

Determining the environmental impact of urea production by Life Cycle Assessment

Level: Master
Requirements: Should have followed the environmental life cycle assessment course (MM020a or FMT032) or be willing to do this as preparation for the thesis project.
Start date: The start date is flexible
Duration: 6 months

Host organisation and location:

Stamicarbon B.V., Sittard.

The student can work on site in Sittard, but also at the Radboud university.

Supervisor at host organisation:

Joey Dobrée – Product Portfolio Manager

Hans van den Tillaart – Senior Process Engineer

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Supervisor at Radboud University:

Rosalie van Zelm - *Assistant Professor Environmental Science, RU*

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Problem description:

A full life cycle assessment of urea production, including all the life cycle stages to understand the environmental footprint of urea production for the fertilizer industry.

Goal of research project:

With the current carbon tax, the fertilizer industry is forced to lower its CO₂ emissions. Stamicarbon is the global market leader in the design, development and licensing of urea plants for the fertilizer industry. So far, they do not have a full life cycle assessment of urea production. This would help them to understand where the environmental impacts/tradeoffs take place and where this process can be improved to reduce the environmental impact. For example, can carbon capture and utilization (CCU) lower the impact of urea production? The goal of this research is to determine the environmental impacts of urea for the fertilizer industry and provide improvement options.

For this you will:

- Perform a full life cycle assessment (LCA), including all the life cycle stages of urea production and fertilizer use. The LCA will be 'cradle-to-cradle'.
- Think of and model improvement options in urea production to lower the environmental impact.

To strengthen recommendations made to Stamicarbon, a social-science component can be added. Examples are; expert interviews to obtain insights on the production process or on the potential of the outcome, a multi-criteria decision analysis that combines environmental impacts with economic, social or other impacts, or a stakeholder analysis.