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Impact of Ambient Temperature on LNG Liquefaction Process Performance: Energy Efficiency and CO_2 Emissions in Cold Climates

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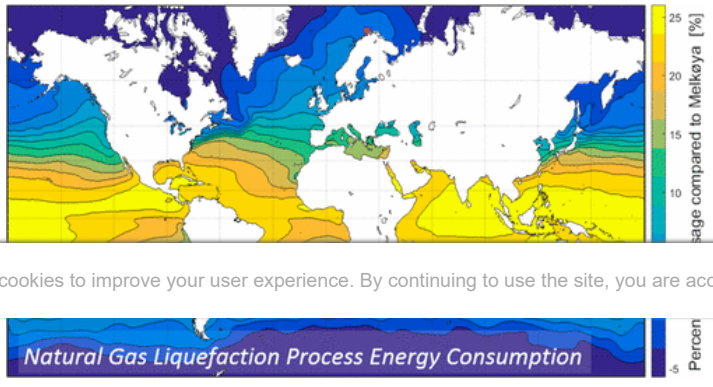
Abstract



The temperature of the available heat sink, often air or seawater, affects performance in many industrial processes. Low temperature processes, such as natural gas liquefaction, are particularly affected. Industrial development in the Arctic presents many challenges but has the benefit of access to a low temperature heat sink. Although several studies have considered the impact ambient temperature has on the performance of natural gas liquefaction, there is little agreement about the scale of the benefit. The present study focuses on the modeling and optimization of several different liquefaction processes. The results show that the energy consumption of any optimized gas liquefaction process will be 20–26% higher in the Middle East or Northern Australia than in an Arctic climate such as that found in Northern Norway, equivalent to a 0.8–1.3% reduction in CO_2 emissions for the full gas to power chain. The performance data are also combined with worldwide sea temperature to illustrate variation by geographic location.

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