R2Gas workshop:
Biomethane - The most obvious renewable fuel of today

The second workshop of the Research Centre for Renewable Gases (R2Gas) took place in Vienna on 24 April 2023. Around 80 experts from the biomethane scene discussed the current market for biomethane with its legislative requirements and the current state of gas processing technology in two blocks of six input presentations each. The market is strongly influenced by the framework conditions of RED II and RED III and the Union Database (UDB), which is currently being set up, as well as the various sustainability criteria and their determination. Membrane technology and chemical absorption are becoming increasingly important in gas treatment.

Wl. The second biomethane workshop, which was organised on 24 April by the independent Research Centre for Renewable Gases (R2Gas) - an association based in Vienna - attracted around 80 specialists with practical experience of renewable gases. A total of 12 input presentations (6 each on the market situation and technology) on current developments provided the basis for the subsequent questions, comments and discussions. The valuable exchange of information, including during the breaks, will support the future development of biomethane projects.

Market

The big issue that is driving the industry is the Union database, in which the data flow of all certificates, i.e. designations of origin, certificates of origin (COO), quality of biofuels and mass flows are to be recorded. It is ultimately intended to serve cross-border greenhouse gas accounting and avoid double marketing.
Galin Gentchev, Deputy Head of the Decarbonisation and Sustainability of Energy Products Unit in the Energy Directorate of the European Commission, gave an in-depth insight into the current status of sustainable gases. In his position, he is responsible for the certification and traceability of liquid and gaseous fuels.
While liquid biofuels have been included in the UDB since January 2024, renewable gases are due to be included in November 2024. Although the development of the UDB was generally very welcome, there were some very critical questions about the systematic recording. There are doubts as to whether it makes sense for producers to enter their products in the database themselves, while the currently well-functioning system of national registration is left out.

In the following presentation, the function and market of guarantees of origin (GOs) and sustainability certificates were presented in detail. Kevin Lim from Veyt (formerly Greenfact) analysed the effect and benefits of HKNs for biomethane, which can be traded in units of 1 MWh regardless of the physical flow. This is in contrast to the physical feed-in of green gas with the corresponding sustainability certificates. He showed the market development of the two different systems in various European countries.

Jan Kniekamp from SURE-Zertifikatsysteme discussed the EU Emissions Trading Scheme (EU ETS) and showed its original function and current development. The influence of the market availability of products on the equivalent CO2 prices became very clear. With the new Energy

Directive (RED III), solid biomass will also become part of the ETS. From an output of 7.5 MW, the GHG reduction must be at least 80%, as with biogas.

Julian Auderiet from AGCS used the Austrian example to explain the functions of a registration body. As a balance group coordinator, AGCS is responsible for issuing monthly biomethane certificates for injected biomethane with clear labelling. In 2023, the amount of biomethane fed into the grid in AT totalled 134 GWh, while imports only amounted to 9 MWh. AGCS attaches great importance to full transparency of the sustainable value (quantitative, qualitative data), documentation of the mass balance and sustainability criteria. Since 2022, Austria has had a quota for the substitution of fossil fuels with sustainable biofuels, including biomethane. This is subject to penalties of EUR 600 per tonne of CO2eq not saved.

Attila Kovacs discussed the potential biomethane market in the EU from east to west, with the current incentives, but also the corresponding bottlenecks. Important factors in the exporting countries are the great potential but also the lack of interest on the part of governments to promote biomethane production. As a result, the market is lagging far behind its potential. A possible transfer of biomethane therefore depends largely on the interest of Western European countries. He used a number of case studies to illustrate possible scenarios.

Finally, Caroline Braun from Landwärme discussed the possibility of marketing CO2 as an additional income from biomethane production. Europe's largest biomethane trader has already gained initial experience in the industrial reduction of CO2. The focus was on the utilisation of CO2 in the beverage industry, the recycling of concrete with CO2 binding and the injection of liquid CO2 into empty oil fields.

Technology

In the technical section, Michael Beil from Fraunhofer IEE gave an overview of the development of the various gas treatment systems. Across Europe, membranes have clearly taken the lead with a share of over 50% of all systems, followed by water scrubbers and chemical absorption with 14% and 12% respectively. Across all processes, reduced methane emissions of less than 1.2% are possible today, although there are major differences between chemical absorption (amine scrubbers, solvents) with less than 0.2%, followed by membranes with less than 1% and the other processes. In terms of electricity consumption, water scrubbers are significantly lower than chemical absorption and even less than membranes. The demand for pure CO2 in Germany is currently 1 million tonnes with a potential of 1.7 million tonnes from existing biogas plants.

In three further presentations, participants were given practical experience from large, experienced plant manufacturers whose portfolio includes the upgrading of biogas to liquid biomethane (LBG). Raiko Kolar from Hitachi Zosen Innova explained why they largely only use membranes and amine scrubbers. With the former, the focus is on the standardised, compact structure, a high operating pressure forms the ideal starting point for compressed and liquefied gas with high heat recovery. Amine scrubbers are characterised by high methane purity, low methane loss and low power consumption. Thomas Rücker from AB Energy presented their plug-and-play system with pre-cleaning of the biogas to CHP quality,

membrane treatment to produce biomethane and cooling to -150° for liquefaction. The latter is particularly interesting because it is also suitable for "small" biogas plants with a modular Sterling Cryo-Cooler system, which is supplied in a container with capacities of 1 to 11 tonnes per day. Jean-René Pouzin from Prodeval and Elise Moatti from EREP presented a gas treatment project at a Swiss wastewater treatment plant. A membrane system was chosen followed by CO2 liquefaction of the off-gas to further reduce GHG emissions.
Finally, Jan Stambasky made a theoretical/economic comparison of the various "small" liquefaction processes: Reverse Joule-Bryton cycle (Cryopur), Linde process (Cryo-Box), reverse Rankine cycle (many products) and cooling with liquid nitrogen. The Rankine cycle has the best efficiency, while the vaporisation of nitrogen has the lowest investment costs but sharply rising operating costs.

The contributions to the workshop and the media text in English are available free of charge on the R2Gas website (www.r2gas.org).

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