

Gladstone LNG Project Fisherman's Landing

The **shared vision** of HQC and LNG Limited



Australian Gas: Global Gas Series: October 31 2011

Corporate Overview – ASX:LNG

October/November 2011

- ▶ **Market Cap:** ~ A\$ 90 million (267.7 million shares at A\$ 0.35/ share)
- ▶ **Capital Structure:**
 - Shares on issue (million) 267,699,015
 - Options on issue (million) 6,680,000
 - Performance rights (million) 2,250,000
- ▶ **Cash Reserves:** ~A\$ 17 million (as at 18 October, no debt)
- ▶ **Strategic Investments:** ~A\$ 14 million (as at 18 October) strategic shareholdings in ASX : MEL and OBL
- ▶ **Top 20 Shareholders:** ~ 60% ownership
- ▶ **Major Shareholders:**
 - HQC (19.89%)- wholly owned by CNPC
 - Copulos Group (10.10%)
 - Dart Energy Limited (5.37%)
- ▶ **Company Directors:**
 - Non-Executive Chairman:** Richard Beresford
 - Managing Director /Joint Chief Executive Officer:** Maurice Brand
 - Executive Director /Joint Chief Executive Officer:** Cathy Wang
 - Executive Director /Chief Financial Officer:** Norman Marshall
 - Executive Director /Chief Technical Officer:** Paul Bridgwood
 - Non-Executive Director:** Leanne Bond
 - Non-Executive Director:** Gavin Zhang

Who is China Huanqiu Contracting & Engineering Corporation (HQC)?

- ▶ Wholly owned by CNPC, with over 9,500 employees
- ▶ Technology focussed engineering, procurement, construction, consulting, R&D, manufacturing and project management group
- ▶ HQC has delivered more than 2,000 projects over its 50 years of operation
- ▶ Executed and delivered Guangdong LNG receiving terminal; Jiangsu LNG receiving terminal near Shanghai; Dalian LNG receiving terminal
- ▶ EPC contractor for the Tangshan LNG receiving terminal near Beijing
- ▶ EPC contractor for the Ansai LNG plant (500,000 tpa) in China using own technology

Who is China National Petroleum Corporation (CNPC)?

- ▶ China's largest oil (54% share) and gas (82% share) producer and supplier
- ▶ Top 5 global oil and gas company, with over 1.6 million employees
- ▶ Ranked 10 in revenue amongst 2010 Fortune Global 500 companies
- ▶ Oil and gas assets and interest in 29 countries and presence in almost 70 countries
- ▶ Businesses covering petroleum exploration & production, natural gas & pipelines, refining & marketing, oilfield services, engineering construction, equipment manufacturing, R&D, capital management, finance and insurance services

LNGL Business Model

- ▶ Identify, develop and retain ownership of mid scale LNG plants in the 1 to 3 mtpa range, e.g. 3 mtpa Gladstone LNG Project Fisherman's Landing
- ▶ Develop and patent leading edge LNG technology such as the OSMR liquefaction process and boil off gas technology, e.g. License and receive fees from the Gladstone LNG Project Fisherman's Landing
- ▶ Leverage gas supply into LNG Project opportunities, e.g. strategic shareholding in Metgasco Limited
- ▶ Leverage the global capabilities of HQC , e.g. identify midscale LNG global projects with HQC

Gladstone LNG Project Fisherman's Landing

Project Description

- ▶ 3 mtpa LNG plant to be located on Fisherman's Landing, an existing reclaimed site on the mainland, Port of Gladstone
- ▶ Project utilises existing Berth #5 and other port infrastructure
- ▶ Key approvals and licences in place
- ▶ 3.8 mtpa LNG plant nameplate capacity (3 mtpa is the guaranteed capacity)
- ▶ HQC supporting gas supply and delivery plan
- ▶ HQC finalising EPC proposal for the LNG Plant; CNPC (or affiliate) to potentially be LNG off-taker
- ▶ Project financing being developed with HQC for the first LNG train

Project Schedule Targets

- ▶ Finalise gas supply arrangements
- ▶ Commence construction in 2012
- ▶ 30 month construction schedule
- ▶ First LNG export in 2014/2015

Gladstone LNG Project Fisherman's Landing



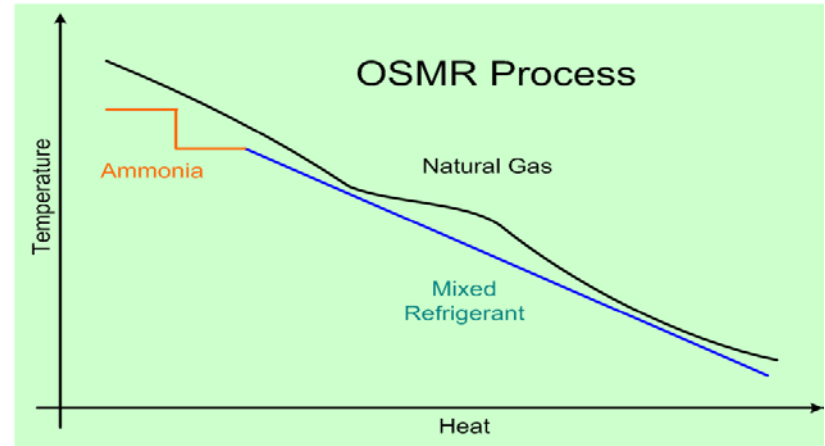
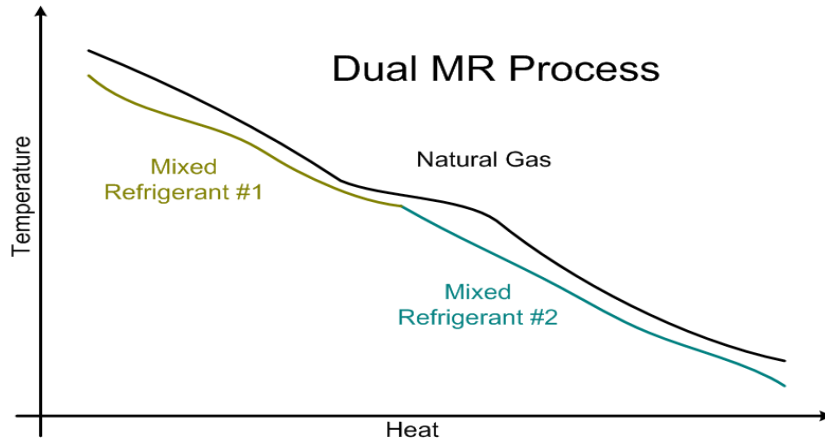
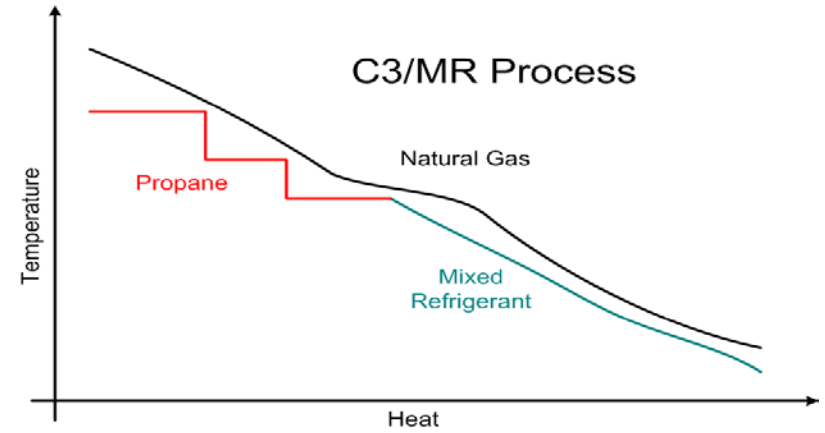
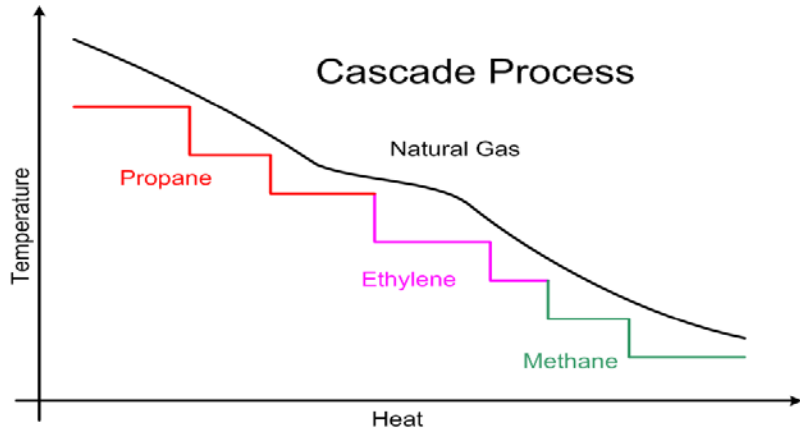
Gladstone LNG Project Fisherman's Landing



Gladstone LNG Project Fisherman's Landing



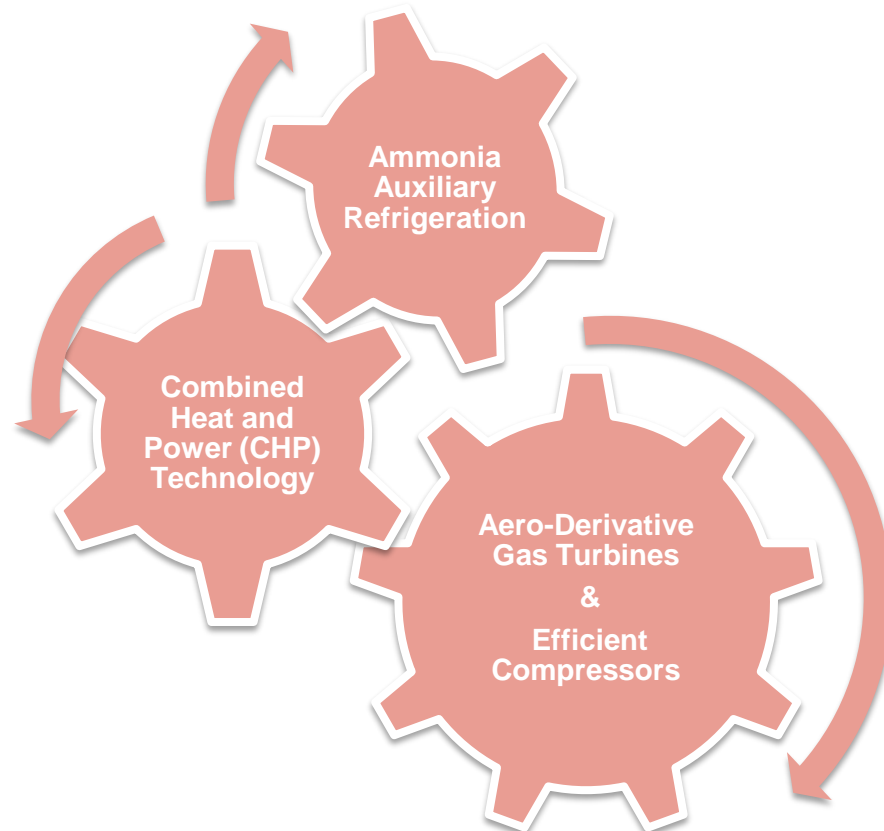
Liquefaction Technology Comparison



LNG Liquefaction Technologies

- ▶ **Large Scale LNG Plants (>3 mtpa)**
 - ▶ ConocoPhillips – Cascade Process
 - ▶ APCI – C3/MR Process
- ▶ **Mid Scale LNG Plants (1-3 mtpa)**
 - ▶ LNG Limited - **OSMR**[®] Process, but option to upscale >mtpa
- ▶ **Small Scale LNG Plants (<1 mtpa)**
 - ▶ Black & Veatch – PRICO – SMR Process
 - ▶ Hamworthy - N² Expansion

Main features of the OSMR[®] Process



The OSMR[®] LNG plant fuel gas usage is < 7% , for a low inert - methane rich Feed gas. This is 30% better than conventional LNG plants.

The OSMR[®] process incorporates three separately proven features.

1. Aero-derivative Gas Turbines

- ▶ Improves fuel efficiency of gas turbine by 25%.
- ▶ No gear box, no helper motor, single-stage (no inter-stage cooler/scrubber).
- ▶ Smaller foot print and weight.
- ▶ Higher reliability and availability.
- ▶ Compact modular design reduces installation and commissioning time and ensures ease of maintenance.
- ▶ Aero-derivatives used in Darwin LNG Project in Australia and proposed for Floating LNG projects.

For OSMR 1.5 mtpa LNG Plant:

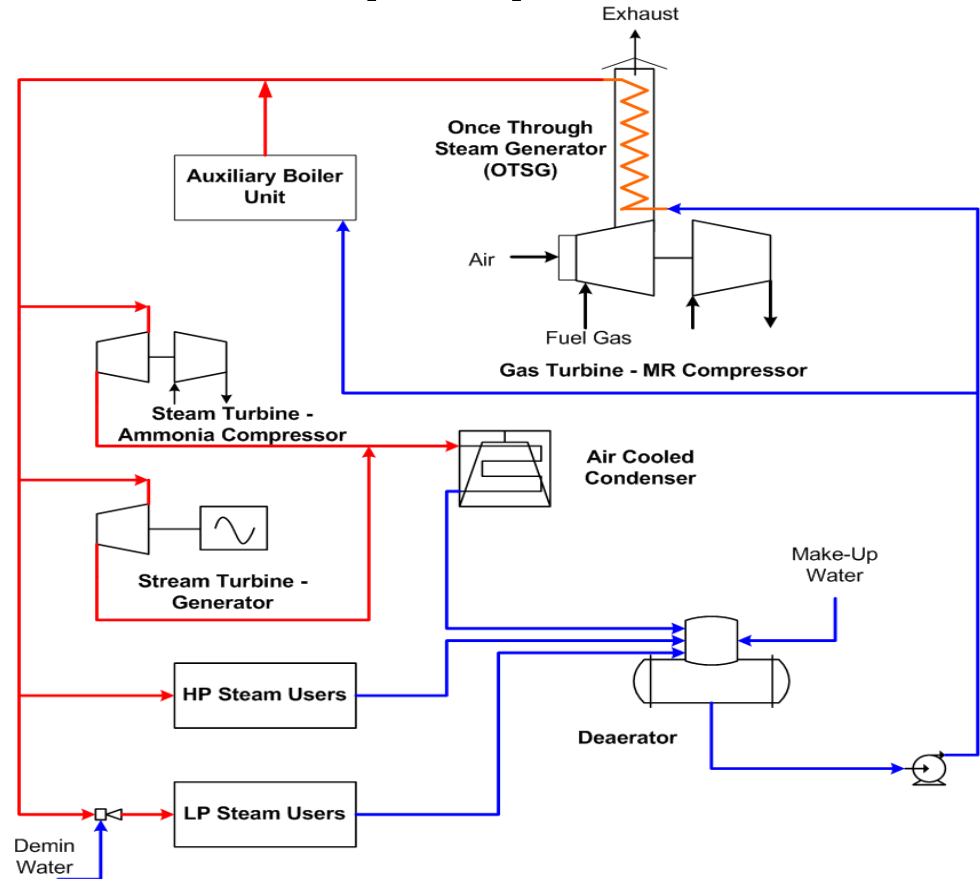
- Gas Turbine: 2 x GE PGT25+G4 (site rating: 33.5 MW)
- Compressor : 2 x GE BCL805 (polytrophic efficiency: 87.7%)

2. Combined Heat and Power (CHP) Plant

- ▶ Waste heat recovery using a OTSG from Gas Turbine exhausts.
- ▶ Steam Turbine drivers for Ammonia Refrigeration Compressors.
- ▶ Steam Turbine driven power generation.
- ▶ Process Steam for heating:
 - ▶ Amine re-boiler
 - ▶ Mol. Sieve regen gas heater
 - ▶ Fuel gas heater
- ▶ Auxiliary boiler - End Flash Gas utilized as fuel.

Steam Turbines for OSMR 1.5 mtpa LNG Plant:

- Ammonia Compressor: 2 x 7.5 MW
- Power Generator: 1 x 7.5 MWe



CHP plants have been used in the Power industry for several decades

3. Ammonia Auxiliary Refrigeration

- ▶ Ammonia is commonly used for
 - ▶ Industrial and commercial refrigeration
 - ▶ Direct inlet air cooling of gas turbines in power industry
- ▶ In the OSMR[®] Process
 - ▶ Refrigeration power is provided by CHP plant so is substantially **“free”**
 - ▶ Cools MR and feed gas streams to increase LNG production by 20% - substantially **“free”**
 - ▶ Direct Cooling of GT inlet air to improve GT power output by 15%

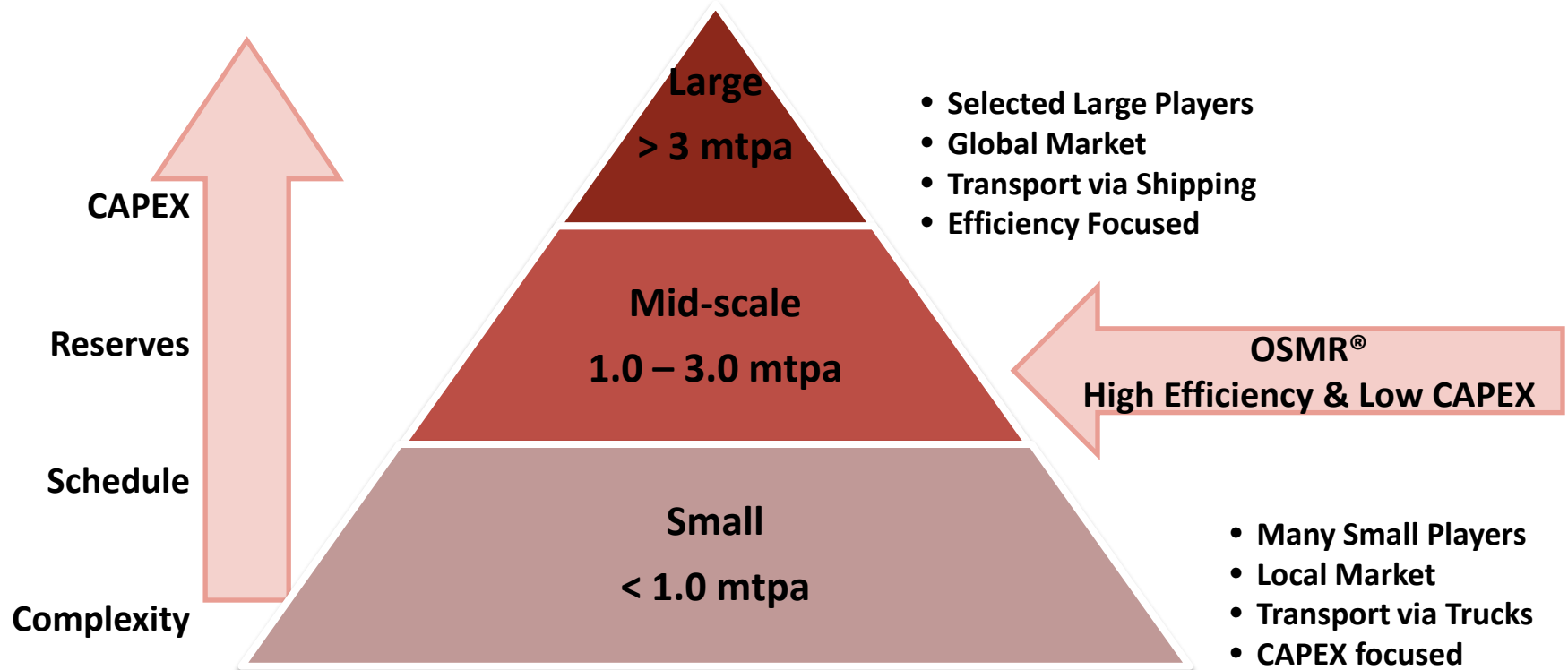
Why Ammonia?

- ▶ Higher latent heat allows smaller flow rates:

	Ammonia	Propane
Mass Flow Ratio	1.0	1.90
Volume Flow Ratio	1.0	1.30
Power Input	1.0	1.20

- ▶ Low swept volume in compressors, small piping and pumps.
- ▶ Higher heat transfer coefficients (twice as propane), reduces Cold Box and Condenser sizes.
- ▶ At $-5^{\circ}\text{C}/45^{\circ}\text{C}$, Ammonia has a higher Compression Co-efficient of Performance than Propane, requiring 20% less power
- ▶ Existing ammonia facility at Fisherman's Landing

LNG Plant Scale Economics



At mid-scale, the best features of the large and small scale LNG plants can be implemented.

Gladstone LNG Project Fisherman's Landing vs Gladstone Curtis Island CSG-LNG Projects

LNG Plant Capex and \$/tpa (2 trains)

	QCLNG	GLNG	APLNG	LNG Ltd
Capacity (mtpa)	8.5	7.8	9.0	3.8
CAPEX (Billion US\$)	10.2	8.8	10.0	1.7
Cost (Billion \$/tpa)	1.20	1.12	1.11	0.45

Source : Energy Quest Report: *Australian Coal Seam Gas 2011: from Well to Wharf* (Aug, 2011) and LNG Ltd estimates October 2011.

Greenhouse Gas Emissions Intensity (tonne CO₂ / tonne LNG)

	QCLNG	GLNG	APLNG	LNG Ltd
Process/Power Plant CO ₂	n/a	0.313	0.279	0.178
Feed Gas CO ₂	n/a	0.034	0.032	0.035
Total Plant CO ₂ Emissions	0.238	0.347	0.311	0.213
Compared to FL-LNG	1.12	1.63	1.46	1.00

Source : Project Environment Impact Study submissions to EPA.

Fuel Gas Consumption (tonne of CH₄/ tonne LNG)

	QCLNG	GLNG	APLNG	LNG Ltd
Fuel Gas Consumption (t CH ₄ / t LNG)	n/a	0.101	0.091	0.063
Compared to FL-LNG	-	1.60	1.43	1.00

Source : Estimated based of Turbine Emissions from Project Environment Impact Studies.

Patent Applications Submitted



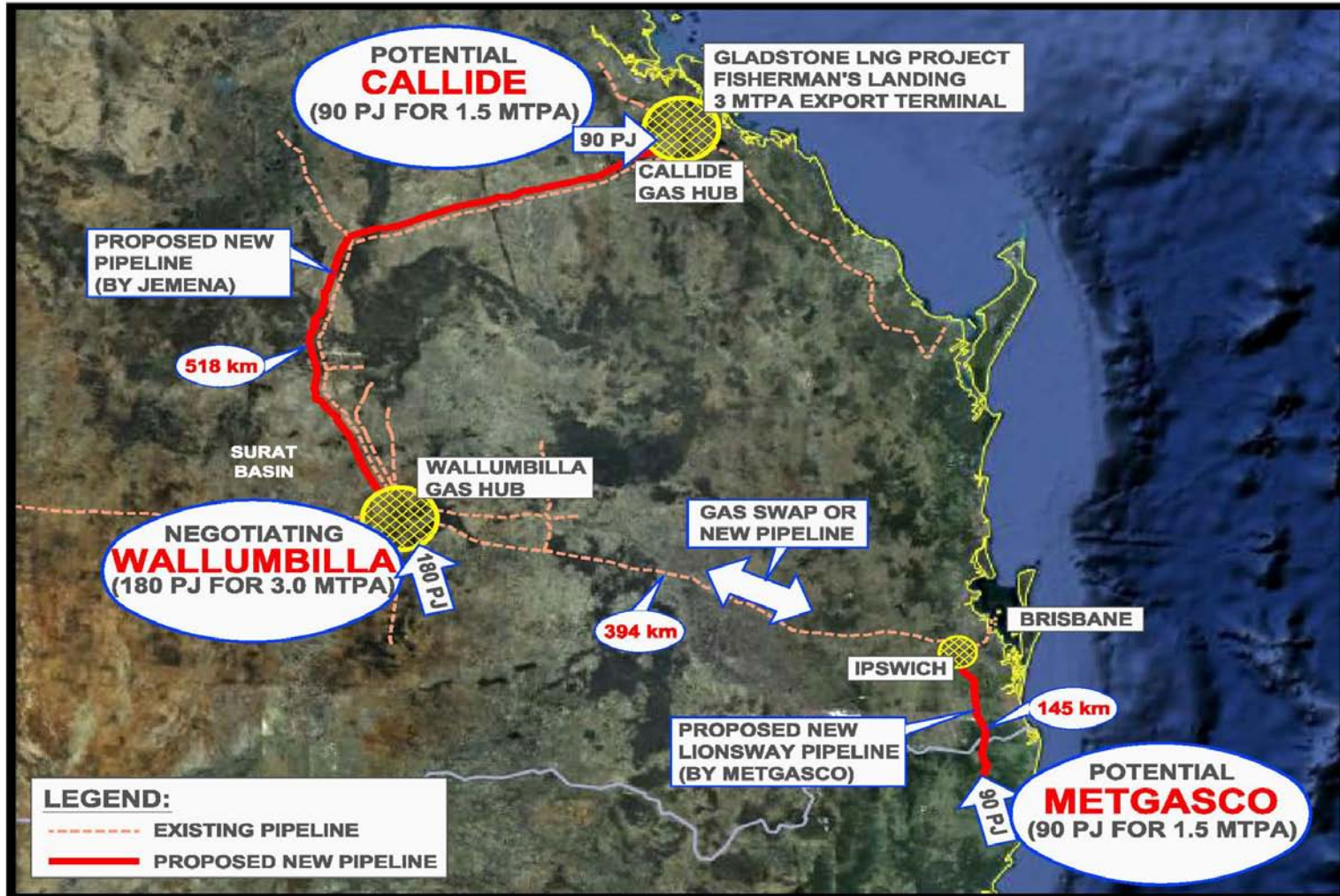
Patents Granted

OSMR[®] Process patents have been granted in Australia and OAPI*

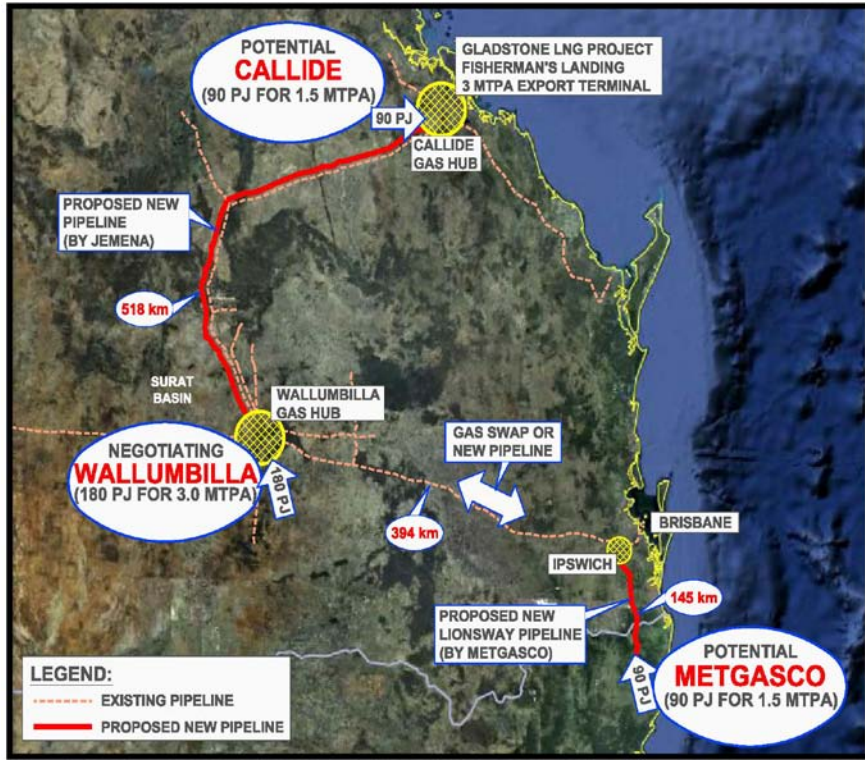
BOG Treatment Process patents have been granted in China, OAPI* and South Africa

*OAPI is **African Intellectual Property Organisation** member states include Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Cote d'Ivoire, Equatorial Guinea, Gabon, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal and Togo

Gas Supply and Delivery Plan

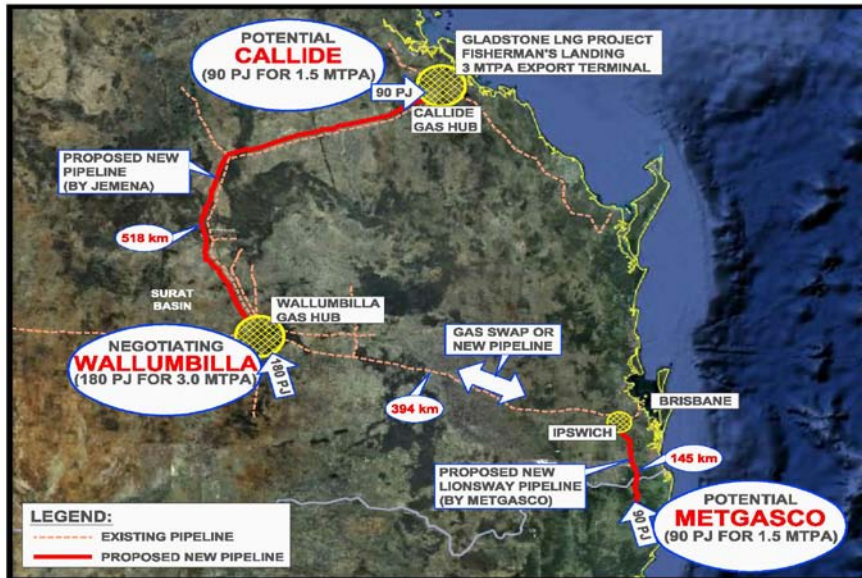


Gas Hubs: Wallumbilla Gas Hub



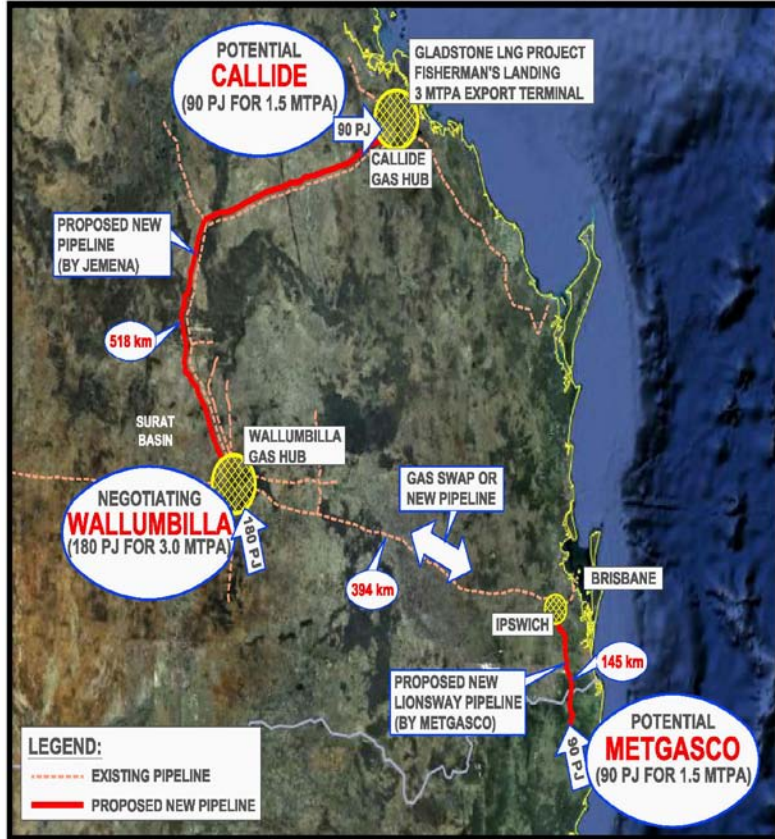
- ▶ Existing gas hub for gas delivery from Cooper, Eromanga and Surat Basins
- ▶ Proposed gas hub for future gas supply from Gunnedah and Clarence Moreton basins
- ▶ Accessible gas hub for developing gas supply companies
- ▶ Existing Jemena gas pipeline can be expanded to deliver 180 PJ/pa (3mtpa) to Gladstone in 2014/2015

Gas Hubs: Callide Gas Hub



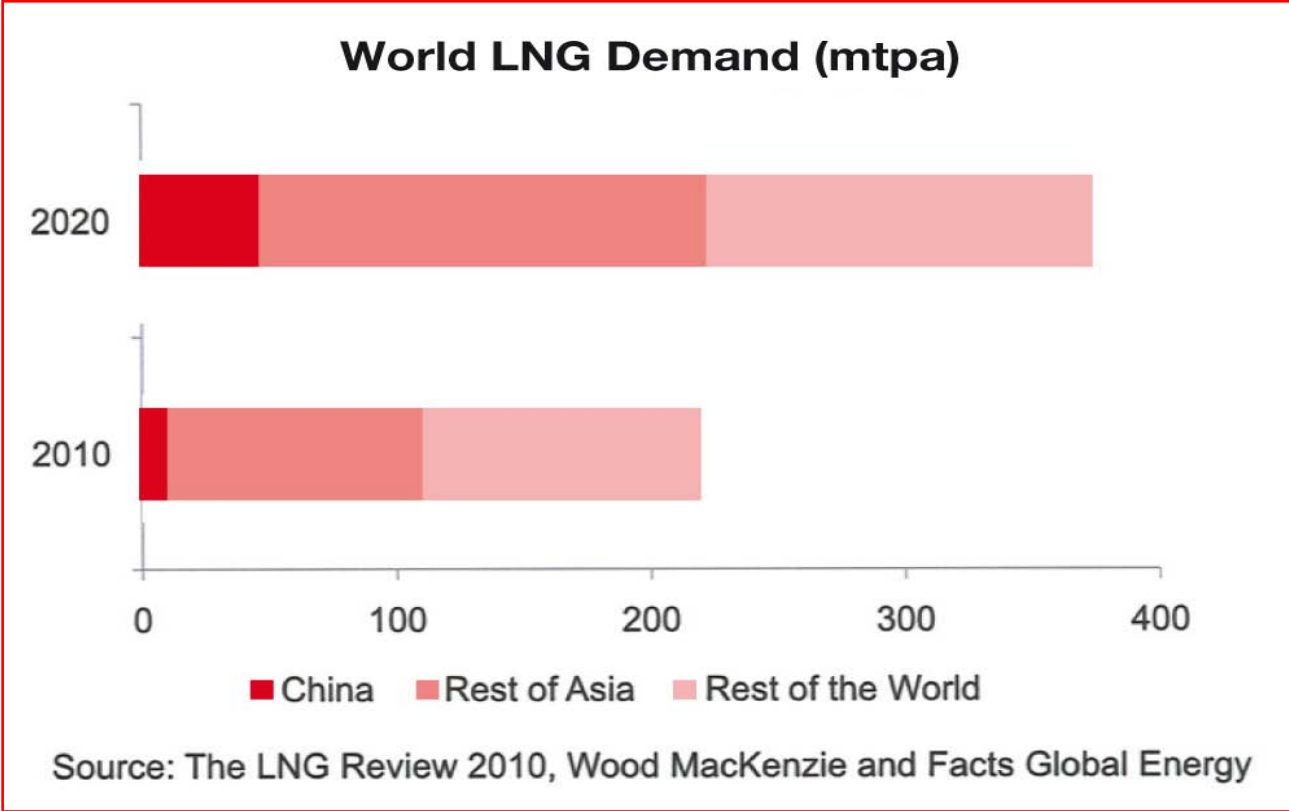
- ▶ Delivery point for existing Jemena to Gladstone gas pipeline
- ▶ Proposed delivery point for six new pipelines
- ▶ Provides an access point for short and long term gas supply

Gas Hubs: Ipswich Gas Hub



- ▶ Metgasco has plans to supply gas to Ipswich (near Brisbane)
- ▶ Gas supply to Ipswich may be delivered to Gladstone via pipelines or able to be swapped with existing gas producers in order to allow first LNG in 2014/5
- ▶ Metgasco has adequate 3P reserves for at least one 1.5 mtpa LNG Train (2,542 PJ 3P reserves)
- ▶ Metgasco has the largest uncontracted 3P reserve base on the east coast of Australia
- ▶ Metgasco gas reserves compliments other gas supply options
- ▶ LNG Ltd and Metgasco entered into a MOU to undertake a joint review of gas supply to the Gladstone LNG Project Fisherman's Landing
- ▶ LNG LTD is the largest shareholder in Metgasco

LNG Outlook: Asia drives demand



In Conclusion

- ▶ LNG Limited (LNGL) is an Australian mid-scale LNG developer and Technology provider
- ▶ LNGL, together with HQC (subject to finalising gas supply) plan to reach FID for Gladstone LNG Project Fisherman's Landing in 2012 and to produce LNG for export in the 2014/2015 fiscal year
- ▶ The Capex for the downstream LNG project is ~ US\$450 tpa compared with the Curtis Island project of over US\$ 1000 tpa
- ▶ LNGL holds the patented OSMR[®] LNG process technology that offers both low Capex **and** high efficiency
- ▶ LNGL, HQC and its strategic partners, are committed to deliver the Gladstone LNG Project Fisherman's Landing to showcase all its partners' capabilities



Our Logo:

We chose the red ant as our logo because it is distinctive and bold and represents strength, energy, hard work and perseverance – characteristics we aim to make trademarks of our corporate culture.

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All references to dollars, cents or \$ in this document is a reference to Australian Dollars, unless otherwise stated.

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