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Serving a new generation of customers with scalable and cost-optimised LNG infrastructure

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With demand for LNG predicted to continue its upward trend well into 2030, the time is right to establish well-functioning LNG supply chains in the world's fast-growing gas markets. This starts with building and operating more small- to mid-scale LNG import terminals and establishing the associated onshore and floating supply chain infrastructure that will enable currently disconnected end-users to have reliable and affordable access to LNG.

AG&P is meeting this demand for infrastructure with technologically advanced, highly efficient, and customer-centric solutions. AG&P is not focused on any particular size of LNG infrastructure, but rather, its designs offer scalability and flexibility. This approach allows solutions to be configured from the customer's perspective using the right combination of onshore and offshore assets with the flexibility to expand over time.

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When planning any LNG project, one of the toughest challenges is ensuring the terminal will be able to meet both current and future demand while phasing the project's total investment. AG&P's import terminals are both scalable and modular. Project owners can choose the initial infrastructure they need according to the site-specific requirements for each project for efficient capital deployment.

Scalable LNG import terminals: AG&P has introduced a standardised, scalable regasification module that enables project developers to provide options for customers who are currently unable to access gas from existing pipeline networks. AG&P offers three technologies: fan ambient air vaporisation (FAV), water-glycol shell and tube vaporisation (STV) and water bath vaporisation (WBV), enabling the regasification module to be used onshore or offshore. Hybrid terminals can be built using a combination of floating storage and onshore regasification, as needed. AG&P's approach meets the needs of a wider range of customers, from small-scale to large-scale projects, offering different delivery pressure ranges based on the needs of each facility. Fabrication is fast and transport is easier compared to having stick-built facilities.

All AG&P's designs are based on applicable codes, standards and considerations for capacity, performance, maintenance, operability, safety and footprint area. This approach to import terminal design is extremely cost-effective and enables LNG import and distribution to be demand-driven, allowing for prudent investment decisions.

Fan ambient air vaporisation (FAV) technology: AG&P has developed an advanced and highly cost-efficient FAV technology for sub-tropical and tropical locations with ambient air temperatures greater than 15°C with adequate available space. This FAV technology offers a significant improvement on existing methods as it simplifies the design of the regasification train, its operations and maintenance. The unique benefits are:

- AG&P's FAV regasification trains have been carefully designed to minimise size and complexity, allowing for a faster build and easier installation
- The technology enables the module to be split into two or stick-built and installed onsite, making it suitable for sites that cannot be accessed with a single, pre-fabricated module
- A suite of integrated features that maximise space, improve flow and increase utilisation to improve overall operational efficiencies

Glycol-water shell and tube vaporisation (STV) technology: AG&P's STV technology uses a multi-tube hairpin exchanger design, suitable for both onshore and offshore applications, with indirect vaporisation with glycol-water as the intermediate fluid, heated with seawater. It has a nominal capacity (per module) of 125MMSCFD. Other than the typical utilities used on these types of facilities, the only required utilities are electrical power, glycol-water, and seawater. Electric power can be generated onsite or provided by a local grid. Dimensions for a single train module are 54' x 37' x 35' (L x B x H). Advantages of using STV technology include:

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- Full vaporisation duty with the use of "available" heat from seawater and minimum air emissions
- Integrates the vaporisation and glycol-water loop equipment (LNG vaporiser, glycol- water/seawater exchangers, glycol-water pumps, filters, controls, etc.) into one module facilitating its manufacturing and transport
- Connects easily to an existing seawater system
- Ideal for facilities with warm seawater temperatures (≥15°C) and/or with no environmental regulations banning the use of seawater

Direct seawater STVs are available in the market but these exchangers have experienced significant corrosion and cracking issues. Therefore, AG&P does not recommend or offer this type of STV technology.

Water-bath type vaporisation (WBV) technology: AG&P's standardised WBV technology utilises fire tubes to transfer heat to a bath of water by convective and conductive heat transfer. The combustion gas never directly contacts the water. To minimise emissions and improve efficiency, the design can also include low NOx burner technology and a waste heat recovery economiser providing high efficiency without the complexity associated with other systems. The benefits of this unique design are:

- Suitable for offshore and onshore applications where space is limited
- Ideal for cold climate and environmentally regulated sites, including sites where an open loop system utilising seawater is not feasible
- Comparable to submerged combustion vaporisers (SCVs) normally used onshore in cold climates but designed to be used in offshore/floating applications
- Ensures a highly competitive footprint that maximises space and assets

Conclusion: By integrating a standardised, scalable regasification module with floating storage, AG&P's terminal configuration significantly improves the schedule and mitigates traditional bottlenecks, such as large onshore conventional storage tanks and other major civil works. The use of this flexible approach is AG&P's preferred solution for onshore applications to meet the specific needs of each customer, site, and project. The benefits are threefold:

- Capital cost is reduced and efficiently utilised through phased development
- Infrastructure is right-sized to match current demand, increasing efficiencies and eliminating unwanted surplus while pre-investing in key components that will support future demand
- A modular approach means assets can be built quickly so a project is operational faster, delivering earlier returns to investors.