

### Determination of optimal operating condition for ship transport of liquefied CO<sub>2</sub>

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Large amount of CO<sub>2</sub> can be transported via pipelines or ships. This study is concerned with ship transport of Liquefied CO<sub>2</sub> (LCO<sub>2</sub>) due to its flexibility compared to the regional constraints of pipelines and wide range of applications. Ship transport of LCO<sub>2</sub> consists of liquefaction, loading, maritime transport, and offshore unloading processes. A key to the design of transport system is to determine optimal temperature and pressure conditions of LCO<sub>2</sub> because this significantly affects the system performance including liquefaction process at the onshore terminal, boil-off gas production in the tank, hydrates formation in the (un)loading line, etc. However, there are few studies that suggest optimal T-P condition of LCO<sub>2</sub> in the literature. The available guidelines, if any, are simply suggested without systematic analysis from the viewpoint of integrated system.

This study addresses the issue by formulating it as a multi-objective optimization problem that minimizes overall ship transport cost and other criteria. The suggested framework constructs Pareto-optimal front by designing an optimizer that iteratively calls the process flowsheet simulator.