ICCDU XVI
27-30 August, 2018
Rio de Janeiro, Brazil

16th INTERNATIONAL CONFERENCE ON CARBON DIOXIDE UTILIZATION

Life Cycle Assessment of the first industrial scale Power-to-Liquid Blue Crude production

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Keywords: Life Cycle Assessment, Power-to-Liquid, Blue Crude Production; High Temperature Electrolysis; Fischer-Tropsch

The transport sector is one of the major contributors to Climate Change. It has a share of 14 % of the global greenhouse gas emissions [1]. While battery electric vehicle might be a solution for many applications, long distance transport as aviation, marine and long haul truck applications will most likely rely on high density liquid fuels.

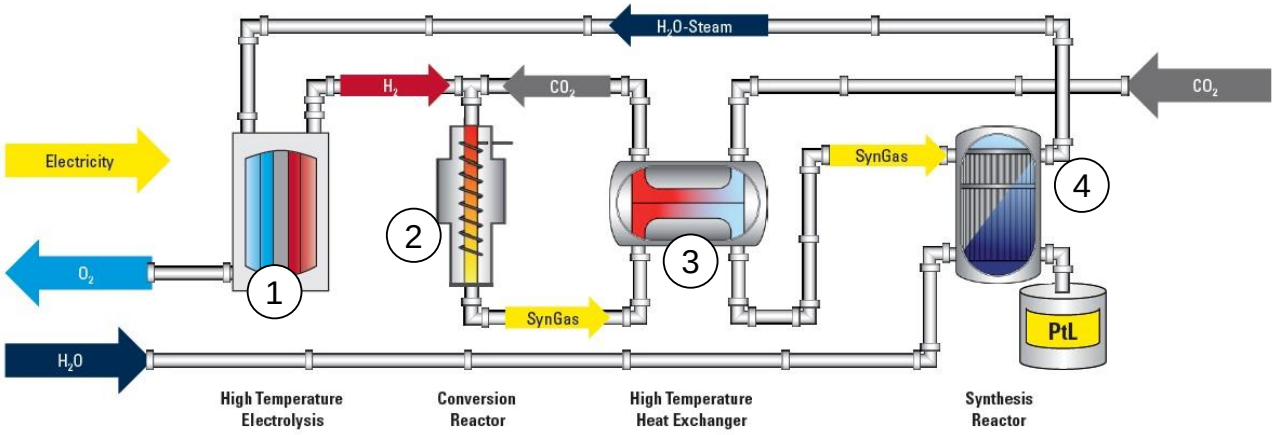

Figure 1. Sunfire Power-to-Liquid process [2].

The company Sunfire [2] developed a novel Power-to-Liquid technology which is capable of closing the carbon cycle by producing high-quality fuels as diesel and gasoline from CO_2 which could be used in existing transport systems without any limitations.
Figure 1 shows an overview of the production process. First, hydrogen is produced in an efficient high temperature electrolyzer (1). The hydrogen is used together with the carbon dioxide in a water-gas shift reactor (2) to generate synthesis gas. A high temperature heat exchanger (3) cools the syngas on one side and heats the CO_2 that enters the water-gas-shift reactor. The syngas is subsequently converted in a Fischer-Tropsch synthesis (4) into gasoline, diesel and kerosene, or other hydrocarbons.
To prove the environmental benefits Life Cycle Assessment was performed including a detailed assessment of the manufacturing of the facility and the reactors. The production of the fuel was evaluated including different electricity sources.
The presentation will show an overview of the technology with a specific focus on the environmental results from the Life Cycle Assessment.

Acknowledgments

The research leading to these results received funding by the German Federal Ministry of Education and research.

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