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Please fill in your manuscript title.	Feasibility Study of Geological CO2 Storage Development in Arthit Gas Field, the First Step to Net Zero Goal

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Abstract

PTTEP has committed to achieving Net Zero Greenhouse Gas Emissions by 2050, with an interim goal of a 30% reduction in GHG intensity by 2030. Catering national gas demand for over a decade, PTTEP has been producing gas from its operating field in Gulf of Thailand, namely Arthit whereby natural gas resources come with relatively high CO2 contents. This thus prompts requirements for process treatment to partially remove CO2 and flare on-site before export for national supply, resulting contribution to GHG intensity. PTTEP has prudently conducted a study to assess feasibility of implementing Carbon Capture and Storage (CCS) to store CO2 geologically as mean to reduce overall GHG intensity for its own gas producing field.

Feasibility study was performed by multidisciplinary team including subsurface, drilling and well engineering, and facility engineering. Potential CO2 storage inventory assessment was carried out by exploring opportunities in saline aquifers, depleted reservoirs, and oil rim reservoirs in all of Arthit areas. The preliminary CO2 storage volume estimations and well designs were also carried out.

Engineering study was performed to verify the feasibility of installing CCS equipment on the existing Arthit central processing platform. Additional CO2 purification process was also evaluated in order to recover some hydrocarbon loss in permeate stream that ultimately help optimizing the geological storage volume requirement.

Subsurface storages identified in Arthit area and their associated volumes accessible via existing wellhead platforms have been compiled where found that saline aquifers and depleted reservoirs are the main storage targets. The largest storages are located within the reach of Platform-A, which is bridge-linked and located within the Arthit central processing complex, where CO2 is separated. The estimated storage found to be adequate for long term CO2 profile. New CO2 injectors were preliminarily designed to drilled from recovered slots from the existing platform. However, other nearby injection sites were also investigated as a backup plan and for future expansion.

The facility and structural assessments showed that additional CCS facilities required for Arthit and the second stage membrane purposed to purify CO2 and recover hydrocarbon loss in permeate gas stream could be installed on the existing platform with deck extension. Furthermore, potential further reduction of CO2 in sale gas to increase its heating value as well as reduce GHG emission scope 3 were also investigated.

An estimated injection capacity of 1 MtCO2e/year is expected when the CCS project in Arthit becomes fully operational. The project is anticipated to be the first CCS implementation in Thailand.

Unlike other CCS projects, Arthit CCS is an add-on development to the existing facility of a long-history gas field. The project has access to a variety of storage types and abundance of data from its 15-year production history. However, it is crucial to emphasize the difficulties of fitting add-on equipment into the existing offshore facility as well as other special considerations for storing CO_2 in depleted field. The success of this project could open up new opportunities for other Gulf of Thailand gas fields with a similar environment.