Experience in developing the Goldeneye Storage Permit Application

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Abstract

The Peterhead CCS project was slated to be the first full chain gas CCS project in the world. It planned to capture 1 Mtpa from the Peterhead CCGT power station on the north east coast of Scotland and store the CO$_2$ offshore, reusing existing infrastructure from the depleted Goldeneye gas field. The project was very advanced when cancelled and had submitted the Storage Permit Application to the UK regulatory authorities who had sent it on to the European Commission for their review.

The permit application was nearly nine hundred pages in length, excluding the Environmental Statement which was nearly six hundred pages. Early on the project team, in collaboration with the regulator, decided to make the permit application a self-contained document – in order to avoid the challenge of maintaining consistency over up to ten thousand pages of technical material that fed into the permit application and that had been developed over a period of years.

The permit application followed a systematic process. First evidence was laid out in a Characterisation volume before going on to present the Containment Risk Assessment. The containment assessment broke new ground as it was built up on two parts, a qualitative bow-tie assessment followed by a semi-quantitative risk assessment. The development of a semi-quantitative approach enabled the team to make comparisons between the relative risk of CO$_2$ migration up different potential migration paths and thereby guided the development of an effective monitoring plan.

The containment assessment referenced the material in the Characterisation volume and it formed the basis of the Measuring Monitoring and Verification (MMV) plan and the Corrective Measures plan. Both the MMV plan and the Corrective Measures plan also fed back into the containment assessment, as in combination monitoring plus identified corrective measures create additional barriers to the release of CO$_2$. The combined plans then informed the Provisional Post-Closure plan which included details of the proposed handover periods, and also the Financial Security provision.

A key enabler in the permitting process was the collaborative approach to working alongside the UK Regulator. A schedule of meetings and workshops was established where the project developer and the regulator teams would meet. In each meeting the plans for the next section were outlined and discussed prior to writing the formal text. The text was then developed and circulated to the regulator for comment at the next meeting. All feedback was then incorporated.

An additional verification step was included in the form of an Independent External Review from the British Geological Survey (BGS) and Herriot Watt University (HWU). The BGS formed a panel of experts who attended a detailed multi-day workshop with the whole Shell technical team. The experts had access to all the technical reports underpinning the Storage Permit Application as well
as a draft of the application. The experts requested additional work and clarification. This was done and formed the subject of a second workshop. The BGS and HWU team finally produced a report with recommendations and an endorsement letter. The review process was extremely useful as it made constructive recommendations on aspects of monitoring and handover which changed the project plans and also gave assurance to the project developer and the regulators.

There were some areas where the project team feels that they could have been more effective – in particular the process of developing the financial security provision took longer than expected. There were also some areas where the nature of CO₂ storage required and the requirements of the EU directive and national regulations necessitated working with more than one regulatory team at the same time – if this had been appreciated earlier in the process some of the permit development activities could have progressed faster.

All in all the process of developing a Storage Permit Application under the UK transcription of the EU directive was found to be moderately straightforward and the close collaboration with the regulator added significant value. If the project team were to start again knowing what they know now the technical work would be more focussed on the needs of the permit. It is hoped that by sharing this experience that other projects can soon follow suit.