

OptiMeOH

Optimized process chain for resource-efficient methanol synthesis

Methanol is a very valuable product of carbon-based process chains for various reasons. For example, the global demand for methanol in 2015 was approximately 70 million tons [1]. Methanol is versatile and is usually used as a chemical raw material. Essential products of methanol are i.e. Formaldehyde, acetic acid and methyl methacrylate. In addition, methanol can also be used as fuel in internal combustion engines or in fuel cells.

The aim of the presentation is to provide an overview of the development of an innovative process chain for the synthesis of the C1-basic chemical methanol without the use of fossil raw materials or exclusively by using compulsory by-products. The process chain consists of a novel biomass conversion process (pressure fermentation) and an innovative reactor concept for methanol synthesis (bubble column methanol synthesis). As a connector to the special requirements of the process chain, adapted synthesis gas production (methane reforming) is provided, which includes the possibility of subsequent integration of upgraded by-product gas streams incurred in industrial processes to expand the raw material base.

Furthermore, an overview will be given in the presentation about possibilities of sector coupling and further application variants of this novel methanol production. The structural sector coupling involves the connection of the power generation sector to the power consumption sectors, e.g. Industry, transport etc. It serves as an important step towards achieving de-carbonization goals. A cross-sector energy storage approach through Power-to-X, in particular Power to Liquid (PtL), allows a higher share of electrification of the heat and fuel sector through the use of i.e. Renewable Energy [2]. The production of low-carbon methanol with hydrogen and carbon dioxide derived from industrial plants will have significant CO₂ savings in general and reduction of industrial emissions in particular [3].

[1] <http://www.methanol.org/the-methanol-industry/>

[2] Bergins et al., “Power to fuel as a sustainable business model for cross-sectoral energy storage in industry and power plants”, POWER-GEN Europe 2016, Milan, 21.-23. June 2016

[3] Buddenberg et al., “Development of large scale low carbon methanol and further gasoline or oxymethyleneether (OME) production for transport in Europe” 3. Internationaler Motorenkongress 2016 – Baden-Baden, 23-24 Feb. 2016, Germany