

## Bioeconomy & Low Carbon Technology Overview for March 2024

This summary of low carbon technology developments for March 2024 is based on the data and information collated by Gifford Consulting and presented on our website: [Gifford Consulting](#)

### Highlights by Topic: March 2024

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

#### Ammonia production

1. Ammonia Production - JERA Co. and ExxonMobil: JERA Co. has teamed up with ExxonMobil for a low-carbon hydrogen and ammonia production project in the United States, aiming to kickstart operations by 2028. ExxonMobil's development at its Baytown complex is expected to become the largest low-carbon hydrogen production facility globally, with a projected annual output of around 900,000 tons of hydrogen and over one million tons of low-carbon ammonia.

#### Biobased Chemicals

2. Biobased Chemicals - Kraton Corporation: Kraton Corporation has introduced SYLVASOLV, a new series of biobased hydrocarbon oils from Crude Tall Oil, targeting low carbon options for agrochemicals, adhesives, and lubricants. SYLVASOLV 1000, the inaugural product, is tailored for the agricultural sector, improving fertilizer coatings and crop protection solutions.
3. Biobased Chemicals - New Energy Blue: New Energy Blue's subsidiary, New Energy Chemicals, will produce bio-based ethylene in the USA. This is to assist Dow in manufacturing low carbon plastics.

#### Biobased Plastics

4. Biobased Plastics - Balrampur Chini: Balrampur Chini announced the establishment of India's first industrial bioplastic plant, focusing on producing polylactic acid (PLA). This venture is a major step towards business diversification.
5. Biobased Plastics - Shell Chemicals and Braskem: Shell Chemicals is collaborating with Braskem to introduce certified bio-attributed and bio-circular propylene to the U.S.

#### Biofuels

6. Biofuels - Trafigura Group: Trafigura acquired Greenergy's European operations, enhancing its biofuels business by integrating renewable fuel production and distribution. This strategic move aims to strengthen Trafigura's fuel supply chain in Europe.
7. Biofuels - Stellantis: Stellantis (an automotive manufacturing corporation) plans a significant €5.6 billion investment in South America for launching over 40 new products by 2030, including Bio-Hybrid and decarbonization technologies. This investment is set to have a major impact on the automotive industry with sustainable innovations and new business opportunities.

8. Biofuels - Growth Energy: Growth Energy announced a record surge in E85 fuel sales in California, highlighting increasing consumer demand for biofuel blends as a cost-effective way to reduce their carbon footprint. This trend signals a growing preference for sustainable fuel options.
9. Biofuels - ClonBio: ClonBio committed an additional \$400 million to expand the AztalanBio facility in Wisconsin. This will result in establishing the state's largest ethanol and grain processing plant.
10. Biofuels - Chempolis Oy and NordFuel: Chempolis Oy partners with NordFuel plan to launch a biorefinery in Finland, using forestry residues for bioethanol, lignin, and biochemicals.
11. Biofuels - Renovare Fuels: Renovare Fuels initiated a \$7.6 million equity raise to fund projects for producing advanced renewable biofuels from waste. This is a novel approach for converting landfill organic gases into sustainable fuel alternatives.
12. Biofuels - Repsol and Bunge: Repsol acquired 40% of Bunge to facilitate new opportunities for producing renewable fuels from lower carbon intensity feedstocks, aiming to accelerate the European Union's mandate for increased renewable fuel production.
13. Biofuels - Blue Biofuels, Inc.: Blue Biofuels, Inc. advanced its Cellulose-to-Sugar technology by producing its inaugural batch of cellulosic ethanol.

## **Biogas**

14. Biogas - TotalEnergies: TotalEnergies collaborated with Cristal Union to utilize beet pulp for biomethane production at the BioNorrois unit in Fontaine-le-Dun, France which is scheduled to begin by end of 2024. This initiative will process organic residues into nearly 100 GWh of biomethane annually initially, with a future capacity expansion to 153 GWh.
15. Biogas - Infravia Capital Partners: Infravia Capital Partners established Heygaz Biomethane, a Pan-European renewable natural gas platform, through the acquisition and merger of assets from Molgas and Efedos. Heygaz aims to meet the rising demand for carbon-neutral gas across various industries and transportation sectors in Europe.
16. Biogas - Green Arrow Capital: Green Arrow Capital, in partnership with Lazzari & Lucchini, announced the completion of their first portfolio of seven biomethane production plants in Italy. This collaboration, initiated in 2020, plans to further expand by adding at least six more plants by 2025.
17. Biogas - Vanguard Renewables: Vanguard Renewables redefined its identity, changing from a renewable energy entity to a company focused on being an organic solutions provider that utilizes organic waste to produce renewable energy, animal bedding, organic fertilizer, and renewable CO<sub>2</sub>.
18. Biogas - Sublime Energie: Sublime Energie, a Mines ParisTech spin-off, has developed a biogas liquefaction process that facilitates the transportation of biogas produced on farms to sewage treatment facilities. This technology provides farmers with a solution for the more effective use of biogas as it can be upgraded and then fed into the natural gas networks.
19. Biogas - AUGA group: AUGA group has initiated the supply of biomethane gas through Lithuania's natural gas system to the German market, capitalizing on Europe's developed biomethane infrastructure and generating 61 thousand megawatt hours of gas annually.
20. Biogas - Suma Capital: Suma Capital acquired an 80% stake in ATH Bioenergy, marking a move towards transforming the Canary Islands' energy and waste recovery sectors into a more sustainable and competitive future.

21. Biogas -Australia's first biomethane-to-gas-network injection plant was certified by "GreenPower" – a government managed renewable energy certification program – in an important next step for Australia's developing renewable gas sector.
22. Biogas - Low Carbon and Agrivert formed a Joint Venture named Beacon to develop, build and operate biogas and biomethane projects across Europe. Beacon combines the expertise of two significant players in the biogas sector. Low Carbon is an independent power producer who has developed more than 2 GW of renewable energy capacity to date with a further 15 GW of projects in development. Agrivert has over 30 years' experience and is considered one of Europe's leading companies that design, build and operate anaerobic digestion facilities.

## **Biojet/SAF**

23. Biojet - LanzaJet and Southwest Airlines: LanzaJet received a \$30 million investment from Southwest Airlines, to develop a sustainable aviation fuel (SAF) production facility and support the operations of SAFFiRE Renewables, LLC, a technology company focused on converting corn stover to ethanol and ethanol to SAF.
24. Biojet - International Airlines Group (IAG): IAG secured its largest Sustainable Aviation Fuel (SAF) purchase agreement with Twelve, acquiring 785,000 metric tons of e-SAF to reduce lifecycle greenhouse gas emissions by up to 90% compared to conventional jet fuel.
25. Biojet - Neste: Neste launched Neste Impact, a new solution for businesses to lower the carbon footprint of air travel and transport by purchasing Neste MY Sustainable Aviation Fuel™, promising up to an 80% reduction in greenhouse gas emissions over the fuel's life cycle.
26. Biojet - Aemetis, Inc.: Aemetis, Inc. obtained consents for a sustainable aviation fuel (SAF) and renewable diesel production plant in Riverbank, California, designed to produce up to 90 million gallons per year.
27. Biojet - Gamalux: Gamalux expects to produce 100,000 metric tons of sustainable aviation fuel feedstock from palm oil before the end of this year. Last year, the company produced about 80,000 tons of SAF feedstock, with most going to Europe. The company is aiming to be the largest biofuel feedstock producer in Malaysia.
28. Biojet - Jet Zero Australia: Jet Zero Australia has secured A\$29 million in funding for Project Ulysses, an Alcohol-to-Jet (ATJ) SAF project in North Queensland. This funding is a significant step towards the project's engineering phase and the company's goal of advancing SAF development.
29. Biojet - Aemetis, Inc.: Aemetis, Inc. has received approval for \$200 million of EB-5 program investment for multiple projects, including the Riverbank SAF production plant and the dairy RNG project. The Riverbank plant is poised to produce 78 million gallons per year of SAF. This project is supported by over \$3 billion in airline contracts.
30. Biojet - TotalEnergies and SINOPEC: TotalEnergies and China Petroleum and Chemical Corporation (SINOPEC) plan to develop an SAF production unit in China with a 230,000 tons annual capacity. The plant will use local waste and residues.
31. Biojet - Co-processing in kerosene hydrotreaters offers a practical route for refineries to produce SAF by using existing infrastructure with minor modifications. This is an efficient way to transition to renewable refineries.

## **Biomaterials**

32. Biomaterials - : A report by Synonym and Boston Consulting Group forecasts a surge in the biomanufacturing market to \$200 billion over the next decade, highlighting next-generation biofoundries as a key driver for sustainable products.
33. Biomaterials - X-BATT: X-BATT's innovative use of Polymer Derived Ceramic (PDC) composite materials and biobased carbon sources aims to develop high-performance, sustainable lithium-ion battery anodes.

## **Biotechnology**

34. Biotechnology - AFYREN and SUEZ: AFYREN and SUEZ are collaborating to develop a new solution for organic waste processing in France. Such collaboration is expected to markedly accelerate the deployment of waste to energy and biomaterial solutions.
35. Biotechnology - Biotalys and Novonesis: Biotalys and Novonesis entered into a collaboration for the production and supply of EVOCA NG, Biotalys' first biofungicide. This is a significant step in sustainable crop protection through biobased control solutions.

## **CO2 Removal**

36. CO2 Removal - Red Trail Energy: Red Trail Energy, LLC, in collaboration with Puro.earth, has become the first ethanol production facility to issue CO2 Removal Certificates (CORCs) in the voluntary carbon market.
37. CO2 Removal - JX Nippon and Chevron: JX Nippon Oil & Gas Exploration Corporation and Chevron New Energies have signed an MOU to evaluate CO2 export from Japan to Carbon Capture and Storage (CCS) projects in the Asia Pacific area.
38. CO2 Removal - Spiritus, a leading climate tech company which designs solutions for market accessible carbon removal using direct air capture (DAC), announced that it will establish its first "Carbon Orchard" direct air capture and sequestration site in Central Wyoming. The facility, known as Orchard One, will be one of the world's largest direct air capture facilities, capable of capturing and sequestering up to two megatons of carbon from the atmosphere annually.

## **E-Fuels**

39. E-fuels - Infinium and Amogy: Infinium and Amogy Inc. (Amogy), a pioneer of carbon-free, energy-dense power solutions company, formed a collaboration to explore opportunities to integrate their technologies and develop commercial applications across the e-Fuels and green ammonia value chain. Infinium and Amogy are also exploring collaborations with both Mitsubishi Heavy Industries (MHI) Group and SK Innovation for deployment of the integrated e-fuel solutions.
40. E-fuels - SoCalGas, Electrochaea, and LLNL: SoCalGas partnered with Electrochaea and Lawrence Livermore National Laboratory to develop an electro-bioreactor for converting renewable electricity and biogas into renewable natural gas.
41. E-fuels - : Infinium commenced operation of the world's first commercial scale facility for producing electrofuels in Corpus Christi, Texas. This technology is offering a sustainable alternative for heavy transportation and chemical processes.
42. E-fuels - Mitsui O.S.K. Lines: Mitsui O.S.K. Lines announced the signing of a memorandum of understanding on the joint development of a synthetic fuel (e-fuel)/synthetic methanol (e-methanol) supply chain including CO2 marine transport with Idemitsu Kosan and HIF USA LLC

and HIF Asia Pacific Pty Limited, subsidiaries of HIF Global, a global producer of synthetic fuels/synthetic methanol. The partners will carry out feasibility studies of the CO<sub>2</sub> marine transport from Japan to HIF's overseas synthetic fuels/methanol production plants as well as a supply chain for fuels back to Japan.

## **Ethanol**

43. Ethanol -Summit Carbon Solutions announced that Valero, the world's second-largest corn ethanol producer and a leader in low-carbon transportation fuels production, will be a contributor on Summit's pipeline, as part of the largest proposed carbon capture and storage project in the world.
44. Ethanol - Green Plains Inc.: Green Plains Inc. has initiated the commissioning of its York, Nebraska, facility, which uses Fluid Quip Technologies' Shell Fiber Conversion Technology. This integrated technology solution aims to maximize corn oil extraction, produce low-carbon fuels, and generate Ultra-High Protein feed from corn kernel fiber.

## **Feedstock**

45. Feedstock - Yield10 Bioscience: Yield10 Bioscience reported that its proprietary varieties of winter Camelina sativa ("Camelina") in development responded as expected to herbicides in the first field tests conducted in the United States. Yield10 tested winter Camelina engineered with tolerance to glufosinate ("HT"), a herbicide widely used to manage weeds and protect yields in crop rotations in North America.
46. Feedstock - Chevron U.S.A. Inc. and Bunge North America, Inc.: Chevron and Bunge formed Bunge Chevron Ag Renewables LLC. This initiative will advance renewable fuel feedstocks by combining Bunge's oilseed processing expertise with Chevron's fuels manufacturing capability.
47. Feedstock - Empa researchers have extracted nanocellulose from a waste product of beer brewing and processed it into an aerogel. Aerogen is a high-quality biodegradable material which can be used for food packaging.
48. Feedstock - Castera Ag Ltd and Evogen Ltd.: Castera Ag Ltd, alongside Evogen Ltd., is enhancing its castor seed production capabilities in Brazil and Africa, focusing on high-yield, high-oil varieties to meet the growing demand for sustainable feedstocks.
49. Feedstock - Canadian canola growers will soon be able to benefit from new and expanded market opportunities for renewable fuel feedstocks linked to bioenergy with the new Cargill Power Canola program. Enrolment begins this month for the 2024 crop year. To qualify for the program, canola must be grown on land that is not designated a protected area; forested or wooded, native or biodiverse grassland, a watershed or riparian zone, or home to "at-risk-species.
50. Feedstock -The U.S. Department of Agriculture (USDA) released a plan that will boost biomass supply chain resiliency for domestic biobased product manufacturing, while also advancing environmental sustainability and market opportunities for small and mid-sized producers.
51. Feedstock - Yield10's genetically engineered Camelina varieties, designed for omega-3 fatty acid production, have been cleared by USDA-APHIS for cultivation in the U.S. This provides a new source for omega-3 fatty acids.
52. Feedstock - Siouxland Energy Cooperative, Iowa, and Continuum Ag of Washington, Iowa, have agreed to provide farmers the opportunity to receive potential premiums associated with Carbon Intensity (CI) Certified Grain. Continuum Ag will provide farmers the certification

necessary to participate, while Siouxland intends to be a buyer for the certified feedstock. The goal is to offer premiums for certified grain and capitalize on the pending 45Z Clean Fuel Production Tax Credits in the USA.

53. Feedstock -: CoBank reports that U.S. soybean processors are well-positioned to handle potential downturns in margins, despite risks posed by overbuilding capacity and sustained low processing margins. Over capacity and low processing margins have the potential to threatening the viability of new plants.

## Graphite

54. Graphite – CarbonScape, New Zealand: CarbonScape is converting wood chips and sawdust into graphite for EV batteries in New Zealand, allowing an alternative route for the conversion of waste biomass to carbon-based products.

## Hydrogen

55. Hydrogen -: The Indian government and NTPC are establishing the country's largest green hydrogen production plant in Visakhapatnam. The plant will export green ammonia and methanol to South Asia.
56. Hydrogen -: Equinor has received planning permission for the H2H Saltend project, a low carbon hydrogen production plant in Yorkshire, UK. This project will contribute to the UK's decarbonization efforts by connecting to the UK East Coast Cluster's carbon capture infrastructure.
57. Hydrogen -: ABEL Energy, in Australia, has engaged Worley for the FEED work on a green hydrogen and methanol project in Tasmania.
58. Hydrogen - Nasr Petroleum Company and Global Technical Services (GTS) have signed a Memorandum of Understanding (MoU) to develop a feasibility study for green hydrogen production in Egypt. Green hydrogen will be generated at Nasr Petroleum in Suez. The MoU includes identifying all the necessary facilities for the establishment of a green hydrogen production unit. It is anticipated that the hydrogen will be used as a combustion fuel along with natural gas for distillation furnaces. Furthermore, a solar plant is being installed to supply renewable electricity.
59. Hydrogen - Hydrexia Holding Limited, a hydrogen technology solution provider in China, and Toyota, announced that the Malaysia subsidiaries of the two companies have reached a commercial agreement for hydrogen application solutions. Hydrexia will provide UMW Toyota with its containerized mobile hydrogen refuelling stations (HRSs) to refuel the hydrogen fuel cell vehicles to be showcased at Toyota's "Beyond Zero" event in Malaysia.
60. Hydrogen - StormFisher Hydrogen is developing several facilities capable of converting up to 300 MW of renewable electricity from wind and solar into e-fuels. These low-carbon fuels will have the ability to decarbonise hard-to-abate sectors such as natural gas utilities in North America as well as through the LNG supply chain, heavy industries such as refineries, ammonia production facilities, steel plants, glass, cement and other industries with large process and thermal loads, as well as the marine sector.
61. Hydrogen - European Investment Bank and Sunfire: The European Investment Bank is supporting Sunfire's development of solid oxide electrolyzers with up to €100 million. This development will allow the production of green hydrogen more efficiently for industries seeking to decarbonize their production processes.
62. Hydrogen - bp and BASF: bp has selected BASF's OASE® white technology for CO2 capture at its H2Teesside blue hydrogen project.

63. Hydrogen - Levidian and United Utilities: Levidian collaborated with United Utilities, the UK's largest listed water company, to deploy its 'LOOP' technology for decarbonizing wastewater treatment. This technology captures carbon and produces graphene and hydrogen from biogas, enabling United Utilities to generate on-site hydrogen for its heavy-duty vehicle fleet.
64. Hydrogen -: A 200 MW electrolyser, powered by renewable energy from an offshore wind farm, is set to become Europe's largest commercial renewable hydrogen production facility. Producing around 60,000 kg/d of hydrogen, it will support Shell's Energy & Chemicals Park in Rotterdam in decarbonizing fossil fuel production and supporting the transition of the heavy transportation industry to low carbon fuel sources.
65. Hydrogen - EverWind Fuels signed a Memorandum of Understanding with Nova Scotia-based energy distribution company Eastward Energy. This development will facilitate making green hydrogen available in Nova Scotia.
66. Hydrogen - ABB and Green Hydrogen International: ABB is partnering with Green Hydrogen International (GHI) to assess technology deployment for GHI's Hydrogen City project in Texas. This project aims to produce 280,000 tons of green hydrogen annually, using renewable sources. The hydrogen will be converted into green ammonia.
67. Hydrogen -: Chinese company Huadian, in collaboration with Minh Quang JSC, plans to establish a \$2.4 billion green hydrogen facility in Vietnam. The project includes wind and solar power plants and a water electrolysis plant for hydrogen production.
68. Hydrogen -: Norwegian Hydrogen has begun receiving equipment for its plant in Hellsø, with installation and commissioning to follow. The equipment includes electrolyzers, compressors, storage systems, and a refuelling station. This infrastructure will support the use of hydrogen for heavy vehicle use in Norway.
69. Hydrogen -: Haringa based in Taranaki, New Zealand-is developing, wind generation capacity of up to 24 MW to supply renewable electricity to an electrolyser. The green hydrogen will be used both as feedstock to the Ballance fertiliser plant and as a zero-emission transport fuel.

## **Marine Fuels**

70. Marine Fuels -Syngenta Crop Protection, a leader in agricultural innovation, is to reduce its greenhouse gas (GHG) emissions from its logistics supply chain by using Maersk's ECO Delivery solution for its marine shipments. This follows the finalisation of an agreement for the transport of containers using biofuel for the Europe-US shipping route in 2024.

## **Market Development**

71. Market Development - Bioplastics Sector Insights: The bioplastics sector anticipates an annual growth rate of 17% from 2023 to 2028, driven by demand in Asia and the USA, with European markets growing at a slower rate. The sector's expansion, including significant capacity increases for PLA and bio-based PE.

## **Methanol**

72. Methanol - : Austrian investors are planning a \$75 million investment in Paraguay to establish a green methanol plant for the European market, This investment will lead to the production of 1.5 million liters of methanol.
73. Methanol - : Direct Methanol Fuel Cells (DMFCs) offer promising applications for various industries, combining efficiency and emission reduction potential with cost-effectiveness. DMFCs utilize methanol directly, positioning them as an attractive option for reducing emissions and lowering costs in energy applications.

74. Methanol - : Abel Energy is planning to develop a green methanol manufacturing plant in Cleveland Bay, Queensland, Australia, aiming for an annual production of 400,000 tons.

## **Policy**

75. Policy - : Tire and road wear particles (TRWP) combine with environmental materials to form contaminants that are challenging to remove and pose potential environmental risks. This issue highlights the need for further research and mitigation strategies to address the environmental impact of TRWPs.
76. Policy - : The EU is considering defining post-consumer plastic waste as “plastic waste placed on the market of a Member State or a third country” – this definition could threaten the recycling industry in Europe.
77. Policy - : The significant drop in the EU's CO2 price risks undermining the carbon market's credibility and poses a challenge to industrial decarbonization efforts, highlighting the need for stability and confidence in carbon pricing mechanisms.
78. Policy - : India launched 'ETHANOL 100', a new automotive fuel, at select retail outlets, demonstrating the country's commitment to alternative fuels and energy sustainability. This move signifies India's efforts to diversify its fuel mix and reduce carbon emissions.
79. Policy - : The German government has set a groundbreaking policy with a €23 billion subsidy program aimed at industrial decarbonisation over the next 15 years. This initiative represents a significant commitment to reducing carbon emissions and fostering sustainable industrial growth.
80. Policy - Biomass and Biofuels Concerns: A coalition of 70 organizations has issued a statement voicing concerns over the increasing reliance on biomass and biofuels. They argue for a shift in bioeconomy strategies towards sustainable growth, ecological limits, and reduced resource consumption to prevent biodiversity loss and climate impact.
81. Policy - : A new report highlights the potential and challenges of the US bioeconomy, pointing out raw material potential and bottlenecks in regulation and infrastructure that hinder biomass integration into industry.
82. Policy - : The European Commission has approved a €900 million French scheme to boost biomass and renewable hydrogen use in energy production. This support aligns with the Green Deal Industrial Plan, aiming for a net-zero economy and reducing fuel dependencies.
83. Policy - EU Biotechnology and Biomanufacturing: The EU faces challenges in biotechnology and biomanufacturing, including research transfer, regulatory complexity, and finance access. The Commission proposes targeted actions to overcome these, leveraging advances in life sciences, digitalisation, and AI to address societal issues and enhance sectors like agriculture and energy.

## **Recycling plastic**

84. Recycling Plastic - : The report "Circular Economy for Plastics – A European Analysis" supports the transition to a sustainable plastics economy. It provides crucial data for guiding policies and understanding industry trends, as well as evidence-based policymaking.

## **Renewable diesel**

85. Renewable Diesel - : Vertex Energy's Mobile Renewable Diesel facility reported a production of 3,786 barrels per day (bpd) in Q4 2023, achieving a 96.4% yield but underutilizing its 8,000 bpd capacity.



86. Renewable Diesel - Northdale Oil is planning to build a biodiesel plant in Grand Forks, near the company's bulk fuel plant, that would source soybean or canola oil from local processors. The North Dakota Agricultural Products Utilization Council recently awarded the company a \$50,000 grant to undertake the feasibility study for the facility that would produce 1.2 million gallons of fuel annually, and potentially expand up to 5 million gallons.

## **Feature Company Developments – March 2024**

### **1. TotalEnergies:**

TotalEnergies is collaborating with French sugar group Cristal Union to secure a 15-year supply of beet pulp for BioNorrois, its upcoming biomethane production unit in Fontaine-le-Dun, France. Set to commence operations by late 2024, the facility will utilize organic residues from sugar beet processing, comprising over half of the methanizer's feedstock, with the rest sourced locally. Initially targeting an annual biomethane production of nearly 100 GWh, the unit aims to reach a maximum capacity of 153 GWh annually. Aligned with aviation's carbon neutrality goals, the partnership seeks to reduce CO2 emissions by supplying Sustainable Aviation Fuels (SAF). Furthermore, TotalEnergies is collaborating with China Petroleum and Chemical Corporation to establish a SAF production unit at a SINOPEC refinery in China. The plant will process local waste and residues and produce 230,000 tons of SAF annually.

### **2. Abel Energy, Australia**

Abel Energy, is working with Worley on front-end engineering design (FEED) for its \$1.116 billion green hydrogen and methanol project in Bell Bay, Northern Tasmania. Worley will oversee the facility's design, engineering, procurement, and construction services up to the final investment decision. Abel Energy is also developing plans for a methanol manufacturing plant in Cleveland Bay, Queensland, Australia, aiming to produce 400,000 tons per annum of green methanol.

### **3. Yield 10**

Yield10 Bioscience's winter Camelina sativa varieties, engineered for herbicide tolerance, showed expected responses in initial field tests in the US. These varieties, including those tolerant to glufosinate and stacked with additional herbicide tolerance are targeting enhance crop rotation weed management. Moreover, USDA-APHIS determined that Yield10's genetically engineered Camelina sativa varieties, producing omega-3 fatty acids, are exempt from regulations, enabling cultivation in the US. This breakthrough addresses the rising demand for sustainable omega-3 sources, crucial for aquafeed, pet feed, baby formula, and pharmaceuticals and potentially addresses shortages of omega-3 from fish oil.

### **4. Chevron**

Chevron U.S.A. Inc. and Bunge North America, Inc. have officially formed Bunge Chevron Ag Renewables LLC in California. This collaboration aims to advance renewable fuel feedstock, combining Bunge's oilseed processing proficiency and farmer connections with Chevron's fuels manufacturing and marketing expertise. Additionally, Chevron New Energies, a division of Chevron U.S.A. Inc., disclosed plans for a 5-megawatt hydrogen production venture in California's Central Valley. These initiatives underscore Chevron's commitment to sustainable energy solutions and signify strategic investments in renewable fuels and hydrogen production to drive environmental progress and meet evolving energy demands.

## 5. Infinium

Infinium and Amogy Inc. agreed to a memorandum of understanding (MOU) to explore synergy in their technologies, focusing on e-Fuels and green ammonia applications in New York.

Collaborations with Mitsubishi Heavy Industries (MHI) Group and SK Innovation are also being considered. Infinium's Project Pathfinder, located in Corpus Christi, Texas, is the world's first commercial-scale facility producing drop-in-ready e-fuels.

Top five companies (frequency of mention)

<b>Company</b>	<b>Frequency</b>
TotalEnergies	3
Abel Energy Australia	2
Yield 10	2
Chevron	2
Infinium	2

## Topics & Themes– March 2024

Feature topics and themes (top 10) and frequency of mention

<b>Rank</b>	<b>Topic</b>	<b>Frequency</b>
1	Hydrogen	18
2	Biofuels	15
3	Feedstock	13
4	Policy	12
5	Biojet/SAF	10
6	Biogas	9
7	e-fuels	4
8	CO2 Removal	3
9	Biobased plastics	3
10	Biobased chemicals	3

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