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Newsletter IEA Bioenergy Task 37: 04/2023

Wrap-up of 2022: Reports, innovations & collaborations

Topics:

Tracking clean energy progress

The IEA's Net Zero Emissions by 2050 Scenario (NZE) is a pathway for the global energy sector to achieve net zero CO_2 emissions, while also achieving universal energy access by 2030 and major improvements in air quality. Tracking Clean Energy Progress (TCEP) assesses recent developments for 55 components of the energy system that are critical for clean energy transitions. Progress is assessed against the Net Zero by 2050 Scenario trajectory for 2030, and recommendations are provided on how they can get 'on track' with this pathway. The assessed components include technologies, infrastructure, sectors, subsectors and cross-cutting strategies. Of the 55 components tracked, two are fully "On track"– electric vehicles and lighting. Two other grades of progress have been defined: "not on track" and "more efforts needed". Bioenergy is among the latter. Modern bioenergy is the largest source of renewable energy globally, accounting for 55% of renewable energy and over 6% of global energy supply. The Net Zero Emissions by 2050 Scenario sees a rapid increase in the use of bioenergy to displace fossil fuels by 2030. Use of modern bioenergy has increased on average by about 7% per year between 2010 and 2021, and is on an upward trend. More efforts are needed to accelerate modern bioenergy deployment to get on track with the Net Zero Scenario, which sees deployment increase by 10% per year

between 2021 and 2030.

More Top

IEA Bioenergy: Technology advances in liquid biofuels and renewable gas

IEA Bioenergy held its biannual workshop on 17 October 2022 in Vienna, in conjunction with its Executive Committee meeting (ExCo90). The workshop consisted of three parts: 1) advances in renewable gas / biomethane, 2) advances in liquid biofuels, and 3) related developments in Austria. The summary report of the workshop as well as the presentations can be downloaded from IEA Bioenergy's website.

More

European Union Renewable Energy and Energy Efficiency targets

The brief Study on 2030 Renewable Energy and Energy Efficiency Targets in the European Union developed by the Technische Universität Wien (TU Wien), with input provided by EREF, assesses scenarios of higher 2030 EU targets for the combination of renewables with energy efficiency measures, demonstrating their feasibility and impact on national target levels. The report aims to provide a compact and well-founded basis for national and European decision-makers who are setting more ambitious 2030 targets for renewable energy and energy efficiency in the European Union (EU), complementing existing analyses and studies.

More

RNG has better GHG emission when considering complete lifecycle analysis

A recent study sponsored by the Argonne National Laboratory, the Joint Research Center, and the European Commission confirms that battery electric and hydrogen technologies, other than hydrogen made from renewable natural gas (RNG), emit far more greenhouse gases (GHG) when evaluated through a well-to-wheel (WTW) analysis, verses just looking at what is happening at the tailpipe. This conclusion was made after the study performed a WTW analysis for all transportation fuels, applying both the U.S. and EU forms of WTW measurement. Specifically, the study found that in both the U.S. and EU markets, waste-streams-to-energy technologies, such as CNG production via anaerobic digestion of wet waste resources, have the best GHG emissions, including a negative carbon intensity (CI). This study highlights what the data and science continue to confirm – that RNG used as a transportation fuel performs better than electric when considering its full lifecycle impact, especially for near-term reductions.

More

Top

EBA White Paper: Biogenic CO2 from the biogas industry

This White Paper explores the climate impact of biogenic CO2 use or storage, the main utilisation avenues and perspective markets opportunities. While detailing current CO2 requirements, the paper underlines current obstacles to and opportunities for the further take-up of Bio-Carbon Capture and Storage (BIO-CCS) and Bio-Carbon Capture and Utilization (Bio-CCU) solutions, summarizes best cases, and concludes with a set of policy recommendations to define a suitable legislative framework for the further deployment of Bio-Carbon Capture Use and Storage (Bio-CCUS) solutions, necessary to meeting Europe's mid-century climate neutrality target. One tone of biomethane can approximately produce 2 tons of biogenic CO2, making the potential of the sector to carbon capture, storage and utilization non-negligible. In 2020, Europe could have produced 24Mton of biogenic CO2, based on the volumes of biogas and biomethane produced that year (18 bcm). By 2030, we

could generate 46Mton of biogenic CO2, by producing 35 bcm of biogas and biomethane.
More

Methane emissions from the gas network: lower than expected

As part of a project of the Swiss Gas and Water Industry Association (SVGW), together with Carbotech AG and the Federal Office for the Environment (FOEN), a new model was developed to estimate the amount of methane emitted annually by the Swiss gas industry. The results show that emissions from almost all parts of the gas infrastructure were overestimated - in some cases by a factor of 25. SVGW previously estimated these emissions using a calculation tool developed in 2014. The calculations were based on fixed emission factors for various components of the gas network infrastructure (e.g., the annual gas losses of a pressure regulator station) as well as data from the gas statistics collected once a year from all network operators in Switzerland. In the new study, the database and thus also the reliability of the basic data used in the calculation model were considerably improved - not only with regard to the emission factors, but also through the SVGW gas statistics, which have been expanded in recent years. In addition, it was shown that in practically all of the more than 100 categories considered in the model, emissions had previously been overestimated - in some cases by a factor of 25. The DVGW research project published in 2022 by DBI Gas- und Umwelttechnik GmbH arrives at comparable results for Germany. The lower emissions are not only the result of new findings and measurements, but also of the investments made by the gas network operators in the infrastructure: The gas networks have been constantly modernized, problematic materials have been replaced by newly developed ones. Equally, Chevron highlighted in their recent 2022 methane report that thanks to better maintenance and control they were able to reduce the methane intensity by more than 50% since 2016.
More (in German)

Cross-border trading of RNG will support the decarbonisation of the gas sector

Cross-border trading of biomethane and other renewable gases will underpin the decarbonisation of the gas sector in the path towards a climate-neutral Europe. This was one of the conclusions of REGATRACE – a Horizon project that started in 2019. Regulatory, technical and economic barriers today prevent or hinder the emergence of a biomethane market in many EU countries. REGATRACE helped to pave the way to recognise the green value of biomethane in all countries to facilitate biomethane trade across national borders. The ERGaR Certificates of Origin (CoO) Scheme and the AIB EECS Gas Scheme provide the technical requirements for cross-border transfers of biomethane. The ERGaR CoO Scheme has been facilitating the cross-border trade of biomethane since 2021 and is operated by the European Renewable Gas Registry. Between end-2021 and mid-2022, the amount of biomethane transferred via the ERGaR CoO Scheme increased from 30 GWh to 159 GWh.
More

Top

New edition of EBA Statistical Report

The 2022 edition of the EBA Statistical Report published in December 2022 shows that the biogas and biomethane sector is already providing 18.4 billion cubic meters (bcm) of renewable gas to Europe. In the mid-term, our sector is a key pillar of the REPowerEU strategy, including the deployment of 35 bcm of sustainable biomethane a year by 2030 to mitigate climate change and strengthen the EU's strategic autonomy. By 2050, it could provide up to 167 bcm and cover 62% of the gas demand. The demand for biomethane for all final uses is strong: last year, the growth of the sector was unprecedented, with a 20% increase in biomethane production and a total of 3.5 bcm produced in 2021. An even greater

expansion is expected in 2022, as a record number of new biomethane plants (184) started production last year and will become operational within 2022. The EBA Statistical Report is the only detailed publication tracking the state of play of biogas and biomethane production and use across Europe. The 12th edition includes a specific chapter dedicated to digestate use, brand-new country profiles, fresh analysis on the evolution of Europe's energy mix, as well as updates on the sector's production costs and contribution to green jobs, among other relevant highlights.

More

India's first and largest biorefinery to produce biomethane from straw

In the Punjab region of India, the bioenergy company VERBIO has spent the last three years building a biorefinery modeled on plants in Germany. In April 2022, the first volumes of biomethane (BioCNG) were produced from rice straw. Now production is being ramped up. Verbio India supplies biomethane as a fuel to the Indian Oil Corp. Ltd. filling station network in the region. The Lehragaga plant can produce up to 33 to/d of BioCNG and 650 to/d of humus fertilizer. The biorefinery will process about 100,000 tons of straw annually that would otherwise be burned in surrounding fields. At the same time, it will produce humus fertilizer that will improve soil quality. The plant is the first and largest biorefinery facility of its kind in India under the Satat program launched by the Indian government in 2018. And the potential for further growth is great: more than 300 million tons of unused straw are available in India each year.

More (in German)

ARABern: A waste water treatment plant as renewable energy hub

ARABern is one of the largest waste water treatment plants (WWTP) in Switzerland and has gradually been muted to an energy producer. The biogas formed from the sewage sludge plus 200 to/d of restaurant and food industry waste is upgraded to biomethane and injected into the grid. It is used for the public buses in the city of Berne. Since this year, the separated CO2 with a purity of more than 98% is transported to the start-up company Neustark who has developed a process to convert CO_2 into calcium carbonate, i.e. limestone, and thus becomes permanently stored in the rock, keeping it out of the atmosphere. The conversion to limestone is quite quick and exothermic, i.e. does not require any additional energy. The produced concrete granulate requires less cement to achieve the same strength. The reduced consumption of cement therefore has a further positive effect on the concrete's ecological footprint. An increasing part of the electricity consumption of the WWTP is covered by PV panels placed on the buildings. The required heat is provided by a nearby waste wood boiler.

More

Top

Researchers develop new method to produce biogas from sewage sludge

A Washington State University research team, lead by Birgitta Ahring, tested a pretreatment technology, adding an extra step to typical treatments and using oxygen-containing high-pressure steam to break down sewage sludge. They found that they were able to convert more than 85% (up from less than 50%) of the organic material to biogas. The WSU research team treated the sludge at high temperature and pressure with oxygen added before the anaerobic digestion process. The small amount of oxygen under the high-pressure conditions acts as a catalyst breaks down the polymers in the material. The WSU researchers have been studying this pretreatment process for several years, using it to break down straw and woody materials. They were surprised that the process worked well

also with the different composition of sewage sludge
More

Seasonal gas storage in the Swiss subsoil

Methane can be stored in tanks, caverns or gas pipelines, but only in limited quantities. Porous rock formations from which natural gas was previously extracted offer another storage option. Extracted natural gas deposits are used worldwide for large-volume, long-term storage of natural gas. The Austrian gas storage company RAG Austria AG made a remarkable discovery about ten years ago: if hydrogen and CO2 are brought underground under suitable conditions, naturally occurring microorganisms (archaea) there ensure the methanation of the hydrogen i.e. its conversion into methane. This methane can be extracted and used like conventional natural gas. Experts refer to this process as geo-methanization. It has been successfully tested in two projects from 2013 to 2020, in Pilsbach (between Salzburg and Linz). In the field tests, up to 10 vol% hydrogen and 2.5 vol% CO2 were added to a storage tank filled with natural gas: The microorganisms converted the two gases into methane within a few weeks, with conversion rates of 10 to 90% observed.
A research team from the University of Bern investigated whether there are also geological formations in the Swiss subsurface that are suitable for geo-methanization. Even though the work has not yet been completed, the University of Bern has come to a positive assessment for different areas in the Swiss mid-land. There, rock formations are found that fulfill the main criteria for such a reservoir: First, the rock is porous, capable of holding 20 or more percent gas by volume. Secondly, these porous rock formations are closed at the top by an impermeable opaline cover layer.
More (in German)

Nature Energy to invest up to $1B in up to 10 Quebec biomethane plants

In Canada, in the coming years, around $1 billion will be invested in building up to 10 biomethane plants in Quebec by the Danish company Nature Energy together with Énergir, Quebec's leading gas supply company. Nature Energy and Énergir will jointly develop, build, and operate biomethane plants that together can supply 200 million m3 of biogas per year, corresponding to one third of Quebec's target for CO2 reduction by 2030. As mentioned in Newsletter 02/2023 Nature Energy is taken over by Shell plc.
More

California Bioenergy secures up to $500M from Brookfield Renewable to grow RNG

California Bioenergy (CalBio) announced a funding partnership of up to $500 million with Brookfield Renewable and its institutional partners to scale CalBio's growth in renewable natural gas and other waste-to-energy opportunities. With Brookfield's funding, CalBio plans to more than double RNG production over the next five years with continued expansion of its California digester projects and selective expansion into other States. Currently, CalBio is reducing emissions by over 1 million metric tons of CO2e per year and with expanding state and federal carbon credit programs, it is targeting two to three million tons per year of CO2e of reductions.
More

Top