Lunch Lecture e-Refinery

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(Project Developer e-fuels, Climeworks)

Fully circular fuels with CO_2 from the air

Please reserve the following colloquia for 2021 in your agenda:

June 1 Valentin Batteiger *Bauhaus Luftfahrt e.V.*
July 6 Karen Chan *Technical University of Denmark*
September 7 Csaba Janáky *University of Szeged*
October 5 Wim Brilman *University of Twente*
November 2 Doris Segets *University of Duisburg-Essen*
December 7 (9 AM) Douglas Macfarlane *Monash University*

Specially for long-haul transportation, whether in the air, on land or at sea, e-fuels will play an important role to reduce CO_2 emissions. From 2050 on, these fuels need to be produced fully circular in order to reach our net-zero climate targets. The newly released Powerfuels study from the German Energy Agency (LUT University and dena, 2020) finds that by 2050 80% of the global CO_2 demand for e-fuels production will need to be provided from direct air capture technology (DAC).

A Climeworks DAC plant captures atmospheric CO_2 applying a vacuum-temperature swing adsorption process. Air is drawn into the plant using fans and the CO_2 within the air is chemically bound to the sorbent material. CO_2 -free air is released back into the atmosphere. Once the filter is saturated with CO_2, it is heated (using low-grade heat as an energy source) to around 100°C. The CO_2 is then released from the filter and collected as concentrated gas and the continuous cycle is ready to start again. The Climeworks direct air capture technology runs exclusively on clean energy, and the modular CO_2 collectors can be stacked to build machines of any size.

One of two things happens to the Climeworks air-captured carbon dioxide: either it is returned to earth, stored safely and permanently away for millions of years, or it is upcycled into climate-friendly products such as carbon-neutral fuels and materials. Currently, Climeworks is working on several e-fuels projects, including Zenid, a demonstration plant that will produce jet fuel from only air, water and renewable electricity in the Rotterdam region. The project aims to kick-start the industrialization of DAC-based e-fuels in order to be able to provide the vast amounts of fuels needed by 2050.

The founders and co-CEOs Christoph Gebald and Jan Wurzbacher, direct air capture from lab scale to industrial scale. In addition to its currently running capture facilities, Climeworks has started the construction of its new large-scale direct air capture and storage plant, Orca, in Iceland making carbon dioxide removal even more attainable to the public. Climeworks' vision is to inspire one billion people to remove carbon dioxide from the air.

When: Tuesday May 11
Time: 12.30 - 13.30
Where: Zoom meeting
The login link will be sent after registration via e-refinery@tudelft.nl.

The e-Refinery initiative is a partnership between five faculties: 3mE, Aerospace Engineering, Applied Sciences, EWI and TPM. Researchers in the e-Refinery initiative focus their research on the electrochemical conversion of sustainable electricity into fuels and chemical building blocks, from the molecular scale to large-scale system integration. E-Refinery hosts a lunch lecture every first Tuesday of the month.

If you would like to register for our monthly announcement, you can register via: **e-refinery@tudelft.nl**.

TU Delft

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e-Refinery
Towards sustainable production of chemicals and fuels