

12807-PP

NGH Chain: A New Gas Transportation Concept

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This paper was prepared for presentation at the International Petroleum Technology Conference held in Kuala Lumpur, Malaysia, 3–5 December 2008.

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Abstract

In general LNG chain is economically feasible for natural gas reserve with sizable volume over several Trillion Cubic Feet (TCF) and long distant transportation projects. Feasibility studies reported so far have appeared that Natural Gas Hydrate (NGH) chain (production, ocean transportation, and re-gasification) had economical advantage, particularly under a certain condition with suitable size of gas reserve and transportation distance.

JOGMEC and Japanese engineering companies have recently focused on the NGH chain as a new gas transportation concept. Particularly the production process greatly impacts on a reduction of the total capital cost. Therefore JOGMEC and Japanese engineering companies have promoted the development of NGH production process since 2001. We have developed the bubbling/stirring-type formation reactor, the water-spraying-type formation reactor, and a new hydrate formation system which uses micro-bubbles with tubular reactor and higher formation rate over other systems has been obtained by micro-bubbles-type.

In the near future, it is further needed to improve the precision of the feasible study along with an advance of the technology development to find out to what extent NGH technology has the potential to compete effectively with LNG technology. For that, it is important not only to consider an optimization of one process but also to understand an impact of one process on the chain and an optimization of entire NGH chain.

Background

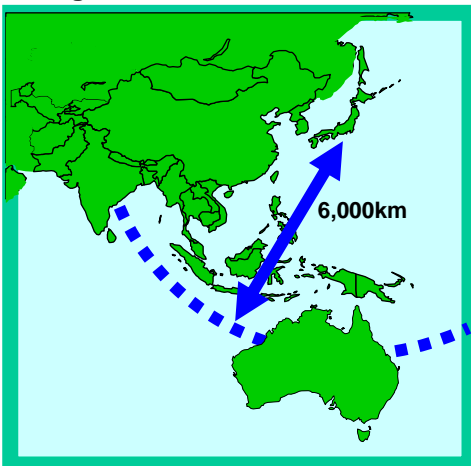


Figure 1 Middle and small gas fields in Asian countries within 6000km from Japan

There are many middle and small gas fields in Asian countries within 6000km from Japan. Those fields are considered difficult to be developed by conventional techniques, such as LNG and pipelines, because of the balance of its gas amount and initial cost of those facilities. In future, when all large gas fields are consumed, more economical technology to develop those smaller gas fields will be essential.

Natural Gas Hydrate (NGH) has drawn much attention as one of the new economical gas transportation methods these days. NGH contains 170 times as much gas as its volume under milder conditions, such as at much higher temperature than LNG. Therefore, initial cost of NGH process is estimated lower than LNG.

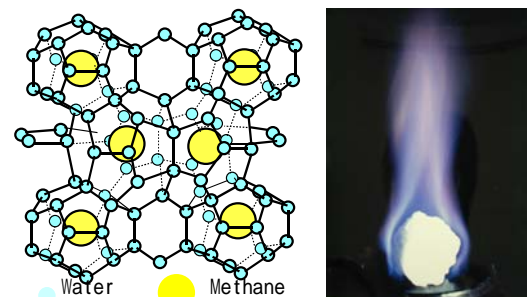


Figure 2 Natural Gas Hydrates

In general LNG chain is economically feasible for natural gas reserve with sizable volume over several Trillion Cubic Feet ("TCF") and long distant transportation projects. On the other hand, pipeline, another natural gas transportation system practically used, is suitable for transportation for relatively short distant ones because the capital cost is in proportion to the transportation distance. Natural Gas Hydrates transportation chain (NGH chain) are now attracting attention as a new and development solutions of small-to-medium-scale or remote gas fields in the face of expected on the increasing worldwide demand for natural gas. (See in Figure3)