

Decarbonizing the Industry in Moerdijk by Managing Emissions Regionally

Publieke samenvatting / Public summary

Aanleiding

Like many industrial clusters around Europe, Moerdijk is looking at decarbonization options. CO₂ capture and storage (CCS) is amongst the technologies that can be used to this end. Individually, some of the companies within the cluster have already investigated the possibility of implementing CCS. However, while some of the industries are large emitters and benefit from economy of scale, others are smaller – and for those, CO₂ capture can become economically unfeasible. In the DIMMER project, we will look into Decarbonizing the Industry in Moerdijk by Managing Emissions Regionally. That means that the project will explore integration of CO₂ emitted from the different sources into a jointly managed network. The level of integration will vary as to find alternatives that also fits the smaller emitters. The philosophy being that no company should be left behind in their quest to decarbonize, and that inter-companies integration can help lower the costs of CO₂ capture, while also lowering materials and energy consumption, thus minimizing the environmental impacts of CO₂ capture.

Doelstelling

DIMMER will evaluate the feasibility of applying CCS to decarbonize the Moerdijk cluster. When developing cluster-level CCS networks, it is common to focus on CO₂ transport and storage (e.g., Porthos), in a sink-oriented approach. The various point sources, i.e., the companies that constitute the cluster, should then elaborate individual

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strategies on how to capture and condition the CO₂ so that it can be delivered at the right specification to the CO₂ collection network (intra-company CO₂ capture strategy). DIMMER's objective is to change the CCS cluster design perspective, bringing a holistic approach that covers from source to sink. We will propose inter-companies CO₂ capture strategies. While integrating CO₂ capture plants is expected to lower the overall decarbonization costs, it comes with technical and non-technical challenges. In DIMMER, we will evaluate non-technical challenges (environmental permits, commercial relationships, legislation, etc.) as well as design a pilot unit that addresses the technical challenges arising from the proposed integration. The pilot, to be executed in a next project phase, will de-risk the proposed inter-companies CO₂ capture strategies.

Korte omschrijving

The activities within DIMMER are divided into 6 technical work-packages (WPs). WP1 delivers a detailed mapping of the point sources in the Moerdijk cluster with data on the various CO₂ emission points. WP2 proposes individual and inter-companies CO₂ capture strategies, studying different levels of integration using data from WP1. A focus of WP2 is to maximize the capture rate, by including as many point-sources as feasible. In WP3, the transport and storage concepts are proposed: local transport of CO₂ can be done in a local pipeline for CO₂ collection (compressed gas) as well as by truck (liquid) and/or a combination of these approaches. Transport of the collected CO₂ to geological storage sinks may be done by barges (liquid), by pipeline (liquid or gas) or a combination of both. In WP4, techno-economic evaluations will be conducted for the full-scale CCS network. WP5 proposes a roadmap towards 2050 and evaluates the non-technical (financial, legal, societal) aspects and possible risks and opportunities to the implementation of the proposed CCS network. In WP6, a pilot plant is designed and its costs are evaluated.

Resultaat

DIMMER will deliver a conceptual design of a full-scale CCS network for the Moerdijk cluster. A techno-economic evaluation will be performed, to determine the feasibility of implementing the designed solution. DIMMER will also evaluate the non-technical aspects that may pose risks to the implementation of the proposed solution (legislation, permits, commercial relationships). This will give the multiple CO₂ emitters in the region an estimate of the feasibility of adopting CCS as a decarbonization strategy. The integrated inter-companies CO₂ capture approach is novel. Some of the research questions related to the implementation of this approach will be answered within DIMMER, particularly regarding the techno-economic and legal feasibility of the concept. However, some of the technical research questions require experimental research. Particularly regarding mixing CO₂ capture solvents from absorbers located in multiple point-sources and combining these streams into a centralized stripping unit. To answer these questions, a pilot plant is designed within DIMMER, taking into consideration the proposed design of the full-scale system, to be executed in a follow-up project.

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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