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The Impact of Crude Oil Deficit on the Energy Industry



As the global energy landscape evolves, the crude oil deficit has emerged as a critical concern for the energy industry. This issue not only affects oil prices but also shapes investment strategies and energy policies worldwide. Recent developments indicate that the crude oil market is facing significant supply constraints, driven by a combination of geopolitical tensions, production cuts by OPEC+, and increasing demand from emerging economies.

One of the primary factors contributing to the crude oil deficit is the ongoing geopolitical instability in key oil-producing regions. Tensions in the Middle East, particularly surrounding Iran and Iraq, have raised concerns about potential disruptions in oil supply. These uncertainties have prompted OPEC+ to implement production cuts in an attempt to stabilize prices, inadvertently exacerbating the crude oil deficit. As major producers limit output, the balance between supply and demand shifts, often resulting in higher prices and increased volatility in the market.

Additionally, the resurgence of demand as economies recover from the COVID-19 pandemic has put further pressure on crude oil supplies. Countries like China and India are ramping up their energy consumption, driving the need for more crude oil. This rebound in demand, coupled with supply constraints, has led to predictions of a prolonged period of tight markets and elevated prices. Analysts project that if the trend continues, it could push energy costs higher across various sectors, influencing everything from transportation to manufacturing.

Moreover, the crude oil deficit is prompting companies to reconsider their investment strategies. With uncertainties in supply, there is a growing interest in diversifying energy portfolios. Many firms are investing in renewable energy sources and alternative fuels to mitigate risks associated with fluctuating crude oil prices. This shift not only aligns with global sustainability goals but also positions companies to adapt to the changing energy landscape.

The crude oil deficit is a pivotal issue for the energy industry, influencing market dynamics and shaping strategic decisions. As geopolitical tensions persist and demand continues to rise, industry stakeholders must navigate this complex environment with agility and foresight. The balance between crude oil supply and demand will remain a key determinant of energy prices and overall market stability in the coming years.

In This Issue!

energyHQ's August 2024 issue covers the most recent developments and events pertaining to the energy industry, as well as including valuable insights, details and spec sheets / peer reviews related to latest technologies, innovations, products, services, and projects of relevance to the industry and its audience.

- Article on page 7 talks about Renewable Energy Financing & Investment
- Article on page 16 focuses on Non-Power Applications of Nuclear Technology
- Article on page 24 sheds the light on Sustainable Aviation Collaboration
- Additional content is also available covering the latest activities of manufacturers, importers, and exporters – worldwide!

We hope you benefit from this issue's content and find it useful & actionable for your business. For any comments, suggestions, or feedback please don't hesitate to contact me.

Best wishes,
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World Digest



Denmark

Denmark approves certification scheme for PtX producers

The Danish Energy Agency says its new certification scheme is a “short-term transitional solution” to launch Power-to-X (PtX) projects this year. It will eventually be replaced with the European Commission’s certification system.

The Danish Energy Agency has pre-approved a certification scheme to allow PtX producers in Denmark to certify green fuels.

PtX, also known as green hydrogen or electrofuels, involves using electricity to produce hydrogen. EU legislation requires these fuels to be certified in order to be described as “green.”

The European Commission has not yet finalized its certification scheme for PtX producers, causing concern about a lack of certification for upcoming Danish projects. The Danish Energy Agency said its certification system should remove this uncertainty and allow production to start this year.

The agency has described the approval process as a “short-term transitional solution.” It will be replaced by the European Commission’s certification system, which is expected later this year.

The agency has pre-approved PtX fuel certification under the International Sustainability and Carbon Certification EU (ISCC). The ISCC’s certification requirements are available on its website.



United States

Clean energy sector to invest \$65bn in US offshore wind by 2030

The clean energy sector is projected to invest \$65bn in US offshore wind projects by 2030, which will support 56,000 jobs, according to a new report by the American Clean Power Association (ACP).

The ACP said in its 2024 Offshore Wind Market Report that there were currently 12GW of projects with active offtake agreements, including 4GW under active construction at Vineyard Wind, Revolution Wind, and Coastal Virginia Offshore Wind.

Across 37 leases in the U.S., there are currently 56GW of capacity under development, enough electricity to power the equivalent of 22m homes.

According to the ACP, market analysts forecast that there will be 14GW of offshore wind deployed by 2030, 30GW by 2033, and 40GW online by 2035. These outlooks build on the 7.6GW of offshore wind projects seeking to be operational by the end of 2027.

The new report also pointed out the economic impact of offshore wind on domestic US shipbuilding, port infrastructure, and other supply chain activities such as more than 40 new vessels currently on order – 28 CTVs, seven SOVs, two different types of installation vessels, two tugs, and two barges to support offshore wind operations and maintenance.

Brazil



Portugal

Portugal plans to raise share of renewables in electricity consumption to 93% by 2030

Portugal plans to raise the contribution of renewables in electricity consumption to 93% by 2030, as part of its decarbonisation push, according to an updated draft of its energy and climate plan.

However, the draft proposal plans to lower the 2030 target for the installed capacity of electrolyzers to make green hydrogen by 45%. Portugal is only just now taking the first steps to install electrolyzers and has almost no production of green hydrogen.

Portugal's new centre-right government will release the draft later on Monday for in public consultation until Sept 5, when it will be sent to parliament.

European nations are increasingly betting on renewable energies, especially after gas prices hit record highs in 2022 after the Russian invasion of Ukraine.

Renewable utilities supplied 61% of Portugal's electricity consumption in 2023, already one of the highest ratios in Europe. A year ago, the former socialist government set the target for 2030 at 85%.

Environment and Energy Minister Maria da Graça Carvalho said the updated plan aims to combat climate change and guarantee energy security and also "attract investment and generate competitiveness".

Spain

Spain unveils €2.3 billion support program for hydrogen development, renewable energy sectors

The country's ecological transition ministry has published the regulatory bases of aid to large hydrogen clusters, industrial capacities in solar, wind energy, heat pumps, batteries and electrolyzers; innovative renewable energy, storage and heat pump projects; and energy communities.

The Ministry for the Ecological Transition and the Demographic Challenge (MITECO) has published main bases of its support program aimed at achieving various objectives:

Aid for the creation of large valleys or clusters of renewable hydrogen, endowed with €1.2 billion from Next Generation EU funds.

Support for the industrial value chain of renewable energy sources and storage; endowed with €750 million.

€250 million for innovative renewable energy, storage and heat pump projects.

€120 million to create more energy communities.

Green hydrogen valleys

The the aid program for the creation of large valleys or renewable hydrogen clusters is endowed with €1.2 billion from the NextGenEU funds. The objective of this new line of aid is to create renewable hydrogen valleys, large industrial centers or zones of generation and consumption.

Brazil Leads The Way: A Beacon For Global Clean Energy Transition With 90% Renewable Energy

Brazil stands out among the world's largest economies for its clean energy transition, boasting the lowest share of fossil fuels in its energy mix. As the G20 president in 2024, Brazil is poised to lead the global energy transition agenda, leveraging its renewables-based power system and substantial biofuel sector. The upcoming COP30 climate change conference in Belém, near the Amazon, will highlight Brazil's clean energy efforts on the world stage.

Brazil's journey to becoming a clean energy leader has not been easy. Over several decades, the country faced numerous challenges, including delays in major projects, blackouts, and economic setbacks driven by both domestic and international factors. These experiences offer valuable lessons for global energy transitions and suggest ways to accelerate progress.

Hydropower, supported by Brazil's abundant water resources and landmark projects like the Itaipu Dam, initially provided a robust foundation for the country's electricity generation. However, reliance on hydropower left Brazil vulnerable to climate change. In 2001, low rainfall, coupled with limited investment in generation and transmission, led to blackouts and the need for electricity rationing and policy interventions to reduce demand.

France



French energy industry calls for 'stability' amidst political upheaval

France has faced political instability since President Emmanuel Macron's camp's poor performance in the June European elections and snap national assembly elections three weeks later. The newly elected national assembly is even less in favour of Macron than before, meaning that Macron will struggle to form a government.

As a result, the energy and climate framework texts – most notably the energy and climate planning law (LPEC) and the multiannual energy plan (PPE) – could not be adopted. These plans set out sectoral targets, and have five- and ten-year horizons respectively.

The letter signatories first call for the adoption and implementation of this framework. "Stop-and-go measures are detrimental to our long-term industries," they wrote.

With the National Energy-Climate Plan (NECP) submitted to the European Commission on 10 July, there is now an "official reference framework up to 2030, but we're working a bit backwards", Jules Nyssen, president of the SER renewables association and a signatory of the letter, told Euractiv.

The EU-required NECP is a higher-level summary of France's energy and climate objectives, which summarises targets from the LPEC and PPE, but also from France's low carbon strategy (SNBC) and its climate change adaptation plan (PNACC).

Renewable Energy

07 Renewable Energy Financing & Investment



Powering New Investments in The Clean Energy Space



The passage of the Inflation Reduction Act (IRA) in the U.S. has fundamentally changed the cost of capital for many technologies and successfully attracted private investment across all forms of energy — including renewables.

Among the biggest players in this space is clean energy developer Ørsted, which has more than 700 employees in the U.S. alone and a growing portfolio of assets and partnerships involving offshore and land-based wind energy, solar, storage technologies and e-fuels. This includes America’s first offshore wind farm, located off the coast of Block Island.

A big deal for renewable energy

To further ramp up the pace of renewable energy development, Ørsted realized it needed to optimize its tax base while continuing to further invest in clean energy infrastructure. To this end, it recently partnered with J.P. Morgan on a \$680 million tax equity financing deal, which will support its portfolio of solar and storage assets in Texas and Arizona.

The deal is notable for several reasons — for

starters, it represents one of the largest solar and storage tax equity transactions that uses a production tax credit (PTC) and investment tax credit (ITC) structure since the passage of the IRA. It also includes the option for tax credit transferability, which enables corporate buyers to support clean energy projects and offset their federal tax bills through the purchase of tax credits. This allows more participants to enter the market, paving the way for more investments — thereby speeding up the energy transition.

“Ørsted is an experienced developer and operator of renewable energy projects in the U.S., including offshore and onshore wind, solar and battery storage, all of which will generate tax credits valuable to investors,” said James Giamarino, Chief Commercial Officer for the Americas at Ørsted. “With this new market unlocked by the IRA, we’re excited to continue our tax equity partnership with J.P. Morgan and bring on new entities looking to advance the U.S. renewable energy industry, support job growth and promote local economic development.”



The deal helped fund the completion of Sparta Solar, a 250 MW solar project located in Mineral, Texas, and Eleven Mile Solar Center, a 300 MW solar and 300 MW/1200 MWh storage project in Pinal County, Arizona. The economic impact of both projects is sizeable: Sparta Solar created approximately 250 jobs during the construction process and is expected to contribute \$45 million in tax revenue to the local community, while Eleven Mile created nearly 1,000 jobs during construction and will generate over \$80 million in property taxes.

A long-term commitment to the energy transition

This agreement builds on J.P. Morgan's existing investments in Ørsted's portfolio, which have supported the development of over 1.8 GW of renewable energy projects in the U.S. The Sparta Solar and Eleven Mile Solar Center projects alone will have the capacity to generate enough energy to power the equivalent of over 100,000 U.S. homes.

The deal also underscores how J.P. Morgan is best placed to support clients, deploying expertise and capital to help them meet

their objectives. Tax equity is critical to the renewable finance market, and since 2003, the firm's Tax Oriented Investments (TOI) team has raised over \$40 billion of tax equity for U.S. renewable projects with approximately 50 GW of capacity. The team has also invested \$5–6 billion of tax equity in utility-scale wind, solar and geothermal projects, as well as residential solar system programs, in each of the past three years.

"Ørsted needed a tax equity partner that was knowledgeable in underwriting large co-located solar plus energy storage projects, with the wherewithal to monetize both PTC and ITC within a portfolio transaction. There are only a handful of tax equity providers in the market that can do that efficiently at a sizable scale, and J.P. Morgan was the best fit," said Dave Stoppel from J.P. Morgan's Energy Investments team. "Overall, the team is proud to have structured a deal of this magnitude, and we value the collaborative partnership with Ørsted underscored by this successful execution."

www.jpmorgan.com

Sustainability & Decarbonization

10 Education & Training for a Sustainable Future



Training Programme for Capacity Building in Electrical Safety Management

Training Programme for Capacity Building in Electrical Safety Management for New and Renewable Energy Power Generation Facilities in the ASEAN Region

The ASEAN Centre for Energy (ACE), in collaboration with the Korea Electrical Safety Corporation (KESCO), successfully conducted

by focusing on South Korea's best practices in electrical safety management for NRE facilities.

The training programme was attended by representatives from seven ASEAN countries, including Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, and



a three-day training programme on capacity building in electrical safety management for New and Renewable Energy (NRE) power generation facilities in the ASEAN region. Held from 8-10 July 2024 in Wanju, Jeollabuk-do, South Korea, the event aimed to enhance the knowledge and skills of participants from various ASEAN Member States (AMS)

Thailand. Additionally, representatives from several public power utilities, such as Sarawak Energy (Malaysia), Électricité du Cambodge or EDC (Cambodia), and Électricité du Laos or EDL (Lao PDR), also participated.

The training programme started with the opening ceremony and welcoming speech by Park Jihyun, President of KESCO. During

the opening speech, Park Jihyun emphasised the importance of electrical safety and the importance of this activity laying the foundation for strengthening energy safety management cooperation and collaboration with the ASEAN countries. The session was then continued with the introduction of KESCO and the Training Programme, which was presented by Oh Dongmin, Head of the International Cooperation and Investigation Team of KESCO.



The afternoon session featured an excursion to KESCO's remote control facilities for energy storage. This included a presentation on Korea's ESS Management System, detailing how they monitor and control energy storage facilities to prevent and reduce incidents of fires and other potential losses. On the second day, the participants visited

the Electrical Safety Human Resource Development Institute (ESHRDI). The morning session focused on introducing electrical safety policies, highlighting regulatory frameworks and best practices. After lunch, the participants toured the Electrical Disaster Research Centre, where the participants gained knowledge on how KESCO uses advanced technology to analyse the causes of electrical product disasters. The visit to ESHRDI also showcased KESCO's efforts and facilities dedicated to training and improving workers' skills, which are also available to government officials and university students interested in pursuing careers in electrical safety.

Later in the afternoon, the group moved to the Renewable Energy Theme Park in Buan, South Korea. Here, the participants explored various renewable energy technologies and learned how South Korea promotes and engages the younger generation in the importance of renewable energy for the future.

On the final day, participants visited Doosan Fuel Cell in Iksan, South Korea for an in-depth look at the latest fuel cell technologies. The group then proceeded to the ESS Research Centre for an excursion focused on energy storage solutions and safety measures. The ESS Research Centre demonstrated South Korea's commitment to expanding their Electrical Safety Management System, especially in the NRE sector. They aim to develop more robust Energy Storage System (ESS) management standards and testing protocols and to expand global joint R&D on ESS facilities and testing.

Overall, this training programme marked a significant step towards enhancing the capacity of ASEAN countries in managing electrical safety not only in NRE power generation but also in the overall electrical safety management system. By sharing knowledge and best practices, this programme has laid a strong foundation for improved safety management in the renewable energy sector across the ASEAN region, contributing to the broader goal of achieving sustainable and secure energy systems.

<https://aseanenergy.org/>

Oil & Gas

13 Social & Economic Impacts of Oil & Gas



The Economic Impact of The Oil and Gas Industry on Local Communities



The Oil & Gas industry has a significant economic impact in local communities, positively influencing various aspects of daily life. This industry not only provides the energy we all use on a daily basis, but also stimulates the local economy through job creation and infrastructure development. The Italian company QOC Solutions, which specialises in the design of customised quick opening closures, actively contributes to this industry. QOC Solutions' advanced solutions improve safety and operational efficiency, supporting the economic development and well-being of local communities.

The economic impact of the Oil & Gas industry in local communities: all the benefits

The economic impact of the Oil & Gas industry in local communities manifests itself mainly through the creation of jobs

and career opportunities. Companies in the sector hire thousands of workers, offering competitive wages and stable working conditions. This increase in employment leads to an improvement in the average income of local households, raising the overall standard of living.

In addition to direct employment, the industry stimulates the local economy through demand for services and supplies. Related activities, such as equipment maintenance, logistics and support services, generate additional job opportunities for local businesses. This multiplier effect further strengthens the economy of surrounding communities.

In addition, tax revenues from industrial operations are often reinvested in local infrastructure, improving the quality of public services and promoting sustainable

development. The Oil & Gas industry, through its direct economic impact, contributes significantly to the prosperity and stability of local communities, creating a virtuous circle of growth and development.

Local infrastructure development, another element of the economic impact of the Oil & Gas industry in local communities

The economic impact of the Oil & Gas industry in local communities is also reflected in infrastructure development. Companies in the industry invest heavily in the construction and improvement of roads, schools, hospitals and other essential facilities. These investments not only facilitate industrial operations, but also improve the quality of life in the communities.

Advanced infrastructure attracts further investment and stimulates economic growth. Better roads enable more efficient transport of goods and people, reducing logistics costs and increasing local competitiveness. Well-equipped schools and modern hospitals provide essential services, contributing to a skilled workforce and the general welfare of the population.

In addition, the infrastructure developed through the Oil & Gas industry promotes social cohesion and inclusion. Improved community facilities provide space for social and cultural activities, strengthening the social fabric of local communities. The companies' commitment to improving infrastructure is therefore a key element of their positive economic impact, fostering sustainable and lasting development.

The economic impact of the Oil & Gas industry in local communities: sustainability and social responsibility

The economic impact of the oil and gas industry in local communities is amplified by the sustainability and social responsibility initiatives promoted by Oil & Gas companies. These initiatives aim to reduce the environmental impact of industrial operations and improve the quality of life in

surrounding areas.

Companies implement sustainable practices, such as adopting low-impact technologies and recycling materials, to minimise pollution and preserve natural resources. They also invest in environmental conservation and ecosystem restoration projects, demonstrating a concrete commitment to environmental protection.

Social responsibility is also manifested through training and development programmes for the local community. Companies in the sector offer scholarships, vocational training courses and growth opportunities for young people, helping to create a skilled and motivated workforce. The focus on sustainability and social responsibility strengthens the link between the Oil & Gas industry and local communities, promoting harmonious and lasting economic development.

The economic impact of the Oil & Gas industry in local communities: future prospects

Future prospects for the economic impact of the Oil & Gas industry in local communities are promising. As technologies advance and the focus on sustainability increases, the industry will continue to play a key role in local economic development. The adoption of green technologies and greener practices will reduce the environmental impact of operations, improving overall sustainability.

In addition, social responsibility initiatives and vocational training programmes will continue to improve living conditions and create growth opportunities for local communities. QOC Solutions, with its innovative quick opening closures, will remain an essential partner, contributing to safety and operational efficiency. The future of the Oil & Gas industry promises a balance between economic development, environmental sustainability and community well-being.

<https://www.qocsolutions.com/>

Nuclear

16 Non-Power Applications of Nuclear Technology



IAEA's Grossi Highlights the Growing Promise of Nuclear Energy

Rafael Mariano Grossi, director general of the International Atomic Energy Agency. (Photo: IAEA)

The peaceful uses of nuclear science and technology today hold more promise to heal the world since Austrian Swedish physicist Lise Meitner and her colleagues discovered nuclear fission in 1938, said Rafael Mariano Grossi, director general of the International Atomic Energy Agency, in a new essay titled “Nuclear Must Be Part of The Solution” published by the magazine *Foreign Affairs*.

Atoms for Peace: Grossi described how the world has strayed from President Eisenhower’s vision of Atoms for Peace—as North Korea develops a nuclear weapons program, Iran enriches uranium to military grade, arms control and disarmament treaties collapse, and threats of nuclear weapons being used in conflicts in Europe and the Middle East continue to grow.

At the same time, Grossi noted that nuclear energy is providing large amounts of low-carbon electricity in Europe and the United States, China is building numerous nuclear power plants, India is considering nuclear power expansion, nuclear medicine is raising hopes of cancer cures in developing nations, and nuclear technologies are playing increasing roles in agriculture.

Nonproliferation: Grossi described the 1970 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) as a “grand bargain” in which states without nuclear weapons promised not to develop or acquire them and to submit to IAEA inspections to verify their adherence. Nuclear weapons states also promised in good faith to eliminate their arsenals, while other nations pledged not to develop such weapons.

Unfortunately, he continued, the NPT has since come under “undeniable stress,” with



Israel, India, and Pakistan not joining the treaty; North Korea and Iran pursuing illegal or questionable nuclear programs; and existing stockpiles of nuclear weapons growing.

The next NPT review conference will occur in 2026.

Peaceful purposes: Grossi stressed the importance of the NPT not only for its nonproliferation benefits, but also for its facilitation of “the exchange of equipment, training, and scientific information for the peaceful use of nuclear energy.” He said, “The IAEA has a mandate to expand access to nuclear technology for peaceful purposes. . . . The uses of nuclear technology and science are so varied that they directly support more than half [of] the UN’s Sustainable Development Goals (and indirectly support all of them).”

After detailing the energy, medical, and climate benefits of nuclear technology, Grossi pointed out, “Around the world, countries are recommitting to nuclear energy or embarking on developing it.” He cited recent pronuclear actions in Bulgaria,



the Czech Republic, France, Hungary, Romania, the United Kingdom, India, China, South Korea, Japan, United Arab Emirates, Egypt, Turkey, Russia, Canada, and the United States.

Net zero and fusion: Grossi then turned to the promise of advanced nuclear technologies for reaching the goal of net-zero carbon emissions. He noted that these technologies “can recycle spent nuclear fuel, leaving less waste, and . . . small modular reactors . . . could make up about ten percent of the world’s nuclear power capacity [by 2050], distributing electricity in developing countries and providing more affordable options for smaller grids, such as those operated by industries in remote locations.”

Regarding nuclear fusion, Grossi said, “We must continue to back fusion so it will be able in the not-too-distant future

to produce nearly unlimited quantities of power with almost no harmful waste at all. The establishment of a worldwide fusion platform by the IAEA—working with the G7 and other bodies, including the 35-nation fusion experiment known as ITER—is moving us closer to fusion electricity than ever before.”

Embrace nuclear: Grossi concluded his essay by noting, “We face a convergence of challenges: climate change, energy, water and food insecurity, and the need to provide health care for all. Floods, fires, and droughts portend a disastrous future. But we have the means to avoid the worst and to adapt to new realities—with nuclear technology as a vital part of the solution. Global leaders must embrace and scale up this tool in ways commensurate with the challenges we face.”

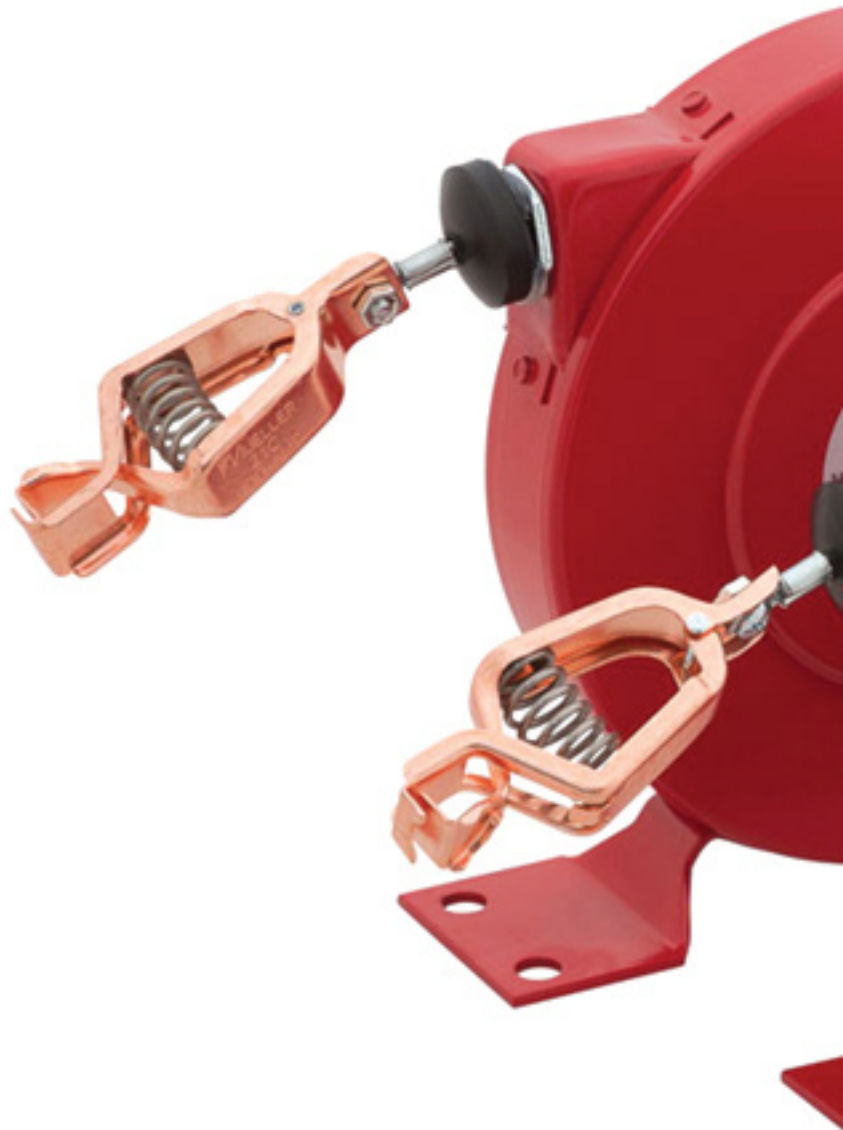
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Hydrogen

21 International Collaboration & Hydrogen Trade



The Hydrogen Stream: Canada, Italy Announce Funds for Hydrogen Trade, Infrastructure



Canada and Italy have unveiled substantial funding initiatives for hydrogen projects. In parallel, Australian researchers have recommended that by 2030, Australia should export hydrogen to Japan via methyl cyclohexane (MCH) or liquid ammonia (LNH₃), while not fully dismissing liquid hydrogen (LH₂) as an option.

Canada is pledging up to CAD 300 million (USD 217 million) to promote clean hydrogen trade with Germany. “The funds will be distributed through a competitive auction process expected to be launched by the end of the year, following the European Commission’s review of the auction parameters and a matching funding commitment from Germany,” announced the Canadian government. This initiative is part of the Canada-Germany Hydrogen Alliance, aimed

at facilitating Canadian companies’ access to German markets for clean hydrogen and ammonia, and ensuring Germany receives competitively priced clean energy products produced by Canadian industry.

Italy has activated a €994 million fund to support the Important Project of Common European Interest (IPCEI) Hy2Infra. This follows the European Commission’s approval last February of state aid proposals from seven European countries, totaling €6.9 billion. “The IPCEI Hydrogen 3 Fund aims to support Italian companies in developing a European hydrogen network, with a focus on infrastructure investments,” stated the Italian government.

An Australian research team incorporated dynamic efficiency and the overload capacity of PEM electrolyzers in their techno-economic



model to determine the best options for exporting green hydrogen from Australia to Japan by 2030. Their sensitivity analysis indicated that a lower weighted average cost of capital and increased scale could significantly reduce the landed levelized cost of hydrogen (LCOH). “Increasing the landed hydrogen capacity tenfold to 1000 t/d substantially lowered the landed LCOH,” the researchers stated in their paper, “Techno-economics of renewable hydrogen export: A case study for Australia-Japan,” published in Applied Energy. The study concluded that LNH₃ and MCH are the most cost-effective hydrogen carriers. “Under base case assumptions, the LH₂ pathway is costly due to the high boil-off gas (BOG) rate at every supply chain stage. However, it could become economically viable if effective BOG management measures are implemented,” the researchers noted.

In the UK, Green Marine’s initiative to retrofit crew transfer vessels with hydrogen, fuel cells, and batteries has received approval in

principle from global classification society RINA. “Phase 1 of Project Verdant, involving a preliminary design and feasibility study, has been completed and deemed viable, paving the way for subsequent phases focused on design, engineering, and sea trials,” announced the British marine operator.

Meanwhile, Masdar has signed an agreement with TotalEnergies to explore the feasibility of developing a commercial green-hydrogen-to-methanol-to-sustainable-aviation-fuel (SAF) project. “The project aims to decarbonize hard-to-abate, emission-intensive sectors such as aviation and maritime,” stated the United Arab Emirates’ energy company. The initiative will also capture and utilize CO₂ from an industrial source as feedstock, alongside green hydrogen from renewable energy-powered electrolysis, for the production of green methanol and SAF.

Edited by Hassan Mourtada
www.energyHQ.world



Cover Story

24 Sustainable Aviation Collaboration

Masdar Teams Up with France's TotalEnergies to Explore Sustainable Aviation Fuel Project



The Two Companies Said They Conducted A 'Successful Test Flight' During The Cop28 Climate Conference In December.

Joint venture plans to capture carbon dioxide from an industrial source and use it, along with green hydrogen, to produce the fuel

Abu Dhabi's clean energy company Masdar has signed an agreement with France's TotalEnergies to explore a sustainable aviation fuel (SAF) project using methanol produced from green hydrogen.

The agreement follows a "successful test flight" conducted by the two companies during the Cop28 climate conference in December, which demonstrated the potential for converting methanol to SAF, Masdar said in a statement on Thursday.

The project, which aims to help decarbonise hard-to-abate sectors such as aviation and maritime, will capture carbon dioxide from an industrial source and use it, along with green hydrogen, to produce green methanol and SAF, Masdar said.

The cost of the potential project and its

location were not disclosed

SAF includes alternative fuels made from renewable sources that are used to power aircraft.

The International Air Transport Association estimates SAF could contribute to about 65 per cent of the reduction in emissions needed by the aviation industry to reach its target of achieving net zero by 2050.

The aviation sector is responsible for about 2 per cent of global carbon-dioxide emissions.

SAF can reduce carbon emissions over the fuel's life cycle by up to 85 per cent in comparison with petroleum jet fuel, according to the International Civil Aviation Organisation.

However, its adoption is still in early stages due to small-scale production and the green fuel's higher cost, compared with conventional kerosene.



The UAE, a major aviation hub, aims to supply 1 per cent of fuel to national airlines with domestically produced SAF by 2031, in line with government plans to decarbonise the sector.

Under its General Policy for Sustainable Aviation Fuel, the country aims to position itself as a regional hub for low-carbon aviation fuel and boost its production of SAF to as much as 700 million litres annually.

It also plans to create a national regulatory framework and explore policies to support the long-term operation of SAF facilities in the UAE.

In October, Masdar and US aerospace company Boeing teamed up to help advance the SAF industry in the UAE and globally.

The companies said they would collaborate in the development and adoption of policies, including accounting principles for SAF, expected to help

the industry overcome geographical barriers as its use continues to increase.

The UAE, the Arab world's second-largest economy, aims to achieve hydrogen production of 1.4 million tonnes annually by 2031, increasing to 15 million tonnes a year by 2050.

The country is planning to develop at least two hydrogen production plants, or oases, by 2031.

Masdar, owned jointly by the Abu Dhabi National Energy Company, better known as Taqa, Adnoc and Mubadala, is active in 40 countries. It aims to expand its capacity to at least 100 gigawatts of renewable energy by the end of the decade, from about 20 gigawatts currently.

By Johnny Benny

www.thenationalnews.com

Energy Storage & Grids

27 Economic Benefits & Cost-Effectiveness



Next-Gen Lithium Batteries Born from Discarded Solar Panels



Turning photovoltaic waste into valuable battery components not only reduces landfill waste but also enhances the performance of lithium-ion batteries.

Chinese scientists have achieved a significant breakthrough by repurposing discarded solar panels to develop high-performance lithium batteries. This innovation holds promise for revolutionizing EVs and grid-scale energy storage.

Innovative Repurposing of Solar Panels

Researchers have found groundbreaking ways to extract silicon from old solar panels, creating high-performance silicon battery anodes. When these anodes are combined with a new type of electrolyte, the resulting lithium batteries can store significantly more energy than those using traditional graphite anodes. This makes the batteries more efficient and longer-lasting, which is crucial for applications such as EVs and large-scale energy storage.

Performance Improvements

The silicon anodes derived from recycled solar panels have shown impressive performance metrics. For example, they achieved an energy density of 154 watt-hours per pound (340

watt-hours per kilogram) for 80 charging and discharging cycles, far surpassing the limit of graphite anodes, which is 136 watt-hours per pound (300 watt-hours per kilogram). These anodes also demonstrated high durability, retaining 83.1% of their capacity after 200 charging cycles and boasting a coulombic efficiency of 99.9%.

Environmental and Economic Benefits

Repurposing solar panels for battery production offers substantial environmental and economic benefits. This approach helps mitigate the environmental impact of photovoltaic waste by preventing valuable materials from ending in landfills. Additionally, it reduces the cost of lithium-ion batteries, making their production more sustainable and accessible. Dong Tiantian, co-first author of the research paper, emphasized that converting waste into valuable battery components significantly lowers the overall cost and encourages the development of sustainable battery materials.

Extraction Process

The extraction of silicon from discarded solar panels involves several steps to ensure the silicon is purified and ready for reuse.



The recycling process for solar panels begins with dismantling them to separate the silicon cells from other components like glass, aluminum, and plastic. Next, the silicon cells undergo chemical treatment, soaking in hot, diluted phosphoric acid to remove metals such as aluminum and silver.

This treatment is repeated with fresh phosphoric acid to ensure the complete removal of metallic impurities, resulting in high-purity silicon wafers. In advanced methods, these purified silicon wafers are further processed into nano-silicon using a ball-milling technique, which enhances their properties for high-performance battery anodes.

Addressing Recycling Challenges

Recycling solar panels presents several challenges, including the lack of standardization, economic viability, limited infrastructure, environmental and health risks, and regulatory hurdles. Improving solar panel recycling infrastructure requires a multifaceted approach involving technological, economic, and policy innovations.

Increasing the number of specialized facilities through funding new plants and upgrading existing ones is vital to enhance solar panel recycling. Developing consistent, industry-

wide standards can streamline the process and ensure safety. Financial incentives, like tax breaks or subsidies, can motivate companies to invest in recycling infrastructure.

Investment in research and development is crucial for creating more efficient and cost-effective recycling technologies. Building a robust infrastructure requires collaborating with governments, manufacturers, and recycling companies. Moreover, raising consumer awareness about recycling solar panels and providing convenient collection points can boost participation rates.

Future Implications

This recycling strategy addresses major challenges in battery materials and sets a precedent for sustainable innovation in the energy sector. Lead researcher Cui Guanglei expressed optimism that their work could pave the way for next-generation batteries, which are crucial for both EVs and large-scale energy storage systems. By transforming waste into a resource, these scientists prove that high-performance, environmentally sustainable lithium-ion batteries are within reach.

By Marybeth Collins

www.environmentenergyleader.com/

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Germany's Green Power Generation Hits Record High in First Half Of 2024

In the first half of 2024, Germany set a new record for renewable electricity generation, producing 140 terawatt hours (TWh) of green power, which accounted for 65% of the net public electricity generation. This marked a significant increase from previous years, as detailed by the Fraunhofer Institute for Solar Energy Systems ISE based on data from energy-charts.info. The shift towards renewables has been accompanied by a continued decline in generation from fossil fuels and a decrease in electricity prices on the exchange.

Wind energy remained the dominant source of electricity, generating 73.4 TWh compared to 66.8 TWh in the same period of 2023. This represented 34.1% of the net public electricity generation, with onshore wind contributing 59.5 TWh and offshore wind 13.8 TWh. Photovoltaic (PV) systems also saw a significant increase, feeding 32.4 TWh into the grid, up 15% from 28.2 TWh in the first half of the previous year. Hydropower generation rose from 8.9 TWh in 2023 to 11.3 TWh in 2024, while biomass generation slightly decreased from 21.6 TWh to 20.8 TWh.

Overall, the total electricity generated from renewable sources reached 140 TWh, setting a new record and increasing the renewable share in the load (which includes electricity consumption and grid losses) to 60%, up from 55.7% in the first half of 2023. This milestone reflects Germany's ongoing commitment to transitioning to a greener energy mix.

On the other hand, the share of electricity generated from fossil fuels hit an all-time low. Total electricity production in the first half of 2024 was 215 TWh, down from 222 TWh in the same period in 2023. The proportion of fossil fuels in the energy mix fell from 39.6% to 35.0%, with only 75 TWh generated from coal, natural gas, oil, and non-renewable waste, marking the lowest levels ever recorded. Since 2015, renewable electricity generation has increased by 56%, while fossil fuel generation has decreased by 46%.

Germany's electricity load increased by 1.8%, reaching 233 TWh in the first half of 2024, up



from 229 TWh in the same period the previous year. Despite this increase in demand, the country managed to maintain a significant renewable energy contribution.

The balance of electricity imports and exports also shifted. In the first half of 2024, Germany had a net import surplus of 11.3 TWh, a significant change from a net export surplus of 0.8 TWh during the same period in 2023. Electricity imports mainly came from Scandinavia, France, Switzerland, Belgium, and the Netherlands, driven by lower prices from wind and hydropower in Scandinavia. Conversely, Germany exported electricity to Austria, the Czech Republic, Luxembourg, and Poland.

Despite strong growth in solar PV capacity, with 6.2 GW installed by the end of May 2024 and a planned total expansion of 12.5 GW for the year, the expansion of wind power lagged behind targets. Only 0.8 GW of new onshore wind capacity and 0.2 GW offshore were added in the first half of 2024, far short of the targets of 7 GW onshore and 1 GW offshore. Brandenburg led in installed wind and solar PV capacity per inhabitant.

The expansion of electrical energy storage continued, with 1.8 GW of storage systems and a capacity of 2.5 GWh connected to the grid in the first half of 2024. The total installed capacity of battery storage reached 9.9 GW, equal to that of pumped storage, with battery storage capacity at 14.4 GWh compared to pumped storage at 40 GWh.

By Mohan Gupta

<https://solarquarter.com/>

First Ministerial Meeting of the IAEA World Fusion Energy Group

IAEA Director General Rafael Mariano Grossi and Italian Prime Minister Giorgia Meloni will co-chair the inaugural ministerial meeting of the World Fusion Energy Group. (Photo: Government of Italy)

The International Atomic Energy Agency (IAEA) and Italy – the current Group of Seven (G7) presidency – will co-host the inaugural ministerial meeting of the World Fusion Energy Group (WFEG) later this year to inject further momentum into intensifying global efforts to develop a potentially clean, safe and limitless source of energy.

Italian Prime Minister Giorgia Meloni and IAEA Director General Rafael Mariano Grossi will together chair the 6 November meeting in Rome, which will see governments, scientists, executives and investors join forces in paving the way for this promising technology to provide the abundant low carbon energy the world needs to meet its growing development needs.

Increased political and economic interest in fusion energy – which has seen key scientific breakthroughs in recent years – was highlighted at the 13-15 June summit of the G7 leading industrialized nations in Italy's southern Apulia region, where the leaders said it “has the potential to provide a lasting solution to the global challenges of climate change and energy security.”

Pledging to promote international collaboration “to accelerate the development and demonstration” of fusion, the G7 summit communique also welcomed Italy's and the IAEA's decision to hold the first WFEG meeting in the Italian capital.

This high-level endorsement follows several technological milestones, including the historic achievement of a net energy gain, as well as a significant expansion of private sector investments and activities in the quest for fusion energy.

Director General Grossi announced the establishment of the WFEG when he opened the IAEA's 29th International Fusion Energy Conference (FEC) in London last October.

The WFEG will work to accelerate research, development, demonstration and deployment of safe and sustainable fusion energy, with a focus on



fostering global cooperation, ensuring the efficacy of R&D activities, identifying existing technology and engineering gaps, encouraging discussion on establishing effective fusion regulation, and other relevant topics.

Prime Minister Meloni said: “Italy is deeply committed to supporting research and innovation in the energy sector. Our vibrant fusion energy programme, involving numerous Italian research organizations, academia, industries and international collaboration with the IAEA, underscores our dedication. We look forward to advancing fusion energy on a global scale.”

The Rome meeting will consist of a ministerial segment where invited high-level political representatives will provide insights into their strategies for accelerating fusion energy development. The WFEG will also discuss priority themes ranging from policy and financial frameworks, technological advancements, commercialization pathways and international collaboration.

Coinciding with the first WFEG meeting, the IAEA will publish its second edition of the World Fusion Outlook, a global reference for developments and prospects in fusion energy, and the Fusion Key Elements, an overview of the fundamental considerations surrounding fusion energy from research and development to demonstration and deployment, essential for establishing a unified approach to advancing fusion as a cornerstone of future energy solutions.

www.iaea.org/

Experts Say Nation at Forefront of Energy Turn

Technicians check photovoltaic panels at a solar power station in Dezhou, Shandong province, in May.

China is poised to provide effective solutions to the significant challenges faced in achieving a global energy transition, as the country has been continuously accelerating energy technology innovation, said industry experts.

China is already a pioneer in global energy technology transformation, as the world's second-largest economy has been vigorously promoting the implementation of advanced technologies, which is fostering the gradual maturation of related industries, said Lin Jianhai, vice-president of the International Finance Forum and former secretary of the International Monetary Fund.

The vast scale of China's market and its comprehensive industrial system have enhanced the overall development level of the energy industry chain while driving the global green transition, Lin said.

He made the remarks during the launch ceremony of the IFF Energy Transition and Development Committee, jointly initiated by the IFF and the China Electric Power Construction Association (CEPCA), in Beijing on Thursday.

In the field of energy supply, key technologies such as third-generation nuclear power have achieved breakthroughs. China is leading globally in areas such as photovoltaic cell conversion efficiency, ultrahigh voltage transmission technology and the hydropower industry. The industrialization of frontier technologies like new energy storage and hydrogen energy is also accelerating, he said.

China has achieved significant success in energy transition in recent years, with its renewable energy installed capacity exceeding 1.5 billion kilowatts last year, accounting for over 50 percent of the nation's total installed power capacity and historically surpassing thermal power installed capacity, according to data released by the National Energy Administration.

The country accounted for more than half of



the global new renewable energy installed capacity in 2023, it said.

This year, the government is prioritizing the advancement of 33 key projects, including the Sichuan-Chongqing ultrahigh voltage alternating current project, while speeding up the initiation of construction on 37 other key projects.

Du Zhongming, head of the electricity bureau of the NEA, said the NEA will work to improve the grid's ability to flexibly adjust scheduling of power supply and enhance inter-provincial power-sharing capabilities.

According to a report released by the International Energy Agency in June, over the past decade, the average costs of global wind power and photovoltaic projects have cumulatively decreased by more than 60 percent and 80 percent respectively, mostly driven by China.

In 2023, China's new renewable energy installed capacity exceeded the total of the rest of the world, making it the largest contributor to the development of the global renewable energy industry, it said.

By ZHENG XIN
www.chinadaily.com.cn/

Services

34 Coming Events



Coming Events

International Conference on Electronics and Power Engineering 2024

Montreal, Canada - Virtual Event
05 - 06 Aug 2024

[Event website](#)

The Electronics and Power Engineering conference in Montreal aims to bring together researchers, scientists, scholars, and engineers to share their research and discuss innovations in the field...

Solar PV & Energy Storage World Expo 2024

Guangzhou, China
08 - 10 Aug 2024

<https://en.pvguangzhou.com/>

Solar PV & Energy Storage World Expo will showcase products like silicon rod silicon block silicon ingot production equipment, silicon wafer production equipment...

Solid-State Battery Summit 2024

Chicago, USA
13 - 15 Aug 2024

[Event website](#)

Join us for an exciting in-person and virtual summit that delves into the global solid-state battery ecosystem from every perspective. This unique event will explore significant advances...

India Process Expo and Conference 2024

Hitex Exhibition Center, Hyderabad, India
16 - 18 Aug 2024

<https://ipeexpo.in/>

India Process Expo and Conference is the country finest platform for the machinery and equipment manufacturers as well as service providers to showcase their technological superiority/latest innovations to the Pan India audience...

The Energy Expo 2024

Miami Airport Convention Center, Miami, USA
20 - 22 Aug 2024

<https://www.theenergyexpo.com/>

The Energy Expo (6th edition) in Miami, Florida, comes as an in-person physical tradeshow to serve your energy-clean needs, in the proper place, at the proper time...

Canadian Crude Oil Conference 2024

Lake Louise, Canada
18 - 20 Sep 2024

<https://www.ccoonline.com/>

The Canadian Crude Oil Conference is an important event for industry executives to discuss critical issues. The conference will highlight how WCSB production can provide...

Enlit Asia

Kuala Lumpur, Malaysia
08 - 10 October 2024

<https://www.enlit-asia.com/>

Enlit Asia is an annual conference and exhibition comprising two events in the energy sector: POWERGEN Asia and Asian Utility Week. It attracts 12,000 attendees and 300 exhibitors worldwide to showcase their products...

ASEAN Clean Energy Week

Manila, Philippines
21 - 22 November 2024

<https://www.aseancleanenergyweek.com/>

In November the SMX Convention Center Manila will host the 7th edition of ASEAN Clean Energy Week. 5000 attendees, of which 1,500 are C-suite executives will come together to discuss how to expedite the green transition in Southeast Asia...

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Carbon Capture Is Becoming Big Business, Here Is How



The treatment process is projected to meet 16 per cent of the required reductions in greenhouse gas emissions by 2050

ExxonMobil projects that carbon capture, use, and storage (CCUS) will be a \$4 trillion market by 2050. CCUS is considered essential for meeting climate targets by many analysts, despite opposition from some environmental groups. The key question is whether CCUS can be profitable.

CCUS encompasses technologies that capture carbon dioxide from various sources such as industrial facilities and power plants. This captured CO₂ can be used to produce goods like fizzy drinks and plastics or injected underground for storage or enhanced oil recovery.

Environmentalists often oppose CCUS due to its ties with the oil and gas industry and its perceived competition with renewables. However, CCUS is crucial for sectors like heavy industry and blue hydrogen production, where it is expected to contribute 16% of the necessary reductions in greenhouse gas emissions by 2050. It can also help balance renewable-heavy electricity systems.

The cost of CCUS varies widely, with capturing carbon dioxide being the most expensive part, ranging from \$20 to over \$120 per tonne, depending on the process. However, with rising carbon prices globally, many CCUS approaches are becoming economically viable. For example, the US offers \$85 per tonne in tax credits, the EU's emissions trading system provides about \$76 per tonne, and Canada aims for \$125 per tonne by 2030.

Direct air capture (DAC), a related technology, removes CO₂ directly from the atmosphere and is costly at \$500 per tonne or more. This technology is essential for offsetting emissions that are hard to eliminate and reducing past atmospheric pollution.

CCUS is integral to climate strategies in the Gulf Cooperation Council (GCC) region, where large emitting sources are close to suitable storage sites. Gulf oil and gas companies, like Adnoc, Saudi Aramco, and QatarEnergy, are actively developing CCUS projects and aim to capture over 25 million tonnes annually by 2030.

Globally, CCUS capacity needs to increase from the current 40 million tonnes per year to over 7.6 billion tonnes by 2050. Companies like Occidental and ExxonMobil foresee a multi-trillion-dollar global industry, with DAC and CCUS playing significant roles.

There are six main revenue streams for CCUS: decarbonizing domestic economies, utilizing captured CO₂, importing CO₂ for storage, offering DAC services, creating low-carbon industries, and providing CCUS technology and equipment. The GCC can leverage its expertise and resources to be a leader in CCUS innovation and implementation.

In conclusion, while CCUS may not reach the scale of the petroleum industry, it promises to be a significant and profitable sector. For the GCC, seizing opportunities in CCUS is vital for balancing its future economic outlook and contributing to the global climate effort.

Robin Mills

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