Newsletter IEA Bioenergy Task 37: 12/2025

IEA Reports and New Developments

Topics:

New IEA report: quadrupling of sustainable fuels by 2035

The International Energy Agency (IEA) has published a new report "Delivering Sustainable Fuels". The deployment of sustainable fuels – liquid biofuels, biogases, renewable hydrogen and hydrogen-based fuels – is complementary to the electrification and energy efficiency in energy transition in various sectors, like transport and industry. If current and proposed national and international policy would be fully implemented their deployment could double by 2030 and even quadruple by 2035, compared to 2024 levels. Sustainable fuels complement electrification and energy efficiency in energy transitions, and are particularly important for sectors that continue to be reliant on fuel-based solutions such as aviation, shipping, and parts of road transport and industry. Sustainable fuels can also enhance energy security, strengthen environmental sustainability and stimulate economic development, particularly in rural areas. This report was prepared in support of Brazil's COP30 Presidency and its Climate Action Agenda. It presents a sectoral analysis of global pathways for accelerating the deployment of sustainable liquid and gaseous fuels to 2035. It also summarizes cumulative policy experience to date, identifies key technology and infrastructure requirements for scaling up deployment.

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IEA's World Energy Outlook is out

The IEA's flagship *World Energy Outlook (WEO)* is the most authoritative source of global energy analysis and projections. Updated annually to reflect the latest energy data, technology and market trends, and government policies, it explores a range of possible energy futures and their implications for energy security, access and emissions. This year's edition comes amid major shifts in global energy policies and markets, and acute geopolitical strains. Governments are reaching different conclusions about the best ways to tackle concerns about energy security, affordability and sustainability. Three scenarios are being discussed: The Stated Policies Scenario (STEPS) and the Current Policies Scenario (CPS) present two views on how the energy system may evolve, building on different assumptions regarding today's policies and technologies. Both scenarios see continued increases in energy demand to 2050, albeit at different speeds. The emissions trajectory in the CPS is consistent with warming of almost 3 °C by 2100, whereas lower levels of emissions in the STEPS keep this to around 2.5 °C. In the Net Zero Emissions by 2050 Scenario (NZE Scenario), warming peaks around 2050 at about 1.65 °C and declines slowly after that, largely due to active measures to remove CO2 from the atmosphere.

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Task 37 – Energy from Biogas – The work program of the triennium 24-27

During the first meeting of the Task 37 in March 2025, the new Task Leader Bernhard Drosg presented the work program of the new triennium from 2025-2027. A short summary can be downloaded.

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PHA and biogas

Polyhydroxyalkanoates (PHA) are biodegradable polymers produced by bacteria through the fermentation of renewable resources, primarily plant-based sugars, ensuring a lower carbon footprint. Thomas Hennebel of Dionymer explains in an interview with Biogas Channel how PHA can also be obtained from organic waste during processes such as anaerobic digestion. This fact could create interesting synergies with biogas plants. In fact, PHAs have surprising market prospects because they not only have a lower environmental impact compared to traditional polymers but are also completely biodegradable and do not generate microplastics.

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EPA's draft sewage sludge risk assessment

The U.S. Environmental Protection Agency released the Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) for public comment. The draft risk assessment reflects the agency's latest scientific understanding of the potential risks to human health and the environment posed by the presence of PFOA and PFOS in sewage sludge that is land applied as a soil conditioner or fertilizer (on agricultural, forested, and other lands), surface disposed (e.g., placed in a sewage sludge-only landfill called a monofill), or incinerated.

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Microalgae and bacteria team up to convert carbon dioxide into useful products

In Illinois, scientists have spent decades genetically modifying the bacterium Escherichia coli and other microbes to convert carbon dioxide into useful biological products. Most methods require additional carbon sources, however, adding to the cost. A new study overcomes this limitation by combining the photosynthetic finesse of a single-celled algae with the production capabilities of the bacteria E. coli. The new method differs from those because the microalgae used, a mutant form of Chlamydomonas reinhardtii, takes in CO2 and excretes an organic acid, glycolate. E. coli

readily consumes glycolate, but many other organisms cannot, whereas sugar has universal appeal and can feed a variety of microorganisms.
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JRC study on carbon stock in agricultural soils

A study by the JRC reveals that carbon reserves in the topsoil of 23-44% of agricultural land in the EU and UK are at “high risk”. The form in which soil organic carbon (SOC) is stored determines its capacity and stability, commonly described by separating bulk SOC into its particulate- (POC) and mineral-associated (MAOC) constituents. The study finds that rather than a universal mineralogy-dependent maximum MAOC capacity, an emergent effective MAOC capacity can be identified across pedo-climatic zones. JRC estimated that between 43 and 83 Mha of agricultural soils are classified as high risk, mostly constrained to cool and humid regions. To protect these reserves, measures like cover crops, improved crop rotation, and agroforestry are needed.
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CNG tanks could accommodate 25% hydrogen

SFBM, an Italian company specializing in the distribution of methane in cylinders, has successfully completed a series of tests with a new fuel, hydrobiomethane. Blending 25% hydrogen with biomethane, the mixture offers all the safety conditions required for large-scale use, and has the advantage of significantly reducing CO2 emissions. In collaboration with the Universities of Milan and Pisa, and under the supervision of the national branch of ISO, the R&D department of the Italian manufacturer has put trucks on the road powered by tanks filled with a mixture of 75% methane and 25% hydrogen without any problems of security. Until today, ISO standards only allow a maximum addition of 2% hydrogen in CNG vehicle tanks. However, the continued tests will show if the mix gas will have an effect on the engines.
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AI to help with waste control

Waste separation is an integral part of everyday life in a number of European countries. Nevertheless, many people find it difficult to separate their waste correctly. In Germany an amendment to the Organic Waste Ordinance came into force that severely limits the amount of foreign matter and plastic in organic waste. Violations can lead to stricter controls in many places. The nationwide implementation depends on the respective districts. The district of Würzburg for example, is planning to use AI to monitor organic waste garbage in the medium term.
Artificial intelligence (AI) is already being used in Reutlingen to check organic waste for foreign matter with specific cameras. If incorrect waste is detected, fines of 60 to 80 euros can be imposed.
In Switzerland manual controlling is done since years with limited success. In the last 5 years different camera systems have been tested. The latest version by axis communication (Anexia) uses cameras in the collection truck and in the waste bunker of the biogas plant. The pictures are evaluated and documented by AI.
More (in German)

Prairie Robotics expands its AI truck tech

Prairie Robotics, a Canadian firm that offers artificial intelligence-enabled camera systems for recycling collection trucks, is expanding its partnerships with municipalities in North America that want to reduce contamination in their curbside streams. The company works with about 40 cities in the U.S. and Canada. The company recently partnered with the City of Tacoma, Washington, on a two-year project to help educate residents on what can and cannot be recycled in the city’s curbside program. Prairie is among the companies capitalizing on a newer use for AI-enabled on-truck cameras: measuring recycling contamination such as food waste or trash in real time.
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Power to methane in industrial scale

Since spring 2022, Limeco has been operating Switzerland's first industrial P2Gas plant in Dietikon (Switzerland) with an electric power of 2.5MW. It is located directly next to a waste incineration plant, which produces renewable electricity in addition to heat, and a wastewater treatment plant with a raw biogas production of 160 to 220m3/h. Previously, the gas operated a combined heat and power plant. The new plant uses the renewable electricity from the waste incineration plant to produce hydrogen that converts sewage gas with roughly 40% CO_2 into biomethane, which is fed into the local gas grid. After production started, the P2G plant faced a challenge: In the fall of 2022, there was a threat of power shortages following Russia's invasion of Ukraine. Limeco therefore decided to feed all of the waste incineration plant's electricity into the grid. The down time of the P2G plant was used to iron out a few teething problems. Today, the bioreactor operates stably as long as the key parameters of temperature, pressure, stirring power, and stoichiometric gas input are maintained. The plant breaks even with an average feed-in tariff of just under 12 € cents/kWh.

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New Bacterial Order Discovered

Scientists from the European research project Micro4Biogas have discovered and classified a new taxonomic order of microbes that are specialized in the decomposition of organic material. They could be the key to optimized biogas production. The order, which they call Darwinibacteriales, is one of the most common bacterial orders in biogas plants but has not been scientifically classified so far. To better understand the functions of the individual strains in the biogas plants, they were examined at the genus level. Particularly the organisms MBA03, Proteiniphilum, a member of the family Dethiobacteraceae, the genus Caldicoprobacter, and the methanogen Methanosarcina show high relative frequency across a variety of plants. MBA03 and Dethiobacter demonstrate syntrophic conversion of acetic acid, thereby contributing to hydrogenotrophic methanogenesis. On the other hand, the genera MBA03, Proteiniphilum, and Caldicoprobacter exhibit hydrolytic activities.

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Production process for CO2-negative hydrogen through biomethane cracking

Together with partners in the H2MikroPlas project, TH Köln is developing a process for producing CO_2-negative hydrogen by microwave plasma cracking of biomethane. This involves splitting biomethane from waste into hydrogen and solid carbon (carbon black), which can be used as a raw material for plastics or battery technology. So far, the process is working with natural gas in lab-scale. The aim is an industrial, mobile container solution that can also process contaminated biogas such as landfill gas. The project, which is funded with EUR 3.2 million until 2028, aims to enable flexible, sustainable hydrogen production with a negative carbon footprint.

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New sorption-enhanced methanation plant at Empa

In June, Empa in Switzerland commissioned a new type of methanation plant. It is the first pilot-scale demonstration of sorption-enhanced methanation, a technology developed at Empa that makes the "P2Gas" process more flexible and robust. It specifically increases the load flexibility of the process – a decisive advantage for the use of fluctuating renewable energy sources. At the heart of the new plant is sorption-enhanced methanation, in which zeolite pellets with a defined pore size act as catalyst carriers. These adsorb the water produced as a by-product of the methanation reaction, shifting the chemical equilibrium in favor of methane formation. This allows the process to be operated at lower pressures and temperatures.

More (in German)

MIT spin-off teams with Montauk Renewables to develop biogas-to- methanol projects

In Massachusetts, Emvolon, an MIT spin-off that converts greenhouse gas emissions into carbon-negative fuels and chemicals, and Montauk Renewables, Inc. announced a joint venture to develop multiple biogas-to-green methanol projects. Following a successful field demonstration project, Emvolon and Montauk plan to deploy a portfolio of biogas-based sites with an aggregate annual production capacity of up to 50,000 metric tons of green methanol by 2030. They will begin with the HRE facility in Humble, Texas. The HRE site will convert a flared gas stream into low carbon methanol, generating up to 6,000 metric tons of green methanol annually. The project marks a significant expansion of biogas utilization beyond traditional renewable natural gas (RNG) and power applications, unlocking new pathways to decarbonize industrial sectors.

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Cold Jet launches dry ice production at RNG sites

In Ohio, Cold Jet announced a groundbreaking initiative designed to transform renewable natural gas (RNG) sites worldwide into dual-purpose revenue generators. By integrating carbon capture and liquefaction technology with its highly efficient dry ice production solutions, RNG facilities can now monetize their CO2 emissions. While liquid CO2 itself commands a growing market, with demand projected to increase eight times by 2050 in the European Union and 2% annually by 2028 in the U.S. for uses in food & beverage, agriculture, fire suppression, eFuels, and sustainable urea, the revenue potential from dry ice production is even more compelling.

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New liquid can simplify hydrogen transportation and storage

Scientists from the groups led by Andreas Züttel at EPFL and Satoshi Horike at Kyoto University have developed the first example of a deep eutectic solvent (DES) for hydrogen. This is a transparent, stable, hydrogen-rich liquid that remains liquid at room temperature. The new DES can contain up to 6.9 percent hydrogen by weight, exceeding several technical targets for hydrogen storage. To produce the new DES, the scientists mixed ammonia borane and tetrabutylammonium borohydride in various quantities to find out which combinations would remain liquid at room temperature. The correct ratio (between 50 and 80 percent ammonia borane) resulted in a stable liquid that did not reform crystals even at low temperatures (amorphous). Tests have shown that the new liquid could release hydrogen when heated to just 60 degrees Celsius. This temperature is well below that of most hydrogen-rich solids.

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SwRI evaluates effects of hydrogen and natural gas blends on storage tanks

Southwest Research Institute (SwRI) is taking on the challenges of a hydrogen-powered future. In collaboration with NYSEARCH, a nonprofit research and development organization for the gas industry. They are investigating how blending hydrogen into liquid natural gas (LNG) could affect the integrity of the LNG storage tanks. LNG peak shaving facilities help stabilize energy supply and pricing during periods of high demand. In these systems, natural gas is liquified and stored in massive cryogenic tanks during times of low usage, typically in summer, and regasified during winter months when demand surges. The potential introduction of hydrogen into these systems raises important safety questions. SwRI is addressing a major concern that the temperature of the liquid natural gas, when mixed with hydrogen, may dip below the storage tank's temperature rating, affecting its safety and pressure integrity.

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