



IEA Bioenergy
Technology Collaboration Programme

Gasification news

Highlights from the IEA Bioenergy Task 33 meeting in Lyon, France, October 18-20

Newsletter II

IEA Bioenergy: Task 33: December 2023

INTRODUCTION

IEA Bioenergy Task 33 organised the second bi-annual meeting of 2023 in Lyon, France 18-20 October. The meeting started with a visit to the Gaya gasification plant outside Lyon (Figure 1). The second day, IEA Bioenergy ExCo arranged a workshop titled *Bioenergy in a Net Zero Future*, with several contributions from Task 33. The third and the last day, the members of Task 33 presented an overview of the gasification status in all participating countries. South Africa participated as an observer and presented ongoing gasification activities in the country.



Figure 1. Photo from the site visit at the Gaya gasification plant outside the city of Lyon.

WORKSHOP ON BIOENERGY IN A NET ZERO FUTURE

The workshop, organized by IEA Bioenergy in collaboration with the French research funding agency ADEME, aimed at discussing the role of bioenergy in the transition to a carbon neutral energy system (see <https://www.ieabioenergy.com/blog/publications/ws30-bioenergy-in-a-net-zero-future/>). One session focused on policies and strategies to support the role of bioenergy in the energy transition, and another on the flexibility of bioenergy in the energy system, the use of biogenic CO₂ and promising developments in bioenergy concepts. Several contributions were made by Task 33-members.

SHORT HIGHLIGHTS FROM THE COUNTRY REPORTS

In the following, some of the highlights from the country reports are presented, for more information please reach out to your country representative (see “Participants and Country Reports” in <http://task33.ieabioenergy.com/>)

Austria

Since last year, the new gasification plant in Vienna, used in the Waste2Value-project is in operation. The first test campaigns have been carried out and the results evaluated. Figure 2 shows the producer gas quality compared with the gas composition of the 100 kW gasification facility located at Vienna University of Technology (TU Wien).

First results VI: Comparison to the experience from 100 kW, GC measurements of main components, H₂ calculated

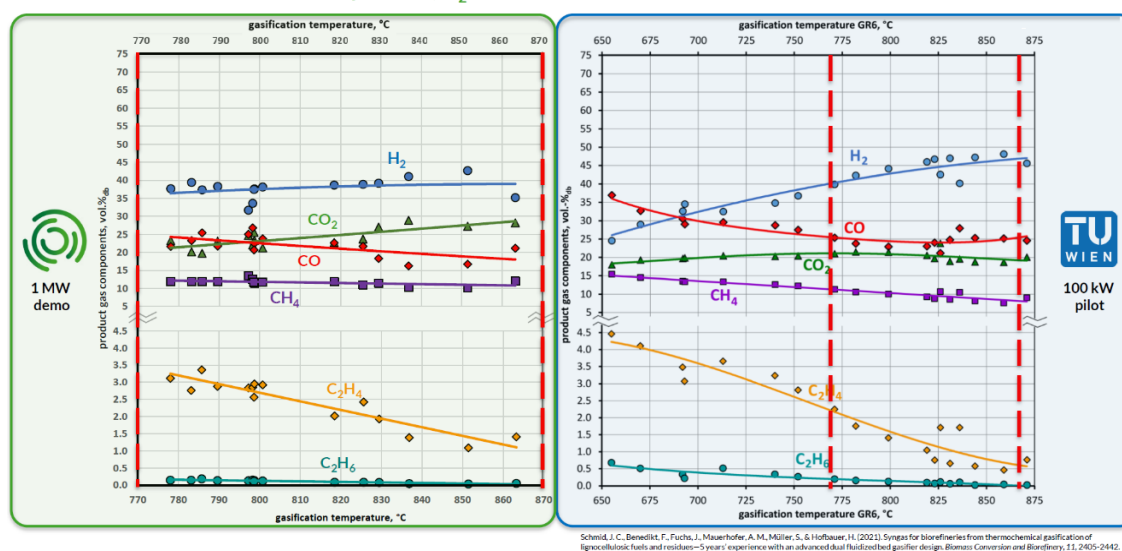


Figure 2. Comparison of gas quality produced by Waste2Value-plant (to the left), and a 100-kW pilot gasification facility at Vienna University of Technology (to the right).

As shown in Figure 2, similar gas quality with slight deflection was achieved during the gasification tests of Waste2Value plant (left) compared to tests at Vienna University of Technology (right). Extensive experiments are in progress.

Belgium

The Belgian gasification company Xylergy is currently finalizing the assembly of its plant delivered to Matsumoto (Japan). The commissioning is planned for the beginning of 2024. Regarding gasification research, the Enerbio project is ending with promising results on steam- and oxy-gasification and UCLouvain is looking for further developments and valorisation of the project. The TTCogen project from CERDECAM is delayed with commissioning planned for mid-2024.

Canada

In Canada, Enerkem is moving ahead with the deployment of its gasification technology. The Edmonton facility is operating, site preparation in Varennes, Quebec is ongoing, and they recently signed a Memorandum-of-Understanding (MoU) with Technip Energies to cooperate in the replication of Enerkem's platform in other jurisdictions. Another company, Hydrogen Naturally, based in Calgary, Alberta is completing front end engineering for a green hydrogen plant that will convert 600,000 dry tonnes of western Canadian forest residues into hydrogen and sequestered CO₂.

China

The high-temperature solid waste gasification to hydrogen demonstration project located in Fangshan District, Beijing was commissioned in December 2021 and passed the engineering acceptance in 2022. The project has been operating at a scale of 2 tons/day of municipal solid waste (MSW). The effective output syngas concentration can be up to 65% and the purity of hydrogen production can be up to 99%, with vitreous as a by-product. Biomass, obsolete MSW, undisposed MSW, RDF, etc. are all feedstocks for the project. Although hydrogen production from biomass gasification is still in its infancy, it is being explored extensively by the industry and research institutes. The demonstration project is constructed by WUHUAN Engineering Co. and China Chemical Engineering Sixth Construction Co.



Figure 3. The high-temperature solid waste gasification to hydrogen demonstration project located in Fangshan District, Beijing.

A rice husk gasification project for production of biochar and power is currently in operation in Fuyang, Anhui Province, China. The project adopts an updraft fixed-bed gasifier with a capacity of 150 tons of rice husk per day. The power output of the gas engine is 3 MW and the production of rice husk biochar is 10,000 t/a.

Germany

In Germany, Plagazi AB (<https://www.plagazi.com>) plans two plants for gasification of waste to hydrogen - one in cooperation with Neue Energie Premnitz, and one with Korn Recycling. RWE finished a project regarding phosphorous recovery from sewage sludge. A Multi Fuel Conversion Plant was built and operated in the Innovation- and Technology Center Carbon Conversion in Niederaußem, gasifying coal and sewage sludge in an entrained flow gasifier and thus recovering the phosphorous and carbon. (<https://www.rwe.com/forschung-und-entwicklung/rwe-innovationszentrum/kreislaufwirtschaft/multi-fuel-conversion>)

At TU Munich, Chair of Energy Systems, the International Future Lab REDEFINE H2E (<https://redefine-h2e.de/>) focuses on research on technologies and system aspects to produce green hydrogen using gasification and other hydrogen production processes.

India

The Indian Institute of Science and Indian Oil Corporation Ltd. are jointly working on developing and demonstrating biomass gasification-based hydrogen production of fuel cell-

grade quality. The system consists of a down-draft fixed bed gasifier using oxygen and steam as oxidants and a vacuum pressure swing adsorption (VPSA) system for hydrogen purification.

Italy

Continuing with the implementation of the IPCEI Hy2Use-funded programme, the Italian MyRechemical (a subsidiary of NextChem, Maire Tecnimont Group) has proposed the construction of a second hydrogen valley in Sicily, see <https://hydronews.it/nextchem-gruppo-maire-vuole-realizzare-una-hydrogen-valley-anche-in-sicilia/> The first under implementation in Lazio (to hydrogen and ethanol production), see <https://www.nextchem.it/it/newsroom/comunicati-stampa/dettaglio/hydrogen-valley-roma-lanzatech-etanolo-circolare/>. The company aims to develop a second Circular H2 hub based on its proprietary 'waste to hydrogen' technology, which also includes gasification. Taking advantage by the model developed for Lazio, the Sicilian H2 valley would allow to obtain the green energy vector from municipal solid waste while enabling at the same time the revamping, as well as low-impact energy reconversion, of various industrial areas such as the petrochemical sites already present on the island.

United Kingdom

The Supergen Bioenergy Impact Hub was launched on 14th November 2023; the hub works with academia, industry, government, and societal stakeholders to develop sustainable bioenergy systems that support the UK's transition to an affordable, resilient, low-carbon energy future. This new stage of the hub will explore two topics linked to gasification, one for hydrogen production, and one looking at negative emissions from waste (BECCS). More details about the launch event and topics covered can be found in here <https://www.supergen-bioenergy.net/resources-from-supergen-bioenergy-hub-launch-event-2023/>

Altalto is Europe's first waste-to-SAF plant, they will produce enough fuel to power over 1,000 transatlantic flights with net-negative carbon emissions. They have recently completed the work necessary to claim the first tranche (£7 million) of the grant and have obtained private funding for the period from 1 April 2023 (DfT and private match funding). This is a collaboration between Velocys and British Airways, using technology from Velocys (Gasifier and Fischer-Tropsch). Further updates and news can be found in here <https://www.altalto.com/2023/05/10/altalto-immingham-project-update/>

The ABSL plant in Swindon is complete and is currently being brought online. Waste is delivered to site, currently feeding woodchips into gasifier as part of start-up process with switch to oxy steam gasification shortly. All regulatory consents are now in place with Environment Agency, HSE and Ofgem. Further updates can be found here <https://absl.tech/>

USA

SunGas Renewables today announced it has been selected by Australian green hydrogen and methanol project developer, ABEL Energy, to supply green methanol for a new \$1.4 billion facility in Northern Tasmania, Australia. Johnson Matthey, a leading methanol synthesis technology and catalyst supplier, was also selected to supply key technologies for the project. The ABEL Energy Bell Bay Powerfuels Project is expected to produce 300,000 tonnes of green methanol per year. This amount is three times Australia's current methanol consumption and is the shipping fuel equivalent of removing 540,000 tonnes of carbon dioxide from the atmosphere annually.

Sweden

Uniper carries out the project SkyfuelH2 together with Sasol ecoFT aiming to produce sustainable aviation fuel (SAF) on an industrial scale in Långsele in Sollefteå municipality. The production is based on gasification of torrefied biomass and hydrogen produced from water

and renewable electricity. Approximately 75 000 tons of SAF will be produced annually together with 15 000 tons of naphtha via Fischer-Tropsch synthesis technology. The biomass comes from residual products from forestry. The plan is to start construction of the facility in 2025, to provide the aviation industry with SAF in 2028. The project would create up to 100 new direct and 200 indirect employment opportunities locally.

<https://www.uniper.energy/sweden>



Figure 4. Illustration of the planned SkyfuelH2 plant in Långsele (Uniper, 2023)

In the autumn 2023, LTU Green Fuels received funding (>8 M€) from the European Union and the Swedish Agency for Economic and Regional Growth to build a test bed for electrolysis systems (approximately 1 MW) at the LTU Green Fuels pilot plant in Piteå to carry out tests with electrolysis for producing hydrogen and oxygen in arctic climates. This also opens the opportunity to test and increase the knowledge on the combination of biomass gasification and water electrolysis. <https://www.ltu.se/centres/CH2ESS/Nyheter/81-miljoner-till-testanlaggning-for-vatgas-vid-LTU-Green-Fuels-1.233173?l=en>

South Africa

The Council for Scientific and Industrial Research Energy Centre, based in Pretoria, is in the process of refurbishing pilot fluidized bed combustor/gasifier for gasification of biomass and waste in corporation with an external client. It can operate in gasification mode to produce synthesis gas (H₂, CO) or in combustion mode.

The Netherlands

The Dutch gasification landscape is growing steadily with more technology providers and project developers being active. The main focus of projects in the Netherlands (including specific technology developments) is related to the production of Green Gas, because the increasingly favourable boundary conditions. Secondly there are several waste to methanol projects under development and lastly also gasification for the production of hydrogen has several initiatives. The main ones are Torrgas with the BrigH2 project, RWE with their waste to hydrogen approach (FUREC) and Netenergy who focusses on relatively small units operated on roadside grass to produce hydrogen. They successfully [produced hydrogen in 2023](#) and announced a collaboration with Vermeulen Group to produce 500 kg H₂ per day.