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Previous Article Next Article Table of Contents

Impact of Ambient Temperature on LNG Liquefaction Process Performance: Energy Efficiency and CO₂ Emissions in Cold Climates

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Ind. Eng. Chem. Res., 2017, 56 (12), pp 3388–3398

DOI: 10.1021/acs.iecr.7b00333

Publication Date (Web): March 8, 2017

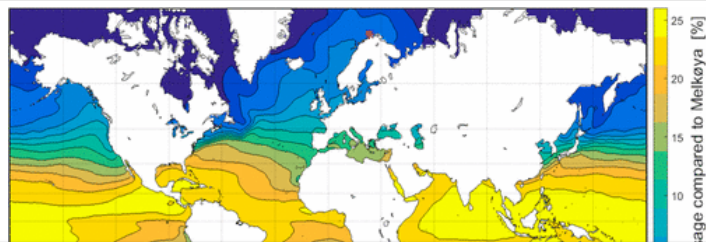
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Cite this: *Ind. Eng. Chem. Res.* 56, 12, 3388-3398

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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 CO₂ 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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Received 23 January 2017
Date accepted 8 March 2017
Published online 8 March 2017
Published in print 29 March 2017

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