LNG – LET'S GET SMALL, STEVE

FOR MUCH OF ITS HISTORY, THE LNG MARKET HAS FAVOURED THE BIG. BUT SMALL COULD NOW BE THE NEW BIG. BY **MICHAEL WHALEN**, MANAGING DIRECTOR, AND **JOANNA MARTIN ZIEGENFUSS**, ASSOCIATE DIRECTOR, OF **BERKELEY RESEARCH GROUP** IN WASHINGTON DC.

Stakeholders in the global liquefied natural gas (LNG) market might want to recall the early gags of the comedian Steve Martin. During the pre-Netflix days of the late-Seventies, the US funnyman had a platinum comedy album, back when this medium existed, bearing the same title as his then-signature stand-up bit: "Let's Get Small".

Martin's stand-up gag was an absurdist call-out to the relaxed social mores of California. But his exhortation captures what many see as a key driver of future LNG trade growth – an increasing role for small-scale LNG in balancing burgeoning supply with demand, and inherent movement toward increasing market flexibility.

Here, we look at the drivers for small-scale LNG, define what it encompasses, assess the status and opportunities of this market segment, and consider the issues raised in financing current and future small-scale projects.

Fortune favoured the big

For much of its history, the LNG market has favoured the big. Significant scale and size have been a key factor for many projects – hardly surprising considering the economics of this supply chain. Capital-intensive and specialised investments are required to liquefy, transport, and regasify its product.

This, in turn, resulted in most LNG projects being developed around large-scale elements. Large quantity commitments for LNG, contractually bound for long periods, from big anchor tenant buyers provided the foundation to mobilise high levels of debt finance.

But bigness comes at a cost. The buy-in required of new customers is high: both in commitment and investment in enabling infrastructure or equipment conversion. And LNG trade, compared with its liquid fuel peers, is markedly less flexible in its terms.

In recent years, supply and demand LNG factors have trended toward greater flexibility and smaller scale. On the push side, major LNG suppliers insist there is no market oversupply. But abundant US shale gas – the driving force in the United States becoming a net natural gas exporter in 2017, for the first time since 1957 – plus other new LNG capacity seeking to come to market is putting pressure on the traditional fixed-term, fixed-destination, large volume contract structure.

This is a challenge for potential LNG megaprojects – many of which are defined by enormous multi-billion dollar investments in upstream production, processing, liquefaction, and transportation logistics.

On the demand side, emerging economies seek to substitute natural gas for current dirtier transportation and power generation fuels as well as to meet the demands of growing populations and rising per capita energy use. But big hasn't been better for these new customers.

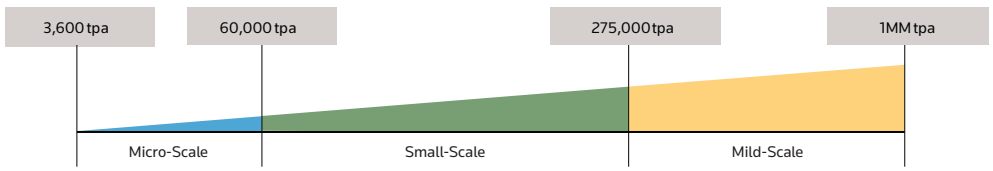
Baseload demand is nascent and limited at first to a single power generation facility. The costs of generation fuel conversion, LNG cargo handling and processing, cryogenic storage, and pipeline transmission and distribution capacity may represent a considerable hurdle, not to mention the time and expertise needed to undertake large-scale projects.

Bite-sized projects, in contrast, allow small or mid-sized markets space to grow and new end-uses to gain momentum. They may also be more appropriate for logistically isolated demand centres, as seen in archipelago and island nations.

Who are you calling small...

What then is considered to be small-scale LNG? In many ways, it is a broad term that encompasses liquefaction, regasification, LNG conversion, and distribution projects. However, it is loosely considered by many in industry to be based on liquefaction and regasification facilities with a production capacity smaller than 1m tonnes per year (tpa), see Figure 1.

FIGURE 1 - MICRO, SMALL AND MID-SCALE LNG CONVENTIONS



Source - BRG and Chart Industries

These myriad implementations of small-scale LNG can include, see Figure 2.

- Small inland or floating liquefaction units tied to a stranded gas resource insufficient to economically support a large-scale LNG train. An example is the 54,000 tpa Galileo project that deploys liquefaction units to convert stranded gas in the Malargüe region in Argentina. The gas is monetised by trucking the LNG to a 41MW power plant located in Anchoris, Argentina.
- Small floating storage and regasification vessels (FSRUs) or small floating storage platforms (FSUs), which also may be dedicated to a single customer: eg, power generation or industrial. An example is the FSU anchored in shallow waters off the coast of Benoa, Bali. This project consists of a 26,000 cubic metre (m³) storage capacity FSU associated with a 300,000 tpa regasification barge delivering gas to the local 200MW power plant.
- Standard containerised cryogenic tanks – known as ISO tanks – that have a 35 m³ (16 tonnes) storage capacity and are used to deliver LNG to facilities off a gas grid. An example is the supply of US-sourced LNG in ISO tanks shipped from Florida to power Coca-Cola bottling facilities in Puerto Rico.
- Small LNG carriers with cargoes ranging from 1,000 m³ to 60,000 m³ that are break-bulked from traditional LNG cargoes and delivered to coastal small power plants, off-grid industries or bunkering storage.
- Alternative transportation fuels – generally driven by the price spread between LNG and diesel or heavy fuel oil and the need for lower emissions by high horsepower engines such as heavy trucks, cargo ships, and trains.

Small getting big

The trajectory of small-scale LNG markets has been impressive.

As an alternative transportation fuel, the LNG trucking markets, particularly in Europe and China, have seen strong growth in recent years.

The market in the EU has grown by approximately 300% since 2013 and is projected to attain 400,000 LNG trucks by 2030. The market in China has almost 250,000 LNG trucks on the road and is projected to grow to 700,000 LNG trucks in the next three years.

The current number of LNG-fuelled ships worldwide is estimated at just over 100 vessels, with more than 75% located in Northern Europe, and it is expected to double in the next two to three years with strong growth expected in Asia.

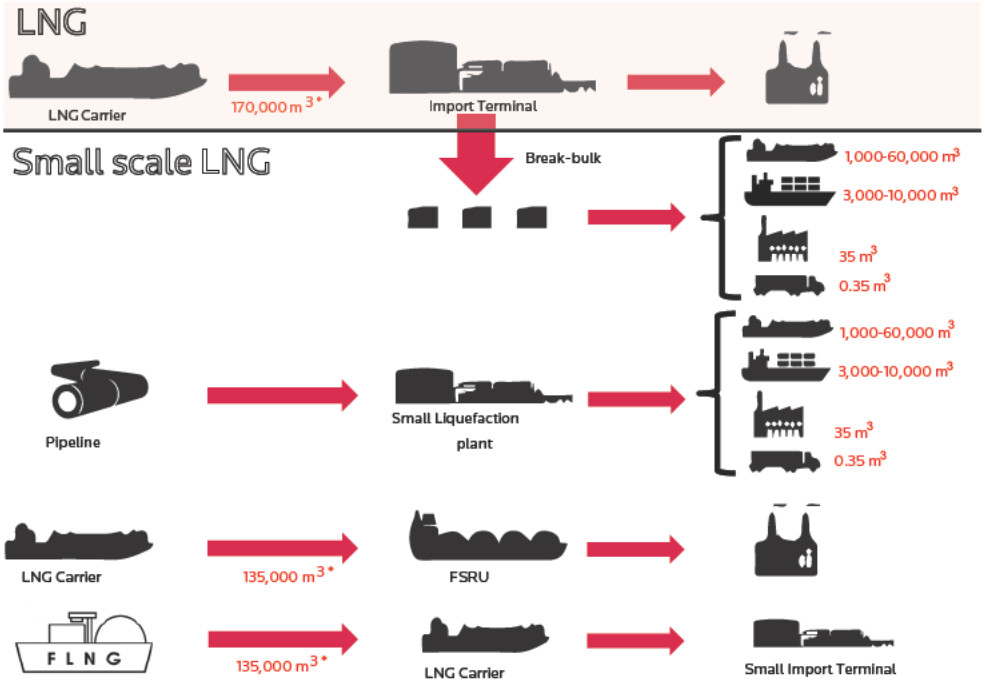
Distributed LNG fuel demand has encouraged small-scale liquefaction plants, LNG fuelling stations and LNG bunkering facilities worldwide. There are close to 2,500 LNG fuelling stations and 60 LNG bunkering facilities worldwide.

Alternative transportation fuel is one of the drivers of distributed demand growth spurring investments in hub-and-spoke centres for LNG. The Gate LNG Import Terminal in Rotterdam, for example, has already made break-bulking and truck loading adjustments to capture new commercial opportunities in the industrial, bunkering, and trucking markets.

The port of Singapore is following suit and other LNG import terminals worldwide are considering break-bulk services with truck or small LNG carrier loading capabilities to further expand to big and small downstream markets.

Each of these hubs seek to leverage economies of scales to optimise long-distance deliveries to service small, discrete onward demand markets. Norway has successfully implemented such a model for its

FIGURE 2 - LNG SUPPLY CHAIN VOLUMES



Source - BRG

*Average cargo size, other volumes are approximate

coastal gas power plants, and a similar effort is under way in the Indonesian archipelago.

It is a viable model that could be implemented in countries or localities where discrete LNG demand is insufficient to justify large-scale LNG infrastructure, but regionally aggregated volume could justify the development of a hub.

LNG importation infrastructure has been more accessible to many emerging economies with growing energy demands via evolving FSRU and FSU technologies and capacities. This permits many counties with limited domestic energy resources or insufficient overland, cross-border pipeline capacity to overcome the buy-in associated with an onshore regasification terminal..

Bigger financing challenges...

The movement of LNG demand into emerging, specialised or smaller markets broadens the global pool of LNG customers, but it increases the frequency of financing challenges for the associated capabilities and infrastructure for those customers to access this resource.

Small-scale applications may offer lower spectrum sovereign or corporate customer credits, greater buyer sensitivity to LNG price movements, and narrower downstream diversity in end-use or even untested uses for natural gas. In other circumstances, there may be lower overall financial capacity to support the types of long-tailed contractual commitments or investments in enabling infrastructure that are typically seen in the LNG sector.

Indeed, to the extent that the attractiveness of natural gas is driven by increasingly rigorous environmental laws and policies that penalise dirtier fuel alternatives, one fundamental ingredient for successful financing of small-scale LNG activities is a supporting framework of laws and regulations for small-scale LNG to operate.

This can include foundational energy market rules that determine which entities are permitted to purchase, process, transmit, or distribute LNG or natural gas for new LNG entrants. But there may also be gaps over whether open access policies apply to such infrastructure, or how existing maritime codes and requirements apply to long-term moorages such as would be used for an FSRU or FSU being parked in domestic waters. Whether a small-scale LNG facility is funded via project finance or via other recourse-vehicles, a sound legal underpinning should be in place.

Assuming this is the case, frequently the next question is that of the underlying contractual structure of the smaller LNG project. Perhaps even more than their larger brethren, smaller scale LNG projects can present a multi-dimensional contractual puzzle.

First, the LNG buyer may be seeking supply contract flexibility – for example, a short-duration contact to cover only an expected gap in natural gas supply, the absence of traditional take-or-pay obligations, or greater flexibility on LNG pricing relative to reference prices of fuel alternatives given the absence of a global LNG price index.

Given the increase in spot and short-term market trading, these targeted flexibilities may be accommodated. In other cases, these buyer-friendly features would present obstacles to new upstream production and liquefaction capacity seeking non- or limited-recourse financing for large-scale investments.

FSRUs have brought in welcome flexibility in regasification infrastructure commitments to many smaller LNG buyers, but this flexibility is a function of the capacity of the FSRU market and the extent to which existing or new vessels require long-term charters to attract financing.

Additionally, enabling offshore infrastructure associated with FSRUs such a jetties, breakwaters, pipelines, and other equipment, may require stable contractual terms to support financing unless undertaken wholly as sovereign or corporate risks.

Finally, downstream use of the natural gas may require a contractual basis to provide sufficient certainty to the stakeholders in the LNG supply chain, including lenders at each level.

Regardless of the length and terms of such contracts, one of the frequent challenges is the interaction of separate tiers of contracts on the financings of any one link in the supply chain. Potential conflicts between and among power purchase agreements, facilities use agreements, pipeline transmission agreements, ship charters, and gas supply agreements can be particularly acute in small-scale projects where different parties, often with different underlying financial arrangements, are not usual.

Some market participants have staked out positions to aggregate larger scopes in the overall supply chain to minimise the integration challenges. In other instances, this has meant that an overall wrap needs to be provided by a sponsoring sovereign or corporate entity. Given that small-scale LNG projects generally have a lower base in which to absorb schedule delays and high fixed costs of complex contractual structuring, such support may be needed to minimise the project-on-project misalignments.

Not surprisingly, development finance institutions have been significantly active in supporting risk mitigation and financing issues for emerging market small-scale LNG projects. Both Bangladesh and Pakistan have featured multiple floating LNG regasification projects with the IFC and other official lenders directly financing necessary infrastructure investments.

The continuing trend of multilateral banks providing contingent or partial risk support to credit enhance downstream energy markets – as has been seen in African markets – will be welcomed by private sector debt providers wanting a wider pool of bankable projects. However, other projects have eschewed project financing.

Jamaica secured millions of dollars in LNG infrastructure investments from New Fortress Energy, which won the opportunity to provide its small-scale LNG supply solution to meet Jamaica's power and industrial natural gas needs without tying these to external debt financing arrangements.

In all likelihood, financing arrangements for small-scale LNG will be as varied as the specific needs of emerging customers' energy demands, the technological solutions being developed for small-scale applications, and the multiplicity of new LNG commercial arrangements. ■