

Acetone Direct Vapor Recompression An Environmental Study for Aceton DVR

Publieke samenvatting / Public summary

Aanleiding

The Dutch industrial sector is known for its CO₂ intensity, particularly in the chemical industry, which is the largest contributor to CO₂ emissions. A significant share of energy consumption in this sector stems from excess heat generated during production. Despite high emissions, there is optimism about potential carbon emission reductions. An important opportunity for emissions reductions is the recovery, upgrading and re-use of waste heat, decreasing the consumption of primary and secondary energy, helping the industry achieve the EU's 2030 target of reducing greenhouse gas emissions by at least 55% from 1990 levels. Distillation is vital in chemical separations but is one of the most energy-intensive operations, accounting for around 3% of global energy use. While many energy-saving technologies are available, high-efficiency, process-integrated heat recovery options for Ashland remain limited. Direct Vapor Recompression is an innovative solution but poses challenges in safety, technology, and economic feasibility when applied to acetone vapors. To meet Ashland's goals and broader policy targets, further research into DVR of acetone and similar compounds is essential.

Doelstelling

Since 2019, Ashland has focused on identifying the best technology for improving energy efficiency in its distillation process. Distillation accounts for more than half of Ashland's total CO₂ emissions, representing a significant opportunity for reduction.

Projectinformatie / Project information

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TESN25-03849944

Subsidiebedrag / Grant amount
€ 381.423,00

Algemene informatie / General information

Penvoerder / Secretariat
Ashland Industries Nederland B.V.

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A DVR has shown the highest potential COP while theoretically capable of handling acetone vapors and their risks. Originally used for water vapors, the DVR uses a compressor to heat acetone to the required temperatures for effective heat transfer. However, implementing the DVR in this context introduces safety risks due to acetone's flammable properties. Ashland aims to develop a feasible solution that meets safety protocols, allowing integration of this technology into existing processes while achieving energy and cost savings. Through the environmental study, Ashland intends to validate the technological and economic viability of an integrated solution for the DVR of acetone vapors in preparation for a potential demonstration project.

Korte omschrijving

The project can be broken down into three work packages designed to address the defined research questions. During the study, all necessary engineering, (process) technical, safety and permitting aspects will be studied as the foundation for the final investment decision regarding the development of the demonstration plant. The project was divided into the following work packages: 1. WP1 – Preliminary engineering 2. WP2 – Front End Engineering Design (FEED) 3. WP3 – Final evaluation and optimization

Resultaat

As a result of this study, a well-informed decision can be made regarding CO₂ emissions reduction by recovering heat in the distillation process. This decision will be supported by simulations and risk analyses, along with practical insights from in-situ research. The study will evaluate whether it is technologically feasible, within reasonable investment boundaries, to safely integrate the acetone vapor DVR into Ashland's existing operations. With these outcomes, a solid foundation will be established for further development, engineering, and implementation of CO₂ emission reduction through Direct Vapor Recompression. During the follow-up project, Ashland aims to further demonstrate the technology's capabilities to reach

an optimized acetone vapor DVR that increases energy efficiency and generates significant savings in operational costs while meeting sustainability objectives.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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