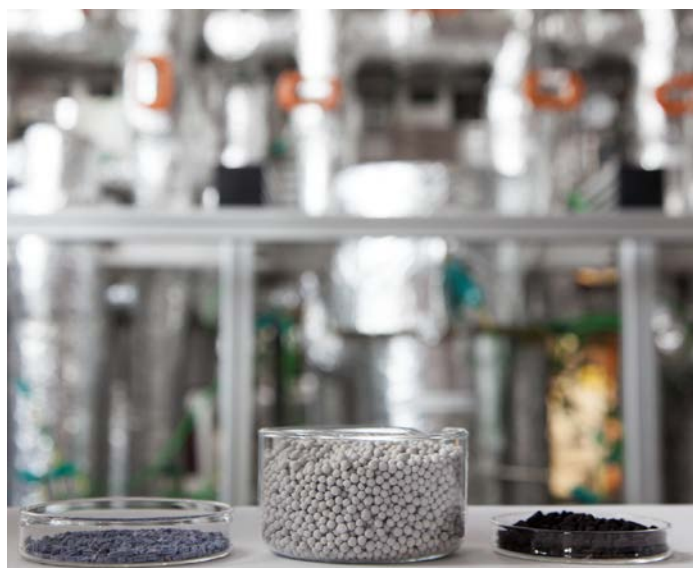


BIOFUELS FROM GASIFICATION

SYNGAS CONDITIONING AND CATALYTIC CONVERSION



THERMOCHEMICAL BIOMASS CONVERSION TO FUELS AND CHEMICALS

Gasification will play a mayor role in the energy transition by converting a wide range of organic and carbonaceous materials into a combustible gas, called product gas. This gas consists of H₂ and CO (syngas) and instantly produces chemicals such as ethylene and benzene. Product gas can be used for a variety of end- products ranging from fuels to high-value chemicals.

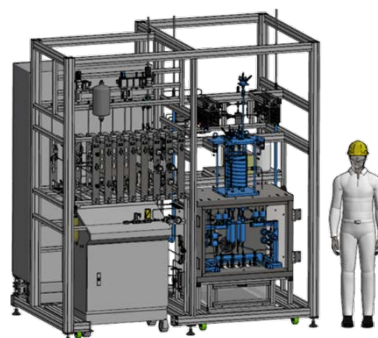
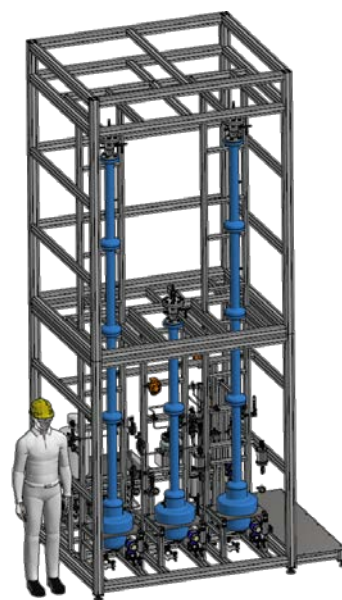
TNO has a long standing history in bio-energy research focusing on high efficient thermal conversion technologies. We optimize existing and develop new technologies to pre-commercial readiness. Indirect gasification is one of these technologies that allows the production of green energy, green chemicals and biofuels.

TNO BIOFUELS PRODUCTION LABORATORY

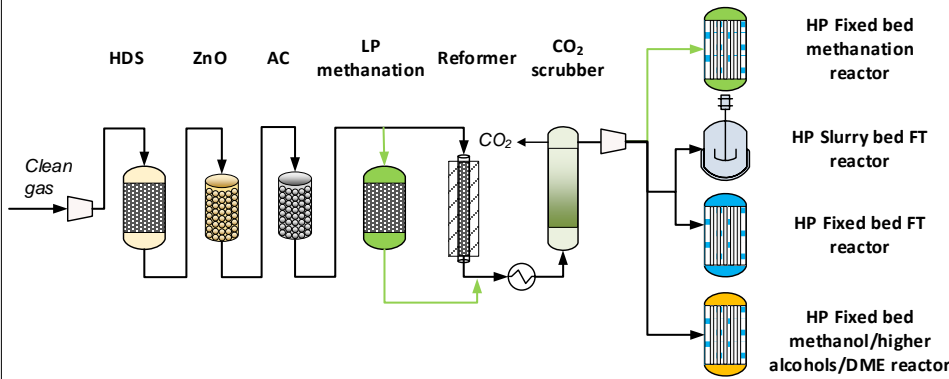
Government, research institutions and industrial partners all have an interest in adding “green “value to their production value chains. TNO’s biofuels lab consists of state-of-the-art facilities where experts work on affordable biofuels.

In our new laboratory, gasification of various types of biomass and plastic waste is one of the main conversion technologies. This thermochemical process operated at relatively low temperatures and in absence of oxygen allows the production of producer gas that can be processed downstream into Renewable Natural Gas and/or liquid fuels. The extensive facilities at TNO are unique in the world and allow show-casing of complete value chains.

› **TNO** innovation for life



GAS CONDITIONING AND CATALYTIC SYNTHESIS AT TNO



In 2020 a new laboratory for biofuels production from gasification became available at TNO. The new line up includes deep gas cleaning (HDS, Sulphur removal) reforming, compression and subsequent catalytic conversion facilities, enabling the cost efficient biofuel production with co-production of chemicals.

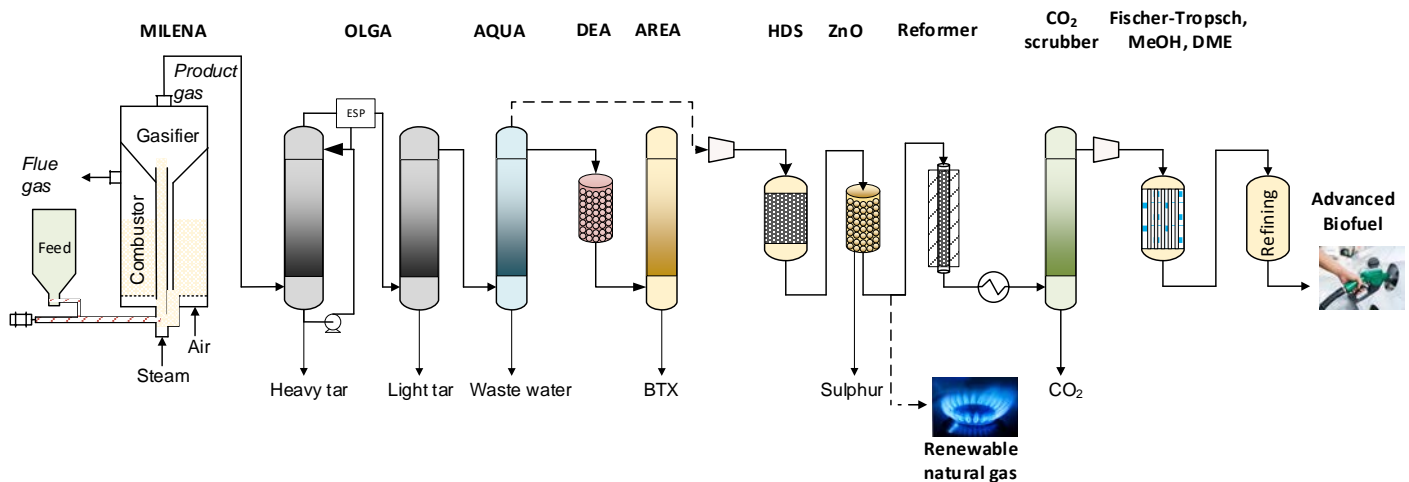
With two new high pressure catalytic fixed bed reactors and one slurry reactor, our facilities are able to process up to 1.7 Nm³/h of syngas and convert it to SNG, methanol and higher alcohols, DME or Fischer-Tropch liquid with high efficiency. The support facilities in our laboratory include a high pressure FT wax upgrading unit, a catalyst screening unit, a gas bottling system, as well as advanced analysis equipment.

READY TO BE PART OF THE ENERGY TRANSITION?

Research lies at the heart of our organization and therefore, we dedicate our international expertise and years of experience to the improvement and optimization of our client's process development. We ensure our solution is suitable to your application.

- Support and design of thermochemical processes to optimize the valorization of biomass streams;
- enhance valorization options;
- Collaboratively develop gasification based systems for energy, chemicals and biofuels from a variety of biomass;
- Convert biomass all the way to Synthetic Natural Gas, Methanol, DME, Mixed Alcohols or other biofuels via Fischer-Tropsch and wax upgrading;
- Performance optimization of existing gasification systems;
- Perform technical due diligence on gasification based technologies.

A COMPLETE SOLUTION FOR BIOFUELS PRODUCTION



Our gasification platform (MILENA OLGA) allows the development of various value chains, either towards chemicals or fuels. It can even operate on plastic rich waste for the production of olefins and BTX. We are ready to support you with your transition towards 2050.

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