



Optimising LNG ship-to-ship transfers





Background

Liquefied natural gas (LNG) is a key component of the energy mix as a cleaner, alternative fuel which will help the world to transition to a low-carbon future. While ship-to-ship (STS) transfers of LNG are not a new practice, in recent years it has seen significant expansion over a short period of time.

The transition to LNG has been expedited by recent geopolitical factors, such as curtailment of Russian pipeline gas, leading to a desire for Europe to become more self-sufficient with regards to its energy supply. While long-term supply agreements remained firm, this allowed short-term rescheduling to come to the fore with the industry experiencing a rise in the number of floating storage regasification units (FSRUs) being established off the coasts of many countries in Europe, such as Germany, Greece and France.

This move to LNG STS pointed to a viable solution to the decreased imports of natural gas to the EU, and a captive market for operators trading in LNG. However, this has not been without its technical difficulties for operators, necessitating lengthy periods of compatibility testing due to vessels being ill-equipped to perform STS at sea and additional training requirements for their crews.

James Fisher Fendercare (JF Fendercare) responded to growing customer demand by utilising its experience and expertise to develop solutions in the LNG ship-to-ship (STS) market. Having been approved by many of the world's largest energy companies, JF Fendercare is on hand to support them with optimising their shipping and trading portfolios.

Market outlook

The challenges facing LNG STS at sea:

LNG has the potential to be a key resource in ensuring the energy mix remains stable and diverse, boasting half the CO₂ emissions of coal and two thirds that of conventional marine gasoil.

However, LNG STS is still a relatively new and niche industry, having grown from an estimated 500 in 2013 to an estimated 1,500 operations in 2023. As such, it has come up against a variety of challenges.

Some of the key issues facing the industry include vessels not being suited for offshore STS, growing levels of preoperational studies and crews being unfamiliar with STS operations.

Vessels unsuited for offshore STS:

LNG vessels were typically designed for long-haul transportation serving long-term agreements between the supplier and receiver.

Disruption in trade diverted molecules from their traditional route to cater to larger European demand. Traders realised the immense potential of LNG STS leading them to break and build bulk. However, since these vessels were not designed with STS transfers in mind, much of the onboard equipment is required to be checked for compatibility.

Examples include:

- Absence of the manifold rail, requiring the use of saddles to comply with the minimum bend radius of LNG composite hoses. To accommodate saddles, the manifold area of both vessels must be thoroughly checked.
- During LNG STS, boil off gas (BOG) generation is enhanced, and both vessels must use all their available equipment to control the BOG to keep the tank containment pressure within limits.
- A specialised portable safety instrumented system is required to handle emergency release during STS.
- Mooring systems are checked and found to be compatible. Mooring analysis for a particular location is an important tool to identify the weather window for LNG STS.



Growing levels of preoperational studies:

Since vessels are not best suited for STS operations, all stakeholders, including owners, charterers and operators, become more involved in each aspect of the STS operation. This leads to various pre-STS meetings to align all parties with the process.

Mooring analysis is requested for all STS operations regardless of whether the same vessels are attending at the same location. Certain oil majors insist on studies to assess the safety integrity level of the transfer kit that will be required for a particular location. Safety integrity level assessments are more prevalent in chemical process industries requiring extensive automation.

Design changes to the propulsion systems of LNG vessels meant BOG handling capability during STS needed to be assessed very carefully. This was possible only through exposure to LNG STS with various kinds of LNG carriers. Those with moss tanks and those with membrane tanks had to be assessed differently.

Utilising advanced mooring arrangement analysis, JF Fendercare can help to mitigate risk to ships and their crews by carrying out pre-operational studies to determine mooring forces and the compatibility of two vessels while alongside.

JF Fendercare's specialised LNG STS transfer systems come with dry breakaway couplings which ensure no loss of cargo in the event of an emergency disconnection. The systems are rated to minimum safety integrity level (SIL)1, are highly universal and portable, and can be used for various LNG STS applications, such as:

- Breaking and building bulk to maximise trading routes and cargo flows.
- Gassing up and cooling down to save on port costs.
- Emergency STS response and contingency.

They can achieve high flow rate, effective cargo transfer and BOG management, all of which are critical to limit time alongside.

Crew familiarity with STS:

Give the sudden rise in LNG STS, for many crews this has brought to light a lack of experience or training in STS which can often lead to delays. However, by taking additional measures, such as working together with vessels on an expanded joint plan of operation or taking crewmembers through operations manuals and procedures, JF Fendercare aims to bridge this skills gap by functioning as a collaborator to energy companies.

Given the high cost and risk associated with automated LNG STS equipment, part of JF Fendercare's scope includes providing specialist LNG superintendents who are responsible for the deployment, connection and functionality of the transfer system and who remain onboard throughout each STS operation. Working closely with the vessel's crew, their expertise ensures the cargo transfer is conducted swiftly and safely, with effective management of boil off gas.

JF Fendercare seeks a change in the narrative of the STS industry, influencing decision makers to act and enable changes which lead to improved safety.

Conclusion

How can the high safety standards be sustained, but improvements be made in operational efficiency?

The rise of LNG STS has not been without its technical difficulties for operators, necessitating lengthy periods of compatibility testing due to vessels being ill-equipped to perform STS at sea and additional training for their crews.

To help address the issue of vessel compatibility, mooring analysis using tools such as OPTIMOOR can help to identify pre-operation issues and mitigate hazards for crews and vessels. It can be used to plan a mooring arrangement and to assess the adequacy of a vessel's mooring equipment, as well as limitations due to wind or current. In addition, specialised portable safety instrumented systems, such as those found in JF Fendercare's transfer systems, can provide emergency release during STS transfers through their quick-release couplings.

Pre-operational studies and meetings can also often lead to delays requiring extensive discussion with various parties in different time zones. An additional requirement for certain companies involves the analysis of the transfer kit to check its safety integrity level. However, given the availability of information such as the SIL ratings of various manufacturers' transfer kits and improved awareness of STS as an operational procedure across the industry, operational risks have been mitigated as a result. While pre-operational studies are a necessary part of the process to mitigate risks, mooring analysis of the same vessels at same location can be dispensed with.

Finally, to address the issue of crews being unfamiliar with LNG STS, energy companies stand to benefit from closer collaboration between their vessels and STS leaders. By utilising the consultancy and training services of a dedicated team of highly skilled operators and coordinators, this will help to ensure the safe and seamless execution of LNG STS operations. In terms of support, JF Fendercare's team of LNG STS superintendents can provide a comprehensive review of all operational requirements and associated documentation, including vessel compatibility studies, detailed weather studies and location-specific LNG STS risk assessments.

About us

James Fisher Fendercare pioneers marine solutions to keep global seaborne trade moving - protecting people, assets, and our oceans.

James Fisher Fendercare (JF Fendercare), part of James Fisher and Sons plc, is a world-leading provider in ship-to-ship (STS) transfers and a major global supplier of premium quality marine equipment.

We've been at the forefront of STS transfers services globally, on average conducting 2,500 transfers annually across over 60 fully operational locations worldwide. With the largest pool of highly trained and experienced and STS superintendents and pre-positioned modern equipment, we offer seamless solutions that are tailored to your specific requirements.

With the largest global LNG STS location network, we can provide solutions to help optimise trading and shipping as well as break-bulk, build-bulk, top up, gas up, cool down, bunkering and emergency.

As the world's demand for cleaner and greener sources of energy grows, JF Fendercare is committed to providing safe and efficient LNG STS services to assist the sustainable energy transition.



Case studies

JF Fendercare is renowned for providing the complete LNG STS package. Included within JF Fendercare's scope of services is the provision of:

- Specialist equipment
- Expert personnel
- Operating procedures
- Marine technical expertise
- All STS assessments and studies

2023 | Victoria Bay, Labuan, Malaysia – break bulk

JF Fendercare conducted break-bulk LNG STS operations for a leading energy company, transferring cargoes of varying quantities. Requiring meticulous planning and preparation, this allowed the cargo to be split from a large vessel to numerous smaller vessels to overcome local terminal restrictions.

- World's first LNG STS at the location
- Multiple STS operations completed in succession



2022 | Gibraltar Bay, Gibraltar – optimising

One of the world's largest commodity traders required the transfer of LNG via STS as part of a trade. Traditionally, LNG STS is planned well in advance but, due to a narrow window to execute the deal, the notice for this STS was just five days. During this time, JF Fendercare had to rapidly deploy its services, which included performing all the studies and compatibility assessments, arranging deployment of the equipment, and gaining approval from the local authorities in Gibraltar.

JF Fendercare then completed the transfer safely in less than two days. Demonstrating capability to perform LNG STS on a very prompt basis allowed the trader to seize a new opportunity for trade and shipping optimisation.

- Rapid deployment of services with no delays to vessels
- Commenced operation at short notice (less than 5 days)

2022 | Linggi, Malaysia – gas up / cool down

This operation required JF Fendercare to cool down the customer's vessel via STS rather than at a terminal. The complex operation involved gassing up then cooling down the cargo tanks. This was then followed by loading heel cargo for the vessel to cool down all tanks during onward voyage and prior to reloading.

With the growing challenges of performing such operations at terminals, JF Fendercare's tried and tested STS solutions provided a cost-effective and convenient alternative.

- Gas up and cool down warm vessel via STS and transfer of heel cargo
- Cost effective alternative to terminals



If you'd like to find out more about our LNG solutions, contact us and speak to one of our experts who can help:

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