Initiating large-scale storage in the Netherlands offshore

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Abstract

Carbon capture and storage (CCS) is a cornerstone GHG mitigation measure essential to limiting the average world-wide temperature increase to well below 2 ^{o}C. IPCC studies conclude that, along with measures such as efficiency improvement, development of renewable energy supply, energy conversion and storage and fuel switching away from coal and ultimately hydrocarbons, CCS will be a key technology to realise rapid CO_2 emission reduction from hydrocarbon intensive power and industry sectors.

The Netherlands government has a stated objective to develop CCS for industrial sources and waste incineration on a large scale, aiming to achieve a capture and storage rate of close to 20 Mpta by 2030. This is an ambitious target to kickstart CCS, but it is only the beginning. As an industrial cluster generating about 15% of the total national greenhouse gas emissions, the Port of Rotterdam aims to capture and store up to 5 Mtpa by the mid 2020's.

Both targets require a fast and efficient build-up of CO_2 transport and storage infrastructure that connects the main industrial regions in The Netherlands with offshore storage capacity.

This paper presents a timeline of the activities required to realise the CCS ambitions for the Rotterdam cluster and highlights the status of some key offshore transport and storage requirements;

Storage permitting.

- The CO_2 storage permit for the P18-4 field has been extended. The permit was granted in anticipation of the ROAD project. Several aspects of the storage plans that support the permit will need to be brought up to date before first CO_2 injection.
- A storage permit application for the P18-2 field needs to be submitted at short notice, drafted substantially in line with the P18-4 permit application but respecting the key differences in well and field characteristics. Subsequent storage permit applications will follow soon after for three P15 fields.

Optimal re-use of existing facilities.

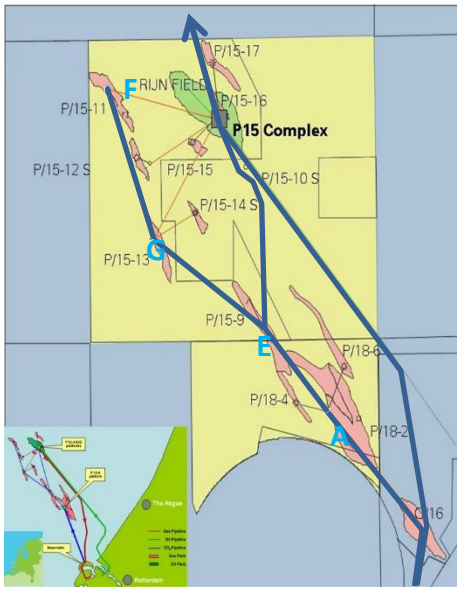
- The map below shows the offshore region considered, with gas fields in pink, satellite platforms indicated by blue letters and potential CO_2 pipelines in dark blue. Several wells

will be re-used for CO_2 injection and monitoring. The extent of modifications to the satellite platforms depends on the space and weight limitations for extra facilities.
- The next phase of storage to the North of P15 requires the addition of compressors and, possibly, heating facilities at the P15 Complex and the conversion of the platform to electricity, recognizing the phasing out of hydrocarbon production.
- Re-using existing pipelines saves cost and time and the following pipelines will be evaluated for conversion to CO_2 transport duty; P18-A platform to P15 Complex; P15-E platform to P15 Complex; Maasvlakte to P15 Complex (reverse flow).

The result is a roadmap of activities for rapid development of the estimated 70 Mt of potential storage capacity in the P15 and P18 depleted pressure gas fields. Further capacity may be available in the oil field and aquifer structures also drilled from the platforms. A steady build up in CO_2 volumes transported offshore from the Rotterdam area and beyond can be accommodated and the P15 Complex can potentially be prepared as a future onshipment hub to serve storage clusters to the North.

The potential storage capacity of the P15 and P18 gas field clusters can support a substantial part of the national 2030 CCS target. However, more storage clusters and transport routes will need to be developed in parallel and well before the 2030 ambition deadline, to ensure a smooth transition into the 2030 – 2050 period, when deeper emission cuts will be required. The timeline will list some of these storage options and outline the actions to be taken, many of which should be initiated well before 2030.

The roadmap for the Rotterdam offshore transport and storage infrastructure will be relevant to other offshore regions where depleted gas fields represent the first priority storage option.



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