CERAMAH TEKNIK TECHNICAL TALK

Carbon capture and storage: What are the big issues and opportunities facing the petroleum industry in Malaysia?

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Fossil fuels such as coal, oil and natural gas, currently supply around 85 per cent of the world's energy needs, and will continue to do so for many years to come. However, the burning of fossil fuels is a major source of carbon dioxide (CO_2), the principle greenhouse gas (GHG) linked to rapid, human-induced climate change. Significant additional CO_2 is emitted from the production and separation of large CO_2–rich gas accumulations. These are common in Malaysia which has offshore gas fields having some of the highest concentrations of CO_2 in the world, ranging from 25 to 87%. These gas fields are a significant challenge to operators because the high CO_2 makes the development of most of them uneconomical. One potential solution to this challenge is the capture, transport, storage & utilization of CO_2. This talk addresses the various technologies for GHG reduction and focuses mainly on geosequestration. Also known as carbon capture and storage (CCS), geosequestration involves the long-term disposal of captured CO_2 emissions in subsurface geologic formations. Geosequestration comprises a number of steps: first, the CO_2 is captured at the source, the captured CO_2 is then transported, typically via pipeline, from the source to the geologic storage site; next, the CO_2 is injected via conventional wells into the geologic reservoir, where it is stored in the geologic reservoir, and where its movement is carefully monitored and the quantity stored is regularly verified.

The main geological conditions for the geosequestration of CO_2 include many of the same requirements as for a hydrocarbon prospect: a porous and permeable reservoir rock, a trap, and an impermeable caprock. Expertise in locating such formations is well established within the petroleum industry, and CCS geoscientists and engineers utilise existing technology to identify and assess specific sites for geosequestration. Each site is evaluated for its potential storage volume as well as to ensure that conditions for safe and effective long-term containment are present. Monitoring programs are then put in place that provide long-term assurance of the safe containment of the CO_2.

Malaysia is presently a net producer/exporter of gas but may become a net importer if an economic and environmentally sustainable method for production of its high CO_2 fields is not found. Such efforts require top quality science, appropriate regulation and acceptance by the community. Subsurface geologic storage sites need to be characterised with respect to the physical and chemical processes which will take place during and after injection. Similarly, appropriate technologies for monitoring the injected CO_2 need to be selected. In addition the risks associated with all phases of the process must be identified. These tasks will fall to geoscientists and engineers who are familiar with subsurface technologies and who have been able to become similarly well versed in geosequestration.

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