



## AG&P's Innovative, Modular E-houses

### Company Overview

AG&P is a 118-year-old industrial infrastructure company with world-leading credentials across our three lines of business: Gas Logistics [LNG supply chain design, development and marketing], Modular Construction and FieldCOM [manpower services and site works]. We have a long, established heritage of successfully serving blue-chip clients on some of the world's most demanding projects in the mining, utilities and oil and gas sectors.

**Gas Logistics:** AG&P delivers gas logistics solutions for new, growing markets through a unique and fully integrated platform with LNG engineering, technology, manufacturing, project management, local marketing, commercial and operational skills for LNG or natural gas delivery. Our innovative, customer-centric approach allows project owners the flexibility to choose the infrastructure they need according to the site and current demand. We simplify LNG logistics and make it affordable for our customers to switch energy sources.

**Modular Construction:** AG&P builds the world's infrastructure in Lego-like pieces in our highly controlled, world-class manufacturing facilities in the Philippines. We have a strong track record of providing award-winning modular construction solutions for LNG plants, refineries, petrochemical facilities, mining operations and utilities plants around the world. Our dense, high-value modules significantly improve project capex and schedule, while maintaining world-class quality and safety.

**FieldCOM:** AG&P's onsite construction team [Field Construction, Commissioning, Operations and Maintenance] provides clients with highly trained, experienced professionals and craftsmen who are deployed to project sites across the world. These dedicated teams of professionals take responsibility for functions at project sites from installation of AG&P's own modules and their subsequent commissioning, operation and maintenance [O&M] to full onsite construction.

### AG&P's E-house Solution

The most complex and intricate components of any project or facility are the instrumentation, control and electrical/power systems. These have to be installed in secure structures and the integration of such sensitive equipment and switchgear demands a highly skilled workforce. So far, developers have had little option but to execute these works at the project site, necessitating specialized storage and construction facilities to handle such equipment. In addition, site works have demanded sourcing a specialized workforce often in a location in which these professionals are not resident – an expensive proposition.

AG&P brings a solution that allows project developers to build the nerve centers of their plants and facilities in a highly controlled environment, where a skilled and experienced workforce supported by state-of-the-art manufacturing equipment delivers a high-quality product safely, on schedule and at a lower cost.



## Benefits of E-house Modularization

AG&P's modularized E-house solutions are designed to be scalable and flexible to meet project requirements. We build E-houses that range from the size of a 6m container up to a multi-story building weighing over 1,000MT. AG&P's multi-disciplinary engineering team can work to all major global standards and engages closely with customers to define a solution that best fits their needs.

Modular E-houses are an ideal solution to the many challenges of traditional, stick-built electrical and control facilities. The benefits include:

- Factory-level quality in remote locations such as dense jungles, deserts, frozen plains and deep oceans
- Access to the best cross-section of value and talent across the globe
- Testing and pre-commissioning in a controlled environment
- Reduced project time to completion due to parallel processing with onsite construction
- Minimal set-up costs as modules are designed to plug-and-play
- Reduced impact on local ecosystems as man-hours are moved off-site

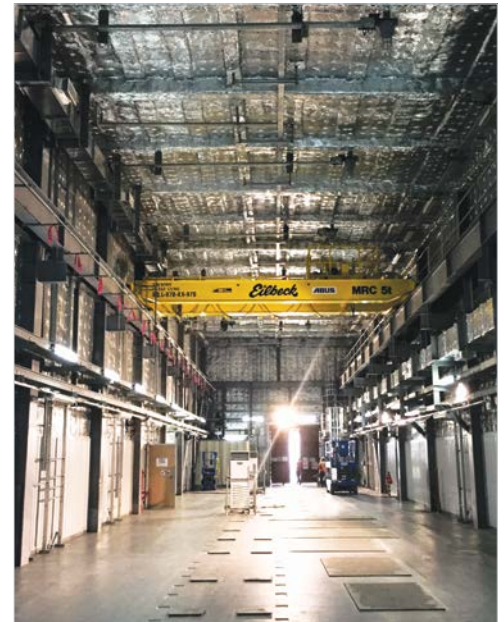
Borders are irrelevant as long as there is a connection by ship, barge, inter-modal containers, rail or truck. AG&P's E-houses can be engineered to fit any of these transportation envelopes.

E-house applications span the oil and gas, petrochemicals, power, mining and infrastructure industries. If a project requires electrical or control equipment, AG&P's modularized E-house solution becomes an essential component of the execution strategy saving time and money.

## A Complete Solution

AG&P's E-houses are pre-fabricated modular buildings that integrate electrical, instrumentation, mechanical and HVAC systems inside an engineered structure that can be fire- and blast-rated. These E-houses are fully-tested, bio-secure and delivered to site ready-to-operate upon delivery.

AG&P provides complete E-house project life-cycle services that start with detailed design and engineering, and include procurement, assembly, testing, pre-commissioning as well as delivery and installation at site, per our client's overall instructions.



## Engineering

AG&P's design and engineering team provides comprehensive engineering services across structural, architectural, HVAC, electrical and instrumentation disciplines. They specialize in E-house design development and optimization, executing deliverables across the engineering life-cycle.

DESIGN ENGINEERING	CONSTRUCTION ENGINEERING
Development of design basis	Material engineering
Detailed design for all disciplines	Material take-off (MTO)
Design calculations for all disciplines	Fabrication and assembly drawings
Structural in-place analysis	Lifting and load-out analysis
Structural connection design	Cable schedule and sizing
Mechanical and electrical equipment sizing and selection	Manufacturer's data book
Lighting design calculations	Operations and maintenance manual
Fire and gas system design and integration	
Technical specifications	
Equipment data sheet	
Load list and calculation	
Hazardous area classification	

AG&P's E-houses are designed to optimize the protection of critical equipment and can be customized to project specifications. E-houses are designed taking into consideration the project location's seismic, wind, snow, temperature variance and other environmental criteria. For projects that are in hazardous areas as found in oil and gas facilities, our E-houses are designed with blast and fire protection.

## Procurement

AG&P has a dedicated and experienced supply chain group responsible for procuring all requirements for E-houses. Leveraging our extensive global supplier network, AG&P is experienced in sourcing specialized materials including sandwich panels, fire-rated and thermal insulation systems, firewall cladding, blast wall cladding or blast-relief cladding, raised floors, fire-rated and blast-rated doors and equipment for classified and non classified locations. We have a tried-and-tested supply chain for HVAC, and fire-fighting systems as well as electrical bulks such as cables, ladders, trays and lighting. Most importantly, AG&P has long-standing relationships with major electrical and automation equipment suppliers who work closely with us to integrate their equipment into our E-houses. Alternatively, if our customers define and supply the equipment, AG&P can manage logistics, receiving and handling until these are integrated with the E-house.

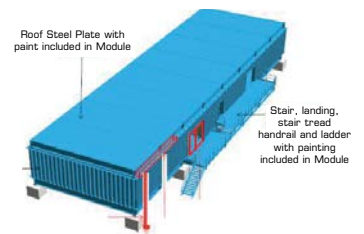
AG&P's yards are certified special economic zones that are exempt from taxes and duties, with expedited clearance procedures, allowing AG&P to provide our clients with a cost-effective and efficient procurement strategy that brings together the right materials and equipment from all over the world. With customs officials being based within our yards, we avoid any delays that may occur at traditional ports and thus retain greater control of schedule.

## Construction

AG&P undertakes all construction and installation activities at our facilities in the Philippines, from structural and architectural fabrication to complete systems integration including the installation of electrical, instrumentation, HVAC, fire and gas systems. AG&P leverages its modular construction capabilities to deliver fully-tested and pre-commissioned E-houses, ready to plug-and-play upon arrival at the project site. Each of our yards is equipped with its own deep-water port, allowing direct shipment to and from the Philippines.

### Designed to International Codes and Standards

- ANSI
- ASME
- API
- BS
- NEMA
- ISO
- IEC
- JIS
- ABS
- SOLAS
- DNV



Our state-of-the-art manufacturing facilities are equipped with modern, automated systems throughout the manufacturing process that increase fabrication capacity at reduced man-hours, resulting in greater productivity and lower costs. AG&P is also home to one of the largest painting and blasting shops in the world, allowing a complete E-house module to be handled in a climate-controlled environment. Critically, AG&P's facilities include huge climate-controlled warehouses where sensitive equipment and switchgear is safely stored until the modular building structure is completed and pressurized, ready for installation.

### AG&P's Yards in the Philippines

Yard 1	
Total area:	1,000,000m <sup>2</sup>
Assembly area:	460,000m <sup>2</sup>
Quay:	240m [L]
Fabrication shops:	
<ul style="list-style-type: none"> <li>• Layout and cutting</li> <li>• Pipe spooling</li> <li>• Structural fabrication</li> <li>• Blasting and painting</li> <li>• Climate-controlled warehouses</li> </ul>	



Yard 2	
Total area:	500,000m <sup>2</sup>
Assembly area:	287,300m <sup>2</sup>
Quay:	450m [L]
Fabrication shops:	
<ul style="list-style-type: none"> <li>• Layout and cutting</li> <li>• Pipe spooling</li> <li>• Structural fabrication</li> <li>• Blasting and painting</li> <li>• Climate-controlled warehouses</li> </ul>	



AG&P's facilities are manned by a highly skilled, English-speaking workforce, with international experience operating to the highest quality and safety standards. AG&P has its own training school where our workforce is trained in glanding, terminations, MCT blocking, earthing and bonding, crimping, panel installation methods, panel wiring and cable management.

### AG&P'S INSTALLATION CAPABILITIES

Switchgear	Telecom	HSSD and VSDs
Transformers	Fire and gas systems	Harmonic filters
Control systems	Sub-systems	ICSS
HVAC	Power panels	Bus-bar and bus-duct alignment
Lighting	Batteries and UPS	

### Testing and Pre-commissioning

All E-houses undergo a thorough testing program and are pre-commissioned at AG&P's facilities in the Philippines. The scope of pre-commissioning/commissioning activities is to confirm that all equipment has been constructed and installed correctly and in accordance with drawings, specifications, applicable statutory codes and practices. This ensures a complete and functioning product is delivered to the project site.

### TESTING AND PRE-COMMISSIONING

LV/MV/HV links and bus isolating switches <ul style="list-style-type: none"> <li>• Insulation, continuity, operation, earthing</li> </ul>	Circuit breakers <ul style="list-style-type: none"> <li>• Insulation, continuity, operation, control voltages, protection, earthing</li> </ul>
Battery and charger <ul style="list-style-type: none"> <li>• Insulation, voltage, connections, electrolyte</li> </ul>	Low voltage light and power circuits <ul style="list-style-type: none"> <li>• Insulation, continuity, operation, control voltages, protection, earthing</li> </ul>
Earthing system <ul style="list-style-type: none"> <li>• Visual inspection, earth resistance</li> </ul>	
Cables <ul style="list-style-type: none"> <li>• Insulation, continuity, leakage</li> </ul>	

## Transportation, Delivery and Site Support

AG&P provides a full suite of heavy-lift and transportation solutions from early engineering and logistical planning stages to shipping and final positioning onsite. In partnership with leading logistics providers and with its own equipment, AG&P services the lifting, installing, ballasting, jacking, weighing and transporting of large, heavy E-house modules from our facilities to client sites worldwide. We additionally comply with the most stringent bio-security standards in every region where we operate with well-established, accredited procurement and logistics to mitigate any risk of contamination.

AG&P's FieldCOM Division specializes in site construction, hook-up and commissioning, having undertaken projects across the globe. FieldCOM deploys self-reliant teams of craftsmen with their own management, quality and safety personnel to the project site to supervise and execute the safe installation of E-house modules and ensure a comprehensive handover to the customer. If required, our teams are also geared to provide maintenance and support services for the lifetime of the products.



AG&P is licensed by the Philippine government to recruit, process and deploy locally based workers to overseas jobs. We are a consistent recipient of awards and recognition for excellence in overseas manpower deployment.

In 2005 and 2014, AG&P was awarded the Presidential Award for Excellence, the highest honor and recognition bestowed upon licensed overseas recruitment agencies that exemplify the highest standards of ethical recruitment and deployment of Filipino workers for overseas employment.

In 2016, AG&P received the 'Outstanding Global Player Award' from the Philippines' Department of Trade and Industry in recognition of our outstanding performance and contribution to the export sector through overseas manpower deployment.



For more information, visit [www.agp.ph](http://www.agp.ph)

Published June 2018