The BioProGReSs project and societal benefits of bioSNG

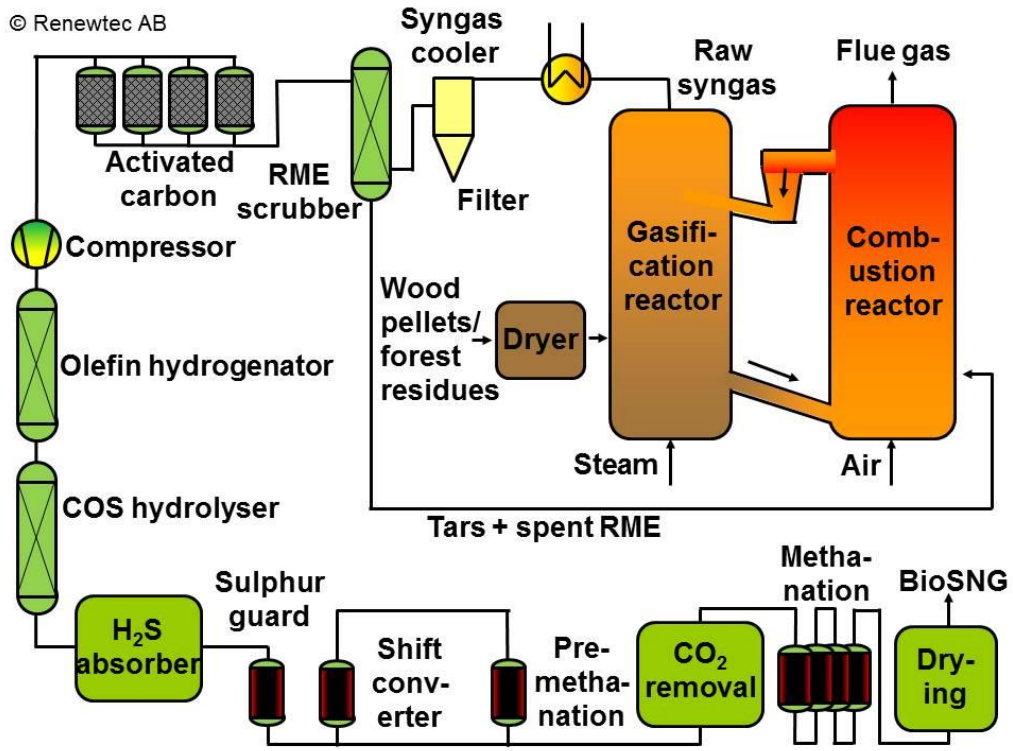
Within the framework of the European initiative, Bioenergy Sustaining the Future (BESTF), Göteborg Energi AB (coordinator), Chalmers University of Technology, Technische Universität Berlin and Renewable Energy Technology International AB have been granted funding from the European Union's Seventh programme for research, technological development and demonstration under grant agreement 321477, for development and demonstration of advanced syngas cleaning.

The project title, BioProGReSs, is an acronym for Biomass Product Gas Reforming Solutions. The three year project is supported by approx. 2.2 MEuro through the Swedish Energy Agency and 0.42 MEuro through FNR, Germany. The support is made possible by the corresponding industrial co-financing in the form of access to the Chalmers gasifier and the GoBiGas plant for testing, development and evaluation of new innovative technologies for syngas cleaning.

The aims of the project are among others to reduce the investment and operating cost of the syngas cleaning and increase the yield of biomethane from the gasified biomass. Furthermore, an innovative and novel measurement technique for online detection of the tar content, developed at the Technical University of Berlin, will be tested with the objective of developing new monitoring and control strategies for GoBiGas.

Arial view over the GoBiGas plant, the green building at the back. The white building in front of GoBiGas is a district heating central.

GoBiGas is the world's first industrial scale plant for production of biomethane through gasification and methanation of biomass, also called bioSNG. The plant with a capacity of 20 MW_{bioSNG} is based on indirect gasification. Hot bed material is transferred from the combustor to the gasifier where the biomass is converted to a raw syngas. From the gasifier bed material together with char are brought back to the combustion reactor where the char is combusted. More info is available at the GoBiGas website, www.gobigas.se



Simplified process scheme - GoBiGas.

Today conventional scrubber technology with RME is used to remove the bulk of the tars in the raw syngas out of the gasifier in the GoBiGas plant. After the scrubber four activated carbon beds capture the remaining tars. It is important that the syngas is clean of tars to protect the catalytic processes downstream of the gasifier. Instead of separating the tars one can reform them, either thermally or catalytically. Thermal reforming where the tars are cracked at high temperature is associated with high energy consumption and hence lower efficiency. A more interesting option is to reform tars catalytically already in the gasifier through a clever choice of bed material and fines. Here Chalmers has many years of knowledge and experience in materials suitable for the so-called Chemical Looping Combustion. In this application, however, the term Chemical Looping Reforming (CLR) is used. Catalytically active material from the combustor is transferred to the gasifier where tar reforming takes place when the tars in the syngas come in contact with the material. The catalytic material deactivates eventually due to carbon deposition, but is regenerated when it is circulated back to the combustor where the deposited carbon is simply combusted. A certain oxygen transport from the combustor to the gasifier will also take place since the catalytic material is oxidized in the combustor and reduced in the gasifier.

This industry led project is unique in many aspects. A new innovative measurement technique for on-line detection of tars offers a possibility to monitor and control the oxygen transport and the temperature in the CLR-process will be demonstrated. New advanced syngas cleaning based on Chemical Looping Reforming will be tested and developed in the Chalmers pilot plant and thereafter demonstrated in the world's first industrial scale bioSNG plant, GoBiGas. The project is multidisciplinary and takes advantage of long-standing R&D activities at two reputable universities with a direct transfer of the results to an industrial application.

If everything goes as expected the aims are to show that the total investment cost can be reduced by up to 30%, the operating cost can be reduced by up to 10% and that the yield of biomethane can increased by up to 10%. All three parameters are contributing positively to the possibility of

commercialising GoBiGas and that step two of the GoBiGas project, which includes a plant of 80-100 MW, can be realized.

More information is available at the project website, www.bioprogress.se.

A consortium of eight EU Member States and Associated Countries, including the UK, Denmark, Finland, Germany, Portugal, Spain, Sweden and Switzerland, is implementing an ERANET Plus activity entitled **Bioenergy Sustaining the Future (BESTF)**. This activity will provide funding to collaborative bioenergy projects that demonstrate at least one innovative step and will result in demonstration at a pre-commercial stage, http://eranetbestf.net/home/.

Societal benefits of bioSNG

There are societal benefits of renewable methane produced through gasification and methanation of biomass and waste, bioSNG, in all the steps of the value chain, i.e. production, distribution and utilization.

Production
BioSNG has the highest conversion efficiency, from feedstock to final product, of all second generation biofuels and is hence a resource efficient way to convert indigenous feedstock to a high quality transport fuel.

Distribution
Since bioSNG is miscible with natural gas in any proportion it can be distributed in an efficient and environmentally friendly way through the existing natural gas grid.

Utilization
The versatility and the low combustion emissions make bioSNG an attractive renewable fuel not only within the transportation sector but also for efficient heat and power production and in industrial processes where clean and efficient combustion is required.

Other societal benefits
The greenhouse gas emissions are significantly reduced when bioSNG replace fossil fuels and for countries like Sweden with vast biomass resources the bioSNG route offers several other benefits such as increased security of supply, regional development and new job opportunities.

On behalf of the BioProGReSs consortium

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