Technology Collaboration Programme by iea

task37.ieabioenergy.com

Newsletter IEA Bioenergy Task 37: 10/2021

IEA and other reports

Topics:

Annual report 2020 of IEA Bioenergy

The *Annual Report 2020 of IEA Bioenergy* includes a special feature article 'Technical, ecological and economic assessment of biorefinery cases' prepared by Task 42 "Biorefining in a Circular Economy".The Annual Report also includes a report from the Executive Committee and a detailed progress report on each of the Tasks. Also included is key information such as Task participation, Contracting Parties, budget tables and substantial contact information plus lists of reports and papers produced by the Technology Collaboration Programme.

More

Clean energy demand for critical minerals is set to soar

Supplies of critical minerals essential for key clean energy technologies like electric vehicles and wind turbines need to pick up sharply over the coming decades to meet the world's climate goals, creating potential energy security hazards that governments must act now to address. *IEA's special report* on the subject, The Role of Critical Minerals in Clean Energy Transitions, is the most comprehensive global study to date on the central importance of minerals in adopting cleaner energy. It outlines specific challenges to ensuring the necessary supplies, such as complex supply chains and the concentration mining and processing of certain minerals in a small number of countries. Manufacturing the typical electric car uses six times the mineral inputs of a conventional automobile, and an offshore wind plant requires 13 times more than a similarly sized gas-fired plant. We have used our detailed modelling tools to establish a unique database showing future requirements for minerals such as copper, lithium,

nickel, cobalt and rare earths under various climate and technology pathways.
More

Technologies for Flexible Bioenergy

The increasing share of renewable energy sources such as photovoltaic systems and wind turbines, of which electricity production depends on weather conditions, leads to a need for more flexibility and controllability of other energy sources, energy carriers and energy storage devices. The new *IEA Bioenergy Task 44 report* wants to highlight a number of technologies which make the inherent flexibility of sustainable bioenergy usable. A concise overview of the technical possibilities is presented, in the appendix more detailed information on individual flexible bioenergy technologies including references is given. The flexibility of bioenergy has several dimensions: 1) Short term flexibility to balance and stabilize the electricity grid by both positive and negative ancillary services and 2) Long term flexibility by biomass-based energy carriers that can be (seasonally) stored and transported within existing infrastructure.
More

Potential and utilization of manure to generate biogas in seven countries

Production of biogas from manure at a farm level is the very epitome of a sustainable bioenergy system. The system incorporates a circular economy decentralized production of organic biofertilizer and biogas for use in heat, power or transport fuel, whilst simultaneously reducing fugitive methane emissions from open slurry holding tanks, reducing smells and minimising pollution effects on rivers and wells. The characteristics of manure depend on farm animal source and the method of husbandry, which in turn leads to a wide range of levels of technically available manure resource and costs of biogas produced from manure. To exemplify this, IEA Bioenergy Task 37 published this report which examines the potential of manure for utilization in biogas facilities across seven countries: Germany; Australia; Austria; Norway; Canada, Ireland and the UK. These countries have differing levels of biogas industry, very different farming practices and a range of climates. The major factors which define the suitability of manure for an economic anaerobic digestion process include: the biogas potential of the manure; the water content of the manure; unwanted and inhibitory materials in manure; the herd size where the manure is processed; and the resulting amount of manure available to the biogas facility.
More

Minhe Chicken Manure Biogas Plant

In China, the rapid development of the poultry production sector has resulted in significant amounts of chicken manure. Chicken manure is quite rich in ammonium, can be detrimental to the environment should it not be managed well and is not ideally suited to anaerobic digestion. In terms of digestibility the major disadvantage is the low carbon to nitrogen (C/N) ratio of chicken manure, which is generally between 6:1 and 12:1. *The Task 37 case story* shows the successful operation of the Minhe Chicken Manure Biogas Plant, located in Yantai city, Shandong Province, China. It has two clusters of biogas digesters which were constructed in two separate phases; the initial phase in 2009 and the second phase in 2015. The facility can treat about 300 tonnes/day of raw chicken manure and 240 tonnes/day of chicken house cleaning wastewater. The resulting mixtures fed to the digesters has a total solids content in the range 8% to 9% TS. The daily average biogas production is 30,000 m3/d (100m3 biogas/t raw chicken manure) generating typically 60,000 kWeh/d of electricity.
More

Biogas as part of the production of high-quality products from recycled paper

In Pitten, Austria, 450,000 tons of paper and board are produced annually on 2 paper machines. Due to the focus on sustainability, recycling waste streams from the industry via anaerobic digestion of wastewater is a matter of course. W.Hamburger has used recycled paper for decades as a raw material for the production of various paper and board products. The *Task 37 case story* describes the

wastewater treatment plant to clean wastewater volumes of 6,000 m³ per day. Four anaerobic reactors with a total volume of 3,500 m³ generate approximately 17,600 Nm³ of biogas per day (c. 3m3 biogas per m3 wastewater). In 1990, the first UASB reactor was installed at the facility. The initial UASB facility had a working volume of 910 m³. In 2004, another biological stage (UASB) with 950 m³ volume was installed. Further increases in the load of the plant led to the addition of 2 more anaerobic reactors in 2016. The energy from biogas is used onsite at the production facility to provide energy for the industrial process and substitute the use of fossil fuel. Anaerobic digestion produces 5-6 million Nm³ of biogas per year, about 30,722 MWh, which is equivalent to 5% of primary energy demand at the facility.
More

New demo plant Waterleau carries out fertilizer field trials

Waterleau New Energy is a biogas plant located in Ieper (Flanders, Belgium), a region with a manure surplus due to the intensive pig husbandry and the stringent local fertilizing legislation. In order to overcome the surplus issues, and to close nutrient loop, a process for manure management has been developed, integrating anaerobic digestion, centrifugation and evaporation technology. The produced biobased products, including raw digestate, liquid fraction of digestate, evaporator concentrate and ammonia water, have the potential to be used as recycled fertilisers for crops. To evaluate the potential value of these biobased products as substitutes for synthetic mineral N fertilizers, a three-year field trial on maize was set up in Oosterzele, Belgium. The plants were harvested on 22nd September 2020 and soil samples were taken to determine the risk of post-harvest N residue. The results showed no significant difference in agronomic performance between treatments using biobased products and those using synthetic mineral N fertilizer, nor in post-harvest soil N residue. The highest biomass yield and N uptake were observed in those crops which were grown with the addition of liquid fraction of digestate. These results were significantly higher compared to the unfertilized control and trial crops grown using raw digestate, evaporator concentrate and ammonia water. Based on the preliminary first-year results, it seems that the liquid fraction of digestate from Waterleau biogas plant has high potential value to fully replace synthetic mineral N fertilizers in crop cultivation, while evaporator concentrate and ammonia water share a potential for partial substitution. In the coming two years, the long-term effect of these biobased products will be further assessed, taking into account the impact of weather conditions
More

Biogas in the EU-28: 16.6 Mtoe biogas produced in 2019

Primary energy production from biogas in the EU28 countries has increased only slightly since 2017. According to EurObserv'ER, output reached 16.6 Mtoe in 2019, which is marginally higher than in 2018, but around the same level as in 2017. Thereof, 62.5 TWh of electricity have been produced. The rollout of regulations less supportive of using food-type energy crops for producing biogas has fuelled this general trend and has been compounded by the limitation on the capacity allocated to biogas tenders and less attractive biogas electricity payment terms. Nonetheless, some member countries have posted positive output growth, thanks to their determination to both encourage biomethane injection and recover energy from fermentable waste. The injection of biomethane into the gas grid in the EU28 is surging, having increased from 186.8 ktoe (2.2 TWh) in 2018 to 269.6 ktoe (3.1 TWh) in 2019. The main reason for this significant growth (of 44.3%) is the increase in the biogas fuel consumption level identified in Italy.
More

Biomethane continues to grow in France

In April GRDF, GRTgaz, the SPEGNN, the Syndicat des Energies Renouvelables (SER) and Teréga presented the 6th edition of the "Panorama du Gaz Renouvelable"", which monitors developments in the sector every year. A document that confirms the strong dynamics of the French biomethane sector but also a record consumption of bioGNV. Although it still represents only a tiny share of French

consumption, biomethane continues to grow in France. With 91 new biomethane injection sites commissioned in 2020, France had 214 sites in service by the end of the year. The quantities of renewable gas injected into the networks were almost doubled and reached 2,270 GWh in 2020.
As gas becomes greener, CNG is becoming more and more renewable. According to the report, 286 GWh of bioNGV was consumed in 2020. That's 36 more than the 250 GWh recorded in 2019. By 2020, the report puts the number of accessible publics refueling stations in France at 173, with 41 deployed in 2020 alone. While projects should continue to multiply over the next few years, the industry is concerned about the lack of ambition in the new Multi-Year Energy Plan (MPE). Published in May 2020, it sets a biomethane production target of 6 TWh in 2023 and 14 to 22 TWh in 2028. This ambition is well below the trajectory needed to reach 10% of gas consumption covered by green gas in 2030.
More (in French)

German biomethane industry barometer 2021

The biomethane industry is looking to the future with confidence thanks to the Increasing market share of biomethane from 9,735 GWh in 2019 to 10,269 GWh in 2020. This is reflected by this year's Biomethane Industry Barometer published by the German Energy Agency (dena). The main reasons for optimism are recovering trading prices and good prospects in all markets. Regulatory changes create room for diverse development opportunities. For the 2021 industry barometer, dena surveyed around 50 companies in the biomethane sector on developments, opportunities and challenges. Nevertheless, reliable framework conditions that can be implemented by companies are needed, especially for the increased use of manure and residual materials. Thanks to RED II and the new national regulation on the GHG quota in the Federal Immission Control Act, sales at filling stations increased to almost one terawatt hour (2019: 733 GWh). Meanwhile, almost all CNG filling stations have been converted to biomethane, which suggests a further increase in sales in 2021. Here, the industry is also benefiting from the CO2 tax on fossil fuels, which came into force this year with the Fuel Emissions Trading Act. The heating market continues to grow steadily as well with total biomethane sales of 640 GWh in 2020.
More (in German)

The role of biogas production from industrial wastewaters

A new paper released by the European Biogas Association has mapped the opportunities of producing biogas from industrial wastewaters and quantified the biogas production potential of different EU industry sectors. The results show that biogas has a high potential to mitigate methane emissions from wastewater whilst at the same time providing a huge potential source of renewable energy. This will reduce energy consumption at wastewater treatment installations, provide a solution for the management of sludge and create additional green jobs at local level. The paper includes recommendations to untap the biogas potential from wastewaters. The findings of this paper show that it is possible to recover around 14 Mtoe (142 TWh) of biogas per year by valorizing industrial wastewater from the spirits, biodiesel, pulp and paper, beer, vegetable oils, ethanol, meat, and cheese sectors. However, the large potential of biogas production from industrial wastewater is not yet considered in most studies evaluating the biogas production potential in Europe in 2050 between 87-114 Mtoe (1,008-1,326 TWh). This potential can be even higher than currently estimated.
More

Biogas: Pathways to 2030

Human activity currently generates 105bn tons of organic wastes every year, which are releasing harmful gases into the atmosphere, particularly methane. By recycling these organic wastes, the biogas industry can enable countries to deliver a GHG reduction of 10% worldwide. The World Biogas Association report on “Pathways to 2030” explores how, by 2030, appropriate management of all organic wastes can enable a reduction in the amount of these wastes, especially food waste, which would itself cut global emissions by 3%, and the transformation of the unavoidable organic wastes into valuable bioresources. The report highlights the fundamental part our industry can play in achieving net

zero and in creating a circular, sustainable and environmentally-friendly economy for both high- and low- income countries.
More

CO2 Emission Abatement Costs of Gas-Fueled Mobility and other Road Transport Options

NGVA Europe published in May its newest study: "CO2 Emission Abatement Costs of Gas-Fueled Mobility and other Road Transport Options" which had been commissioned to Frontier Economics. The study analyses and compares CO2 emissions, the economic costs, and the resulting emission abatement costs of key road transport vehicles, while also illustrating the potential contribution of gas-fueled mobility (g-mobility) alongside other technologies. The focus is on the near term (up to 2030) using two vehicle types as examples: passenger cars and trucks. Within each vehicle type, the study compares a range of low-carbon options to a fossil counterpart, using a comprehensive approach rather than focusing narrowly on tailpipe emissions. The analysis demonstrates that g-mobility is a readily available and attractive complement to the technology mix in transport in 2030 that will be required to effectively and efficiently migrate towards a net-zero carbon mobility sector in Europe. It will therefore be key to ensure that the regulatory framework allows for g-mobility to contribute to emission reductions. The key results of the study are as follows: Passenger vehicles, running on a mix of RNG and CNG have similar total emissions to a BEV while vehicles running on pure Biomethane have even lower emissions calculated on a combined Well-to-Wheel (WtW) and manufacturing emissions basis. Conventional diesel and LNG trucks have similar overall emissions. Trucks, using a mix of LNG and bio-LNG, have significant lower total emissions than Diesel-powered trucks. Regarding the costs, the numbers illustrate that Liquefied Biomethane production cost will be the most expensive in 2030, while they have a clear cost advantage for CO_2 emission savings.
More