

CO-FOUNDER NEEDED

Apply to co-found [here](#)
no later than FEB 28, 2025!

Sorption Booster

We empower small-scale green ammonia production via sorption-based solutions

THE PROBLEM

Ammonia is essential for global food production, sustaining over half the world's population through fertilizer. Currently, ammonia is synthesized from fossil fuel-based hydrogen and nitrogen with a conversion efficiency of about 16%, followed by condensation to separate unreacted gases. This method, used in large-scale plants, is unsustainable, responsible for 1.5% of global CO₂ emissions annually, and creates political dependence. A shift to green ammonia production using hydrogen from renewable sources is critical. According to Eurostat data, 70% of future green ammonia plants will be small-scale due to land-use constraints of renewable energy sources.

However, a significant challenge is the separation process. Current technologies, like condensation, are not suitable for small-scale operations, as they cannot accommodate the intermittent nature of renewable energy and are prohibitively expensive at smaller scales, presenting a major barrier to local green ammonia production.

OUR SOLUTION

Sorption Booster is an ammonia separation device designed for small-scale ammonia plants. Placed after the ammonia synthesis reactor, it processes a gaseous mixture of ammonia (10-20% mol), nitrogen, and hydrogen. The device delivers a nitrogen-hydrogen mixture with trace ammonia (ppm levels), which is recycled back into the reactor, and liquid ammonia.

Sorption Booster enables small-scale green ammonia production, which reduces CO₂ emissions and ensures ammonia security for the global food supply. Compared to traditional condensers, Booster improves ammonia separation efficiency from 70% to 99%, cuts costs by up to 11% for small-scale plants, and provides flexibility for intermittent renewable energy sources. Additionally, Sorption Booster supports low-pressure ammonia synthesis methods, such as electrosynthesis, which are not viable with condensation due to low efficiency. This positions Sorption Booster as a critical technology for sustainable localized ammonia production.

PATENT STATUS

Yes, European patent application to be submitted in Feb 2025.

FINANCIAL OVERVIEW

Our business model focuses on selling sorption booster units. Our product design cycle includes collaborating with customers on specifications, designing and manufacturing units, providing maintenance, renewing sorbents every 2-3 years, and ensuring recurring sales.

Pricing combines cost-plus and value-based strategies. The initial price is estimated at €70,000 per tonne per day of NH₃, based on bill of materials and expected savings in OPEX and CAPEX for small-scale plants. As production volumes grow, the unit price will decrease.

Commercialization begins with demonstrations with industrial partners, NitroFix, and NitroFix, in Q4 2025, scaling up for the first commercial launch in 2028. It will position Sorption Booster within the electrochemical startup sector and open doors to partnerships with ammonia companies like Skovgaard Energy.

MILESTONES ACHIEVED

- TRL4 is achieved. TRL5 will be reached in Q4 2025.
- Two letters of intents were issued - NitroVolt (Denmark) and NitroFix (Israel).
- Over 5 MDKK were secured through soft funding programs within 2 years.

TARGET MARKET & CUSTOMERS

Our customers are companies manufacturing small-scale green ammonia plants, with sorption booster units being a key component. The customers fall into two categories:

- Established ammonia players (topsoe, Yara) focused on downscaling their existing thermal synthesis technologies for plants under 100 tonnes per day.
- Startups (NitroVolt, NitroFix) working on upscaling electrochemical ammonia synthesis technologies and aiming to have commercial units producing 150 kg per day by 2028.

CO-FOUNDER PROFILE WE ARE LOOKING FOR

Must-Have Qualifications/Background

- Business background
- Experience in the chemical industry (able to understand the technology at intermediate level)
- Experience with startups before

Nice-to-Have Qualifications/Background

Experience in the ammonia industry

Personal Fit

- Hunter personality
- Getting things done attitude
- Respectful

TASKS & RESPONSIBILITIES

(FIRST 3 MONTHS; TO BE ADJUSTED W. CANDIDATE)

1) Co-Founder Alignment

- Description: Aligning expectations, roles, and responsibilities with potential co-founders.
- Output: A detailed alignment sheet completed by both parties

2) Next Step Funding

- Description: Identify and map potential soft funding and equity funding for the next stage of development.
- Output: Two individual spreadsheets outlining soft funding and equity funding opportunities.

3) Startup Plan

- Description: Develop a comprehensive startup plan detailing actions, timelines, and costs. Explore potential support from DTU Elektro throughout spinout process.
- Output: A spreadsheet detailing actions and costs after spinout.

4) Market Research

- Description: Conduct market research to update the pitch deck and define vision.
- Output: Updated pitch deck with a well-defined vision.

5) Commercial Hypotheses

- Description: Formulate and test hypotheses regarding the commercial benefits of the product with real customers.
- Output: Create a survey, test with customers and sum up results in spreadsheet.

6) Pricing Strategy

- Description: Develop an overview of potential pricing models for the product.
- Output: Presentation outlining relevant insights on pricing for the industry and comparable industries.

ACADEMIC BACKGROUND OF CURRENT CO-FOUNDERS

- Anastasiya Karabanova - PhD (DTU Energy), founder
- Selin Ennam - PhD candidate (DTU Energy), co-founder
- Emmelina Viktoria Frick - MSc Chem Eng (Lund University)
- Heiðar Snaer Asgeirsson - MSc Chem Eng (DTU)

ENTREPRENEURIAL BACKGROUND OF CURRENT CO-FOUNDERS

No.

PHYSICAL ADDRESS

Villum Power to X center
(Fysikvej) 312, Lyngby;

DTU Energy
(Fysikvej) 310, Lyngby)



About Open Entrepreneurship

Open Entrepreneurship is a collaboration between all Danish universities aiming to create more new companies based on research and new technology.

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