



Technology Collaboration Programme
by IEA

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Newsletter IEA Bioenergy Task 37: 12/2024

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Life Cycle Upstream Emissions Factors 2024

The IEA is disseminating a new database including life cycle emission factors corresponding to national electricity grids. The database aims to assess and compile reliable data to provide a global harmonized database on an annual basis. This database complements the IEA Emissions Factors 2024 database which includes emission factors corresponding to direct combustion at the point of electricity generation.

Data is published in an excel format and includes three main sheets with a set of life cycle emission factors corresponding to electricity generation. The factors include: Total upstream emission factors; Fuel-cycle emission factors and Life cycle adjustment factors for transmission and distribution losses.

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IEA Report: Renewables 2024

This edition of the IEA's annual Renewables market report provides forecasts for the deployment of renewable energy technologies in electricity, transport and heat to 2030, while also exploring key challenges facing the industry and identifying barriers that are preventing faster growth. For the first time, the report features a special chapter on renewable fuels, including bioenergy, biogases, hydrogen, and e-fuels. It forecasts their role in global energy demand by 2030 and their potential for decarbonizing the industry, building, and transport sectors.

In addition to its detailed market analysis and forecasts, the report also examines key developments for the sector, including policy trends driving deployment, solar PV and wind manufacturing, the costs of renewable technologies, electrolyser and renewable capacity for hydrogen production, prospects for renewable energy companies, and system integration of renewables, along with grid connection queues.

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IEA Gas Market Report Q3

Preliminary data suggest that global natural gas demand increased by 3% in the first half of 2024. Asia accounted for around 60% of the increase in global gas demand in the first half of 2024, with demand in both China and India increasing by just over 10% y-o-y. In this quarterly publication, the IEA included an "outlook for low-emissions gases" by 2027. Global biomethane production is expected to accelerate and double by 2027, reaching 16 bcm, including 8.5 bcm in Europe. Europe and North America are set to drive this expansion, contributing over 70% of the overall growth. Global e-methane production is expected to reach more than 1.2 bcm by 2027.

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State of the biogas industry in 12 member countries of IEA Bioenergy Task 37

IEA Bioenergy Task 37 addresses the challenges and opportunities related to the economic and environmental sustainability of the production and utilization of biogas from anaerobic digestion (AD). In most, if not all, countries, biogas production has been dependent on investment support and/or subsidies to be financially viable, indicating the need to improve steps in the value chain to reduce both investment and operating costs, and derive more revenue or value from all of its products. This current publication is the sixth annual summary of Task 37 country reports collated from the presentations made at meetings and from additional background details provided by the national representatives. It is hoped that this publication will enable widespread dissemination of up-to-date information on the state of the biogas industry in Member Countries located in the EU, North America, South America and Asia that will inspire readers to see the great potential for biogas solutions.

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Renewable CO₂ from food waste-based Biogas in Switzerland

The upgrading of the biogas to biomethane produces an offgas, which contains mainly the renewable CO₂ and a residual proportion of methane, the so-called methane slip. Conventionally, such waste gas streams are either combusted to reduce methane emissions or they are discharged into the environment. Since March 2023 in Nesselbach, Switzerland, the off gas is

treated further to turn the CO₂ into a commercial product. The CO₂ cleaning and liquefaction plant is one of only a few plants in Europe to provide biogenic CO₂ in a food grade quality.

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Interview with Jerry Murphy: success stories thanks to biogas

In this interview by Biogas Chanel, former Task 37 leader Jerry Murphy, Director of the MaREI Centre, talks about his team's research into biogas, with a focus on the biorefinery model to decarbonize the energy system. Professor Murphy shares success stories, where biogas is used to improve sustainability in rural communities or in businesses, such as distilleries. Finally, he discusses the use of biomethane for the creation of a circular and sustainable economy.

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Dark fermentation produces biohydrogen and methane from wastewater

Dark fermentation is a process that produces biohydrogen and methane from wastewater. A research team at Münster University of Applied Sciences has studied how biohydrogen and methane can be produced sustainably from wastewater that contains starch. This is done using two reactors - a hydrolysis reactor and a methane reactor - which generate the desired gases at a temperature of 60°C. Bacteria are used in these reactors in the absence of oxygen and light. The team analyzed a total of 60 different types of waste water, mainly from the food industry. The study found that hydrogen yields were 2.5 liters of hydrogen per liter of wastewater for artificial wastewater with a hydrogen content of 40% in the gas. For brewery wastewater with a hydrogen content of 38% in the gas, the hydrogen yields were 1.2 liters of hydrogen per liter of wastewater. Furthermore, when the hydraulic retention time (HRT) was 18 hours, the stirred tank with subsequent sedimentation tank showed a higher hydrogen yield.

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Engie invests in WASE technology to increase-biogas production by 30%

ENGIE New Ventures, ENGIE's Research and Innovation investment fund for innovative start-ups that accelerate the energy transition, has invested in WASE, a UK-based company developing technology that unlocks a 30% increase in the amount of methane generated from biomass, including from previously untreatable waste streams. WASE is unlocking the power of waste to make it the fuel for the future. Its proprietary Electro-Methanogenic Reactor (EMR) technology maximizes the amount of biogas produced from biomass in anaerobic digestion (AD) plants, as well as from organic matter in wastewater. Its units increase biomethane yield by 30% and reduce production time by up to a factor of 10. WASE's plug-and-play system fits into existing infrastructure and is also 50–70% smaller than the units currently available. The modular solution allows for customization, making it much easier for companies to deploy at their site, resulting in higher energy production and lower costs in the long run.

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Producing sustainable fuels with sun and biogas

The Swiss company Synhelion uses solar energy from pilot plant near Jülich to convert biogas and in future CO₂ into carbon in a -neutral solar fuels. Solar radiation is reflected by a field of more

than 100 mirrors, concentrated onto a receiver, and converted into high-temperature process heat. The generated heat is fed to a thermochemical reactor that produces syngas, a mixture of H₂ and CO. The syngas is then processed by standard gas-to-liquids technology into fuels, such as jet fuel, gasoline, or diesel. Excess heat is saved in the thermal energy storage to enable continuous 24/7 operation.

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Bajaj launches first natural gas motorcycle for the Indian market

A few weeks ago, Bajaj's first natural gas motorcycle has just been officially revealed. The Freedom 125 is equipped with a 125 cc, 9.4 horsepower engine mated to a 5-speed gearbox. Slightly less powerful than gasoline models, which typically develop between 2 and 2.5 more horsepower, Bajaj's compressed natural gas (CNG) motorcycle runs on a single tank housed under the saddle, which stores 2 kilos of the gaseous fuel. The autonomy is 200 km in CNG mode. A 2-liter additional fuel tank provides an additional range of 130 km.

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Evonik introduces high-capacity biogas membrane

Evonik has unveiled its latest biogas membrane, the SEPURAN® Green G5X 11", featuring the highest capacity of its kind currently on the market. Specifically designed for upgrading biogas to renewable natural gas (RNG) in large landfill, agricultural, organic waste, and wastewater treatment projects, the membrane is specifically engineered for maximizing sustainability and efficiency gains in biogas upgrading projects. The SEPURAN® Green G5X 11" is designed with double the capacity of the SEPURAN® Green G5X 6"L, and is ideal for large flow projects among landfills. Used in Evonik's 3-stage configurations, which are patented in the US, it excels in maximizing methane recovery rates and enabling high onstream times. Additionally, the new membrane offers more compact systems, less piping connections and welding time, and is easy to operate due to its ability for precise monitoring.

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Collection trucks get AI upgrades to fight contamination

Updated artificial intelligence (AI) capabilities are helping waste collectors automatically identify contamination inside recycling carts long before the material arrives at a MRF. In a new trend, haulers are attaching AI-enabled camera systems directly to recycling collection trucks in order to see and measure items in recycling bins that shouldn't be there. Such a system can capture images of the material as it's dumped into the truck. Then, it analyzes the images for incorrect items, such as stray plastic bags or food waste, and sends photos of the offending items directly to customers to offer personalized feedback on how to recycle correctly.

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Story of syngas fermentation – a story outside biogas

Years ago, they called it "the technology that dare not speak its name" because it was too crazy risky, when they did not call it "the technology that could not scale" between the guffaws in many board rooms. After the laughter subsided, the catcalls, the tech-shaming, those who stayed to

learn, usually came away impressed. Many invested in three companies — then, LanzaTech, Coskata and Ineos Bio. Later, LanzaTech, Synata Bio and Jupeng Bio. The technology landscape is littered with good ideas that did not work out, but the Big Three of syngas fermentation have shown remarkable resiliency.

It's a simple idea, in concept, it's all about execution. Find an organism that can consume the carbon found in waste gases if they are bubbled into an aqueous solution in just the right way, and especially find one that produces a waste product (to them) that is valuable (to us), such as ethanol. Yes, simple idea. Execution? Not simple. One of the shining success stories of the advanced bioeconomy is the pioneers of syngas fermentation proving it could be done, done reliably enough, fast enough, long enough, efficiently enough. Then, proving that engineers could take it to sufficient scale to make an impact on carbon and get enough economies of scale to make it interesting to investors and the owners of waste carbon feedstocks. Good news, the world has a lot of syngas.

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Electrocatalytic conversion of CO₂ and up-conversion to ethylene glycol

Researchers have targeted the use of catalytic methods to reduce CO₂ to single carbon intermediates, then to follow with biological up-conversion to multi-carbon compounds. In this project, Montana State researchers developed electrochemical reactor components with laterally graded pore structure to aid in reaction distribution when the reactor is scaled-up. Project partners integrated these components into the reactor and determined performance. Finally, the recent discovery of a novel C-C bond forming reaction that is orthogonal to central metabolism and requires fewer enzymes and reaction steps was utilized to develop bioproducts. Lee Spangler of Montana State University led the team that created this presentation on project progress and milestones ahead, for DOE Project Peer Review.

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McKinsey's low carbon fuel predictions

Low-carbon energy sources are expected to grow from 32 percent of the global power generation mix today to 65 to 80 percent by 2050. Solar and wind are likely to be the greatest share, driven by lower technology costs, according to senior partner Humayun Tai and colleagues in McKinsey's annual Global Energy Perspective. Solutions with higher costs—including hydrogen and other sustainable fuels, and carbon capture, utilization, and storage—lack sufficient demand and policy support for strong growth.

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Synthetic methane production on the rise in Europe

A white paper just published by the European Biogas Association (EBA) reveals that e-methane (or synthetic methane) production is growing rapidly in Europe. To date, 55 plants are producing this gas combining green hydrogen and recycled CO₂. Over the past eight years, synthetic methane production capacity in Europe has risen from 20 GWh per year to 449 GWh per year.

Projections indicate that by 2027, it will reach almost 3,000 GWh per year, equivalent to 0.27 billion cubic meters.

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First virtual pipeline concept for biogas in the EU

Renera, an independent Swiss biogas trader, and Methagora, an expert in anaerobic digestion, have jointly implemented a new virtual pipeline concept in France for the first time ever. This milestone was made possible by the long-term biomethane purchase agreement between the two companies.

This is the first time that Methagora's award-winning virtual pipeline concept has been implemented, making it possible to produce biomethane in small biogas plants that are not directly connected to the gas grid. A hub is formed bundling the gas produced by five decentralized biogas plants which are less than 100 km away from the central plant. They previously used CHPs but are now equipped with biogas upgrading units. The gas is compressed up to 200 bars and transported to the hub. At the transfer point, the biomethane is decompressed and can be used by end consumers in industry, at a CNG filling station or for feeding into the grid. The annual biomethane production is expected to reach 35 million kWh.

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First virtual biomethane pipeline in Spain

Nedgia, the Naturgy group's gas distributor, has established a strategic alliance with the pan-European biomethane platform CycleO to put into operation the first virtual gas pipeline in the country. Nedgia's new virtual biogas pipeline will inject 70 gigawatt hours (GWh) of renewable gas into the distribution network annually. This gas will come from various plants located in the province of Lleida, in Catalonia. The gas will be produced from the treatment of agro-food waste, which will be compressed for transport as Bio-CNG to an injection point in the Nedgia network.

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Hitachi Zosen Inova becomes Kanadevia Inova

Swiss waste-to-energy technology company Hitachi Zosen Inova rebranded on 1 October. The Zurich-based company, which has nearly 3,000 employees in 17 countries, will now operate as Kanadevia Inova. Parent company Hitachi Zosen Corporation decided on the name change last year and the Japanese group itself also began operating as Kanadevia Corporation. «Kanadevia» is derived from the Japanese verb «kanaderu», which means «to make music in harmony», and «via» (Latin for «way» or «method»). Only the name is changing; the company's ownership, organizational structure, management and employees remain unaltered.

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