

### Modeling and Simulation of Liquefaction Process for Ship-based Transport of CO<sub>2</sub>

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With growing concern about CO<sub>2</sub> as greenhouse gas, Carbon Capture and Storage (CCS) is considered to be the most practical approach for reducing CO<sub>2</sub> emission in near future. Previous CCS research has mainly focused on efficient capture and storage methods. However, there is a relative lack of studies on transport. Thus, this study addresses the issue by modeling of the processes for ship-based transport due to its flexibility compared to the regional constraints of pipelines. Ship-based transport of CO<sub>2</sub> consists of liquefaction, loading, maritime transport, and offshore unloading processes. A key to the design of transport chain is to determine liquefaction process because this has a decisive effect on the energy requirement of whole chain processes. Therefore, this study systematically investigates the liquefaction process by modeling and simulation solving some fastidious trade-off problems. In particular, optimal compression ratio and heat integration, dehydration, cooling water are investigated to provide essential guidelines for minimum energy requirement of liquefaction process.