Bioeconomy & Low Carbon Technology Overview for March 2025

Our summary of low carbon technology developments for March 2025 is based on data and information collated by Gifford Consulting and provided on the website: Gifford Consulting

Highlights by Topic: March 2025

More information on these articles can be found on our website dashboards.

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Ammonia production

1. **Ammonia production**: Australia. (CIP) through its CI Energy Transition Fund I (ETF I), announced it has secured $512 million through the Australian Government's Hydrogen Headstart program for its Murchison Green Hydrogen project in Western Australia. The Murchison Green Hydrogen project is set to produce approximately 1.8 million tons of green ammonia annually, primarily for export to Asian markets. Link 31/03/2025
2. **Ammonia production**: China. Alfa Laval has signed its first contract for the ammonia fuel supply system, FCM Ammonia, strengthening its position in developing solutions for decarbonizing the maritime industry. The FCM Ammonia will be installed onboard seven LPG/ammonia carriers for Tianjin Southwest Maritime. Alfa Laval has achieved a significant milestone by securing the contract for the ammonia fuel supply system. The FCM Ammonia will be installed on a CSSC Huangpu Wenchong shipyard in China for ship owner Tianjin Southwest Maritime (TSM). The installation will commence with three 25,000 cubic meter vessels, followed by four 41,000 cubic meter vessels. Link 24/03/2025

Biobased chemicals

3. **Biobased chemicals**: France. Lactips produces 100% biobased natural polymers that are water-soluble and biodegradable in various environment, is expanding its paper coating range. Their new CareTips® PFP344MAX sealant grade meets a market need for a more economical, durable and high-performance alternative. The new CareTips® PFP344MAX sealant grade offers high sealability for optimum protection of packaged products. 100% biobased, recyclable and compostable at home, with no PFAs, it reduces the environmental footprint while guaranteeing food safety and compliance with health standards. Link 06/03/2025
4. **Biobased chemicals**: Germany. The new market and trend report "Bio-based Building Blocks and Polymers – Global Capacities, Production and Trends 2024–2029", written by the international biopolymer expert group of the nova-Institute, shows capacities and production data for 17 commercially available, bio-based polymers in the year 2024 and a forecast for 2029. Link 20/03/2025
5. **Biobased chemicals**: USA. OCOchem, a startup turning captured carbon dioxide into a valuable industrial chemical, is completing construction of its pilot plant in Eastern Washington. OCOchem will start using its electrolyzer cells to turn CO2 into formic acid and other formate compounds. These chemicals can replace petroleum as a feedstock for products such as clean hydrogen fuel, animal feed and fertilizer. Link 17/03/2025

Biobased plastics

6. **Biobased plastics**: India. Balrampur Chini Mills Limited (BCML) announced the set up a Polylactic Acid (PLA) biopolymer manufacturing unit at Kumbhi, Uttar Pradesh with an investment of ₹2,850 crore. It will be funded through 40% equity and 60% debt. ($US 250 million). This plant is going to be India's first industrial scale biopolymer plant & also set a new global benchmark. It will be powered by 100% renewable energy for its entire production process, and also the first plant location where sugarcane is transformed into PLA in a single, integrated site. Link 05/03/2025
7. **Biobased plastics**: USA. Bioplastics manufacturer Danimer Scientific Holdings LLC is facing closure due to severe financial struggles. Danimer opened a plant in Winchester, Kentucky, in 2020 to make polyhydroxyalkanoate (PHA) via fermentation. The company anticipated a

vibrant market for the biobased and biodegradable polymer in single-use plastics applications like straws, cup lids, produce bags, and utensils. Later that year, Danimer went public through a merger with a special purpose acquisition company (SPAC). It had plans to triple the size of the Winchester plant and build a large facility in Bainbridge, Georgia, at a cost of $700 million. In 2021 it purchased Novomer, which made similar polymers, for $152 million. Link 27/03/2025

Biofuels

8. **Biofuels**: United Kingdom. Quadrise announced the signature of a Joint Development Agreement with sustainable fuels pioneers Licella Holdings Ltd. Licella is an Australian-based global technology and project developer delivering the next generation of low carbon solutions. Licella's patented Catalytic Hydrothermal Reactor (Cat-HTR) is the world's leading hydrothermal liquefaction (HTL) technology, using water at high temperature and pressure to sustainably transform abundant biomass residues into an advanced bio-intermediate, a valuable, low-carbon alternative to fossil oi. Under the JDA, the Company and Licella will collaborate to seek to progress the use of Licella's Cat-HTR bio-intermediate as a potential cost-effective renewable feedstock for bioMSAR and bioMSAR Zero, with success of initial lab testing at the Quadrise Research Facility expected to lead to lab-scale diesel engine tests within 12 months. Link 28/03/2025
9. **Biofuels**: USA. Aemetis Inc. released fourth quarter and full year 2024 financial results, reporting increased revenues for its U.S. ethanol and biogas operations as well as its biodiesel operations in India. The Aemetis Biogas subsidiary expanded its annual production capacity by 80% last year. Revenues were up by 139%. Link 19/03/2025

Biogas

10. **Biogas**: Australia. Delorean Corporation Ltd announced the successful execution of a A$6.08 million grant funding agreement with the Australian Government's Australian Renewable Energy Agency. The funding, provided under ARENA's National Industrial Transformation Program, will accelerate the development of Delorean's SA1 bioenergy facility, currently under construction in Edinburgh Parks, South Australia. The ARENA grant will support the procurement, installation, and commissioning of critical infrastructure upgrades to enhance the facility's ability to produce and upgrade biogas into mains-grade biomethane. This renewable gas will be supplied to industrial users through the Adelaide gas network under long-term offtakes currently under negotiation. Link 10/03/2025
11. **Biogas**: France. Arkema continues its transformation towards a more sustainable industrial model with the signing of a new, eight-year contract with ENGIE for the supply of biomethane for several Bostik sites in France. This 25 GWh/year contract will cover some 85% of the annual gas consumption of four Bostik sites in France (Coubert, Privas, Ribécourt and Venette), a notable step forward in the decarbonization of the company's energy supply. Link 31/03/2025
12. **Biogas**: India Thiruvananthapuram: The city corporation is ready to sign an agreement with Bharat Petroleum Corporation Ltd (BPCL) to set up a centralized compressed biogas (CBG) plant in the capital. It will process biodegradable waste, contributing to the city's goal of achieving zero waste for organic matter. The facility's capacity will be either 100 or 200 tonnes. Link 07/03/2025
13. **Biogas**: Japan. Weltec Biopower GmbH has announced orders for two new biogas power plant projects in Japan with a third under planning. According to the company, it can adapt its technical solutions to seismically active areas in the shortest possible time using special

structural engineering. Two digesters will be used in Yamagata Prefecture to treat the 80 tonnes per day of cattle manure and wastewater from milk production. The biogas will be used exclusively to generate electricity and heat in a 250-kW combined heat and power (CHP) plant. In addition to the biogas plant, a Weltec Blue Water plant with a processing capacity of 50,000 tonnes per annum of digestate from the biogas plant is currently being constructed. The treatment technology separates the digestate from the biogas plant in a multi-stage process into solid and liquid fertilizer and dischargeable water. Link 18/03/2025

14. **Biogas**: Spain. CycleØ announced a €200 million investment to boost biogas production in Spain. The company plans to build, own, and operate up to 30 new biogas plants in the country, with a combined production of 800 GWh per year, enough to meet the gas needs of around 123.000 households. This investment will help reduce the 75% gap between current production and renewable gas generation targets in Spain. Link 21/03/2025
15. **Biogas**: Spain. Naturgy will supply renewable gas to Aena to boost the decarbonization of its airport network. The agreement reached by the two companies includes the supply of some 83 GWh of natural gas over the next two years, of which at least 20 GWh will be biomethane, with which the airport manager will significantly reduce its emissions linked to thermal energy consumption and make progress in decarbonization by consuming sustainable and competitive energy. Link 10/03/2025
16. **Biogas**: Sweden. Eskilstuna Biogas was established with the aim of building and operating a greenfield biogas facility in Eskilstuna. The facility will produce liquefied biogas for use as fuel for city busses and ferries. The plant, currently under construction, will actively reduce greenhouse gas (GHG) emissions by producing biogas that replaces fossil fuels. The Nordic Investment Bank and Eskilstuna Biogas AB have signed a seven-year loan to co-finance the construction of a new biogas production plant near Eskilstuna. Link 28/03/2025
17. **Biogas**: Sweden. St1 Biokraft signed an agreement to acquire Södra Hallands Kraft Biogas AB with a production facility in Hov outside Laholm. St1 Biokraft already owns and operates an upgrading plant in the same property. St1 Biokraft currently owns and operates 12 production and upgrading facilities in Sweden, Norway and South Korea with its own production of approximately 550 GWh of biogas. In addition, they have two plants under construction in Finland and are in the process of completing another in Mönsterås, Sweden. The company also has a growing network of filling stations for compressed and liquefied biogas in Sweden and Finland. Link 05/03/2025
18. **Biogas**: Turkiye. WasteFuel Global LLC, a US-headed developer of biorefineries focused on converting municipal solid waste (MSW) into low carbon transportation fuels, and ITC, a leading Turkish integrated waste management company, developed a partnership to commence the Front-End Engineering Design (FEED) on a green methanol biorefinery located in Ankara, Türkiye. Link 18/03/2025
19. **Biogas**: USA. Southern California Gas Company (SoCalGas) executed a contract with Organic Energy Solutions (OES) to procure renewable natural gas (RNG) converted from organic waste and inject it into SoCalGas' pipeline system. The contract is the first approved by the California Public Utilities Commission (CPUC) under Senate Bill (SB) 1440 which sets specific RNG procurement targets for the state's natural gas utilities. The RNG will be sourced from a project located in the city of San Bernardino and is an important step toward achieving California's goal to reduce methane emissions from agriculture. Link 20/03/2025
20. **Biogas**: USA. The project, privately funded and operated by leading waste-to-value infrastructure developer Nexus W2V, is to deliver significant economic and environmental benefits to Northwest Indiana and the greater Chicago area, including increased American domestic production of natural gas from food waste. The facility is part of a $140 million

planned investment by W2V and will process 200 tons of organic waste daily, such as food scraps and processing byproducts, to convert them into renewable natural gas. Link 24/03/2025

Biojet/SAF

21. **Biojet/SAF**: France. Elyse Energy has selected biofuel technology that will convert wood waste and forestry residues into cleaner jet fuel using clean hydrogen. Elyse, alongside its project partners, selected thyssenkrupp Uhde's BioTfueL® technology for its BioTJet project in the Pyrénées-Atlantiques region of France, which aims to produce 110,000 tonnes of e-fuels from 2029. Wood waste is heated at high temperatures to break it down into syngas. Clean hydrogen is then added to improve the quality of the gas, making it more efficient for fuel production. In 2024, Axens signed a licence agreement for BioTfueL® technology, which includes thyssenkrupp Uhde's PRENFLO® gasification and Axens' GASEL®. Link20/03/2025
22. **Biojet/SAF**: France. TotalEnergies and Air France-KLM signed an agreement for the energy company to supply up to 1.5 million tonnes of sustainable aviation fuel (SAF) over a 10-year period. This agreement marks one the largest SAF purchase contracts signed by Air France-KLM to date. Link 04/03/2025"
23. **Biojet/SAF**: Japan. Taiyo Oil Co., Ltd (Taiyo Oil) chose the Honeywell UOP Ethanol-to-Jet (EtJ) technology to produce sustainable aviation fuel (SAF) at its Okinawa Operations in Japan. This facility will be based on Honeywell UOP's first EtJ license and basic engineering design in the Asia Pacific region with a production target of 200 million litres neat SAF per year. Expected to begin operation in 2029, the facility becomes the fifth of its kind in the world and will provide a vital supply of SAF and renewable diesel to both domestic and international markets. Link 05/03/2025
24. **Biojet/SAF**: Portugal. Galp is developing the Biofuels unit, already at a construction stage, in partnership with Japan's Mitsui, as part of a total €400 m investment, of which €250 m is provided by the EIB. This unit will convert vegetable oils and residual fats into sustainable aviation fuel (SAF) and renewable diesel. This unit, set to begin production in 2026, will have the capacity to produce up to 270 ktpa of renewable fuels, enough for Portugal to comply with the European Union mandate for this type of fuels in aviation. In parallel, Galp is building in the same site a 100 MW electrolyser, a €250 m investment of which the EIB will finance €180 m. It is set to produce up to 15 ktpa of green hydrogen. Link 03/03/2025
25. **Biojet/SAF**: Romania OMV Petrom is supplying Cluj Avram Iancu International Airport with sustainable aviation fuel (SAF) in 2025. Through this partnership, Cluj International Airport and OMV Petrom reaffirm their commitment to supporting the energy transition and adopting sustainable solutions in the aviation sector. Link 14/03/2025
26. **Biojet/SAF**: USA. Synagro Technologies and Firefly Green Fuels are partnering to bring Firefly's novel fuel production techniques to the American market. Synagro, a North American provider of sustainable solutions for biosolids, organics and residuals, has agreed to be the exclusive supplier of the biosolids feedstock used in Firefly's innovative process. Firefly has developed a unique process to turn biosolids into a product slate of highly sustainable, high-performance fuels, including SAF. The process is based on hydrothermal liquefaction, which chemically alters biosolids waste, breaking it down into biocrude and biochar. Link03/03/2025
27. **Biojet/SAF**: Japan. Japan Airlines (JAL), Airbus, Nippon Paper Industries, Sumitomo Corporation, and Green Earth Institute (GEI) signed a MoU to collaborate on the deployment of SAF using bioethanol derived from domestic wood. The five companies will work to enable a low-carbon society by reducing greenhouse gas emissions during raw material

procurement and production, and by producing and selling domestic wood-based bioethanol that has a low LCA Link 20/03/2025

Biomaterials

28. **Biomaterials**: France. Futerro, Belgian company specialised in the production of lactic acid, lactide (two platform molecules) and PLA (polylactic acid), has launched the engineering and the Front End Engineering Design (FEED) – called "Avant-Projet Détaillé" in French – for its future European biorefinery to be located at Saint-Jean-de-Folleville between Rouen and Le Havre Link 25/03/2025
29. **Biomaterials**: Spain. CBE JU representatives attended the groundbreaking ceremony of the future SUSTAINEXT project's biorefinery in Hervás, Spain. The project will turn an existing production plant into a digitalised circular biorefinery to produce healthy ingredients from local medicinal and aromatic plants, and agricultural side streams. The biorefinery will supply a wide range of sectors: food and feed, cosmetics, chemicals, and bio-based fertilisers. Link 20/03/2025

CO2 removal

30. **CO2 removal**: Sweden. The world's first large-scale BECCS (bioenergy with carbon capture and storage) project, deploying Capsol's capture technology, is now moving into construction as Stockholm Exergi has made a final investment decision (FID). The facility is scheduled to begin operations in 2028, permanently removing 800,000 metric tons of CO2 annually while setting a precedent for negative emissions projects worldwide. In total, Capsol has biomass and energy-from-waste (EfW) projects with a full-scale potential of 7.8 million tons of CO2 in the mature pipeline, translating into significant cost saving potential for plant owners and a Capsol revenue opportunity of EUR 80-115 million based on target licensing revenues of EUR 10-15 per tonne installed capacity. Link 31/03/2025
31. **CO2 removal**: USA. Green Plains Inc. announced that construction commenced on the compression infrastructure for its carbon capture and storage initiative in Nebraska, an important step in the company's ongoing transformation to produce low-carbon, high value biofuels and ingredients. The compression equipment will enable the permanent sequestration of approximately 800,000 tons of biogenic carbon dioxide each year from Green Plains' three Nebraska facilities in Central City, Wood River and York. Link 19/03/2025
32. **CO2 removal**: USA. Homeostasis announced a successful Pre-Seed fundraise of $600,000 plus matching funds from the Washington Department of Commerce. Investments come from the Shakopee Mdewakanton Sioux Community, Kayak Ventures and angel investors. Homeostasis addresses a critical vulnerability in America's industrial supply chain: our nation's dependence on foreign sources for high purity engineered graphite. Graphite, which is essential to energy storage and nuclear technologies, is prerequisite to power infrastructure modernization in an era of skyrocketing demand. Homeostasis technology enables domestic production of graphite with small, modular and portable electrochemical reactors. Link 28/03/2025

e-Fuels

33. **e-fuels**: Denmark. Ammongas, is developing carbon capture (CCU and CCS) technology in southern Denmark via a new CO_2 liquefaction facility at Tønder Biogas – one of the largest biogas plants in Europe. This facility, which is now commissioned, will capture, purify, and liquefy biogenic CO_2. The Kassø facility has the capacity to produce 48,000 tonnes of liquefied CO_2 annually for European Energy's renewable energy projects. A significant portion

of the captured CO_2 will be delivered to European Energy's Kassø e-methanol facility, where it will be a crucial component in producing e-methanol—a sustainable fuel and chemical essential for decarbonising industry and transportation. By capturing and repurposing biogenic CO_2, the project supports emissions reduction and promotes circularity in renewable energy production. In addition, it serves as a prime example of Carbon Capture and Utilisation (CCU). Link 31/03/2025

34. **E-fuels**: Germany. INERATEC agreed to a EUR 40m venture debt loan with the European Investment Bank (EIB) and EUR 30m grant with Breakthrough Energy Catalyst. The combined €70 million backing will finance construction of Europe`s largest sustainable e-Fuel production plant in Frankfurt and e-Fuel research and development. The new investment will enable INERATEC to scale up production capacity and commercialize its innovative reactor technology, which converts green hydrogen and CO2 into synthetic aviation fuel. This represents a significant step in commercialisation of INERATEC's Power-to-Liquidtechnology. Link 18/03/2025
35. **E-fuels**: Germany. INERATEC has formally agreed a €40 million venture debt loan with the European Investment Bank (EIB) and €30 million grant with Breakthrough Energy Catalyst. The combined €70 million backing will finance construction of Europe`s largest sustainable e-Fuel production plant in Frankfurt and e-Fuel research. Link 10/03/2025
36. **E-fuels**: Norway. Boeing became a key project development partner of Norsk e-Fuel, supporting one of Europe's first industrial scale Power-to-Liquids (PtL) facilities. Boeing's investment will accelerate the production and availability of sustainable aviation fuel (SAF) in the Nordics and globally. It is also intended to support the commercial aviation industries and ICAO member states' common goal to achieve net-zero carbon emissions. Link 10/03/2025
37. **e-fuels**: USA. Syntholene Energy secured a dedicated geothermal energy resource sufficient to deploy the world's first geothermally powered synthetic sustainable aviation fuel (e-SAF) plant module. The signing of a binding agreement for up to 20 megawatts of electrical energy (or thermal equivalent) marks a key step toward the company's goal of delivering clean synthetic fuels at lower cost than fossil fuels. Syntholene combines geothermal heat and electricity to enable breakthrough energy efficiency for high temperature steam electrolysis, with the mission of overhauling the economics of power-to-fuels technology. Link 20/03/2025

Ethanol

38. **Ethanol**: Brazil. Wärtsilä has partnered with Brazilian energy company Energetica Suape II S.A, majority owned by Grupo Econômico 4M, to conduct a world-first clean energy trial, which will see ethanol – a biofuel mainly produced from sugarcane – used to generate clean power. Taking place at the Suape II power station in Recife, Brazil, the trial will test the world's-first ethanol-fuelled engine for large-scale electricity generation. Link 28/03/2025
39. **Ethanol**: Japan. Nippon Paper Group, Sumitomo Corporation and Green Earth Institute reached an agreement to establish a joint venture company, Morisora Bio Refinery LLC, which will focus on the production and sale of bioethanol and biochemicals derived from woody biomass. The joint venture will construct a semi-commercial plant at Nippon Paper's Iwanuma Mill in Miyagi Prefecture. Using sustainable forest resources from the Tohoku region, such as wood scraps from sawmills, GEI's proprietary low-carbon, cost-efficient bioethanol production process will be used to produce over 1,000 kL of bioethanol annually starting in 2027, Nippon Paper Group. Link 04/03/2025

Feedstock

40. **Feedstock**: Norway. WACKER will soon replace coal with biogenic carbon for silicon production at its Holla site in Norway. The company has signed a long-term supply contract with Aymium, a Minnesota-based producer of biogenic carbon. This contract begins once specific qualifications are met. Aymium plans to produce biogenic carbon in a new manufacturing facility in the southeastern United States. Quartz is converted into metallurgical-grade silicon in an electric arc furnace. This process requires carbon as a reducing agent. Historically, hard coal has supplied this carbon, but it will now transition to biogenic coal sourced from certified renewables. Link 21/03/2025
41. **Feedstock**: Ukraine. Astarta approved the decision to begin the development of a new investment project – the construction of a plant for processing oil crops, including soybeans and rapeseed, in Khmelnytsia region. The planned capacity of the future enterprise is 400,000 tons per year. Total scope of investment will be $76 million. The commissioning of the plant is scheduled for 2026. Link 06/03/2025
42. **Feedstock**: USA. Ash Creek Renewables has secured exclusive licensing rights from Montana State University for a new high-performance Camelina seed variety. Camelina is a low-carbon crop that grows with minimal inputs, supports soil health, and provides farmers with an additional revenue stream while integrating into existing agricultural systems. It is increasingly sought after as feedstock for sustainable aviation fuel (SAF) and biomass-based diesel, offering a scalable solution to meet the growing demand for renewable fuels. Link 27/03/2025
43. **Feedstock**: USA. Western Plains Energy runs both corn and sorghum as feedstock at its Oakley, Kansas, ethanol plant for 21 years. The advantage of using sorghum as a feedstock in ethanol production is directly linked to drought or low moisture growing conditions. In arid regions like Kansas, sorghum is a consistent option for feedstock, and corn isn't always available or economical—the feedstock mix varies considerably, depending on availability and price. With the proper considerations, the sorghum and corn mix doesn't affect ethanol production yields. In the distillers' grains market, the sorghum-based product is priced equally to a corn-based feed. WPE markets wet distillers' grains to cattle feeders. Link 14/03/2025

Hydrogen

44. **Hydrogen**: Australia Vast Renewables Limited secured up to AUD 180m ($113m) in conditional funding for the construction of its Port Augusta clean energy project, which will include a hydrogen-based green methanol plant. Awarded by the Australian Renewable Energy Agency (ARENA), the Vast Solar 1 (VS1) initiative is part of the Port Augusta Green Energy Hub and includes an option to power a co-located green methanol production facility called Solar Methanol 1 (SM1). Overall, the Australian project will utilise Vast's next-generation concentrated solar thermal power (CSP) technology to provide long-duration renewable energy storage and generation to supply on-demand clean power to South Australia's grid. The capital expenditure for completing the construction of VS1 is estimated at AUD 360-390m ($226-245m). Vast has already finalised the front-end engineering design (FEED) and commercial development and is now focused on securing additional investment. Link13/03/2025
45. **Hydrogen**: Australia. Copenhagen Infrastructure Partners' (CIP) 1.5GW Murchison green hydrogen project has become the first selected under the Australian Government's Hydrogen Headstart programme to be awarded funding. Energy Minister Chris Bowen today (March 20) gave the Western Australian project the green light by awarding it up to AUD $814m ($514m)

in production incentives. CIP intends to expand the plant to produce around two million tonnes of green hydrogen-based ammonia per year for export to overseas markets. In 2024, the Danish developer signed a Memorandum of Understanding (MOU) with South Korea's Lotte Chemical to explore the supply, purchase and sale of clean ammonia from its US and Australian projects. Link 21/03/2025

46. **Hydrogen**: Australia. Trafigura has scrapped its AUD $750m ($472m) plans to develop a green hydrogen facility at Port Pirie, Australia, adding to the growing list of shelved hydrogen initiatives across the country. The 440MW project announced in 2021 was planned for Trafigura's metals subsidiary Nyrstar Port Pirie smelter in South Australia. The first stage of the project would have introduced an 85MW electrolyser plant before it was scaled up to 440MW. Both the government and Trafigura had reportedly committed AUD $2.5m ($1.6m) each towards the project's design. The initiative would have produced green ammonia for export. The announcement adds to a growing list of hydrogen initiatives shelved across Australia. Last week, Iwatani Corporation reportedly withdrew from the 2.88GW CQ-H2 green hydrogen project in Queensland, Australia, shortly after the local government pulled support for the project. The South Australian government also decided to relocate AUD $600m ($374m) originally set aside for a green hydrogen project in Whyalla to the local steelworks last month. Link 26/03/2025
47. **Hydrogen**: Belgium. Fluxys hydrogen NV, a subsidiary of Fluxys Belgium NV (EBR: FLUX), part of the Fluxys Group, was in April 2024 appointed as the Belgian hydrogen network operator, tasked with developing and managing an open-access hydrogen transport network in the country. Fluxys will build new hydrogen pipelines in the port areas of Antwerp and Ghent, as well as between the ports, from Kallo to Zelzate. The pipelines will use multi-purpose technology, similar to recent natural gas pipelines. The first step of this network is due to be completed in 2026, with plans for gradual expansion over the coming years to align with market development. Link 28/03/2025
48. **Hydrogen**: Brazil. The Brazilian Government granted a 3GW green hydrogen and ammonia project CAPEX and OPEX tax exemptions as the developer prepares to take final investment decision. Solar developer Solatio plans to build the project in the Parnaíba Export Processing Zone (EPS) in the state of Piauí in three consecutive 1GW phases per year, with the first phase planned to come online in January 2029. The majority of the plant's output is planned to be exported to European and Asian markets. Link 20/03/2025
49. **Hydrogen**: Canada. Ballard Power Systems secured a multi-year supply agreement from Egyptian bus and truck producer Manufacturing Commercial Vehicles (MCV) for fuel cell engines totalling 5MW. Under the supply agreement, the Canadian firm will initially provide 35 out 50 FCmove -HD+ engine units to MCV, building on the partnership which began in 2022. Link 11/03/2025
50. **Hydrogen**: Canada. The Canadian Government has backed HTEC's plans to develop a 15-tonne per day hydrogen liquefier facility in British Columbia. The project is being developed under HTEC's H2 Gateway programme, and it will capture and liquefy 15 tonnes per day of industrial by-product hydrogen in North Vancouver, turning waste into clean fuel. The H2 Gateway programme plans the development of up to 20 hydrogen refuelling stations, three hydrogen production facilities and a fleet of 100 hydrogen heavy-duty fuel cell electric (FCEV) trucks. However, liquefying hydrogen is challenging because it requires a lot of energy, extremely low temperatures, special equipment and it can lead to fuel loss and safety risks. Nevertheless, liquid hydrogen is already being used in trucks around the world. Last year, Ineos Inovyn and Daimler Truck launched year-long customer trials of Mercedes-Benz GenH2 trucks powered by liquid hydrogen. Link 24/03/2025

51. **Hydrogen**: Chile. Chinese electrolyser manufacturer Hygreen Energy has been selected by Chile's state-owned Production Development Corporation (Corfo) to establish a local production facility in Chile. Hygreen has been selected alongside Spanish and Chinese electrolyser producers Joletech Solutions and Guofu to receive a share of a $25.6m funding package. Chilean development agency Corfo believes the three projects could collectively attract more than $50m in additional investment. Link 25/03/2025
52. **Hydrogen**: China. Sungrow Hydrogen secured the largest share of the $680 million hydrogen production equipment contract for China Coal Ordos Energy Chemical's "100,000-ton Liquid Sunshine" Demonstration Project, a national green hydrogen flagship initiative. The company will deliver 16 alkaline electrolyzers (1,200 Nm^3/h each) and integrated gas-liquid separation and purification systems, reinforcing its leadership in large-scale industrial green hydrogen solutions. Link 19/03/2025
53. **Hydrogen**: Demark. European Energy has produced green hydrogen-derived methanol for the first time at its project in Kassø, southern Denmark, which is set to be the world's largest commercial green methanol plant — and Europe's largest green hydrogen plant. The "raw", unrefined e-methanol was synthesised in the Kassø plant's methanol loop reactor, using green hydrogen produced from the plant's 52.5MW electrolysis system and biogenic carbon dioxide sourced from a nearby biogas facility in Tønder. This production comes just a month after the developer reported the first production of green hydrogen from the plant's three electrolysers, made by Germany's Siemens Energy, which are set to be powered "mainly" by European Energy's nearby solar installation. Link 17/03/2025
54. **Hydrogen**: Denmark. Danish electrolyser maker Green Hydrogen Systems plans to file for insolvency after failing to secure additional financing. Green Hydrogen Systems struggled to stay afloat since last October, when it launched a drastic restructuring plan to slash costs by up to 50%. The company hoped to hedge its future on its new generation X-Series alkaline electrolyser after experiencing "teething issues" with its A-Series system. Link 11/03/2025
55. **Hydrogen**: Denmark. Everfuel delivered hydrogen produced at its HySynergy 20MW project in Denmark to its offtake partner, Crossbridge Energy. The facility has been developed adjacent to Crossbridge's Fredericia refinery. The hydrogen will be used to decarbonise its operations. The Crossbridge Energy refinery refines crude oil into liquid fuels for shipping, transportation, and aviation, and also supplies heat for district heating. Link 03/03/2025
56. **Hydrogen**: Egypt: The Egyptian Government plans to build a green hydrogen plant in South Sinai worth $17bn. The Investment Opportunities Platform of the General Authority for Investment and Free Zones in Egypt has launched the project. A 3.1GW solar array, supported by pumped hydro storage, would power electrolysers during the day while simultaneously pumping water to a mountain-top reservoir. At night, the stored water would flow downhill, driving electricity-generating turbines to ensure continuous, round-the-clock operations. Link. 07/03/2025
57. **Hydrogen**: EU. Green hydrogen is essential as it serves as an energy-rich reactant converting inert CO2 into valuable chemicals, polymers, materials, and fuels. To ensure an environmental advantage over other carbon sources and external energy carriers, it is crucial that the energy supply for hydrogen production, as well as the conversion and utilization of CO2 as a feedstock comes exclusively from renewable sources. Link 04/03/2025
58. **Hydrogen**: EU. The Hydrogen Councils of Belgium, Germany and the Dutch Hydrogen Association are calling for a clear, European strategy to strengthen the hydrogen market. Together, they present their priorities for the upcoming Clean Industrial Deal (CID) and stress the need for a harmonised regulatory framework that accelerates the cross-border development of hydrogen technologies and builds an efficient infrastructure for the

transport and storage of hydrogen. The implementation of these measures plays a central role in creating a competitive, clean and resilient energy market in Europe that accelerates the cross-border development of clean hydrogen in Belgium, Germany and the Netherlands and builds a common European hydrogen market. Link 12/03/2025

59. **Hydrogen**: EU. The second European Hydrogen Bank (EHB) auction attracted 61 bids from projects spanning 11 European countries, with total grant requests reaching €4.8bn ($5.2bn) – four times the €1.2bn ($1.3bn) budget available from the Innovation Fund. Representing 6.3GW of proposed electrolyser capacity, the projects aim to produce over 7.3 million tonnes of renewable hydrogen over 10 years, which would cover 7% of the EU's REPowerEU ambition. Link. 10/03/2025
60. **Hydrogen**: France Air Liquide (EPA:AI) has raised EUR 500 million (USD 545.1m) from the issuance of a green bond and plans to use the proceeds to support the financing or refinancing of flagship energy transition projects with a focus on low-carbon hydrogen and air gases. Among other initiatives in the sector, Air Liquide is partnering with TotalEnergies on the construction of a 250-MW electrolysis plant in the Netherlands. Under a recently sealed agreement, it will also supply the French energy firm with additional green hydrogen volumes from another project developed in the country. Link 20/03/2025
61. **Hydrogen**: France. TotalEnergies has secured a long-term supply of green hydrogen for its Saxony-Anhalt refinery, signing a 15-year offtake agreement for 30,000 tonnes annually from RWE's Lingen electrolyser plant. The hydrogen will be delivered via a 600km section of Germany's planned 9,000km hydrogen core network (HCN), until the contract's conclusion in 2044. The 300MW plant will use 200MW of ITM PEM electrolysers and 100MW of Sunfire alkaline systems. Hydrogen produced by the plant will be fed into RWE's cavern storage facility in Gronau-Epe. Link 13/03/2025
62. **Hydrogen**: Germany Gascade has started the initial filling with hydrogen of the first pipeline section of a previous natural gas network. As part of the plan, around 400 km of a natural gas pipeline will be repurposed to transport hydrogen by the end of 2025. Gascade is partnering on the Flow initiative with German gas network operators ONTRAS Gastransport GmbH and terranets bw. The overall pipeline of 1,630 km will connect from north to south Rostock, Lubmin, Schwedt, Berlin, Leipzig, Leuna, Erfurt, Ludwigshafen, Karlsruhe and Stuttgart. Link 14/03/2025
63. **Hydrogen**: Germany. BASF has put a 54MW electrolyser into operation to replace up to 8,000 tonnes of grey hydrogen used at its Ludwigshafen facility per year. Hydrogen produced by the Siemens Energy PEM electrolyser will be fed into the facility's Verbund network and distributed across its various chemicals production plants. The new system marks the first time that electrolytic hydrogen has been produced at the Ludwigshafen site, which has previously produced it through steam methane reforming or by-products. Link 18/03/2025
64. **Hydrogen**: Germany. Bosch says it has racked up 100MW worth of orders for its PEM electrolyser stacks before the hydrogen production technology officially launches for sales in April. The German OEM's 1.25MW Hybrion stack will be supplied to the likes of Neuman & Esser, AKA Energy Systems, Andrit and more, as it eyes "billions" in hydrogen revenues by 2030. The stacks will initially be manufactured at Bosch's Bamberg plant in Germany. Bosch is also working with German-based Fest to integrate the stacks into a containerised 2.5MW system. The details come after Bosch made several changes to hydrogen plans, including halting plans to establish a hydrogen fuel cell production line at its South Carolina facility and dropping the development of solid oxide fuel cells (SOFCs). Link 27/03/2025
65. **Hydrogen**: Germany. German hydrogen aircraft developer Apus Zero Emission was placed under provisional insolvency proceedings by the Local Court of Frankfurt. The Strausberg-

based firm has entered administration due to financial difficulties, reportedly attributed in part to what has become a common refrain in the industry: slow market development. Last September, Apus unveiled its four-seater hydrogen fuel cell aircraft, with test flights planned for this year and certification targeted for 2027. Reports indicate the company still intends to proceed with a test flight of its I-2 model. Link 07/03/2025

66. **Hydrogen**: Germany. Germany's €5bn ($5.4bn) Contracts for Difference (CfD) scheme to support industrial sectors to decarbonise with hydrogen, carbon capture and electrification has been approved by the European Commission. The Climate Protection Contracts are a 15-year two-way carbon CFD aimed at supporting fuel switching and electrification in sectors like cement, chemical and steel production. Each will be selected through a competitive bidding process and ranked based on the lowest aid amount requested per tonne of CO2 avoided – meaning only the cheapest technologies will succeed. The system will only cover the actual additional costs linked to the new production processes – however, if operating with the cleaner technology becomes cheaper, beneficiaries will have to pay back the difference to the German Government. Link 25/03/2025
67. **Hydrogen**: Germany. HydrogenPro will deliver a 100MW electrolyser plant to a green hydrogen project being developed by Andritz at Rostock Port, Germany. Andritz will provide the green hydrogen plant on an engineering, procurement and construction (EPC) basis, using the pressurised alkaline technology for electrolysis. The 100MW plant was ordered by Rostock EnergyPort cooperation (REPCO), a joint venture between RWE Generation SE, EnBW Neue Energien, RheinEnergie, and Rostock Port. Overall, the project will include the electrolyser, offsites and utilities, hydrogen purification and compression systems, storage facilities and a hydrogen filling station, with commissioning scheduled for 2027. Link 04/03/2025
68. **Hydrogen**: Germany. More than a quarter of Germany's hydrogen refuelling stations will be permanently closed by the end of June. The 22 filling stations operated by H2 Mobility were all built for passenger cars only and therefore 'no longer meet today's technical and economic requirements'. Europe's largest operator of hydrogen refuelling stations (HRSs) will permanently close 22 of its German sites by the end of June, slashing the number of HRSs available in the country by more than a quarter. Link05/11/2025
69. **Hydrogen**: Greece. Swedish electrolysers provider Metacon AB secured an add-on contract to supply a 20- MW pressurised alkaline electrolysis plant to the refinery of Greece's Motor Oil Group in Ag. Theodoroi in Corinth. It adds to a previous 30-MW contract to result in a 50-MW hydrogen production plant in Corinth. Most of the add-on contract will be executed in combination with the ongoing 30-MW project. Metacon says it is able to offer hydrogen production systems at a competitive price thanks to its collaboration with its Chinese manufacturing partner PERIC. The contract will be worth EUR 10.6 million (USD 11.2m) Link 06/03/2025
70. **Hydrogen**: Japan. Keyou and Komatsu jointly developed a 12-cylinder, hydrogen engine-powered dump truck for the construction sector. Together, the Munich, Germany-based hydrogen technology firm and the Japanese construction equipment manufacturer are now conducting proof-of-concept tests at the latter's Ibaraki plant. The hydrogen-powered truck features a 700 bar tank system provided by Argo-Anleg, which is mounted beside the cab for maximum storage capacity. Link 12/03/2025
71. **Hydrogen**: Malaysia. FuelCell Energy, Inc. and Malaysia Marine and Heavy Engineering Sdn Bhd announced the signing of a Joint Development Agreement (JDA) to co-develop large-scale hydrogen production systems and technologies across Asia, New Zealand, and Australia. Under the terms of the JDA, the two companies will bring together FuelCell

Energy's cutting-edge solid oxide electrolyzer (SOEC) technology and MHB's expertise in large-scale fabrication to develop modular solutions that support rapid deployment of commercial hydrogen production. Link 13/03/2025

72. **Hydrogen**: Malaysia. Valued at around $17m, the EPC contract from H1Hydro could see the first phase of the project enter operations in Q1 2026. Having released its national hydrogen roadmap in 2023, the country is looking to use the state's existing hydropower resources and high renewable energy potential to produce low-cost green hydrogen. The facility is expected to use European electrolysis technology, while hydrogen storage and transport solutions are currently under discussion with firms in South Korea and Malaysia. Link 28/03/2025
73. **Hydrogen**: Morocco. The Moroccan Government approved six hydrogen-based projects worth $32.7bn located in the country's southern regions. The UAE's Taqa and Moeve (formerly Cepsa) will focus on green ammonia and synthetic fuel production. Saudi Arabia's ACWA Power aims to develop green steel, while Moroccan firm Nareva will work on green ammonia, industrial fuel, and green steel. A consortium led by US-based Ortus, Spain's Acciona, and German wind turbine manufacturer Nordex – operating under the ORNX consortium – will also produce green ammonia. Similarly, UEG and China Three Gorges will develop green ammonia production, forming the sixth project. Link 10/03/2025
74. **Hydrogen**: New Zealand. Fabrum and Ara Ake will develop the systems for Stralis Aircraft's fixed-wing aeroplane. Under the partnership, Stralis will deliver the hydrogen-electric propulsion systems and aircraft integrated with Fabrum's tanks and fuel system. The consortium will develop a liquid hydrogen tank and fuel system to enable the region's "first" hydrogen-powered flight. Link 27/03/2025
75. **Hydrogen**: Peru. The Horizonte de Verano project, led by Latin America-focused renewables company Verano Energy, will set up facilities for the production of green hydrogen to obtain ammonia, a water desalination plant and a solar farm, making this the largest initiatives of its kind in the region. Peru's ministry of production has approved the detailed environmental impact assessment (EIA-d) for a USD-11.2-billion-plus (EUR 10.26bn) green hydrogen and ammonia production mega-project in the Arequipa region. the initial phase will rely on 1,500 MWp of solar power, enough to support an annual output of over 420,000 tonnes of ammonia. Link 12/03/2025
76. **Hydrogen**: Portugal. EIB finances Galp's Renewable Hydrogen and Biofuels projects in Sines with €430 million. The Biofuels unit, financed with €250 million, will produce low-carbon fuels for the decarbonization of transport. The renewable Hydrogen production unit, financed with €180 million, will be one of the largest in Europe. Galp is developing the Biofuels unit, already at a construction stage, in partnership with Japan's Mitsui, as part of a total €400 million investment, of which €250 million is provided by the EIB. This unit will convert vegetable oils and residual fats into sustainable aviation fuel (SAF) and renewable diesel of biological origin (HVO). Link 14/03/2025
77. **Hydrogen**: Saudi Arabia. Saudi Aramco has completed the 50% acquisition of Air Products Qudra's (APQ) Saudi-based blue hydrogen subsidiary, Blue Hydrogen Industrial Gases Company (BHIG). The network, in combination with Aramco's carbon capture and storage (CCS) hub in Jubail, will help the firm capitalise on domestic and global opportunities to diversify its energy portfolio. Saudi Arabia already consumes 2.5 million tonnes of hydrogen across refineries, steel, ammonia, and methanol. It's reportedly eyeing 4 million tonnes of low-carbon production annually by 2035. KAPSARC forecasts Saudi blue hydrogen could hit $1.13/kg by 2030, undercutting green hydrogen at $1.48/kg – if CCS and electrolyser costs keep falling. Link 26/03/2025

78. **Hydrogen**: South Korea. Hyundai Motor will begin the construction of a hydrogen fuel cell plant at its Ulsan, South Korea, facility this year, with mass production targeted for 2028. Set to be its third fuel cell manufacturing plant, the facility will reportedly be capable of producing systems for up to 6,500 hydrogen-powered cars per year. Hyundai's fuel cells for passenger vehicles (Nexo), buses, Xcient trucks and its new SUV are currently produced at its Guangzhou facility in China, with an annual capacity of up to 6,500 units, and at its fuel cell factory in Chungju, South Korea, which can manufacture 23,000 units per year. Link 12/03/2025
79. **Hydrogen**: Sweden. HYBRIT's pilot project for hydrogen gas storage has now been completed and reported to the Swedish Energy Agency. The results show that it is technically possible to store fossil-free hydrogen gas for producing fossil-free iron and steel on an industrial scale. This can also reduce the variable operating costs of hydrogen production by up to 40 per cent. The project has successfully designed and constructed a 100 m3 hydrogen storage facility based on steel-lined rock cavern technology in Svartöberget adjacent to the DR pilot for sponge iron production in Luleå, Sweden. The tests now completed show that the technology works to support a large-scale hydrogen user, and that savings of about 25-40 per cent of the variable operating costs of hydrogen gas production could be achieved. Link 25/03/2025
80. **Hydrogen**: Switzerland. The plant, which is expected to be commissioned in July 2026, could represent a total order value for Haffner Energy that may reach up to €8.3 million, including options. With all its equipment and auxiliaries, it is designed to produce 30 kg/h of hydrogen. The hydrogen produced at the plant will be distributed on site or removed for industrial and mobility applications. The electricity produced will be fed into the electricity grid. Biochar, a by-product of the production of syngas (syngas) from which hydrogen is derived and a real carbon sink, will be used for compost enrichment and soil amendment. Link 13/03/2025
81. **Hydrogen**: The Netherlands. Windcat has delivered the first hydrogen-powered crew transfer vessel (CTV) in its new MK5 series, purpose-built for offshore wind farm operations. Equipped with a dual-fuel hydrogen combustion engine co-developed by Cmb.Tech and Man, the 27-metre Hydrocat 60 joins Windcat's MK5 series. It is the company's third hydrogen-powered CTV delivered since 2022. The Hydrocat 60's integrated Cmb hydrogen system can reportedly store up to 458kg of compressed hydrogen. Link 28/03/2025
82. **Hydrogen**: United Kingdom. BP cancelled its HyGreen Teesside hydrogen project, following its recent decision to scale back investments in green energy and limit future hydrogen developments. HyGreen Teesside was expected to be one of the UK's largest hydrogen production facilities, targeting 500MW of electrolyser capacity by 2030, with an initial 80MW phase slated to come online this year. The company's view is that following their recent strategy reset announcement that bp would be focused on high-graded projects in hydrogen and carbon capture, prioritising 5-7 projects for this decade. Link 06/03/2025
83. **Hydrogen**: United Kingdom. Cummins, in collaboration with key tech leaders including Johnson Matthey, PHINIA, and Zircotec, successfully completed Project Brunel, showcasing a significant leap in hydrogen innovation for commercial vehicles. The project culminated in the development of a 6.7-liter hydrogen internal combustion engine (H2-ICE), which caters to medium-duty trucks, buses. By using Cummins' proven engine platform as a foundation, the consortium integrated cutting-edge technologies to make H2-ICE a viable powertrain alternative. This engine drastically reduces tailpipe carbon emissions by more than 99% compared to Euro VI diesel standards and boasts ultra-low nitrogen oxide (NOx) emissions. Link 14/03/2025

84. **Hydrogen**: United Kingdom. Supercritical Solutions secured £14m ($17.4m) in a Series A funding round led by Shell and Toyota to scale its high-efficiency electro Membraneless electrolysers operate without a physical membrane, using fluid dynamics or buoyancy to separate gases naturally. This simpler, cost-effective design offers advantages in durability and maintenance but poses challenges around gas purity and scaling lyser technology, which reportedly produces hydrogen at 42 kWh/kg. Supercritical will use the funding from the likes of Anglo American, Black Finch and more to advance its electrolysers to the pilot stage while refines technology, manufacturing and market expansion. Link 12/03/2025
85. **Hydrogen**: USA. ABB and Charbone Hydrogen Corporation signed a MoU to collaborate on the development of up to 15 modular and scalable green hydrogen production facilities across North America over the next five years. the MoU scope positions ABB as the preferred supplier for the design, engineering, fabrication, testing and supply of modular and standard electrical substations (eHouses) for the interconnection between production facilities and local utilities. ABB will support Charbone in standardizing basic engineering for systems and components. Among the sites covered by the collaboration is Charbone's flagship Sorel-Tracy facility near Montreal in Québec, Canada. The next project to get underway will be in the greater Detroit area in the US, which is the manufacturing base for major automotive companies. Link 8/03/2025
86. **Hydrogen**: USA. Bosch halted its plan to incorporate a hydrogen fuel cell production line into its South Carolina facility. Bosch indicated that he $200m expansion was delayed in mid-2024, after the hydrogen fuel cell mobility market experienced "significant changes over the past year". The expansion plans for the Anderson County facility were first announced in 2022, with production scheduled to ramp up through 2026, bringing an estimated 350 new jobs to the area. Link 04/03/2025
87. **Hydrogen**: USA. Plug Power has logged over $970m worth of non-cash impairments as it introduces further cost reduction measures due to slow hydrogen market development. The $971.3m in non-cash charges stem from asset impairments and bad debt provisions recorded in OPEX. Plug attributed these impairments to strategic shifts following weaker-than-expected market demand, impacting assets like plants, equipment and power purchase agreements. Link 05/03/2025
88. **Hydrogen**: USA. Sustainable aircraft developer ZeroAvia will explore the feasibility of integrating hydrogen propulsion into a Cessna Caravan aircraft for the US Air Force. ZeroAvia will study how hydrogen-electric propulsion and autonomous flight systems could be integrated into a 3.6-tonne aircraft. The Cessna Caravan, a civilian aircraft made by Textron, will be the test platform. The feasibility study will provide greater insight into how hydrogen fuel cell propulsion can reduce detectability and costs of air operations, enhance capability of autonomous air vehicles and derisk fuel supply in forward operating environments. Link 26/03/2025
89. **Hydrogen**: USA. The StormFisher plant will convert 200 MW of renewable electricity, primarily from wind and solar, into green hydrogen via electrolysis and then into e-methane. The site will utilise a local biogenic CO2 source. It is expected to generate 2.5 million MMBtu of e-methane annually, equivalent to around 50,000 metric tonnes of liquefied natural gas (LNG). The pre-FEED contract comes less than a month after the Canadian firm attracted Hy24 as a backer. The Paris-based hydrogen investor committed to investing USD 50 million (EUR 46.7m) in StormFisher Hydrogen to advance its North American pipeline, help it reach final investment decisions (FID) on its projects and support export ambitions to European and Asian markets. StormFisher's pipeline includes several facilities located across the US and Canada, which by 2030 will be capable of converting up to 1.8 GW. Its most advanced

initiative is in North Texas, expected to reach an FID in early 2026. The project targets an e-methanol production capacity of more than 120,000 tonnes per year. Link 07/03/2025

90. **Hydrogen**: USA. This project will use Verdagy's eDynamic electrolysers to produce hydrogen compliant with Europe's Renewable Fuels of Non-Biological Origin (RFNBO) standards and 45V US Treasury requirements. Verdagy opened its electrolyser manufacturing facility in Silicon Valley, California, October 2024, with production starting early 2025. The plant manufactures the company's 20MW electrolyser modules, which are based on single-cell architecture. Link 19/03/2025

Marine fuels

91. **Marine fuels**: Belgium. World Shipping Council (WSC) released new research that shows both renewable-capable vessels and renewable fuels could be available to meet EU 2030 targets, but that the price gap between fossil and renewable fuels is the major barrier to making decarbonization a reality. The first "WSC EU Shipping Decarbonisation Report – Can the EU Fuel Shipping's Decarbonisation?" – launched at the European Shipping Summit 2025 in Brussels, provides a comprehensive analysis of shipping's transition to renewable fuels in the EU. The report finds that while the number of renewable-fuel capable vessels is increasing and fuel availability is improving, pricing remains the primary obstacle to scaled production and widespread adoption. Link 24/03/2025
92. **Marine fuels**: Denmark. Copenhagen Infrastructure Partners has developed an Ammonia Bunkering Operations Manual through its Energy Transition Fund outlining safety protocols for handling ammonia as a marine fuel. The 73-page manual, reviewed by the American Bureau of Shipping, builds on existing gas carrier protocols for loading, discharging, and ship-to-ship transfers, adapting them for ammonia bunkering. CIP stated the manual provides "a structured framework for safe and efficient ammonia bunkering. ETF is working with port authorities in Rotterdam, Sines, and Duisburg to align ammonia bunkering with port safety and infrastructure requirements. The group has also signed an MOU with these ports under the MadoquaPower2X project, which aims to develop a maritime green corridor for ammonia and methanol transport between Portugal and Northern Europe. Link 07/03/2025
93. **Marine fuels**: Denmark. Maersk changes course and postpones clean fuel targets for its fleet. The uncertain access to alternative fuels is now prompting the Danish shipping major, known for being at the forefront of the green transition, to change its intermediate climate goals. Link 03/03/2025
94. **Marine fuels**: Hong Kong. CIMC ENRIC Holdings Limited and Wah Kwong Maritime Transport developed a partnership for green methanol bunkering applications, logistics and bunkering services. The partnership is the first cooperation of the kind for the green fuel sector, tying a leading plant developer to a logistics and downstream service provider. The Agreement is a statement of confidence in CIMC ENRIC's green methanol production capabilities in the renewable fuel sector, and Wah Kwong's capabilities as an investor, offtaker and logistics partner for renewable fuel. CIMC ENRIC is currently developing the first phase of its 50,000 MTPA renewable green methanol plant in Zhanjiang City, Guangdong Province. The plant is strategically located to supply the GBA, Southern China, and South East Asia. It is expected to be onstream in the second half of 2025. Link 05/03/2025
95. **Marine fuels**: Norway. Furetank completed its first bunkering of 200 metric tons of ISCC certified Bio-LNG, in collaboration with environmental commodity trader STX Group and Molgas. As tanker vessel Fure Viken embarks on its next journey powered by a fuel solution rapidly gaining traction. Link 03/03/2025

96. **Marine fuels**: Singapore. The CMA CGM Group renewed a MoU with the Port of Singapore to advance sustainable shipping and innovation. This renewed partnership builds on an earlier MoU signed in 2022 and underscores the shared commitment to strengthening Singapore's position as a premier maritime hub. Under the MoU, CMA CGM plans to expand its fleet and vessel tonnage, adding more vessels under the Singapore Registry of Ships, including four 23,000 TEU LNG vessels. This move reinforces Singapore's position as a maritime hub for CMA CGM and supports the company's goal of achieving Net Zero Carbon by 2050. In this regard, the CMA CGM Group has invested nearly USD 20 billion to order LNG and methanol-powered ships and will have 153 ships capable of using low-carbon energies (biogas, biomethanol and synthetic fuels) in its fleet by 2029. Link 21/03/2025
97. **Marine fuels**: South Korea. HMM takes delivery of 'HMM GREEN', a 9,000 TEU methanol-powered containership. This vessel is the first of nine sister ships ordered in February 2023 from HD Hyundai Samho Heavy Industries (seven vessels) and HJ Shipbuilding & Construction (two vessels). Starting with this delivery, HMM will gradually receive the remaining eight vessels by next year as part of its fleet expansion plan. Link 27/03/2025
98. **Marine fuels**: Spain Moeve, Exolum, and the Port Authority of Huelva demonstrated at the Port of Huelva the new loading and unloading infrastructure, currently under construction, which will improve operational capacities and provide service to the new 2G biofuels plant that Moeve and its partner are building at the La Rábida Energy Park in Palos de la Frontera. Link 14/03/2025
99. **Marine fuels**: The Netherlands Titan Clean Fuels and Mitsui O.S.K. Lines have completed the first LNG and liquefied biomethane (bio-LNG) bunkering operation of a new multi-delivery contract for MOL's vehicle carrier fleet. Titan's Alice Cosulich LNG bunkering vessel delivered 500 tons of bio-LNG and 400 tons of conventional LNG to the Celeste Ace vehicle carrier. The simultaneous operation (SIMOPS) bunkering took place in the Port of Zeebrugge's International Car Operators (ICO) terminal .Link 20/03/2025

Market development

100. **Market development**: Germany. RWE is to reduce its planned investment in clean energy to 2030 by €10bn, due to stricter risk management and higher return expectations. In its annual results for 2024 the German energy company stated that a total of €35bn net is now planned for the years from 2025 to 2030, about €10bn net less than previously planned. Link 21/03/2025
101. **Market development**: USA. A new tool released by HeatMap News assists with the planning and implementation of renewable energy projects in the US. Link 24/03/2025

Methanol

102. **Methanol**: Germany. In collaboration with CreativeQuantum and Leibniz Institute for Catalysis (LIKAT), C1 has developed a fundamentally new proprietary homogeneous catalysis for the production of methanol. The C1 process is much more selective than the heterogeneous catalysis currently in use, which dates to a patent from 1921. It works at significantly lower pressure and temperature, allows for more flexible operations, is more tolerant towards feedstock impurities and scales better. Link 31/03/2025
103. **Methanol**: Mexico. NEXTCHEM's subsidiary KT Tech was awarded a licensing contract for the implementation of NEXTCHEM's proprietary NX AdWinMethanol Zero technology for Pacifico Mexinol, an ultra-low carbon methanol facility near Los Mochis, Sinaloa, on the Pacific coast of Mexico, with an output in excess of 2.1 million tons per year. When it initiates operation in 2028, Pacifico Mexinol is expected to be the largest single ultra-low carbon methanol facility

in the world – producing approximately 350,000 metric tons of green methanol and 1.8 million metric tons of blue methanol annually from natural gas with carbon capture. Link 11/03/2025

104. **Methanol**: Spain. REOLUM, has awarded a consortium formed by Técnicas Reunidas and Siemens Energy the Front-End Engineering Design (FEED) of the La Robla Green project, which aims to develop what will be one of Europe's largest renewable methanol plants in the municipality of La Robla, in the Spanish province of León. The facility, with a production capacity of 140,000 tons per year, will combine biogenic carbon from a biomass cogeneration plant with renewable hydrogen to produce renewable methanol. Link 21/03/2025
105. **Methanol**: Turkiye. WasteFuel, a U.S.-based next generation bioenergy company, and ITC, a leading Turkish integrated waste management company, announced a partnership to commence the Front-End Engineering Design (FEED) on a green methanol biorefinery located in Ankara, Türkiye—the first green methanol facility in Anatolia and one of the largest of its kind in the world. The biorefinery, which would adjoin ITC's existing integrated waste management facility, would utilize biogas derived from anaerobic digestion and landfill gas collection. Once operational, its green methanol will be intended for use as low-carbon fuel for the maritime shipping market. Link 13/03/2025

Packaging

106. **Packaging**: USA. CelluComp, a leading supplier of materials for fiber-based barrier packaging, is expanding its operations to the U.S. with its first ever commercial-scale facility, located in Renville, Minn. It will begin producing its patented micro-fibrillated cellulose product, Curran. Curran is made by extracting cellulose from residual pulp of root vegetables, like sugar beets, which is then used as a key ingredient in making high-quality fiber-based packaging as an alternative to plastics and PFAS chemicals. CelluComp is partnering with Southern Minnesota Beet Sugar Cooperative, located less than a mile away, to supply the plant with up to 7,000 tons of sugar beet pulp to produce 800 tons of Curran to start, and scaling up to 24,000 tons (equalling 2,800 dry tons of Curran) next year. CelluComp will ship its Curran product around the world to manufacturers placing goods in biodegradable, fiber-based packaging. Link 18/03/2025

Plastic recycling

107. **Plastic recycling**: The Netherlands. Dow announced an equity stake in Xycle, a Rotterdam-based pioneer in advanced (also known as chemical) recycling technology, alongside investors ING, Invest-NL, Polestar Capital and Vopak. This marks an important milestone in Dow's ongoing commitment to transform plastic waste into high-value materials and accelerate a circular economy for plastics by further increasing and diversifying access to circular feedstock. Xycle's proprietary pyrolysis technology converts difficult-to-recycle plastic waste into pyrolysis oil that can be used to make virgin-quality plastics. Link 19/03/2025

Policy

108. **Policy**: Australia. The Australian federal government is delivering A$250 million to accelerate the pace of Australia's growing domestic Low Carbon Liquid Fuels (LCLF) industry. This funding is part of the A$1.7 billion Future Made in Australia Innovation Fund and will be provided as grants to support pre-commercial innovation, demonstration and deployment. Alongside the A$250 million for low carbon liquid fuels, the Future Made in Australia Innovation Fund is providing A$500 million for clean energy technology manufacturing capabilities including electrolyzers, batteries and wind towers. Link 10/03/2025

109. **Policy**: Canada. The government of British Columbia announced changes to the law governing its Low Carbon Fuels Standard that will require eligible renewable fuels to be produced in Canada. The changes also boost the renewable content requirements for diesel. The regulatory changes boost the renewable fuel requirement for diesel from 4% to 8% beginning with the 2025 compliance period. Beginning April 1, 2025, the minimum 8% renewable fuel requirement for diesel must be met with eligible fuels produced in Canada. Link 03/2025
110. **Policy**: USA. An orderly transition from today's US nationwide E10 standard to a nationwide E30 standard—as happened with the RFS, moving gradually from E10 to E15, E20, E25, and ultimately E30+ as ethanol production ramps up over the next ten or so years—would increase ethanol's contribution to the U.S. gasoline pool by approximately three-fold, from today's 1.05 million bpd to 3 million bpd, approximately 1 billion barrels per year. In terms of replacing oil for the purpose of making gasoline, ethanol's value doubles and could displace 2 billion barrels/year of crude oil — 100% of U.S. oil imports according to EIA's 2024 statistics. Link 10/03/2025
111. **Policy**: USA. The EU is set to reintroduce tariffs on US steel and aluminium, targeting up to €18bn ($19.6bn) worth of US goods in a move that could impact US electrolyser manufacturers supplying European hydrogen projects. This latest escalation in the US-instigated global trade war comes in response to US President Trump's decision to impose 25% tariffs on all steel and aluminium imports, which took effect on Wednesday (March 12). Link19/03/2025
112. **Policy**: USA. The U.S. government on March 4 implemented new tariffs on a variety of goods from Canada, Mexico and China, including a 10% tariff on biofuels entering the U.S. from Canada. Future retaliatory tariffs could also impact U.S. biofuel exports. The government of Canada on March 4 announced it would move forward with retaliatory tariffs. Biofuels are not yet on that list, but the Canadian government has indicated it will consider a tariff on U.S. biodiesel imports. The country included biodiesel and biodiesel blends containing less than 70% petroleum in a list of goods it will consider including in a second round of retaliatory tariffs. That list is subject to a 21-day public comment period. Link 12/03/2025
113. **Policy**: USA. The United States Government strongly objected to a recommendation on "sustainable" aviation fuels made during the 13th triennial meeting of the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP). This recommendation to the ICAO Council on multi-cropping, the practice of growing two or more crops on the same land, for sustainable aviation fuels, would unfairly penalize U.S. farmers and significantly benefit Brazil over the rest of the world. Link 07/03/2025

Pyrolysis

114. **Pyrolysis**: Brazil Riograndense Refinery (RPR) successfully performed the co-processing test of 5% biomass pyrolysis oil or bio-oil (non-food biomass raw material) with mineral load. In this way, the refinery, located in Rio Grande (RS), which has corporate interests of Petrobras, Ultra and Braskem, was the first in the country able to produce cellulosic-content fuels. Based on a Petrobras technology, the co-processing test occurred in the RPR catalytic cracking unit (FCCU). Link 17/03/2025
115. **Pyrolysis**: Poland. Orion S.A, a global specialty chemicals company, announced today it has signed a long-term supply agreement with Contec S.A., which will provide Orion tire pyrolysis oil to produce circular carbon black for tire and rubber goods customers. Contec S.A. specializes in end-of-life tire processing through chemical recycling, transforming discarded tires into circular, sustainable raw materials. What sets Contec apart is their proprietary

Molten® technology, which utilizes molten salt as a heat transfer medium. This innovative approach ensures safer, more efficient, and economically viable production. Link 10/03/2025

116. **Pyrolysis**: USA. Lummus Technology, a global provider of process technologies and value-driven energy solutions, and Resynergi, a leading innovator in modular plastic recycling technology, announced the commercialization of Resynergi's Continuous Microwave Assisted Pyrolysis (CMAP) Modules. Lummus and Resynergi established this partnership in 2024 and have made rapid progress in developing and commercializing the CMAP technology, which converts plastic waste into circular pyrolysis products significantly faster and more efficiently than traditional pyrolysis methods. Link 21/03/2025

Recycling plastic

117. **Recycling plastic**: Austria. OMV and the European Climate, Infrastructure and Environment Executive Agency (CINEA) signed a grant agreement for OMV's planned industrial ReOil® plant, securing up to EUR 81.6 million funding. This marks the first time that OMV has received a grant from the EU Innovation Fund. The future industrial ReOil® facility will be designed to process up to 200,000 metric tons of used plastics that would otherwise be taken to landfill sites or incineration plants. Using OMV's proprietary ReOil® chemical recycling technology, this recycled material can be converted into sustainable base chemicals and for the manufacture a variety of products for the chemical industry. Link 26/03/2025
118. **Recycling plastic**: France. As the only commercial recycler of PLA, TotalEnergies Corbion offers rPLA in 30% and 100% recycled grades, using its low-energy hydrolysis process at its Rayong, Thailand facility. This approach presents a viable alternative to conventional plastic recycling, minimizing carbon footprints and ensuring that PLA remains fully circular. Link 24/03/2025
119. **Recycling plastic**: Norway. With the PPWR's 2030 target of 70% recyclability for all packaging rapidly approaching, the industry is facing increasing pressure to adapt. The legislation mandates significant recycled content targets, driving innovation in packaging design and recycling technologies. TOMRA's comprehensive suite of solutions – encompassing AI/deep learning, precise flake sorting and sophisticated waste analysis – is set to play a pivotal role in enabling recyclers and brand owners to meet these demands effectively. Link 27/03/2025

Renewable diesel

120. **Renewable diesel**: Australia. Neste allocated 8,500 tons of renewable diesel from used cooking oil for the trial. The fuel was shipped from Singapore to Rio Tinto's Parker Point fuel terminal in Dampier by Viva Energy and blended portside with fossil diesel to create a mix with about 20% renewable diesel. It was then distributed across Rio Tinto's Pilbara iron ore operations for use in rail, marine, blasting, haul trucks, surface mining equipment and light vehicles. Link 04/03/2025
121. **Renewable Diesel**: The Netherlands. Neste Corporation issued a EUR 700 million green bond with 5-year maturity under its EMTN (Euro Medium Term Note) program updated on September 12, 2024, and supplemented by the supplement dated March 10, 2025, and will pay a fixed coupon of 3.750 per cent. The net proceeds from this Green Bond are expected to be used for the expansion of the Rotterdam refinery, which is expected to become the world's largest renewable diesel and SAF facility. Link 19/03/2025

Technology development

122. **Technology development**: USA. MayMaan is reestablishing a new paradigm in power generation with its groundbreaking AquaStroke engine technology, which runs on a fuel

mixture of 70% water and 30% ethanol. The company's innovation offers a commercially viable, cleaner, and more cost-effective alternative to traditional diesel engines and electric batteries. Link 27/03/2025

Textiles

123. **Textiles**: Finland. Metsä Group is developing Kuura and starts pre-engineering the first commercial Kuura textile fibre mill. This is the first stage to prepare for the industrial production of Kuura fibre. This is an important step in Metsä Group's work to develop wood-based products of higher added value. The Kuura textile fibre is produced from softwood pulp, the raw material of which is sourced from Metsä Group's Finnish owner-members' forests. Link 10/03/2025

Torrefaction

124. **Torrefaction**: New Zealand. A new biomass torrefaction facility is being developed by Carbona in the Central North Island to produce 180,000 tonnes of torrefied biomass annually. Carbona has partnered with two leading Austrian technology providers, Polytechnik and Andritz. Carbona (www.carbona.nz) is a New Zealand company specialising in transforming biomass into a renewable energy source. Leveraging technology solutions from its Austrian parent company, Polytechnik. Carbona develops torrefied biomass as a 'drop-in' fuel to seamlessly replace coal in boiler plants. Beyond energy applications, Carbona's carbonised products, such as biocoal and biochar, have valuable uses in carbon capture, soil improvement, animal health, filtration, cement, and steelmaking. Link 17/03/2025

GIFFORD
CONSULTING

Company Summary – **March 2025**

Frequency of mention

Monthly Summary: March 2025

Company	Frequency
US Government	3
Bosch	2
CIP	2
EU	2
Galp	2
Ineratec	2
Neste	2
TotalEnergies	2
WasteFuel	2
Aemetis	1
Air Liquide	1
Alfa Laval	1
Andritz	1
Apus	1
Aramco	1
Arkema	1
Ash Creek Renewables	1
Astarta	1
Australian Government	1
Ballard Power Systems	1
Balrampur Chini Mills	1
BASF	1
BC Government	1
Bharat Petroleum Corporation	1
Boeing	1
BP	1
C1	1
Carbona	1
Total	**121**

Topics & Themes/Category Summary– **March 2025**

Frequency of mention

Category	Frequency
Hydrogen	47
Biogas	11
Marine fuels	9
Policy	6
Biojet	5
e-fuels	5
Methanol	4
Biobased chemicals	3
CO2 Removal	3
Feedstock	3
Pyrolysis	3
Recycling plastic	3
Ammonia production	2
Biobased plastics	2
Biofuels	2
Biojet/SAF	2
Biomaterials	2
Ethanol	2
Market Development	2
Renewable diesel	2
Feedtock	1
Packaging	1
Plastic recycling	1
Technology development	1
Textiles	1
Torrefaction	1
Total	**124**