

Unlocking Mid-Scale LNG Potential: Game-Changing Impact of Modular Applications for Single Mixed Refrigerant Technology

Lead author: Davide De Bacco, LNG Technologies SME, Saipem

Co-author: Mathew Watt, Process Engineering Manager, Chart Industries
Ravi Vipplerla, Process Technology Manager, Chart Industries
Mac Mirazee, Director of Global Strategic Accounts, Chart Industries

This paper explores recent advancements in mid-scale natural gas liquefaction plants, with a particular focus on modularized applications exploiting Chart IPSMR technology.

The long-lasting continuative collaboration between Chart Industries and Saipem has allowed to capitalize on the distinctive competencies of both Companies in technology know-how, engineering design, modularization, commissioning & start up, consolidating a successful approach for a construction-oriented design.

The liquefaction technology selection performed for a recent initiative has raised awareness in both Companies of the strengths and areas of improvements of the IPSMR Process, allowing to understand how to effectively tailor make it for the specificity of each Project.

This document presents the experiences gained by Saipem and Chart Industries in the execution of several Projects at different stages, both in onshore and floating applications, which can guide designers for:

- Overall layout rationalization: single module with an embedded cold box vs two modules, one dedicated to the liquefier and one to the compression string based on LNG production rate, feed gas quality, cooling medium, refrigerant compressors drivers and other Project characteristics. An alternative arrangement with also the compression string located outside the module could be advantageous under certain premises.
- Liquefaction module optimization: location of the Cold Box, along with its Braze Aluminum Heat Exchangers, inside or adjacent to the Liquefaction Module for more efficient construction, reduction of Project costs and schedule.
- Safety and availability upgrade: reliable Braze Aluminum Heat Exchangers which can provide early indication of fatigue damage prior to any loss of containment thanks to Smart Layer®, a Chart-patented feature recognized during HAZOP workshops as effective Independent Protection Layer, in combination with additional tailor-made devices
- Operability enhancement: Flexible process and robust equipment which can safely withstand quicker start-up, achieving on-spec LNG with minimal flaring, finally increasing plant nominal capacity

Moreover, on a case-by-case basis, Saipem can either deploy its own fabrication yards or leverage the first-hand experience, built-up in its premises, to successfully manage any Third-Party yard, providing an extraordinary execution flexibility to its customers.

The paper demonstrates the potential for enhanced cooperation and innovation in the LNG industry to bring value to the End Users in terms of safety, availability, time to market, performances and sustainability.



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