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TNO report

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Report describing most promising
membrane technology
Cato deliverable D2.1.9

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Summary

Capture and storage of CO₂ from fossil fuel fired power plants is drawing increasing interest as a potential method for the control of greenhouse gas emissions. Different options to capture CO₂ are currently investigated. They can be divided into three groups: pre-combustion capture, post-combustion capture and oxy-fuel. This report gives an overview of the role of membranes in post-combustion CO₂ capture.

After a short introduction, the different types of gas separation membranes and their properties are discussed. In general, these membranes are not selective enough at the relatively low CO₂ pressures found in flue gasses. One option to upgrade their total performance is the HICLON process. This process will be studied by ASPENTM simulations as part of CATO deliverable D2.1.10: 'Report describing the potential of membrane technology'.

Next to the overview of gas separation membranes the report focuses on membrane contactors. The use of these in the CO₂ absorption process is discussed in Chapter 3. They give one the chance to optimise the capture process according to thermodynamic rather than operational considerations. This will result in lower operational costs. In order to achieve this, a proper selection of the contactor membrane needs to be made. Aspects that are to be considered are operational stability (i.e., critical entry or breakthrough pressure and chemical and thermal stability), mass transfer performance, commercial availability, costs and environmental impact.

In the following two chapters, design of a large scale membrane contactor and further developments are reviewed respectively.

The remainder of this report is CONFIDENTIAL.