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TNO report

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HICLON: A new concept exemplifying the potential of membrane technology for CO2 capture

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Public Summary

Greenhouse gas emission and its impact on earth's climate are the main driving force for CO_2 capture technology development. Power plants are the major source of CO_2 emission and hence taken as basis for the perfect CO_2 capture technology development study.

Here, the high carbon–low nitrogen (HICLON) concept is evaluated for CO_2 capture from power plants. The concept is based on use of selective membranes for air enrichment and selective membranes for CO_2 removal. The air enrichment unit produces 30-40% oxygen enriched air for combustion. The CO_2 removal unit is targeted to capture 90% of CO_2 from flue gas.

The HICLON concept is evaluated and optimised based on technical results, exergy and economic assessment. Based on the process simulation results and economic assessment, the HICLON concept is not the best concept for CO_2 removal from power plants. But, taking into account better performance of the HICLON concept in exergy analysis, potential options for process improvements are suggested which shows efficiency improvements of 9% as compared with the optimised HICLON concept which makes it competitive.

The rest of the report is confidential.