Karthik Sathyamoorthy, AG&P, discusses how demand aggregation will help make LNG viable in fast-growing, gas-hungry markets.

The LNG market has evolved significantly in terms of complexity and sophistication over the past decade. It has doubled in size and moved from a market dominated by oil and gas majors with large, long-term trade contracts and strict destination clauses; to one with new market entrants, higher credit-risk destinations and flexible contracts. This has given rise to a new era in downstream marketing to serve the next generation of end-customers.

Globally, the number of countries with LNG regasification capacity has tripled in the last 15 years. LNG trade has expanded due to growing flexibility of supply and quicker access to new and existing markets via FSRUs, which have enabled more countries to become LNG importers by lowering the cost of market entry. Currently, FSRUs account for most emerging market LNG import projects.

The industry's rapid expansion is turning LNG into a global commodity, but to continue this trend, new markets must be opened, and that means extending LNG supply chains into less credit-worthy, higher-risk markets. Many of these markets are in the world's developing economies where sustained progress has triggered sharp increases in electricity consumption, as well as new demand. For LNG to reach its growth potential, there is a need to invest significantly in developing domestic energy infrastructure, starting with a well-functioning LNG supply chain for importing, storing and distributing LNG. This will require not only substantial CAPEX, but an innovative approach to marketing to serve new end-customers, from sourcing to last-mile delivery.

Because of this shifting landscape, we are witnessing a change in the patterns of LNG trade, moving from bilateral,

long-term deals between suppliers and one large buyer, or a consortium of buyers in one country, to a competitive supplier setting with multiple market participants serving a growing number of smaller, dispersed demand centres that are currently not connected to gas pipeline networks. These new markets want smaller and more flexible volumes to make LNG a viable option for downstream applications ranging from power generation, to industries and use as a fuel.

It is becoming a buyers' market in a sector that is structurally changing at both the point of production at one end, and the point of consumption at the other. This presents challenges for the traditional LNG supply model, but also opens opportunities for new market models to be developed to address evolving market needs. Risk is shifting from buyers to sellers, who are now the seeking the security of offtake by serving multiple markets. This is leading to the development of improved financial architecture, greater market liquidity and transparency and risk-sharing with third parties, such as traders, who are carving out a new role for themselves.

The challenge for the LNG industry is to achieve economically efficient growth, matching supply to the market's requirements without having a large surplus of unused, costly, production capacity. The contribution of the supply and demand aggregators is emerging against this backdrop.

Figure 1. For LNG to reach its growth potential, there is a need to invest significantly in developing domestic energy infrastructure in emerging markets. This will require not only substantial CAPEX, but an innovative approach to marketing to serve a new generation of end-customers.

Figure 2. In an exclusive agreement with Karaikal Port Pvt. Ltd (KPPL), AG&P is developing an import terminal within the breakwater at the Port of Karaikal on the east coast of India. The terminal design incorporates offshore and onshore infrastructure, making the best use of the deepwater location within the port. Its unique configuration eliminates costly bespoke engineering and modular construction will ensure the terminal is operational faster (image courtesy of KPPL).

The emerging role of aggregators

Large-volume, long-term contracts are becoming increasingly rare, so producers have resorted to selling millions of tonnes of LNG to portfolio players, also called demand aggregators, who account for almost three-quarters of the total purchase of LNG in recent long-term deals. These new contracts generally do not have any destination restrictions, enabling aggregators to provide LNG to end-users and participants in short and medium-term markets.

In an oversupplied market, aggregators can develop more liquid short-term and spot markets and aggregate demand from both the big players and the smaller, price sensitive players in emerging markets, such as India, Indonesia and Bangladesh. Furthermore, aggregators offer supply reliability and provide a platform for gas buyers to exercise their gas supply flexibility through nominations 24/7.

Aggregators are expected to play an increasing role in connecting and enabling 'disaggregated' investment opportunities, providing the confidence to invest in new projects with the reassurance that value will be maintained. While small scale demand aggregation is currently a nascent industry, several factors favour the growth of setting up smaller scale operations using an aggregator model:

- Scalable: operators can easily add capacity to serve increased demand while gaining supply chain synergies.
- Flexible: can address off-grid power generation for industrial and residential needs in remote locations.
- Faster ROI: in contrast to large scale LNG projects, offers investors more immediate and potentially attractive returns in the medium-term.
- Lower CAPEX: proven technology allows projects to offer a plug-and-play service with lower investment requirements and accelerated commissioning schedules.
- Reduced risk exposure: turnkey solutions reduce uncertainty on project execution timing.
- Efficient: meets short-term fluctuations in demand with supply and inventory optimisation, and managing LNG storage.

Aggregators, traders and portfolio LNG suppliers are seizing the opportunities in growing gas markets by developing more flexible, demand-driven contracts while finding innovative ways of mitigating the allocation of risk. Aggregating both demand and supply in one or multiple markets enables the direct link between a single LNG source and buyer to be disrupted, and at the same time, it allows for enhanced security of supply. This new approach also provides the flexibility for aggregators to take maximum advantage of temporary periods of scarcity pricing in any of the growing LNG markets.

The increasing presence of aggregators and traders in the LNG market is expected to impact both LNG sellers and buyers. For traditional LNG sellers, the impact may be negative and positive. On the one hand, it may lead to more risk from increased competition, while on the other, it may create opportunities to use a new platform for accessing

Figure 3. Patterns of LNG trade are shifting to meet the needs of new markets that want smaller, more flexible volumes to make LNG a viable option for downstream applications ranging from power generation, to industries, and use as a transport fuel.

Figure 4. The market for natural gas as a transportation fuel is expected to grow, particularly for heavy-duty commercial vehicles in emerging economies such as India and Indonesia. To serve this growing market, AG&P is establishing a network of refuelling stations providing CNG and LNG to commercial vehicles, including truck loading facilities at its LNG import terminals and mother/daughter LNG storage and dispensing systems to replace existing LPG or liquid fuel LNG.

higher-risk growth markets that would not otherwise have been considered. For LNG buyers, the impact is expected to be positive as it will likely increase optionality in terms of LNG supply, while also providing more flexibility and negotiating power when agreeing contractual terms.

Case study: Karaikal Port, LNG import terminal, India

India is currently the fourth-largest importer of LNG in the world, its energy demand driven largely by the power sector. Natural gas currently forms approximately 6.5% of its energy mix, and the government plans to increase this to 15% by 2022. To make this happen, India needs to dramatically increase its imports and plans to construct a further 11 LNG terminals to bring the total number to 15.

There will be challenges, the biggest of which may be the viability of each project, which will directly impact investment. Liquid-fuelled power plants are typically too small to be viably served on a standalone basis because they are often remotely located and cut-off from the main grid. This means a large portion of the market is left unserved, unless an innovative approach is used to connect the potential end-users to the import terminal. By aggregating customer demand, more projects could become viable and attractive to investors, allowing the market's enormous potential to be unlocked.

Atlantic, Gulf, and Pacific Co.'s (AG&P) proposed import terminal at the port of Karaikal in southeast India, is an example of such an innovative approach. In an exclusive agreement with Karaikal Port Pvt. Ltd (KPPL), AG&P is developing the terminal, which will have a startup capacity of 1 million tpy, which is expected to double to 2 million tpy almost immediately. The terminal will complement the Ennore LNG terminal and will supply PPN's six power stations in the region.

The Karaikal import terminal will also provide wider gas accessibility to Puducherry and the heavily industrialised region of Tamil Nadu – home of the region's fertilizer, cement, steel, textile, leather, sugar and garment industries – which can expect to see a significant reduction in cost of up to 40% when they switch to gas as a fuel source. The project's viability is secured through a unique business model that includes:

- Innovative supply chain infrastructure that is scalable and modular, so the terminal can grow in line with demand, making it significantly faster and cheaper to build.
- An anchor customer – PPN Power – that will use the terminal to supply gas to its six power stations.
- A demand aggregator model to serve customers within a 300 km radius, enabling the terminal to achieve the minimum throughput required to unlock currently under-served gas-to-power markets.

The use of AG&P's unique, standardised infrastructure and modular approach eliminates expensive, bespoke, engineering costs and significantly reduces construction time, helping drive down costs. Unwanted surplus is not created, thereby reducing the cost of tolled gas paid by the end-user.

Driving market growth through small scale aggregation

Demand aggregation is the missing link required to meet the demand for access to affordable gas supply in the world's fastest growing gas markets. In the next decade, major growth is expected in Bangladesh, the Philippines, Malaysia, Indonesia, Bahrain, Panama, Uruguay, Colombia, the Caribbean region, Morocco and South Africa, which will require lower volumes, greater flexibility, and shorter time frames for contracts. The net impact of smaller, shorter-term, higher risk contracts in these markets will be a squeeze on supplier margins, which is where demand aggregation becomes critical.

Beyond the market participants, the industry will also need favourable policy initiatives, as well as a coherent procedure for environmental approvals to enable demand aggregators to reduce their FID and commencement timelines for new LNG projects. Government subsidies for gas-fired power generation could also play as useful role in incentivising the end-customers to switch to gas as a cleaner fuel source. **LNG**