

Electrification of the Chemical Industry

ReNew – a Lay of the Land













The overall objective is to:

- Make a snapshot of current state-of-theart technology in ammonia production;
- Obtain a view on the landscape: who is working on what, and in what stage;
- Identify a sweetspot ammonia technology that is currently ready for a scale-up project.
- **Motivation**
- Ammonia production is responsible for a third of the total CO₂ emission from chemical industry in the Netherlands;
- Interest in sustainable ammonia production because it is carbon-free, can be produced from carbon-free feedstock, has a high energy-density and is suitable as an



Figure 1. Ammonia value chain

Project ideas

- Demonstrator water electrolyser with Haber-Bosch process (high TRL);
- Bench-scale demonstration water electrolyser with novel catalytic NH₃ process (middle TRL);
- Proof-of-concept electrochemical NH₃ production (low TRL);
- Proof-of-principle production of NH₃ with plasma (low TRL).

Figure 2. Various electrolytic options under consideration for ammonia synthesis



Figure 3. Plasma aided electrochemical setup for ammonia synthesis

Project leader: Bart van As (Brightlands) **Researchers:** Paul Brandts (Brightlands), Michail Tsampas (Differ), Adelbert de Goede (Differ), Mark Roelands (TNO), Yvonne van Delft (ECN);

- energy carrier;
- Brightlands Chemelot Campus is setting up a living lab. One of the first technologies to be developed will be the producti-

on of sustainable ammonia.

DIFFER Dutch Institute for **TNO** innovation for life **ECN** **E-mail:** bart.vanas@brightlands.com

Duration: June 2017 - December 2017.

JOIN VOLTACHEM'S COMMUNITY: WWW.VOLTACHEM.COM/COMMUNITY

ACKNOWLEDGEMENT This project is funded by the topsector Chemie via the Dutch Ministry of Economic Affairs.

VoltaChem is powered by



