

## NEXT GENERATION MODULAR LNG

Modularised LNG Improves Construction Efficiency | May 2012

### Woodside's LNG train design represents the beginning of a third generation of modularised LNG train design.

Woodside is a leader in the development of modularised LNG trains through its experience with North West Shelf (NWS) LNG Train 5 and Pluto LNG. We have built our capability from a solid foundation of train design and construction experience.

Our new modular design represents the next generation of modularised trains – one where the selection of the process equipment itself is made with modularisation in mind, not simply the layout and arrangement of that equipment.

#### Intelligent Design

Rather than arranging the same building blocks in a different manner, we have selected smaller, more intensive equipment in order to do more within limited size modules.

Aero-derivative gas turbines have been integrated into the modules, complete with all of the elements of each compression system. This permits the complicated, large-diameter compressor suction and discharge lines to be built in the yard rather than having to be stick-built at site, whilst retaining a practical total module size/weight.

The variable speed nature of the aero-derivative gas turbines simplifies the compressor start-up. It eliminates the need to depressurise refrigerant. Removing the need for starter/helper motors also significantly reduces the maximum power demand of the LNG train. This contributes to a reduction in

total plot space.

#### Designed for Maintenance

The arrangement of the equipment within the modules has been made with construction, maintenance and safety in mind. The main rotating equipment has all been placed at the module edges rather than underneath the air coolers. This permits good access for maintenance and allows the long lead items to be incorporated into the module late in the construction sequence.

The main hydrocarbon inventories have avoided the congested area underneath the air coolers, and have been located away from the main rotating equipment. Elevated platforms with crane access have been provided for the installation of relief and recycle valves.

#### Best in Class Efficiency

In this design, propane pre-cooled mixed refrigerant liquefaction technology has been retained. This is consistent with Woodside's experience with six LNG trains over many years. The combination of the efficient propane pre-cooled mixed refrigerant system and the aero-derivative gas turbines delivers an overall liquefaction efficiency that is expected to be best-in-class.

We believe that mid-scale LNG trains, using intelligently designed modules has the potential to offer a reduction in liquefaction unit cost compared to our first generation modularised LNG trains.

### QUICK FACTS

- The 2.5 mtpa LNG train concept is constructed using only five modules; each less than 4,000 tons in weight.
- Footprint is limited to only 220×60m by integrating pipe-racks and process modules into the train.
- Individual modules can be pre-commissioned. The compression systems are self-contained along with gas turbine, compressor, suction scrubbers, after-coolers and recycle valve.
- Delivers best-in-class efficiency and CO<sub>2</sub> emissions from a generic liquefaction process.
- Eliminates helper motors which reduces power needs and facilitates quick start-up without loss of valuable refrigerant.