P2N0 NEWS AND VIEWS ON THE DRIVE TOWARDS NET-ZERO GHG EMISSIONS

Welcome to the **seventh edition** of **P_2N_0** providing our take on the key themes arising during 2023, and for 2024.

On **February 6**, **2024**, the **eighth edition** of **P_2N_0** will be published, covering key news items arising in January 2024.

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**.

Edition 7: Key themes during 2023 and for 2024

INTRODUCTION:

During **2023**, a number of themes arose consistently, and those themes appear likely to continue as themes during 2024.

Book ending calendar year **2023** were:

- In December 2023, from **COP-28**, to date the most coherent of narratives emerged in **Outcome of the first Global Stocktake** (**COP-28 Agreement**).
  - The headlines arose from **Paragraph 28:** *"Further recognizes* the need for deep, rapid and sustained reductions in greenhouse gas emissions in line with the 1.5°C pathways and *calls* on Parties to contribute to the following global efforts, in a nationally determined manner, taking into account the Paris Agreement and their different national circumstances, pathways and approaches:
    (a) **Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030**;
    (b) Accelerating efforts towards the phase-down of unabated coal power;
    (c) **Accelerating efforts globally towards net zero emission energy systems, utilizing zero- and low-carbon fuels well before or by around mid-century**;
    (d) **Transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science**;
    (e) **Accelerating zero- and low- emission technologies, including, inter alia, renewables, nuclear, abatement and removal technologies such as carbon capture and utilization and storage, particularly in hard-to-abate sectors, and low-carbon hydrogen production**;
    (f) Accelerating and substantially reducing non-carbon-dioxide emissions globally, including in particular methane emissions by 2030;
    (g) Accelerating the reduction of emissions from road transport on a range of pathways, including through development of infrastructure and rapid deployment of zero- and low- emission vehicles;

(h) Phasing out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible."

[**Note:** Emboldening added by the author of **P_2N_0**]

- During Q1 of 2023, in the lead up to **Copenhagen Climate Ministerial** (held on **March 20** and **21**, **2023**), and after, clarity arose as to what needed to be done ahead of **COP-28**. The **Synthesis Report (SYR) of the IPCC Sixth Assessment Report** (**AR6**) provided clear context to the **Ministerial**, and impetus to what needed to be done.

  The key work included:

  1. **Adaptation and mitigation**: deeper and transformative adaptation action and enhanced support, to increase resilience to the impact of climate change, and, in the context of the global stocktake of nationally determined contributions (**NDCs**), how to enhance adaptation.

  2. **Finance**: action to ensure implementation of Article 2 of the Paris Agreement, including tying provision of finance to implementation of **NDCs**, and to ensure that provision of finance is increased, critically, 2023 had been seen as the year in which developed countries were projected to reach the promised (and the required) USD 100 billion a year of financing for developing countries, and in which countries would commit to the **Green Climate Fund** agreed (in concept) at **COP-27**.

  3. **Loss and damage**: It was recognised that there was a major gap in addressing loss and damage. The **Copenhagen Climate Ministerial** wanted to see the **Loss and Damage Fund** fully operational before the conclusion of **COP-28**. This occurred on the first day of **COP-28**.

  4. **Global stocktake**: The **Copenhagen Climate Ministerial** noted that **AR6** sent a strong political signal to phase out the use of fossil fuels and to address green house gas (**GHG**) emissions arising from the agriculture, forestry and other land use (**AFOLU**) sector. The **transition away from fossil fuels** was recognised at **COP-28** (see Paragraph 28(d) above) and **158 countries** backed an initiative to accelerate action to address **Avoidance**, **Reduction** and **Removal** (**ARR**) in the **AFOLU** sector (see **COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action**).

  In addition to the coherent narrative in the **COP-28 Agreement**, through out 2023, publications dropped that provided a consistent narrative, for example:

  - In January, the **bp Energy Outlook 2023** identified four mega trends: **1**. The continued decline in fossil fuels as a proportion of primary energy consumption; **2**. The continued increase in renewable energy as a proportion of primary energy; **3**. The continued increase in the role of electrical energy as a proportion of total final energy consumption; and **4**. The increase, and in due course the accelerated increase, in the use of low-carbon hydrogen as a proportion of primary energy.

  - In September and October, the **IEA** provided updates of its **Net Zero Roadmap: A Global Pathway to keep the I.5°C Goal in Reach, 2023 Update** and its **World Energy Outlook 2023** (**WEO 2023**). (Links to the **WEO 2021** and **2022** are attached.) The headlines emerging from **WEO 2023** were: **1.** The world is on track to achieve peak GHG emissions before 2030; **2.** New dynamics for investment are taking shape, with investments in renewable energy projects exceeding investments in non-renewable projects, with the gap increasing as we progress to 2030; **3.** Achieving increased rate of sustainable development is key; **4.** Increased manufacturing capacity provides a clear path for photovoltaic solar deployment; **5.** "A wave of new LNG export projects is set to remodel gas markets"; **6.** "Affordability and resilience are watchwords for the future"; and **7.** "We need to go much further and faster, but a fragmented world will not rise to meet our climate and energy security challenges".

  In addition, the International Renewable Energy Agency (**IRENA**) (in June 2023) published the **World Energy Transition Outlook 2023 – 1.5°C Pathway**.

In the context of achieving net-zero **GHG** emissions by 2050, these publications (and others) state what is required. For the author, what is required needs to be understood (on a forward looking basis) by the estimated growth in population and urbanization, and what this means: best estimates are that, by 2050, the number of people may be around 9.5 billion, with increased urbanization comes increased energy use, possibly an increase of up to 50%, and up to 80 Gtpa of CO_2-e. What is required is known, the extent of what is required needs further work.

THEMES:

- **Carbon**:
  - **Carbon Capture and Storage**: **CCS** gained ever-increasing impetus during 2023, with policy settings and government support, and laws and regulations being developed, and projects taking positive final investment decisions, with the following being particularly noteworthy:
    - On **October 17**, **2023**, the **Porthos** proponents, **Port of Rotterdam Authority**, **Gasunie** and **EBN B.V.**, took a positive final investment decision to develop the **€1.3 billion**, **2.5 million metric tonnes a year**, CO_2 transport and storage system, taking **CO_2** (captured within the precincts of the Port of Rotterdam) for injection and storage around 20 km offshore, 3 km below the seabed.
    - On **August 21**, **2023**, the **Danish Government** allocated **USD 4 billion** in funding support (in the form of State Aid) to support the development of CCS projects to store permanently **2.3 million metric tonnes of CO_2 a year**;
    - On **June 26**, **2023**, the **Ministry of Economy, Trade and Industry** (**METI**) and **Japan Oil, Gas and Metals National Corporation** (**JOGMEC**) announced support for **seven CCS projects** (in the context of the **CCS Long-term Roadmap**) with capacity to store up to **13 million metric tonnes** of **CO_2** a year, capturing of **CO_2** arising from cement, chemical, hydrocarbon processing and production, iron and steel, and pulp and paper industries;
    - On **March 15**, **2023**, the UK outlined its budget for 2023/24, and committed **£1 billion** a year to the development of CCS; and
    - On **January 6**, **2023**, the **European Commission** (**EC**) approved **€1.1 billion** funding support from the Danish Government for CCS projects in Denmark.

    As **CCS** projects progress, the cross-border transportation of **CO_2** has come into focus, and for this purpose, governments have started to engage with each other on the export and import of **CO_2** from one country to another.
  - **Carbon Markets and a price on carbon**: During 2023 the **voluntary carbon market** came under ever-increasing scrutiny, starting in **January 2023** with the World Economic Forum, **The Voluntary Carbon Market: Climate Finance at an Inflection Point**, with ever-greater definition around what is required for higher to highest value **carbon credits**. A good deal of this definition arose in the context of the anticipated agreement to operationalize Articles 6.2 and Article 6.4 of the Paris Agreement. While progress was made during 2023, it did not result in the operationalization of Articles 6.2 and 6.4. This will be a key focus for 2024.
  - **Carbon Intensity**: Carbon intensity (**CI**) is key to hydrogen and is key to **Cross Border Adjustment Mechanism** (**CBAM**), and it will become key to all products and services overtime. Awareness of **CI** (and accompanying guarantee of origin certification) will increase during 2024, as this fundamental measure will inform purchasing choices and price points and disclosure and reporting.
  - **CBAM**:
    - On **October 1**, **2023**, the **CBAM** commenced its **Transitional Phase**:

      "During the **Transitional Phase**, those that will be subject to **CBAM** from January 1, 2026, … will have to report on the embedded carbon in the goods or electrical energy imported into the European Union

(**EU**), providing a learning period with the opportunity to make amendments to the means of determining embedded carbon and reporting on it[1]."

- On **August 17**, **2023**, the **EC** settled, and adopted, the reporting rules to apply from **October 1, 2023** to **December 31, 2025** (**Transitional Phase**) in advance of the application of the CBAM. A link to the **Implementation Regulation** is attached.

By way of reminder, currently **CBAM** covers the following goods imported into the **EU**: **aluminum**; **cement**; **chemicals** (including hydrogen); **fertilizers** (including ammonia); **iron and steel**; and **electrical energy**.

For the **EU**, the **CBAM** is its " … landmark [policy setting] to put a fair price on the carbon emitted during the production of carbon intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries", i.e., to encourage other countries to place an equivalent price on carbon to incentivize progress towards the use of lower, low and non-carbon-intensive means of production.

- **Carbon Dioxide Removal (CDR)**: In the context of the work done in respect of Articles 6.2 and 6.4 of the Paris Agreement, solutions regarded as **CDR** were debated at length, and continue to be debated. Expect this to be a continued debate during 2024, as agreement is reached to operationalize Article 6.

- **China:** China continues to increase electrification. On **February 20**, **2023**, one of the "go to" analysts for GHG emissions (and all things relevant to the energy transition), Hannah Ritchie, published an excellent article (through sub-stack) outlining the pace at which China is installing renewable electrical energy capacity. The article notes that the China emits around one third of the world's CO_2 emissions. The headline grabbing statistic is that every year the China is installing new renewable electrical energy capacity at a rate that is matching the combined electrical energy use equal to that of Spain, South Africa and the UK. This reflects that during 2022, 125 GW of renewable electrical energy capacity was installed across China, with aggregate installed capacity of 1,200 GW at the end of 2022. During 2023, China installed a little over 150 GW of new renewable electrical energy capacity with aggregate installed capacity now 1,350 GW.

  [**Note:** In early 2024, Hannah Ritchie published a book entitled **Not the End of the World**. It is excellent.]

- **Critical Materials, Metals and Minerals**:

  A key theme throughout 2023 was critical materials, metals and minerals, with many countries and the **EU** bloc putting in place policy settings to ensure security of supply:

  - In **July 2023** the **IRENA** published **Geopolitics of The Energy Transition, Critical Minerals**. The publication provides informed reflection on the current dynamics of critical minerals, including a summary for policy makers. The overarching themes appear to be that: **1.** the Energy Transition will be a main driver of demand for critical minerals; **2.** supply disruptions have had minimal impact on energy security, but have had an outsized impact on the Energy Transition; **3.** while there is no scarcity of reserves of critical minerals needed for the Energy Transition, capabilities for mining, and refining them, are limited, and capacity building is required; and **4.** each critical mineral has a unique geography of trade.

  - In late **July 2023**, the US **Department of Energy** (**DOE**) published its **Critical Materials Assessment**. The **DOE** publication is excellent, although at over 100 pages is one to be read on screen. The graphic on page 22 provides a great visual representation of key themes identified by the **DOE**.

[1]. The basis for carbon accounting under **CBAM** is based on the **carbon footprint of products** or **CFP** (and in the case of electricity, services) imported in the **EU.** We say based on the **CFP** because **CFP** measures **GHG** emissions arising from upstream and downstream processing and treatment, and manufacture, transportation, use, and through life cycle. This means of measurement covers a broader footprint, than the measurement for the purposes of the **EU ETS**, and as such downstream, transportation, use and life cycle **GHG** emissions as not measured.

- On **July 11**, **2023**, the **IEA** published its **Critical Minerals Market Review 2023**. The **Review** provides a sense of price and investments trends, and likely production profiles. The publication takes as its base the **IEA** publication, the **Role of Critical Minerals in Clean Energy Transition**, and the **IEA Critical Minerals Data Explorer**.
- On **May 15**, **2023**, the **IEA** reported that the **G7** had asked it to provide support through its **Voluntary Critical Mineral Security Program**, with the **G7** supporting the **Program** and the **Five-Point Plan for Critical Mineral Security**.
- In **January 2023**, the **EU Net-Zero Industry Act** (**NZIA**) was announced (with the first draft published in March) and **Critical Raw Materials Act** (**CRMA**) was announced in March 2023. The frameworks provided by the **NZIA** and the **CRMA** are complementary. The **NZIA** has the same policy objectives and principles as the US CHIPS Act. On **November 13**, **2023**, the **CRMA** was agreed in principle among the **Council** of the **EU** and the **European Parliament**. On **November 21**, **2023**, the **European Parliament** adopted the **NZIA**.

- **Disclosure and Reporting**:

  During **2023** considerable work came together with the publication of excellent disclosure and reporting guidelines and standards. The **other CI** of 2023 (in addition to **Carbon Intensity**) has been **Compliance Intensity**!

  - On **October 9**, **2023**, the **Transition Plan Taskforce** (**TPT**) published its **Disclosure Framework**. The **Framework** is a masterwork, and is being referred to as a gold-standard: the **Framework** provides a clear basis for corporations to disclose climate change transition plans, and reporting in line with the **ISSB Standards**. The **Framework** is compulsory reading: this is indeed a "brave new world" in which "past is prologue".

    The **Framework** is intended to result in corporations collecting and disclosing data and information, in form and substance, explaining how they intend to mitigate and to adapt to climate change, through their business models, through their operations and through their products and services, including GHG emissions reduction and carbon credit strategies. In addition, read the **IFRS S2 Climate – related Disclosures – TPT Disclosure Framework Technical Mapping** and **TCFD Recommendations and Guidance – TPT Disclosure Framework – Technical Mapping**.

  - Among other things, **Edition 1** of **P_2N_0** stated:

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

    On **September 18**, **2023**, the **TNFD Recommendations** were launched. The publication did not disappoint, providing clear and crisp guidance in respect of the recommended disclosures on **Governance**, **Strategy**, **Risk** and **Impact Management and Metrics and Targets**, being the **four pillars**, with **14 indicators** for reporting across sectors, and recommendations that are sector specific. (In addition, the good folk at **World Business Council for Sustainable Development** have published **CTI.v4.0** (**Circular Transition Indicators v4.0**).)

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

    - **TNFD Recommendations**
    - **Executive Summary of the TNFD Recommendations**

- **Getting started with adoption of the TNFD Recommendations**
- **Guidance on the identification and assessment of nature-related issues: the LEAP approach**
- **Additional guidance for financial institutions**

- On **June 26**, **2023**, the **International Substainability Standards Board** (**ISSB**) published the first two sets of its **IFRS® Sustainability Disclosure Standards**: **S1 General Requirements for Disclosure of Sustainability-related Financial Information**, and **S2 Climate-related Disclosures**. (The **ISSB** was established at **COP-26**.) The **ISSB** standards have developed thinking arising from the work of the **Climate Disclosure Standards Board**, and the **Task Force on Climate-related Financial Disclosures** (**TCFD**). The **ISSB** standards address reporting in respect of **Scope 1** and **Scope 2** emissions, with work continuing on standards to report on **Scope 3** emissions. It is to be expected that, over time, monitoring, measuring, reporting and verifying of **Scope 3** emissions will become mandatory, currently, regarded as best practice, and optional. The Baker Botts team presents on the form and substance, and the significance, of the **ISSB Standards**.
- On **June 9**, **2023**, the **EC** published the **European Sustainability Reporting Standards** (**ESRS**), for the purposes of the **Corporate Sustainable Reporting Directive** (**CSRD**) of the **EU**.

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

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

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

- **Energy security**: Each country continues to be concerned that it is not able to access affordable energy. This policy imperative is manifesting itself in a number of ways but in the near to medium term it is expected that the use of CCS will be part of the affordable energy solution, with CCS to be used to allow the continued use of fossil fuels to generate electrical energy, and allowing for increased electrification using renewable electrical energy.
- **Hydrogen**:
  - **Hubs**: On **October 13**, **2023**, seven **Regional Clean Hydrogen Hubs** (**H_2 Hubs**) were announced, with the **H_2 Hubs**, between them, to be eligible for up to **USD 7 billion** in US Federal Government funding. The funding will be provided under the **Bipartisan Infrastructure Law**. A link is attached to the **White House** announcement (under **Biden-Harris Administration Announces Regional Clean Hydrogen Hubs to Drive Clean Manufacturing and Jobs**). As announced, four hubs will produce Blue Hydrogen, five hubs will produce Green Hydrogen, and two hubs will produce Pink Hydrogen.

    The **H_2 Hubs** are: **1. Appalachian Hydrogen Hub**, eligible for up to USD 925 million; **2. California Hydrogen Hub**, eligible for up to USD 1.2 billion; **3. Gulf Coast Hydrogen Hub**, eligible for up to USD 1.2 billion; **4. Heartland Hydrogen Hub**, eligible for up to USD 925 million; **5. Mid-Atlantic Hydrogen Hub**, eligible for up to USD 750 million; **6. Midwest Hydrogen Hub**, eligible for up to USD 1 billion; and **7. Pacific Northwest Hydrogen Hub**, eligible for up to USD 1 billion. The **US DOE**, **Office of Clean Energy Demonstrations**, administers the **H_2 Hubs** program. It is understood that the **DOE Loan Program Office** has received an

application from one of the **H_2 Hubs**. Please click **here** to view a Baker Botts article published soon after the announcement of the **H_2 Hubs**.

- **Infrastructure**:
  - On **November 15**, **2023**:
    - **Germany** and **the Netherlands** signed a **Joint Declaration on Further Energy Cooperation in the Field of Hydrogen Infrastructure** to develop four hydrogen interconnectors to form an integral part of the **European Hydrogen Backbone**;
    - **ACE Terminal** and **EnBW** announced their intention to cooperate to allow the supply of hydrogen from the **ACE Terminal** facilities (planned for the Port of Rotterdam) to customers of **EnBW** (in Germany);
    - **BP**, **ENGIE**, **E.ON/Essent**, **Equinor**, **Onyx Power** and **Uniper** signed a memorandum of understanding to allow for the supply of hydrogen via the **Netherlands** to customers in **Germany**; and
    - **Gasunie**, **Hynetwork Services**, **Open Grid Europe** and **Thyssengas** signed a cooperation agreement to allow connection of the hydrogen networks of Germany and the Netherlands.
  - On **March 27**, **2023**, the **EU Member States** agreed to develop and to deploy Alternative Fuels Infrastructure Regulation (**AFIR**) for hydrogen refueling infrastructure in 424 major cities, at airports, ports and rail terminals, and at least every 200 km along the core **Trans-European Transport Network** (**TEN-T**). The **AFIR** will provide hydrogen refueling infrastructure for buses, cars and heavy-duty goods vehicles / trucks.
  - On **March 24, 2023**, Denmark and Germany agreed to develop a pipeline to transport hydrogen from Jutland, Denmark, to Schleswig-Holstein, Germany. This followed Norway and Germany agreeing to develop a hydrogen pipeline in January.
- **Gulf and North Africa**: While many countries are progressing with early stage planning for the development of green hydrogen projects, the **Gulf States** and **North African countries** have been making considerable progress, with the following particularly noteworthy:
  - On **May 22**, **2023**, the **2.2 GW** Green Hydrogen and Green Ammonia project located proximate to Neom, KSA, took a positive final investment decision to develop the world's first giga-scale Green Hydrogen and Ammonia production facility;
  - On **May 17**, **2023**, Egypt approved its hydrogen incentive law providing (as reported) an incentive equivalent to "33% to 55% of the tax paid on income generated" from hydrogen projects, and equipment and materials exempt from VAT;
  - On **March 14**, **2023**, the **Sultanate of Oman**, through a corporation called **Hydrogen Oman** (a subsidiary of **Energy Development Oman** (**EDO**)) signed term sheets to provide the framework for the development of **six** Green Hydrogen and Green Ammonia production facilities, which will deploy **15 GW of electrolyser capacity**.

    As reported, the term sheets contemplate development under concessions (with terms of 47 years, 7 years to allow development and 40 years of production). The six term sheets are understood to represent the first round of auctions held by **Oman**, with six areas of land in the south of **Oman** to be the location of the six production facilities within a 1,500 km^2 area within the governorates of Al Wusta and Dhofar.

Location(s) of area of land / project	Corporation (s) awarded concession
Dhofar (427 km^2) and Duqm (320 km^2)	BP Alternative Energy Investments Limited awarded two concessions

Hyport Duqm (2 sites / projects)	DEME, OQ, and Uniper awarded concessions
Green Oman Energy Hub (337 km^2)	Intercontinental Energy awarded one concession
SalalaH2 Green (419 km^2)	Dubai Transport, Linde and OQ

- **Joint procurement and broader cooperation**:
  - On **November 21**, **2022**, it was reported widely that the second round of procurement under which the **EU Hydrogen Bank** is to procure hydrogen (see **Edition** 2 of **P_2N_0**) will take place in spring 2024. The first round of procurement commenced on **November 23**, **2023**, with a procurement budget of **€800 million**.
  - On **March 16**, **2023**, the **EC** outlined the plan for the **European Hydrogen Bank**, established in September 2022 (**EHB**, not to be confused with the use of EHB in the context of European Hydrogen Backbone). The **EHB** will concentrate on the development and implementation of financing arrangements to allow the development of renewable hydrogen capacity consistent with policy settings for the **EU**, including the development and deployment of renewable hydrogen production capacity. As outlined, the **EHB** will coordinate: **1**. Domestic market creation; and **2**. Imports to the EU, on a coordinated and transparent basis, using existing **EU** and existing international financing instruments and sources.
  - On **November 15**, **2023**, it was reported that **Germany** and the **Netherlands** had agreed to undertake jointly an auction in early **2024** to procure up to **€600 million worth** of **renewable hydrogen** for import (each of Germany and the Netherlands to contribute **€300 million**). For these purposes, the two countries have signed a **Joint Declaration of Intent to conduct a joint tender under the H2 Global Instrument**.

    The procurement jointly of hydrogen should come as no surprise: the key to the development of the use of hydrogen is the development of supply in tandem with demand, with supply slightly ahead of demand. The key to developing demand side is government policy settings to incentivize, or to require, the use of hydrogen or ammonia, and to ensure that there is sufficient supply at the right price point to provide the government and users with assurance that the switch from one fuel or feedstock to another is sustainable. Once it is apparent that the switch is sustainable, investment decisions will be made on demand side.
  - On **November 10**, **2023**, it was reported that **Japan** and the **Republic of Korea** (**South Korea**) intend to work closely to develop a hydrogen and ammonia supply chain.
  - **Denmark and The Netherlands travel together**: On **October 17**, **2023**, the **Carbon Herald** (at **https://carbonherald.com**, under **Denmark And The Netherlands To Partner On Carbon Capture and Storage**) reported that **Denmark** and **The Netherlands** had signed a memorandum of understanding (**MOU**) under which they agreed to "**partner on CO_2 capture and storage (CCS) and CO_2 transport**". As reported, the **MOU** "facilitates the transfer of CO_2 between the two nations for … storage in vacant oil and gas reservoirs situated within the exclusive economic zones … of [each nation] in the North Sea."
  - In late **September** and early **October 2023**, it was reported widely that **Germany** and **Japan** are discussing cooperation on decarbonization and the energy transition, including in respect of procuring hydrogen.
  - On **September 26**, **2023**, the **German** and **UK Governments** announced the establishment of the UK-Germany **Hydrogen Partnership**. As announced, the **Hydrogen Partnership** is intended "to enhance closer co-operation on hydrogen technology and infrastructure development to promote mutual trade and investment opportunities." The establishment of the **Hydrogen Partnership** was marked by a **Joint Declaration of Intent**. For further detail, click on **https://www.gov.uk**, under **UK and Germany partner to further advance hydrogen developments**.
- **Strategies**: A number of countries published and revised hydrogen strategies during 2023. On June 5, 2023, the US Department of Energy published the **US National Clean Hydrogen Strategy**. Germany (approved in July

2023), and Japan (released on June 6, 2023), updated their hydrogen strategies, both countries creating demand for hydrogen. Also, the **UAE** put in place its **National Hydrogen Strategy** on **November 6**, **2023**.

- **Impact of GHGs**: Throughout 2023, there was an increasing sense of urgency to avoid, reduce and remove GHG emissions, this was supported by the best available science and by the experiences of each of us: 2023 was the warmest calendar year on record.
- **Methane and Methanation**:
  - **Methane** (**CH_4**): During 2023, **CH_4** emissions made news consistently, in particular, because despite a number of initiatives (including the **Global Methane Pledge**), **CH_4** emissions remain high.

    To address this issue, on **November 15**, **2023** the **Council of the European Union**, the **EC**, and the **European Parliament** agreed, in principle, on the **Methane Regulation**. The headline from the **Methane Regulation** is the requirement to survey existing infrastructure for leaks, and to develop action plans to rectify those leaks, and to fix ongoing leaks of **CH_4** within one month. In addition, the **Methane Regulation** will require CH_4 intensity to be determined, and will impose maximum **CH_4** intensity specifications (backed by prohibitions).

    The **IEA** **Global Methane Tracker** is a useful tool.

  - **Methanation**: Methanation is being used to produce methane and methanol. We expect the number of methanation projects to increase during 2024.

By way of background to methanation:

Methanation involves the use of **CO_2** (and **CO**) to produce **CH_4** (methane) through the combination of **CO_2** (and **CO**) with hydrogen, producing synthetic **CH_4**. If the hydrogen is Green Hydrogen, the **CH_4** produced from its combination with recycled **CO_2** is **e-NG**.

Alternatively, **methanol** (**CH_3OH**) can be produced, as **e-methanol**.

E-NG is in gaseous form at room temperature, **e-methanol** is in liquid form. The key variables are the mass of **H_2** and the amount of renewable electrical energy required to produce **e-NG** or **e-methanol**, and as such its cost of production.

It is clear that methanation and the production of **e-NG** and **e-methanol** have a role to play, with the **IEA** suggesting that **e-NG** may provide fuel for up to 10% of global energy demand by 2040. While the combustion of **e-NG** and **e-methanol** gives rise to **CO_2**, if that **CO_2** is captured, the synthetic production of **CH_4** or **CH_3OH** could continue. **E-NG** can be liquefied to produce **e-LNG**, And of course **e-methanol** (as a liquid) is ready for use.

For those involved in the energy industry, cost and efficiency go hand-in-hand. The production of **e-methane** (or **E-NG**) is neither as cost effective nor as efficient as other uses for Green Hydrogen and renewable electrical energy. **So why produced e-methane** and **e-methanol**? There is one reason: there is a market for **e-methane** now, and there is a growing market for **e-methanol**. As yet, there is not a market for Green Hydrogen or Green Ammonia that is the size of the **e-methane** or **e-methanol** market. This is likely to change over time, but at the moment the demand side for **e-methane** is established, and the demand side for **e-methanol** is growing (driven in part by the need for **e-methanol** for dual fueled sea- going carriers).

As markets for **Green Hydrogen** and **Green Ammonia** develop (and demand side develops new equipment and infrastructure for its storage, transportation and use), it is more than likely than not that those producing Green Hydrogen and Green Ammonia will make a choice of market at that time, and may use the benefit of scale and experience to serve both markets.

- **Renewable Electrical Energy**:

  While renewable energy continued to be developed at an ever increasing rate, the key theme from 2023 was the continued development of Offshore Wind Field (**OWF**) projects, despite headwinds and high-voltage direct current (**HVDC**)**:**

  OWF projects:

  - On **November 20**, **2023**, **Recharge** (at **https://www.rechargenews.com**, under **'15GW every year' / North Sea nations back collective offshore wind tender planning**) reported that **eight EU** countries (Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, and Sweden), and **Norway** (together the **North Sea Cooperation Countries**) had agreed on a collective approach to the tendering for **OWF** capacity, working with the **European Commission**. As reported, the **North Sea Cooperation Countries** will procure **100 GW** of offshore wind field capacity by **2030**, at a rate of **15 GW a year**.
  - On **November 15**, **2023**, the **UK Government** is to increase the strike price for the contracts for differences awarded to successful bidders for offshore wind field capacity in AR6. The strike price will increase **£73/MWh** (for fixed bottom wind), and **£176/MWh** (for floating wind). The announcement from the UK Government can be found at **https://www.gov.uk**, under **Boost for offshore wind as government raises maximum prices in renewable energy auction**.

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

  - On **October 25**, **2023**, **Attentive Energy One**, **Community Offshore Wind**, and **Excelsior Wind** were successful in their bids on the third solicitation round of the State of New York. Up to **4.032 GW** of OWF capacity will be installed across the three areas:

Summary of scale and size			
Consortium	**Attentive Energy One**	**Community Offshore Wind**	**Excelsior Wind**
Consortium Members	Corio Generation, Rise Light & Power and TotalEnergies	National Grid Ventures and RWE	Copenhagen Infrastructure Partners
Capacity	1.404 GW of OWF capacity	1.314 GW of OWF capacity	1.314 GW of OWF capacity

  - On **October 24**, **2023**, the **EU** announced its **European Wind Power Action Plan**. The **Plan** is (both needed and) welcome, and it is hoped that it will add renewed impetus to the development of wind capacity across the **EU**. The announcement from the **EC** (at **https://ec.europa.eu**, under **Commission sets out immediate actions to support the European wind power industry**) provides a helpful summary of the background to, and the purpose of, the **Plan**. The **Plan** is needed because the **EU** is committed to the sourcing of 42.5% (see **EU to mandate use of Renewable Hydrogen** below) of its electrical energy demand from renewable sources by 2030: with a roadmap to have installed **111 GW of wind capacity by 2030**, and an action plan to address challenges across the industry.
  - On **September 8**, **2023**, **The Straits Times** (at **https://www.straitstimes.com**, under **Singapore to start imports of renewable energy from Indonesia within 5 years** and **Sarawak in talks to supply 1 GW renewable energy to S'pore by 2032: Sarawak Energy**) outlined on plans for Singapore to import:

- **2 GW** of low-carbon electrical energy (to match up to 15% of the load of Singapore, and 50% of Singapore's low-carbon electricity import target of 4 GW) from Indonesia.
    - The **Energy Market Authority** (**EMA**) of Singapore announced on **September 8**, **2023**, that it had given approval, conditional, for five projects, in combination, to import up to **2 GW** of low-carbon electrical energy from Indonesia. As reported, the five projects are being developed by **Adaro Solar International**, **EDP Renewables Asia**, **Keppel Energy**, **Pacific Medco Solar,** and **Vanda RE**; and
- **1 GW** of renewable electrical energy (to match up to 7.5% of load in Singapore, and 25% of Singapore's low-carbon electricity import target of 4 GW), from Sarawak, Malaysia.
    - **Sarawak Energy Berhad** (**SEB**) announced that it was in advanced negotiations with a consortium, led by Sembcorp Industries, to supply renewable electrical energy from its hydroelectric power plants via a 700 km submarine high voltage direct current (**HVDC**) cable.

  These initiatives have re-enliven discussion about the Asian Grid.

- On **August 9**, **2023**, it was reported widely that the Federal Government of Australia, **Department of Climate Change, Energy and Environment and Water** (**DCCEEW**) had opened applications for the feasibility licences for the declared **offshore renewable energy zone** off the coast of New South Wales (in the Pacific Ocean). Six **offshore renewable energy zones** are contemplated: the first declared was Gippsland (the Gippsland Declared Area), with the second being the **Hunter Declared Area**. In respect of the **Hunter Declared Area**, applications for feasibility licences are open through **November 14**, **2023**.
- On **July 12**, **2023**, the **German Federal Government** announced the successful bidders in its **7 GW OWF** dynamic tender round.
- **BP** was awarded **two OWF areas** (N-12.2 and N-11.1), to comprise up to **4 GW** of installed capacity in the **German** sector of the **North Sea**. As reported, **BP** bid **€3.66 billion** and **€3.12 billion** for the respective **OWF** areas.
- **TotalEnergies** was awarded the other **two OWF areas**, one located in the German sector of the North Sea (N-12.1), for which it bid **€3.12 billion**, and the other in the German sector of the Baltic Sea (O-2.2) for which it bid **€2.07 billion**).
- On **June 26**, **2023**, a group working (on plans to develop OWF capacity to provide renewable electrical energy from OWF sources) reported to the **Portuguese Government**, recommending the auction of areas in **Figueira de Foz**, **Leixoes**, and **Viena do Castelo** to allow the development of up to **3.5 GW** of OWF capacity. The working group suggested that the auction should take place within 2023, with a further **6.5 GW** of OWF to be auctioned so that by 2030, **10 GW** of OWF capacity will have been installed.
- On **May 30**, **2023**, the **Danish Parliament** reached agreement in respect of the development of up to **14 GW** of **OWF** capacity, including around **6 GW** in four fields **North Sea I** (3 GW), **Kattegat II** (1 GW), **Kriegers Flak II** (**640 MW**) and **Hesselo** (800 MW to 1.2 GW), and a further **3 GW** at **BEI**. In mid-2023, there was around 2.3 GW of installed OWF capacity in Danish waters.
- On **May 11**, **2023**, four **OWF** development projects were successful in their bids under the first ORESS auction (**ORESS-1**), with a combined electrical energy capacity of **3.1 GW** awarded 20-year renewable electrical energy supply contracts. The successful bids were: **1.3 GW Codling Wind Park** (EDF and Fred Olsen), **824 MW Dublin Array** (RWE and Saorgus Energy), **500 MW North Irish Sea Array** (CIP and Statkraft), and **450 MW Sceirde Rocks** (Corio Generation and Ontario Teachers' Pension Plan).

- **Shipping**: During 2023, the maritime sector made considerable progress in the decarbonization of the emissions profile, with commencement of the transition from heavy-fuel oil to dual fuel capacity of methanol, with ammonia

attracting ever increasing attention. This progress has been under way for a while. The headline news of the year as the maiden voyage of the first dual fuel powered and propel container ship:

Editions 1 and **3** of P_2N_0 reported on the increase in the greening of the maritime sector including on **July 12**, **2023**, that **A.P. Moller Maersk** had announced that it had taken delivery of its first container carrier to be powered and propelled using green methanol: the 2,100 TEU box-ship was delivered at the **Hyundai Mipo Dockyard**.

The progress of the carrier was followed closely (including by the author!). On:

- **August 28**, **2023**, the carrier was bunkered at the Port Rotterdam.

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

  On **September 14**, **2023**, the methanol bunkered carrier was named the **Laura Maersk**. The **Laura Maersk** commenced operations in the Baltic Sea in **October 2023**.

- **August 21**, **2023**, the carrier bunkered as it passed through the **Suez Canal**;

- **July 27, 2023**, a second world first took place in Singapore, with the Singapore registered tanker, **MT Agility**, bunkering the carrier with 300 metric tonnes of **ISCC** certified green methanol; and

- **July 16**, **2023**, **OCI** completed the bunkering of the carrier: loading 1,000 metric tonnes of **OCI HyFuels**, being **ISCC** certified green methanol. The bunkering took place at the **Odfjell Terminal Korea** (**OTK**), located at the **Port of Ulsan**. The bunkering with green methanol was a world first.

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

SHAILESH SAHAY
Partner
shailesh.sahay@bakerbotts.com

SHANE WILSON
Partner
shane.wilson@bakerbotts.com

Learn more about Baker Botts' Energy Transition Practice

© Baker Botts L.L.P. 2024. All rights reserved.