (see below).

  The high-level take-ways from **WEO 2024** were:

  - **WEO 2024** continues the ongoing analysis of its **three scenarios**, **Announced Policy Settings** (**APS**), **Stated Policies Scenario** (**STEPS**) and **Net Zero Emissions by 2050 Scenario** (**NZE**). Click through to the previous WEOs, **2021**, **2022** and **2023**.

  - Given the current dynamics of the energy market, each of **APS**, **STEPS** and **NZE** are viewed through including AI, efficiency of energy use and the development of renewable electrical energy capacity, the impacts of heatwaves and the impact of the increasing use of LNG. This is a helpful development.

- **Floating OWFs off South Korea**: On **October 11**, **2024**, it was reported widely that five floating OWF developments, Bandibuli, Gray Whale, Haewoori, KF Wind, and MunmuBaram, had entered into transmission service agreements (**TSAs**) with KEPCO. Under the five TSAs, **6 GW** of **installed OWF capacity** is now connected to the **KEPCO** transmission grid. During the final week of **October 2024**, further details emerged from the **Ministry of Trade and Industry**, that it is to run a tender for **1.8 GW** of wind generation capacity development, with **1.5 GW** of **OWF** capacity of which **1 GW** will be fixed bottom, and **500 MW** floating.

- **€3.1 billion CDR funding in Sweden**: The **Swedish Government** started to run auctions under which CDR projects will be provided with funding support. The first auction is intended to encourage **BECCS projects**. As understood, the first auction will provide funding support in respect of **600,000 metric tonnes** of capture and storage to commence by 2026, with a target to capture and store permanently **2 million metric tonnes** of CO_2 a year by 2030. The support will be provided following demonstration that CO_2 has been stored permanently.

- **FGG approves construction of country wide hydrogen network**: On **October 22**, **2024**, the German **Federal Network Agency** approved the construction of a **€19 billion** hydrogen network across Germany. As announced, the hydrogen network will be developed by 2032, and will have a total length of 9,040km.

- **H2Global auction**: On **October 24**, **2025**, the good folk at **hydrogeninsight** (at **https://www.hydrogeninsight.com**, under **The next round of H2Global auctions will procured hydrogen made in Europe as well as from outside the EU**) reported that the next round of auctions in the **H2Global initiative** will award **€3.5 billion** in funding for the development of renewable hydrogen produced inside and outside the EU. Results of the previous **H2Global initiative** auction conducted can be found **here**.

  By way of a reminder, the **European Hydrogen Bank initiative**, is distinct from the **H2Global initiative**. Results of the previous **EHB initiative** can be found **here**.

- During **November 2024**:

  - **WETO 2024**: On **November 7**, **2024**, the **International Renewable Energy Agency** (**IRENA**) published its **World Energy Transitions Outlook 2024**, as usual just in time for COP. **WETO 2024** presents a pathway to achieve the 1.5OC target. As usual, **WETO 2024** is compulsory reading.

  - **Indonesia shared plans for renewable energy roll-out**: On **November 11**, **2024**, **Climate Envoy for Indonesia**, **Hashim Djojohadikusumo** announced that Indonesia intends:
    - to develop **100 GW** of electrical energy capacity through 2040, of which **75 GW will be renewable electrical energy**, representing a little more than the current installed electrical energy capacity of Indonesia at **90 GW**; and

    - to roll-out **75,000 kms** of new transmission line capacity with PLN (the state-owned integrated energy company to develop this capacity).

  - **KOSPO left as lone bidder**: On **November 22**, **2024**, **Korean Southern Power Co., Ltd**. (**KOSPO**) announced that it was the only corporation selected to participate in the bidding process for electrical energy using clean hydrogen to be undertaken by the **Korean Power Exchange** for the Clean Hydrogen Energy Portfolio Standards (**CHPS**). As reported, the reason that KOSPO is the only corporation selected is that it is the only corporation that was able to satisfy the confidential price cap.

- During **December 2024**:

  - **The Netherlands opts for H_2 and CCS**: On **December 5**, **2024**, the **Dutch Government** announced that the **Delta Rhine Corridor** (**DRC**) will transport hydrogen and CO_2, and that the **DRC** will not now include a 6 GW HVDC.

  - **Market opts out bidding for OWF**: On **December 6**, **2024**, the **Danish Energy Agency** announced that it had not received any bids to development OWF off of Denmark. This rounds out a difficult year for the OWF sector.

Primary 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

STUART JORDAN
Partner
stuart.jordan@bakerbotts.com

DANIEL REINBOTT
Partner
daniel.reinbott@bakerbotts.com

ANDREW ROCHE
Partner
andrew.roche@bakerbotts.com

MARK ROWLEY
Partner
mark.rowley@bakerbotts.com

SHANE WILSON
Partner
shane.wilson@bakerbotts.com

SHAILESH SAHAY
Partner
shailesh.sahay@bakerbotts.com

* Michael Harrison is the primary author of **P_2N_0**, and editor. Any errors are Michael's. **P_2N_0** is written early each Saturday morning. In writing **P_2N_0**, Michael sources from original material. If a news item is covered broadly, the words **reported widely** connote that at least three publications have covered that news item, and reported connotes at least two sources. If there is only one source that is not the original material, that source is named.

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