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SCOPE: an ERA-NET ACT project on sustainable operation of post-combustion capture plant

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Abstract

SCOPE (Sustainable **OPER**ation of post-combustion Capture plants) is a three-year project from the third ERA-NET Co-fund ACT program (<http://www.act-ccs.eu/>). The participants of SCOPE represent the ERA-NET ACT countries of Norway, The Netherlands, Germany, United Kingdom, USA, and India. The SCOPE consortium involves 24 partners from industry, authorities, research, and academia and has considerable involvement of industrial companies. The industrial partners are not only supporting the research but have also committed to directly invest and participate in the R&D and demonstration activities in the project, boosting the credibility of the project's potential for accelerated decarbonisation of the industry.

Amine-based chemical absorption is the leading technology for capturing and removing CO₂ from certain industrial processes, such as those used in cement, metallurgical and steel industries as well as waste incineration and power plants. Although amine-based technology is not new, early adopters have struggled to secure emission permits due to the lack of data on amine emissions and lack of well-defined regulatory procedures for documenting and modelling amine emissions. As a result, a better understanding of the overall environmental impacts of using amine-based chemical absorption to mitigate industrial emissions over time would accelerate the implementation of amine-based technologies for climate protection.

SCOPE (<https://www.scope-act.org/>) takes a holistic approach to ensure that emission reductions for amine-based CCUS are technically feasible, cost-efficient and robust enough to mitigate environmental risks and gain public acceptance. By following the continuous path of the treated gas from source to recipient (see illustration in Figure 1), SCOPE research is designed to address knowledge gaps and information-exchanges that are critical for realizing sustainable, environmentally safe CO₂ capture plants.

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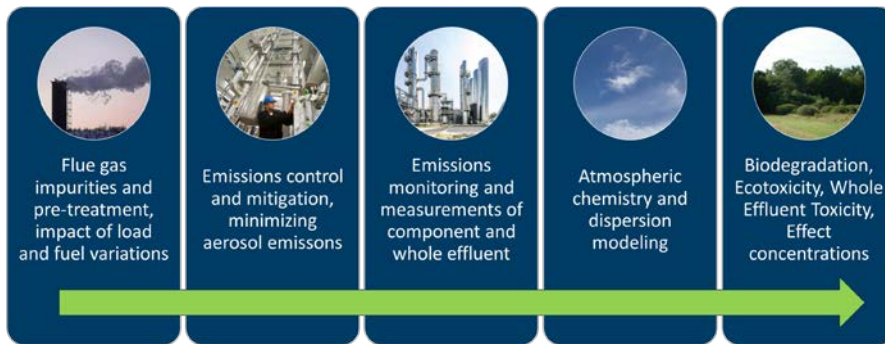


Figure 1: SCOPE governing approach

The overall goal of SCOPE is to support the development of technology for emission control and enable the harmonization of regulations for amine-based CO₂ capture facilities. It will do this through the:

1. Development of effective **online monitoring systems and emission control guidelines**;
2. Validation of predicted amine emissions from solvents against data generated in the project through test campaigns at **6 different pilot plants**;
3. Effective utilization of knowledge about **environmental hazards** in **risk assessment** of amine-based CO₂ capture plants; and
4. Identification of societal concerns, **policies and practices** that may affect the **credibility industrial decarbonisation using** amine-based CO₂ capture in different countries.

At the end of the SCOPE project, plant operators will have access to new tools and data; authorities will have new regulatory guidelines for setting environmental quality and health standards; and decision-makers seeking to support CCUS commercialisation will have clarity on the governance requirements needed to secure a social license to operate in diverse national settings.

The paper will present in detail the aims and objectives of the project, the expected outcomes and the impact and results to be obtained. Specifically, the paper will address the innovations of the project, which entails three technical, three methodological, and two conceptual innovations, of which the latter comprises a new framework for investigating CCUS legitimacy and the SPRINT communication platform for cross-fertilization between researchers and diverse stakeholders.

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Keywords: CO₂-capture; chemical absorption; amine emission environmental risk mitigation; societal awareness