

Simpler gas distribution using buoyant transfer system

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LNG carriers transport liquefied natural gas at very low temperatures to compress gas volumes. Depicted here is a small-scale LNG carrier featuring prismatic tanks designed and developed by LNG New Technologies. (Illustration: LNG New Technologies AS / Michael Grebstad)

A new, fully mobile solution for offloading natural gas from ships to land may lead to increased distribution to new markets around the world.

International demand for [natural gas](#) is high, and there are plentiful deposits to be found in many places. Gas is also more environment-friendly than other fossil fuels. The challenge lies in making it less

difficult to transport to consumers – and Norwegian researchers are looking to do just that.

Buoyancy transfer technology to increase distribution and consumption

When natural gas is cooled, it becomes liquid and its volume condenses by a factor of 600. This liquefied natural gas (LNG) can be readily transported by ship or stored in onshore bunkers.

"Currently, a port requires specially constructed facilities for offloading LNG from carriers," explains Morten A. Christophersen, Managing Director of Connect LNG. "We are developing an alternative solution for transferring the gas from ships to onshore bunkers that makes it possible to utilise simpler LNG terminals. This would help to increase distribution and use of natural gas, in more sparsely populated corners of the world as well."

"The core of our system is a buoy loading system that is used to connect a flexible transfer line between ship and land," says Mr Christophersen. "The LNG is transferred through this line."

The company calls its solution the Universal Buoyancy System. It will help to cut costs and construction time, with the added advantage that it can be moved to wherever in the world there is demand for natural gas. In combination with conventional pressurised tanks, the buoyancy system is virtually 100 per cent mobile and is easy to set up. Different types of ships will be able to use the system with no need for redesign.

Solid research pedigree

Connect LNG has roots from the Norwegian University of Science and

Technology (NTNU) and the Norwegian Marine Technology Research Institute AS (MARINTEK) in Trondheim. The Research Council of Norway's Innovation Programme for Maritime Activities and Offshore Operations (MAROFF) has provided funding for the research behind the company's Universal Buoyancy System.

The researchers have carried out a number of model trials over the last few years and are now seeking partners for a pilot project with full-scale testing to begin in early 2015.

Solving the lack of offloading infrastructure

Conventional intercontinental LNG transport requires large, specialised ships. In addition it is common in Europe and the US to transport natural gas to consumers via a network of pipelines. "Major discoveries of natural gas in the past few years such as those off Africa, Indonesia and Australia have led to relatively low gas prices," continues Mr Christophersen. "This in turn has raised demand in new markets around the world – in remote areas where it isn't feasible to build permanent pipelines."

"The only good way to transport natural gas locally is to use small ships or lorries, known as small-scale LNG. Our solution will bypass the lack of specialised port facilities and infrastructure which prevents small-scale distribution in many places."

"We estimate a demand for 260 small import terminals for LNG in Southeast Asia, North America and Europe in the next 10-15 years," says Mr Christophersen, "so there is substantial market potential for our system out there."

Addresses economic, formal and market challenges

The Norwegian researchers have identified a number of challenges to be overcome to accelerate the expanded production of small-scale terminals:

Furthermore, markets can change abruptly. The Fukushima nuclear accident, for instance, caused huge demand overnight – and all the LNG destined for Europe was redirected to Japan. Major discoveries of shale gas in the US also changed the market when the US quickly became an exporter rather than importer of natural gas.

"Even though [natural gas prices](#) have generally been relatively stable and low around the world," says Mr Christophersen, "we have seen major and sudden geographic changes in demand. This is a disincentive to investment and slows down the growth in LNG terminals. The terminal owners often have long-term contracts already in place with customers before they actually invest in construction. Our solution can help to ease this situation."

Provided by The Research Council of Norway

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