Bioeconomy & Low Carbon Technology Overview for January 2024

This summary of low carbon technology developments for January 2024 is based on the data and information collated by Gifford Consulting and presented on our website: Gifford Consulting

Highlights by Topic: January 2024

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Biobased Chemicals

1. Thyssenkrupp Uhde has embarked on a project to construct a biopolymer plant in the Arabian Peninsula, focusing on producing polylactic acid (PLA) polymer on an industrial scale. The primary feedstock for this production is lactic acid derived from corn.
2. Trinseo is at the forefront of sustainable plastics innovation with the launch of its advanced polymethyl methacrylate (PMMA) depolymerization plant in Rho, Italy. Scheduled for commissioning in early 2024, this facility is a significant leap towards integrating circular economy principles into the plastics industry. By employing a sophisticated recycling and purification process, PMMA will be repurposed, thereby reinforcing the circularity within the plastics value chain and contributing to sustainability goals.
3. WaterProof is developing a novel electrochemical process that transforms CO_2 emissions from waste incineration and wastewater treatment into renewable formic acid. This formic acid is then utilized in a variety of green consumer products, such as decalcifying agents in cleaning solutions and tanning agents for leather. Additionally, WaterProof employs this formic acid to create acidic deep eutectic solvents (ADES), which are instrumental in extracting precious metals from wastewater sludge and incineration ash.
4. OMV and Synthos have entered into a Memorandum of Understanding (MoU) to collaborate on sustainability initiatives, particularly focusing on the provision of sustainable raw materials for high-performance tyre manufacturing. This partnership between OMV, a multifaceted energy and chemicals company, and Synthos, Europe's leading synthetic rubber producer, signifies a commitment to enhancing sustainability in the materials sector.

Biobased Plastics

5. Avantium is making progress with the construction of its FDCA (furan dicarboxylic acid) Flagship Plant in Delfzijl, Netherlands, aiming to commence FDCA production in late 2024. The plant's commissioning will be phased, beginning in early 2024, with sequential development of various sub-units. Avantium's progress is showcased in a video available online, highlighting its partnerships with major brands for diverse applications such as packaging, textiles, and adhesives, demonstrating a strong market demand for sustainable bioplastic solutions.
6. Sulzer Chemtech has introduced SULAC™, a technology designed to enhance the production of lactide biopolymer, catering to the growing demand for sustainable and high-quality plastics. This technology allows PLA producers to integrate new processes for converting lactic acid to lactide efficiently, offering a range of biopolymer grades while optimizing operational performance.

7. In China, MAIRE's NEXTCHEM and its licensor CONSER have been selected by a key client for a project in Northwestern China to provide technology licensing and catalyst supply for biodegradable plastics production.
8. Paques Biomaterials and Looop are joining forces to produce PHA biopolymer from agricultural and food waste streams. With over a decade of research, Paques Biomaterials has harnessed microbial processes to convert organic waste into PHA, while Looop brings its expertise as a supplier of waste streams from the agri-food sector.
9. Genera, originating from the University of Tennessee, has evolved into North America's leading producer of sustainable packaging and biomaterials. Utilizing locally sourced regenerative grasses, Genera offers eco-friendly alternatives to traditional plastics, benefiting local communities and reducing carbon impact. With facilities in Tennessee and Texas.
10. The bioplastics industry is experiencing a resurgence, with production capacities projected to increase from 2.18 million tonnes in 2023 to 7.43 million tonnes by 2028. This growth is fuelled by heightened demand and the development of more sophisticated bioplastic applications.
11. Braskem S.A. and FKuR Kunststoff GmbH are expanding their collaboration to distribute more products from the I'm green™ bio-based portfolio across multiple regions. This extension builds on their partnership since 2011.

Biodiesel

12. Sumitomo Corp is developing the mass production of biodiesel in Japan, utilizing agricultural residues such as wood and sugarcane waste. A demonstration plant is planned for 2025 on Tanegashima Island, in collaboration with the University of Tokyo and Solariant Capital.

Biofuels

13. Renovare Fuels is set to produce nearly 2 million litres of advanced renewable biofuels annually, utilizing biogas derived from landfill waste. This initiative, in partnership with B9 Energy Control Limited and Powerhouse Management in the UK, demonstrates innovative approaches to converting waste to energy.
14. POET Bioprocessing – Cloverdale, IN, has been revitalized with significant investments, marking POET's fifth facility in Indiana. The reopening is a response to improved management of the Renewable Fuel Standard and state support, leading to job creation and increased grain demand.
15. Keppel Corporation and AM Green are exploring the production of sustainable fuels like bio methanol, 2G ethanol, and sustainable aviation fuel. This collaboration aims to leverage biogenic carbon sources for fuel production.
16. Alfa Laval and Bisviridi, part of the BioteCH4 group, are joining forces to enhance organic and food waste recycling's sustainability through the Alfa Laval Prodec Oil Plus decanter. This innovative equipment, pivotal in the Bisviridi process, is designed for anaerobic digestion (AD) facilities to efficiently extract oil from organic waste, reducing fats and grease content before methanogenesis. This process not only minimizes the impact on biogas production but also yields bio crude with up to 99.5% purity, ideal for refinery use in producing biofuel, particularly for the sustainable aviation fuel (SAF) market.
17. Neste is set to redevelop its Porvoo, Finland, crude oil refinery into a premier hub for renewable and circular solutions. Following a strategic review initiated in September 2022,

the redevelopment will occur in stages over the next decade, with completion aimed for the mid-2030s.

18. ClearFlame Engine Technologies in Illinois has marked a milestone with the first sale of its FuelAdaptive™ truck to Vander Haag's Inc. This truck represents a breakthrough in heavy-duty transportation, offering diesel-like performance while reducing fuel costs and carbon emissions. Utilizing nationally-distributed fuel, this innovation paves the way for more sustainable solutions in the trucking industry.
19. Hutanbio, based in the UK, has successfully raised $2.85 million in seed funding to accelerate the supply of biofuels to the global shipping and aviation sectors. This investment will support Hutanbio's mission to contribute to the decarbonization of these industries by providing sustainable fuel options.
20. Repsol is expanding its renewable fuel offerings across the Iberian Peninsula, with plans to surpass 600 service stations by the end of 2024. Currently, Repsol provides 100% renewable fuel at over 60 locations, including key cities and transport corridors. This initiative, which began with the first three stations in Madrid, Barcelona, and Lisbon, positions Repsol as a pioneer in Spain for offering completely renewable fuels.
21. The Environmental Protection Agency (EPA) in Washington has released the final production volumes for biomass-based diesel in 2023 under the Renewable Fuel Standard. The data reveals a significant increase, with production reaching 4 billion gallons, including biodiesel, renewable diesel, SAF, and heating oil. This marks a 1 billion gallon rise from 2022, indicating robust growth in the domestic production and consumption of advanced biomass-based diesel fuels.

Biogas

22. Westfalen's LNG filling stations in Germany are transitioning to bio-methane, a renewable alternative to fossil LNG. Customers at stations in Münster, Herford, Herne, and Cologne will receive documentation of CO2 savings based on the bio-LNG used.
23. Hycamite has commenced construction of a Customer Sample Facility (CSF) in Kokkola, Finland, to showcase its innovative methane-splitting technology for producing clean hydrogen and high-quality solid carbon. With all necessary permits secured and equipment ordered, the CSF aims to demonstrate the technology's viability and its potential to contribute significantly to sustainable hydrogen production, with a projected annual capacity of 2,000 tons of hydrogen and 6,000 tons of carbon.
24. OptiFuel Systems LLC in the US is set to begin testing a groundbreaking 5,600 hp Total-Zero Renewable Natural Gas (RNG) Locomotive and a 2,500 hp Total-Zero Powered Tender in early 2025. With a 7,500 DGE capacity, this prototype represents a significant advancement in sustainable transportation.

Biojet/Sustainable Aviation Fuels

25. Japanese oil refineries are gearing up to produce CORSIA-eligible alcohol-to-jet SAF by 2027, with plans to consume 600 million litres of bioethanol annually, expected to rise to 1.3 billion liters by 2030. This initiative aligns with the International Civil Aviation Organization's (ICAO) CORSIA program to reduce CO2 emissions in international aviation.
26. LanzaTech Global Inc. and Tadweer (Abu Dhabi Waste Management Company) have partnered to explore the conversion of municipal and commercial solid waste into sustainable aviation fuel (SAF) through a feasibility study. This collaboration aims to scale SAF production, highlighting the innovative approach of utilizing waste carbon as a resource.

27. The production of Sustainable Aviation Fuel (SAF) primarily relies on lipid-based feedstocks processed through Hydrotreated Esters and Fatty Acids (HEFA) technology. Despite its technical viability and growing commercialization, significant barriers, including limited availability of suitable biomass feedstocks, hinder the expansion necessary for fully decarbonizing global aviation. Current trends suggest that, without overcoming these challenges, SAF production will not meet the required targets by 2050.
28. The Environmental Protection Authority of Western Australia has endorsed BP's Kwinana Renewable Fuels Project, which aims to transform existing oil refining and production infrastructure for producing aviation fuel and diesel from vegetable oil, animal fats, and other biowastes. The project includes the installation of new hydrogen generation, pre-treatment, product fractionation, and anaerobic bio-digestion units.
29. Stakeholders in Renewable Diesel (RD) and HEFA plant operations are closely monitoring the evolving economic and policy landscape influencing RD and SAF production. While HEFA technology can be adapted for enhanced SAF output, the alignment of financial incentives to offset conversion costs and stimulate SAF production remains uncertain. These dynamics are critical for realizing the potential contribution of HEFA technology to SAF supply in the near to medium term.
30. In Sweden, Topsoe has entered into a licensing and engineering agreement with Preem, the nation's leading fuel company, to produce Sustainable Aviation Fuel (SAF) and renewable diesel using Topsoe's HydroFlex technology.
31. Firefly's process transforms sewage sludge from water utilities into biochar, a valuable fertilizer for agriculture, and bio-crude, which can be further refined into jet fuel. This approach not only addresses waste management challenges but also contributes to the production of sustainable aviation fuels.
32. Blue Biofuels and Vertimass have formed VertiBlue Fuels LLC, leveraging Vertimass' Consolidated Alcohol Deoxygenation and Oligomerization (CADO) technology to produce sustainable aviation fuel, renewable propane, and butane from ethanol. This partnership aims to establish a production facility in Florida.
33. LanzaJet inaugurated the world’s first ethanol-to-SAF production facility, LanzaJet Freedom Pines Fuels, in Soperton, Georgia. This facility, capable of producing 10 million gallons of SAF and renewable diesel annually from sustainable ethanol, represents a significant milestone in SAF technology, supporting the aviation industry's transition towards reduced emissions and aligning with the U.S. SAF Grand Challenge.
34. Sugar Valley Energy is developing a comprehensive 160-acre biorefinery campus in its final development stage, including ethanol production, bioelectric power, and wastewater treatment facilities. This project will produce various sustainable energy products, including SAF, emphasizing the integration of renewable energy sources in industrial applications and its benefits to local communities and industries.
35. Acelen Renewables has chosen Ecofining technology to facilitate the production of sustainable aviation fuel and renewable diesel at its Bahia, Brazil facility, processing a mix of non-edible oils and waste. This agreement positions Acelen as the 50th licensee of Honeywell's renewable fuel technology.

Cement

36. C-Crete has introduced a revolutionary cement-free concrete using a natural zeolite binder, eliminating the need for Portland cement and its associated CO2 emissions. This innovation not only reduces the construction industry's carbon footprint but also captures CO2 during

the curing process, representing a significant advancement towards more sustainable building materials.

CO2 Removal

37. HYCO1 has achieved over 9,000 hours of operation with its innovative CO2 utilization catalyst at the CUBE Technology Center in Houston, Texas. This catalyst efficiently converts CO2 and low CI methane into high-quality synthesis gases, demonstrating a high-speed, selective reaction process that contributes to carbon capture and utilization.
38. The Drax Bioenergy with Carbon Capture and Storage Project in the UK has received development consent, marking a significant step towards capturing carbon emissions from biomass units at Drax Power Station.

E-Fuels

39. Infinium and Breakthrough Energy Catalyst have announced a $75 million investment in Project Roadrunner, aiming to convert waste CO2 and renewable energy into SAF and low-carbon fuels. This pioneering Power-to-Liquids (PtL) eFuels facility is planned for North America.
40. HIF Global and Enap have signed an MoU to boost the adoption of carbon-neutral e-Fuels in Chile, with the HIF Cabo Negro eFuels facility expected to supply 22.5 to 37.5 million litres of e-Gasoline annually.
41. Norwegian Air has become a shareholder in Norsk e-Fuel, planning to establish a significant electrofuel production facility in Mosjøen, Nordland. This strategic partnership ensures early access to fossil-free aviation fuels.

Electricity

42. Vattenfall and BASF are nearing a partnership on the Nordlicht 1 and 2 projects, with BASF poised to acquire a 49% stake. This collaboration aims to leverage fossil-free electricity for Vattenfall's German customers and BASF's operations, underscoring the growing emphasis on sustainable energy solutions for German industry.

Ethanol

43. The European Union's dedication to sustainable energy is evident in initiatives like the Net-Zero Industry Act and REDIII, focusing on reducing emissions in the transportation sector through low-carbon ethanol. Praj Industries contributes to this goal by offering technologies like Mechanical Vapour Recompression (MVR) to enhance the efficiency of ethanol plants.
44. The dormant Sanjivani Sugar Factory in Goa, India, is being revived to produce ethanol, addressing the growing demand for this sustainable fuel. The restart process is facilitated through a Request For Qualification, reflecting the Indian government's commitment to leveraging local agricultural resources for energy production and supporting cane farmers.

Feedstock

45. New Energy Blue has established New Energy Farmers LLC in Mason City, Iowa, partnering with local farmers to aggregate biomass for low-carbon fuel and chemical production. This venture aims to supply sustainable feedstock to Mason City's New Energy Freedom Biomass Refinery and facilitate the expansion of biomass refineries across Iowa and the Midwest.

46. The EU's 2023 sunflower seed production reached nearly 10 million tonnes, a slight increase from 2022 but below the 2017 record. Despite reduced planting areas, improved weather conditions led to higher yields, particularly in Romania, the EU's leading sunflower producer. However, a decrease in Romanian yields resulted in a slightly smaller harvest compared to the previous year, highlighting the region's significant impact on overall EU production.
47. Comstock has invested in RenFuel technology to expand its applications and secured North American and potential global rights. This strategic move includes an option to acquire RenFuel's subsidiary, owning global technology rights, and plans to develop a major refinery in Sweden by 2025.
48. Agrivalle, a Brazilian agricultural biologicals leader, has partnered with Ginkgo Bioworks to enhance its biological products, including next-generation fertilizers and biocontrol agents. This collaboration merges Agrivalle's agricultural expertise with Ginkgo's cell programming and biosecurity capabilities.

Gasification

49. ABSL in the UK has achieved its first waste-to-syngas production using RadGas technology, efficiently converting household waste and biomass into clean syngas. This innovation opens new avenues for biofuel production and CO2 extraction, marking a significant advancement in waste management and sustainable energy.

Hydrogen

50. ACWA Power is developing Indonesia's largest green hydrogen facility in collaboration with PT PLN and PT Pupuk Indonesia, marking a significant step in green hydrogen production..
51. The Netherlands' PosHydon project is nearing its final stage, aiming to produce hydrogen by integrating offshore wind, gas, and hydrogen energy systems. This innovative approach, utilizing seawater for hydrogen production, offers valuable insights into offshore energy integration and sustainable hydrogen production.
52. Bloom Energy and SK ecoplant's collaboration to deploy electrolyzer technology for a green hydrogen project in Korea.
53. AQA Morocco's $27.2 billion investment in a green hydrogen project in Dakhla-Oued El-Dahab aims to accelerate Morocco's energy transition, produce renewable energy for green hydrogen, and position Morocco as a global leader in the green hydrogen sector.
54. HyCC has delayed its green hydrogen project H2eron in Delfzijl to at least 2028 due to market development and cost challenges. The project aims to produce green hydrogen for various sustainable applications, highlighting the complexities and potential of green hydrogen in the energy transition.
55. EET Hydrogen's facility in Cheshire, approved by local authorities, plans to produce significant hydrogen by 2030 for low-carbon refining and manufacturing.
56. Quantron's collaboration with FusionOne aims to develop a refueling platform for hydrogen fuel cell vehicles, particularly trucks.
57. Volvo Group in Sweden is advancing hydrogen combustion engine technology by offering PhD scholarships at Chalmers University of Technology and Lund University. Starting recruitment in early 2024, this initiative aims to explore hydrogen as a sustainable propulsion method.
58. Lhyfe in France has partnered with Source Galileo to establish green hydrogen production units in the UK and Ireland. This collaboration, formalized through a MoU, aims to leverage

renewable energy for hydrogen production, supporting the decarbonization of industrial and transport sectors.

59. Plug Power has launched the largest liquid green hydrogen plant in the U.S., located in Woodbine, Georgia. The facility, equipped with eight 5-MW PEM electrolyzers, can produce 15 tons of hydrogen daily, enough to fuel around 15,000 forklifts. This marks a significant advancement in the domestic green hydrogen infrastructure.
60. ZeroAvia, a U.S.-UK advanced air mobility startup, has entered an agreement to provide 20 hydrogen-electric powertrains to Indian regional operator MEHAIR. This deal signifies a pivotal step towards integrating hydrogen technology in aviation, offering a sustainable alternative to conventional propulsion systems.

Marine Fuels

61. Danish Shipping reports that over half of the new vessels being constructed for Danish companies will be powered by green fuels. This shift towards sustainable marine fuels reflects the maritime industry's growing commitment to reducing its environmental impact and aligning with global decarbonization efforts.
62. Cosco Shipping Energy Transportation has contracted with Cosco Shipping Heavy Industry for six methanol-fuelled tankers, marking a significant move towards greener maritime operations.
63. Stena Line has begun constructing its methanol-ready 'NewMax' hybrid ferries, emphasizing the maritime industry's transition to more sustainable fuel options.
64. A.P. Moller-Maersk has partnered with Yokohama City and Mitsubishi Gas Chemical to develop green methanol bunkering infrastructure, in anticipation of its green methanol-powered vessels.
65. Ocean Network Express has announced the construction of twelve 13,000 TEU methanol dual-fuel container ships, set to be delivered from 2027.

Market Development.

66. UNEM reports the operational start of a new ethanol, meal, and corn oil facility in Maracaju, Brazil, marking a significant contribution to the country's biofuel production. This addition strengthens Brazil's position in the bioeconomy and its commitment to an energy transition anchored in sustainable biofuel production.
67. Nestlé has partnered with CMA CGM to transport its volumes using BIOFUEL+, a biofuel derived from organic waste, reducing its carbon emissions by 84% and significantly lowering its shipping-related greenhouse gas emissions.
68. The International Energy Agency highlights the growing importance of biofuels, particularly in emerging economies like Brazil and India. Despite the acceleration, a significant increase in biofuel demand is necessary by 2030 to align with a net-zero pathway, emphasizing the need for enhanced deployment in sectors like aviation.
69. A JRC report involving 100 experts outlines the vision for a sustainable bioeconomy by 2050, emphasizing collaboration among stakeholders. Recommendations include coherent policies, regional development support, educational investments, and consumer engagement, contributing to the EU bioeconomy strategy update.

Methanol

70. Sumitomo Chemical and Professor Koji Omata have developed the internal condensation reactor (ICR) technology, enhancing methanol and water condensation and separation. This innovation promises improved yields, equipment downsizing, and higher energy efficiency, potentially revolutionizing methanol production with its energy-saving and catalyst-preserving capabilities.

Plastic Recycling

71. APK AG in Merseburg/Leuna, Germany, is set to enhance its corporate strategy by focusing on the expansion and construction of its Newcycling® plant, leveraging strong investor support from entities like LyondellBasell and KIRKBI A/S. This strategic move aims to reinforce APK AG's position in the plastic recycling industry.
72. Reliance Industries Limited has pioneered the chemical recycling of plastic waste-based pyrolysis oil into Circular Polymers, certified by the International Sustainability & Carbon Certification (ISCC)-Plus. This achievement marks RIL as the first Indian company to adopt such a technology.
73. Neste has significantly increased its processing of liquefied waste plastic at its Porvoo refinery in Finland, doubling the total processed volume to over 6,000 tons in 2023. This effort includes a record single run of 2,000 tons, producing high-quality, ISCC PLUS certified material for new plastics.
74. TotalEnergies Corbion's Life Cycle Assessment (LCA) of recycled Luminy® PLA reveals that advanced recycling has a lower environmental impact than using virgin feedstock. The study shows that the Global Warming Potential (GWP) of Luminy 30% rPLA is significantly lower than that of virgin Luminy PLA, emphasizing the sustainability benefits of advanced recycling methods in reducing carbon footprints.

Renewable Diesel

75. New York City celebrated the opening of its first retail fuel station offering renewable diesel, a collaboration between Sprague and Sonomax. This milestone represents a significant advancement in the city's clean air and sustainability initiatives.
76. Greenergy has completed expansion works at its biodiesel plants in the UK and Amsterdam, enhancing pre-treatment processes to accommodate a broader range of waste oil feedstocks. This development enables the production of lower-carbon biodiesel for transport fuels, contributing to emission reductions and supporting the transition to more sustainable fuel alternatives.

Technology Development

77. Vow Green Metals is collaborating to supply biocarbon for smelting operations, aiming to replace fossil carbon sources and significantly reduce CO2 emissions. This agreement is part of a global strategy to increase biocarbon usage to 50% by 2030, demonstrating a commitment to sustainable industrial practices and carbon footprint reduction.
78. Nexa Resources S.A. in Brazil has agreed to purchase 10,000 tonnes of bio-oil from Aperam BioEnergia to replace fossil fuels in zinc oxide production at the Três Marias unit in Minas Gerais. This transition to bio-oil signifies a strategic move towards more sustainable manufacturing processes and highlights the potential for bio-based alternatives in heavy industry sectors.

79. NETL has made significant strides in converting CO2 into valuable products, a key component of cost-effective decarbonization. Innovations include a biocatalyst that transforms CO2 into bio-acetate, which can be used in various applications or further converted into butanol, a biofuel.

Overview –January 2024 (based on the above bullet points):

The advancements in biobased chemicals, plastics, renewable diesel, and technology development reflect a significant shift towards sustainability across various sectors. Companies like Thyssenkrupp Uhde, Trinseo, and WaterProof are pioneering the production of biopolymers, advanced polymethyl methacrylate (PMMA), and renewable formic acid, respectively. These innovations demonstrate a commitment to integrating circular economy principles into industrial processes and creating sustainable consumer products.

Manufacturers of biobased plastics, Avantium, Sulzer Chemtech, and partnerships between Paques Biomaterials and Looop are making significant progress in producing sustainable bioplastic solutions from renewable resources and waste streams. These efforts are aimed at reducing reliance on fossil-based materials and promoting circularity within the plastics value chain.

Renewable diesel initiatives, such as the launch of New York City's first retail fuel station dispensing renewable diesel and Greenergy's expansion of biodiesel plants, highlight the transportation sector's move towards cleaner, lower-carbon fuels. These developments offer immediate reductions in greenhouse gases and harmful emissions.

Technology development in areas like biocarbon sourcing, CO2 conversion, and biofuel production is witnessing substantial innovations. Companies are exploring the use of biocarbon in smelting operations, converting CO2 into useful products, and advancing the mass production of biodiesel from agricultural residues.

Biofuels production, including initiatives by Renovare Fuels, POET Bioprocessing, and Keppel Corporation, demonsrate innovative approaches to converting waste into energy and producing sustainable fuels.

Moreover, the development and expansion of biojet fuel production highlight the aviation industry's efforts to reduce carbon emissions. Partnerships and projects aimed at producing sustainable aviation fuel (SAF) from various feedstocks underscore the industry's commitment to sustainability and the potential of waste-to-energy technologies in creating circular economies.

Overall, these developments across biobased chemicals, plastics, renewable diesel, biofuels, and technology innovation signify a collective move towards more sustainable and environmentally friendly practices. They highlight the importance of collaboration, innovation, and commitment to sustainability goals in addressing global environmental challenges and promoting a more sustainable future.

Companies: Significant Contributions – January – 2024

1. **Thyssenkrupp Uhde**: Embarking on constructing a biopolymer plant for industrial-scale polylactic acid (PLA) production in the Arabian Peninsula, using corn-derived lactic acid.
2. **Trinseo**: Launching an advanced PMMA depolymerization plant in Rho, Italy, aiming for commissioning in early 2024 to enhance circularity in the plastics industry.

3. **WaterProof**: Developing an electrochemical process to convert CO_2 emissions into renewable formic acid for use in green consumer products and the extraction of precious metals.
4. **OMV and Synthos**: Collaborating on sustainability initiatives to provide sustainable raw materials for high-performance tire manufacturing, emphasizing the materials sector's sustainability.
5. **Avantium**: Constructing the FDCA Flagship Plant in Delfzijl, Netherlands, for sustainable bioplastic solutions, with a phased commissioning starting in early 2024.
6. **Sulzer Chemtech**: Introducing SULAC™ technology to enhance the production of lactide biopolymer, meeting the demand for high-quality sustainable plastics.
7. **MAIRE's NEXTCHEM and CONSER**: Selected for a biodegradable plastics production project in Northwestern China.
8. **Paques Biomaterials and Looop**: Partnering to produce PHA biopolymer from agricultural and food waste streams.
9. **Genera**: Evolving into North America's leading producer of sustainable packaging and biomaterials, utilizing locally sourced regenerative grasses.
10. **Braskem S.A. and FKuR Kunststoff GmbH**: Expanding their collaboration to distribute products from the I'm green™ bio-based portfolio, enhancing the availability of bio-based plastics globally.
11. **Sumitomo Corp**: Progressing towards mass production of biodiesel in Japan using agricultural residues, with a demonstration plant planned for 2025 on Tanegashima Island.
12. **Renovare Fuels**: Set to produce nearly 2 million litres of advanced renewable biofuels annually from landfill waste-derived biogas, in partnership with B9 Energy Control Limited and Powerhouse Management in the UK.
13. **POET Bioprocessing – Cloverdale, IN**: Revitalizing its fifth facility in Indiana, marking a positive impact on local economies and job creation through biofuel production.
14. **Keppel Corporation and AM Green**: Exploring the production of sustainable fuels like bio methanol and sustainable aviation fuel, leveraging biogenic carbon sources.
15. **Alfa Laval and Bisviridi**: Collaborating to enhance sustainability in organic and food waste recycling through innovative equipment designed for anaerobic digestion facilities.
16. **Neste**: Transforming its Porvoo refinery into a hub for renewable and circular solutions, with a completion aim for the mid-2030s.
17. **ClearFlame Engine Technologies**: Marking a milestone with the first sale of its FuelAdaptive™ truck to Vander Haag's Inc., offering diesel-like performance while reducing fuel costs and carbon emissions.
18. **Hutanbio**: Raising $2.85 million in seed funding to accelerate the supply of biofuels to the global shipping and aviation sectors, contributing to industry decarbonization.
19. **Repsol**: Expanding its renewable fuel offerings across the Iberian Peninsula, with plans to surpass 600 service stations by the end of 2024.

20. **Westfalen's LNG filling stations**: Transitioning to bio-methane in Germany, offering renewable alternatives to fossil LNG and documenting CO2 savings for customers.

Companies – January 2024

Feature companies (top 10) and frequency of their mention

Rank	Company	Frequency
1	Neste	2
2	Trinseo	1
3	AQA Morocco	1
4	Lhyfe	1
5	Volvo	1
6	Quantron	1
7	EET	1
8	HyCC	1
9	Heraeus Precious Metals	1
10	Bloom Energy	1

Topics & Themes– January 2024

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

Rank	Topic	Frequency
1	Hydrogen	11
2	Biojet/Sustainable Aviation Fuels	10
3	Marine Fuels	5
4	Market Development	4
5	Plastic recycling	4
6	Feedstock	4
7	Technology Development	3
8	Renewable Diesel	2
9	Gasification	1
10	Methanol	1

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