The ECN biomass to SNG process.

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Introduction

Gasification of biomass allows for the conversion of a wide range of bio-fuels, such as wood and bagasse, to be converted to Substitute Natural Gas (Bio-SNG, Bio-CNG or Bio-methane). This process can be operated at much larger scale than the digestion process and can use a greater variety of bio-feed stocks. Bio-SNG can augment the declining natural gas supplies on the existing grid, be used as biofuel for transportation (Bio-CNG) and contributes to the reduction of CO_2 emissions.[1]

Figure 1 depicts a schematic representation of the indirectly heated (allothermal) biomass specific gasification process developed at ECN (Energy research Center of the Netherlands): the Milena.[2] In this process, biomass (mainly wood in our research) and a small amount of superheated steam, is fed into the central riser and contacted with the hot bed material. The biomass gasifies at 850 °C to a mixture of primarily CO, CO_2, H_2, CH_4, C_2H_4 and C_6H_6, tars and char.

The exiting gas is cooled down to about 400 °C and tar is removed *via* oil scrubbing (OLGA), a technology jointly developed with Dahlman which is now available for licensing from Dahlman.[3] After the tar removal, the producer gas is cleaned further by adsorption. The gas stream is catalytically cleaned and upgraded to SNG. After CO_2 and H_2O removal and compression, the gas stream is ready to be supplied to the natural gas grid, used as bio-CNG *etc.*.

Char from the gasification and tar from the OLGA are used to heat the biomass gasifier and thus supply the energy for gasification. Char and tar are combusted with air at 900 °C in the bubbling fluidized bed combustor which supplies the heat for the gasifier through circulating bed material.

Results and Discussion

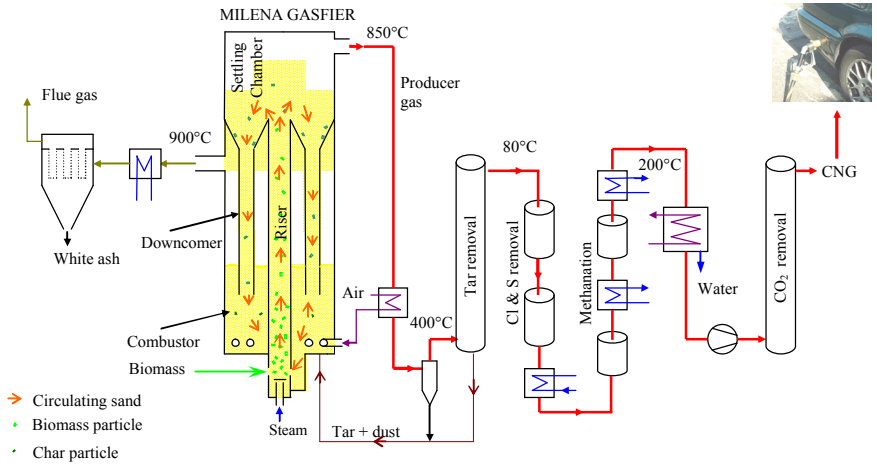
Recently, ECN has commissioned a 800 kWth pilot scale gasifier based on our successful integrated lab scale SNG unit. The gasifier will be coupled to the existing on-site OLGA pilot plant. Initial results show similar performance between the lab and pilot scale units. A local waste company has announced the construction of a demonstration plant, the final step towards commercial biomass-to-SNG plants

Our technology is ideally suited for the gasification of biomass and has an higher overall efficiency (70%) than other biomass conversion technology such as the production of Fischer Tropsch Diesel from biomass (< 50%). However, our gasification and purification technology can also be used for the production of bio-syngas if so desired. Our technology can be implemented at several scales ranging from local CHP to large scale SNG production platforms. We will present the results from the Milena pilot plant and the future outlook for this process.

Significance

The ECN SNG process is a highly energy efficient process (70 %) which converts a variety of bio-fuels into a readily usable, CO_2 neutral fuel which can be supplied to existing distribution networks.

Figure 1.



References

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