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## ON THIS MONTH'S COVER



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# JOINING FORCES

**Derek Thomas, AG&P, USA**, explains how partnerships in small scale LNG solutions will transform Indonesia.



**N**atural gas will be the world's fastest growing energy source over the next two decades through to 2040. LNG represents a key transition away from coal, heavy fuel oil (HFO) and distillates for a wide range of applications, such as baseload and peak shaving plants, fuel for industrial plants, and the fuelling of ships and vehicles. Yet, for all of its potential, moving LNG beyond the large central hubs in which it is stored presents a new set of challenges for those required to redistribute and regasify it across geographically dispersed demand centres. Not only does this require new vessels in the shape of small scale LNG carriers (generally in the range of 500 – 50 000 m<sup>3</sup>), but it also requires innovative thinking to develop ancillary small scale LNG infrastructure that is safe, efficient, flexible and cost-effective to meet the needs of a wider range of LNG offtake locations and customers. Consequently, the LNG supply chain is more complex with a larger number of interfaces across the chain, necessitating both innovation and partnership to establish a viable and sustainable distribution network.

Over the past few years, demand for LNG as a clean, reliable and affordable energy source has increased significantly in Asia. For example, in Indonesia, the world's fastest growing LNG market, the Indonesian government wants to achieve 100% electrification for its entire population of 260 million people across 17 000 islands within the next three years, with gas as a key power source. In a country where 50% of the overall fuel demand is met through imports, a culture of relentless, robustly engineered and cost-effective innovation in small scale LNG transportation is, therefore, vital. To meet these competing imperatives, project developers will need to work with a range of partners to develop new technologies and solutions that improve existing facilities and establish new, smaller scale facilities to serve both stranded and new markets while enabling potential future LNG projects to become more robust.

### Innovation in small scale LNG infrastructure is essential

Beyond Indonesia, in countries such as India, Bangladesh and Myanmar, which have vast coastlines, life-blood river systems and rapidly growing economies, innovative approaches to the development of small scale LNG infrastructure will be essential to supplement non-existent or modest onshore pipeline gas distribution networks with a virtual marine or riverine LNG pipeline. This pipeline consists of appropriately sized LNG

transport, storage and regasification assets distributed across vessel transport corridors in these countries.

Developing the right assets for such a virtual pipeline demands a scalable and robust approach. While small scale LNG distribution infrastructure is still in its infancy, some players have made great strides by creating flexible new solutions for faster, lower-cost and safe LNG distribution. As an example, in 2016, AG&P designed an ultra-shallow draft LNG carrier in capacities ranging from 2000 m<sup>3</sup> to 8000 m<sup>3</sup> capable of accessing rivers and shallow harbours with a full cargo of LNG on board with a draft of only 2 m. A first for the rapidly emerging small scale LNG infrastructure industry in South and Southeast Asia, the carrier will act as a 'work horse' for short-sea LNG milk-run deliveries to locations that offer limited or no access to conventional vessels, such as the shallow estuarine and riverine areas and restricted harbours in many areas of South and Southeast Asia. Unlike other small LNG carriers, the vessel offers a unique hull design with a reduced waterline entrance angle that can be ballasted in open water for optimal trim and speed and then de-ballasted to a 2 m draft when entering restricted bodies of water. With bow and stern thrusters and optional dynamic positioning (DP) systems, the vessel does not require handling tugs. This flexibility makes it suitable for a range of projects and locations, such as the east coast of Java or the Ganges River in India, for example.

### LNG transfer technology for small scale LNG distribution

Small scale LNG transfer solutions are essential to meet emerging demand for the transfer of LNG to and from shore for terminal loading and unloading, and STS transfer for break-bulk, bunkering and final delivery to floating storage and regasification units (FSRUs).

Growing interest in gas for power generation from energy customers remote from the grid and with limited volume requirements is also spurring interest in small scale LNG, notably in the form of coastal gas carriers and regional distribution terminals. For any new regasification, liquefaction, terminal, or power plant construction project, reliability, quick installation and improved operability are all critical factors to consider. Trelleborg's Cryoline LNG transfer systems enable quick installation and can significantly reduce CAPEX. Its cryogenic hose-in-hose technology can negate the need for fixed onshore infrastructure, an alternative that can be cost-effective for locations where the development of fixed onshore infrastructure, such as in India and Indonesia's island of Java,



**Figure 1.** AG&P ultra-shallow draft LNG carrier in 2000 – 8000 m<sup>3</sup> carrying capacities offering a hull design optimised for shallow water LNG shuttle services to remote LNG receiving points.



**Figure 2.** AG&P's ultra-shallow draft LNG carrier fitted with Trelleborg's Cryoline floating cryogenic transfer hoses, allowing for the safe and capital-efficient transfer of LNG in remote regions.



**Figure 3.** Ship-to-shore transfer from a large LNG carrier also employing Trelleborg's Cryoline floating cryogenic transfer hoses; a robust transfer solution.

would be prohibitive owing to difficulties in land permitting and securing pipeline rights of way.

### Offshore LNG transfer

The loading and unloading of LNG in the offshore environment presents fresh challenges for the gas industry. Floating receiving and distribution terminals and coastal gas carriers are integral parts of the LNG supply chain. While floating assets offer greater flexibility for LNG storage and transfer at distributed demand centres, the highest levels of safety characteristic of best practice in the oil and gas industry must be adhered to.

Trelleborg's cryogenic floating hoses are operable in all sea states and are available with inner diameters ranging from 6 in. to 20 in., enabling them to cope with LNG transfer flowrates of up to 10 000 m<sup>3</sup>/hr.

The hose is made up of several key components including an inner cryogenic hose, an outer protective hose, an efficient insulation layer and an integrated leak monitoring system. The inner cryogenic hose has been derived from the latest developments in composite hose technology chosen for its high flexibility and proven in the oil industry for its suitability for STS transfer of hydrocarbons between vessels rafted or dynamically positioned alongside each other. Transfer of LNG to and from onshore terminals is equally possible with Trelleborg's Cryoline transfer hoses.

In terms of an integrated LNG distribution solution, this technology, when added to AG&P's ultra-shallow draft LNG carriers, ensures safe and cost-effective LNG distribution to remote areas. Innovative small scale LNG infrastructure such as this is transforming the LNG landscape in South and Southeast Asia. However, it is intelligent integration and partnerships that make such LNG distribution possible and sustainable.

### LNG distribution in the future

With this in mind, in the emerging economies in South and Southeast Asia, it must be acknowledged that development of LNG terminal and distribution projects, large and small, has been slow. This is due to a range of factors, not least a lack of funding for project developers to invest in the range of infrastructure that is essential to creating a viable and sustainable market for LNG in the region.

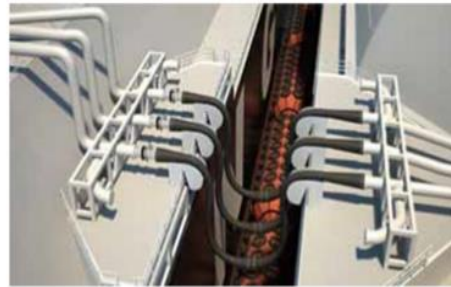
The integration of solutions, including long-term financing, will be key. Through partnerships, an integrator can act as a single point of contact for customers, providing the design, manufacturing, finance, operations and maintenance of LNG distribution solutions across all facets of the LNG supply chain.

This allows for highly efficient delivery of lower cost and flexible solutions across the LNG value chain in the shortest possible time with lower capital investment.

AG&P expects to see more integration in the future where expert parties are brought together to drive LNG projects and deliver better economic value. [LNG](#)

### Note

The author would like to acknowledge the support of Trelleborg Oil and Marine for their support with the development of this article.



**Figure 4.** AG&P is a leading integrator of infrastructure solutions across the LNG supply chain that lower the cost and speed-up the delivery of tolled gas.



**Figure 5.** Trelleborg's Cryoline LNG floating cryogenic hoses can be connected to AG&P's ultra-shallow draft LNG bunker vessel moored offshore, facilitating LNG transfer in shallow and deeper waters without the need for complex onshore infrastructure.