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# Renewable fuel Internship/Thesis at ZEF

**Employer:** Zero Emission Fuels (ZEF)  
**Type:** Internship/Thesis  
**Location:** Delft  
**Duration:** 4 months (or more)  
**Starting month:** January/February  
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## **Problem and Solution**

Global warming is the single most threatening issue which humanity has ever faced. The rising CO<sub>2</sub> concentration in air requires more sustainable energy solutions. The electricity market is switching fast to renewable energy like wind and solar. However, worldwide, two-thirds of all energy used is non-electric. Synthetic renewable fuels can disrupt this non-electric energy demand without the need of building new infrastructure. Methanol is the simplest CO<sub>2</sub> based liquid hydrocarbon and is a commodity that can be used for many applications in existing infrastructure both for fuels and products.

## **Company focus**

ZEF focuses on the development of an innovative large-scale methanol production plant capable of producing methanol capturing CO<sub>2</sub> from air and using solar energy. One ZEF production plant consists of 40.000 high-tech methanol production units each connected to the back of a solar panel. A single production plant has a yearly output of 2800 ton of competitively priced methanol. To reach economic feasible renewable methanol, ZEF plants need to be located in remote areas with elevated sun hours.

## **Company profile**

What we offer is the possibility to work in a young, dynamic, and international team. In fact, ZEF was created by three experienced tech entrepreneurs and is developing the ZEF methanol micro plant through groups of students and technology experts. This team changes every 6 months and from January 2019 onwards the fourth group "Team ZEF 4" will continue the development of the subsystems. Also, we are located on campus in the 'Process and Energy department'.

## **Assignment**

Several vacancies are currently available here at ZEF focussing on one of the following subsystems:

- Direct air capture: making sure we capture enough CO<sub>2</sub> and water from air.
- CO<sub>2</sub> compressor: increasing the pressure of the CO<sub>2</sub> to 50 bars.
- Alkaline electrolysis system: making hydrogen from the water.
- Methanol synthesis: create the methanol using the CO<sub>2</sub> and water.
- Distillation: separating the methanol and water mixture.

**Internships** assignments focus on designing, testing, and building the ZEF plant. This plan is divided in subsystems. Together with a group, you will have the objective to deliver a fully working and integrated sub-system. As a start, you will consider the work previously done on that subsystem, learn best-practices and mistakes, and make a clear, ambitious, but doable plan. We promise that this journey will be challenging but you will learn new and complementary skills while having fun.

**Thesis** topics focus on specific components of the ZEF plant. In this case, you will have to initially conduct a meaningful and scientifically sound literature review. After that, you will be able to start designing, testing, and building new technological solutions which pertain to the edge of the known science. We promise that our support and supervision will be constant and on the point. We want you to excel both scientifically and technically. Our track records (built through almost 10 theses) shows top level research results.

Concluding, to make sure that you are working on something you enjoy, we will decide together which task you will be responsible for (based on your skillset and interests).