



# Gasification for value generation

Gasification is a process for converting a wide range of organic and carbonaceous materials into a combustible gas, called producer gas. This gas basically consists of H<sub>2</sub> and CO (syngas), but depending on the details of the process, may also contain significant amounts of hydrocarbons like methane, ethylene and benzene, and additionally tars. Producer gas can be used for a variety of products ranging from energy to high-value chemicals. This makes gasification a versatile process that contributes to the production of green energy and chemicals, but also for the efficient use of waste and residue streams either for energy production or by chemical recycling.

ECN

P.O. Box 1  
1755 ZG Petten  
The Netherlands

Contact:

T +31 88 515 41 48  
biomass@ecn.nl

[ecn.nl](http://ecn.nl)

## What can ECN do for you?

- Help select and design thermochemical processes for resolving waste problems and optimise the valorisation of biomass streams
- Collaborative development of gasification based systems for energy or chemicals production from a range of biomass and waste streams
- Performance optimisation of existing gasification or combustion systems
- Technology and licensing opportunities, together with our commercialising partner Royal Dahlman

## Greening the energy system

The syngas produced by the gasification of biomass can be used for the production of renewable heat and power through a gas turbine or a gas engine. Another option is upgrading the producer gas to methane that can be injected into the natural gas grid, or applied for transport application either by compressing it to BioCNG or liquefy it to BioLNG. Along these routes the natural gas supply for households, industry and the transport sector can be made sustainable. Furthermore conversion routes can be applied for producing liquid fuels and chemicals.

## Resolving waste issues

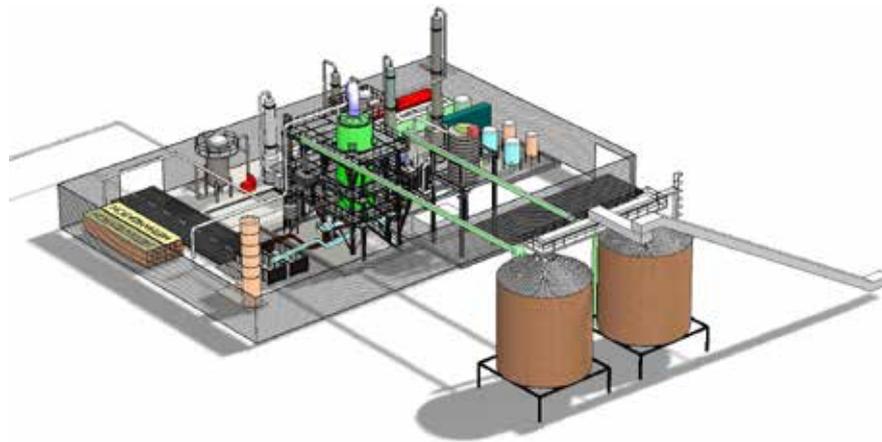
The organic fraction of waste can be gasified and used for producing the same range of products just as with clean biomass. Hereby waste becomes a resource for energy, fuels and chemicals production. Advanced waste processing plants take out a large fraction of the materials for physical recycling. However, a significant stream still remains consisting of a mixture of plastics, paper and biogenic material that can only be chemically recycled, also called depolymerised, by gasifying it and producing drop-in chemicals like for example ethylene and benzene for the plastic production process.





### **MILENA gasification**

ECN's proprietary gasification technology is called MILENA. This is a so-called indirect gasification process in which the heat generation and the actual gasification process takes place in separate reactors. This separation enables optimisation of the operational conditions for each of the processes. By this means, a full conversion of the feedstock, a high conversion efficiency and a producer gas low in nitrogen and high in methane, ethylene, benzene and toluene is achieved. Hence the MILENA process is particularly suitable for co-production schemes, in which energy, energy carriers as well as high-value liquids for the chemical industry are produced. The MILENA system is brought to the market in cooperation with our commercial partner Royal Dahlman, [www.dahlman.nl](http://www.dahlman.nl).



### **OLGA gas cleaning**

The relatively low operating temperature of MILENA causes a significant amount of tars in the producer gas. These have to be removed before leading the gas into CHP units or into catalytic systems for the production of methane and/or liquid chemicals. For this purpose ECN developed the OLGA cleaning system that very effectively and efficiently strips the tars from the gas. Moreover, the system cleans the gas of dust and aerosols. All compounds with a molecular weight equal and below that of benzene, i.e. the high value compounds mentioned earlier, are not affected by OLGA. The tars collected by OLGA represent a high energy value, and therefore they are recycled back to the gasifier, where they are fully burned. In addition to being energy efficient this also circumvents the formation of waste streams that would be costly to dispose of. OLGA is brought to the market in cooperation with our commercial partner Royal Dahlman.