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AD, P2G and SNG

Proved competitiveness of small scale bioSNG technology for biomethane production

The purpose of the renewtec report is to highlight the development and advances in thermo- and biochemical conversion of lignocellulosic feedstock to biomethane, including synergies between the thermo- and biochemical conversion routes for lignocellulosic feedstocks.

There has been a rapid progress in the development of gasification technologies suitable for biomethane production in the small scale (<10 MWth) during the last two decades. Small scale bioSNG technology based on allothermal gasification is able to compete with large scale bioSNG technology based on pressurised oxygen-blown gasification. The technology proved to be competitive in terms of GHG emissions, primary energy needs and conversion efficiency without high production costs. In the Lignosys project the performance of three small scale (<10 MWth) thermochemical conversion routes for lignocellulosic feedstock to biomethane have been investigated by means of system studies: 1) Indirect gasification through the Heatpipe Reformer (HPR); 2) PyroCatalytic Hydrogenation (PCH) and 3) Indirect gasification through the WoodRoll® process. The conversion routes have all high conversion efficiencies, above 60%, based on LHV from biomass to bioSNG using wood chips with a water content of 40% as feedstock.

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Perspectives of Power-to-X technologies in Switzerland

An electricity system largely based on intermittent renewables needs temporal flexibility options buffering generation and demand. One of those flexibility options is P2X. The hydrogen generated from electrolysis can either be directly used as fuel, or – in combination with CO2 from different sources – it can be further converted into synthetic fuels, such as methane or liquid hydrocarbons. Promising P2X options in the Swiss context are the use of hydrogen in fuel cell vehicles and the generation of synthetic methane replacing natural gas as heating and transport fuel. Although there is a host of information available on P2X technologies, the information is typically dispersed and it has not been systematically analyzed in a Swiss context.

The objective of this project was to collect the major existing P2X knowledge and to provide a synthesis and evaluation for the Swiss energy market. The gas market, the mobility sector and the electricity market are specifically investigated with the aim to derive a technical, economic and environmental assessment of P2X in the overall energy system.

The compilation and synthesis of the key findings of this literature review in a White Paper. The White Paper intends to capture the technical, economic and environmental dimensions of this technology, as well as market and systems integration aspects including legal and regulatory matters concerned. The White Paper addresses the major P2X technologies like Electrolyzer technology to produce hydrogen, methanation technologies with different product inputs (i.e. bioenergy, CO_2 from industry) with and without CCS, storage technologies for hydrogen and SNG technologies for injecting hydrogen or SNG into the natural gas grid as well as a number of economic and ecological parameters.

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More pressure for renewable gas target 2030

A new study by Cerre (Centre on Regulation in Europe) recommends a share of renewable gases of 10 to 12% of gas consumption for 2030 and 20 to 50% for 2050. Provided that CCS and CCU is accepted by the population, it should even be possible to achieve a share of 100% by 2050. An annual potential in the EU-28 of 124 billion cubic meters of biogas and biomethane and of green hydrogen (P2G) from green electricity of 18 billion cubic meters was calculated. The potential supply of hydrogen depends heavily on the future development of renewable electricity. Like several gas industry associations, Cerre is also calling for the introduction of EU-wide tradable guarantees of origin for renewable gases. The present production costs of the various renewable gases and hydrogen range from 2 to 5 times the current price of natural gas in the wholesale market. This implies that in the absence of support, renewable gases and hydrogen will find it difficult to enter the market. The economic regulation of renewable gases and hydrogen is meant to improve their position in the market for gas, on the basis that their unfavorable position is due to market failures. This report develops an analytical framework to define the optimal set of regulations. Drawing from this framework, it suggests targets for renewable gas and hydrogen and proposes certificates schemes, access conditions for the grid and, finally, support schemes.
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Impact of using the biomethane and hydrogen potential on European infrastructure

On behalf of the European Commission, Trinomics has done a study to better understand the potential of biomethane and hydrogen contributing to the decarbonisation of the EU energy system, the impacts this will have on the gas infrastructure and the extent to which gas network operators and regulators are prepared to cope with these impacts. This study builds on the findings from a previous gas infrastructure 2050 study of 2018, while significantly advancing the provision of quantitative data to the analysis. The three explorative scenarios and assumptions regarding the use of electricity, methane and hydrogen serve to analyse this impact on the gas infrastructure, rather than aiming to forecast the most probable deployment pathway of biomethane and hydrogen in the EU or any Member State. For this study, a conservative technical biogas/biomethane EU28 production potential of 1 150 TWh/yr was estimated. Subtracting the current biogas production results in an additional production potential of approx. 950 TWh/yr. While the potential development of renewable methane is limited by the availability of biomass resources, by the implementation of more strict sustainability criteria, and by competing uses, While the potential for sustainable biomethane is limited, the technical potential for hydrogen and synthetic methane production based on renewable electricity is large enough to substitute the (remaining) natural gas demand. The technical potential renewable electricity generation in the EU28 is estimated at 14 000 TWh/yr. The annual additional hydrogen production potential from electrolysis of renewable electricity for the EU would amount to 6 500 TWh in 2030, increasing to 7 900 TWh in 2050 due to expected efficiency gains in electrolysis. To exploit this potential, further development and commercialization of electrolysis will be needed, as well as the expansion of renewable electricity production and intermediate hydrogen storage capacity.
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