

# Liquefied Natural Gas Limited



**ASX RELEASE – COMPANY UPDATE**  
**20 May 2013**

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- Company Value Initiatives

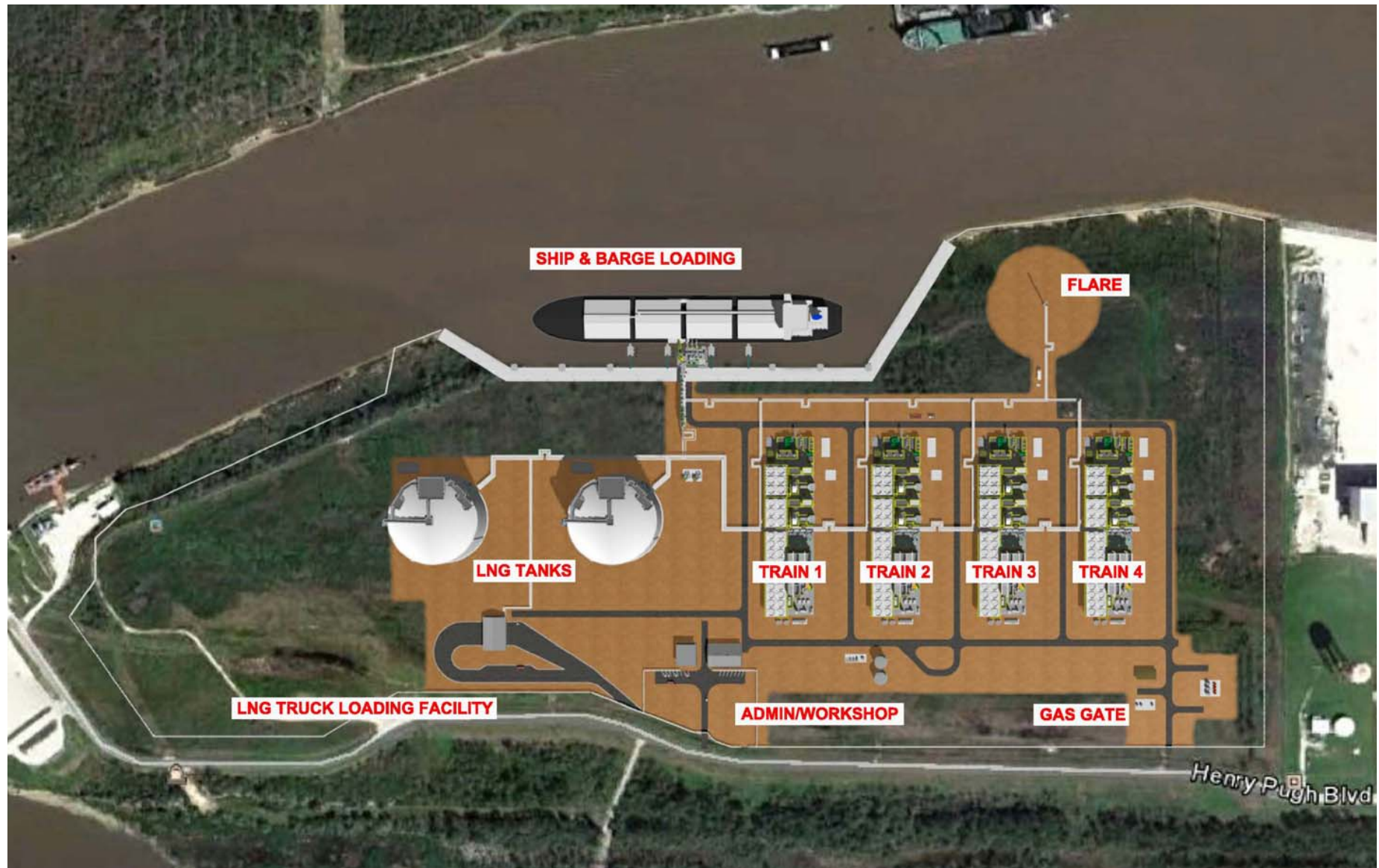
# CORPORATE STATUS

- ▶ Australian Stock Exchange Code: LNG
- ▶ Shares on Issue: 267 million
- ▶ Market Capitalisation: \$ 53.5 million (at \$0.20/share)
- ▶ Cash Position: (17 May 2013) \$ 3.0 million
- ▶ Metgasco Investment: (MV 17 May 2013) \$ 0.7 million (at \$0.062/share)
- ▶ Top 5 Shareholders: 42.9% ownership
- ▶ Director's Interests: 7.96%
- ▶ Major Shareholders:
  - ▶ HQC (CNPC Technology and EPC arm) 19.89%
  - ▶ Copulos Group 9.94%
  - ▶ Dart Energy Limited 5.17%

# CORPORATE STRATEGY

- ▶ **Develop and implement mid scale LNG projects in the global market using own OSMR® liquefaction technology and marketing of OSMR® to third party LNG projects.**
- ▶ **Two LNG Export Projects being progressed:**
  - ▶ Magnolia LNG (Louisiana, United States)
  - ▶ Fisherman's Landing LNG (Gladstone, Australia)
- ▶ **Optimised Single Mixed Refrigerant - OSMR® LNG Process:**
  - ▶ Lower capital cost and improved energy efficiency
  - ▶ Shorter development and construction schedule
  - ▶ Lower carbon emissions and lower overall environmental impact
  - ▶ Patent applications for OSMR® and Boil-off gas handling already granted in many jurisdictions

# Magnolia LNG Project (US)

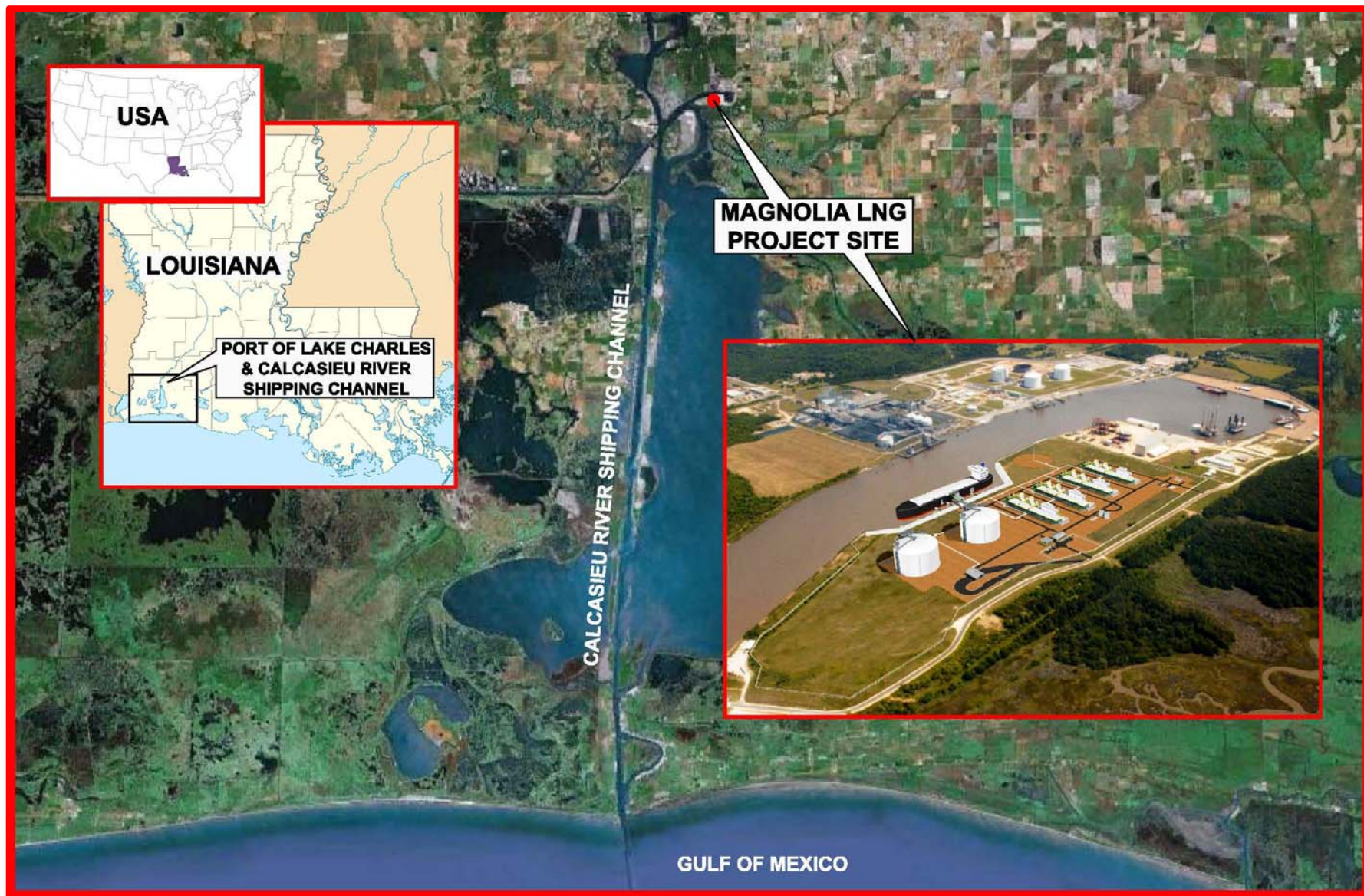


Conceptual Layout

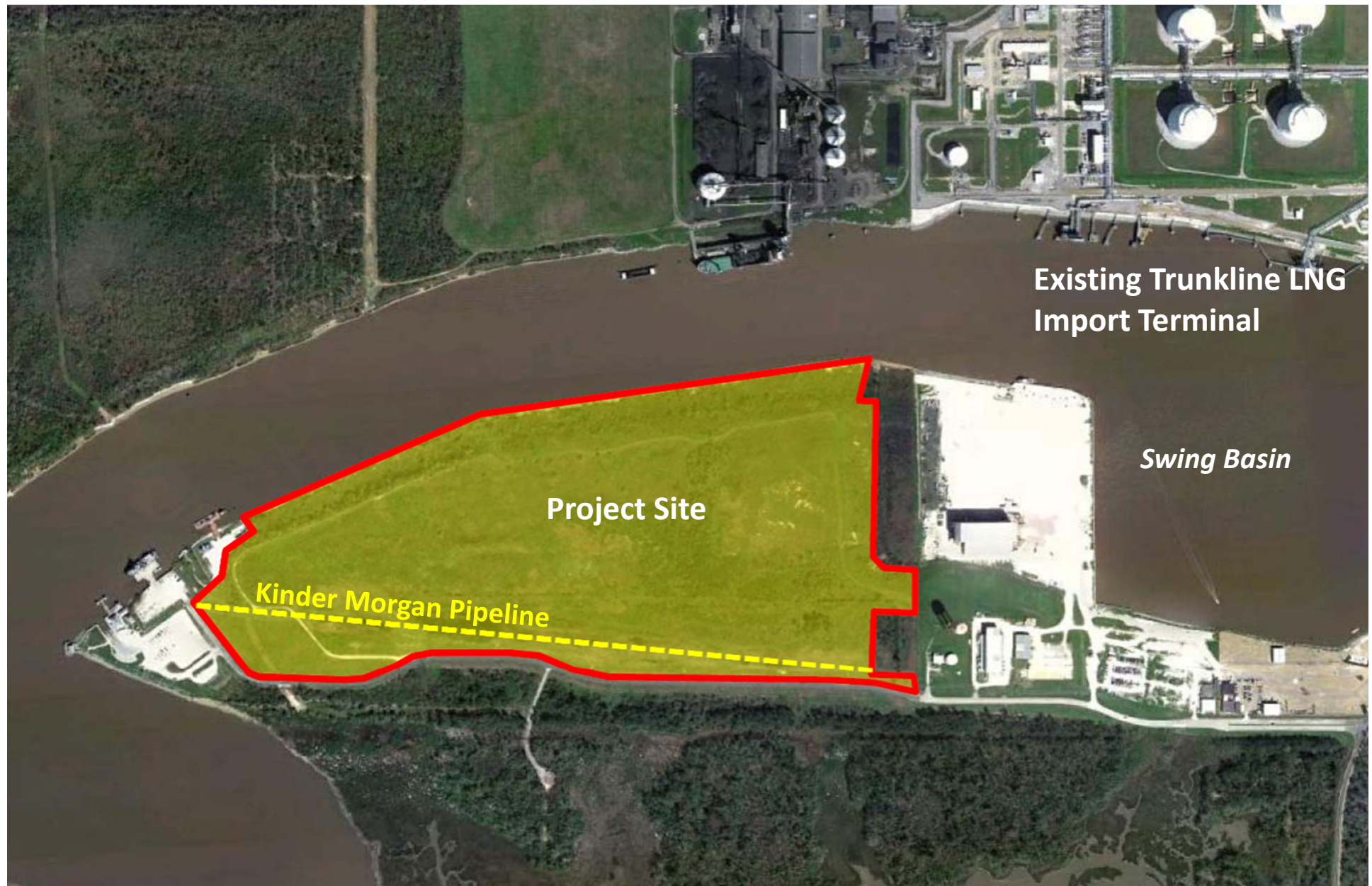
# Project Site Description

- ▶ **The 108 acre site is PLC Tract 475 Industrial Canal off the Calcasieu Shipping Channel and opposite existing Trunkline LNG Import Terminal.**
- ▶ **The site is accessible by road and is near the intersection of Henry Pugh Blvd and Big Lake Road. Major fabrication facilities nearby.**
- ▶ **The Project site is well positioned to provide access for the loading of:**
  - ▶ **LNG Ships for export, which have access to deep water via the main channel and industrial canal**
  - ▶ **LNG Barges for marine distribution to mini-LNG refuelling stations**
  - ▶ **LNG Trucks for potential road distribution to LNG refuelling stations within Louisiana and other surrounding US states**
- ▶ **Lease term: up to 70 years (30 year base + 4 x 10 year extensions).**
- ▶ **The site is located within 3 miles of three major currently underutilized pipeline systems: Kinder Morgan, Trunkline and Gulf South.**
- ▶ **No environmental, community, construction and/or operational issues are foreseen.**

# Project Location



# Project Site



# Project Status

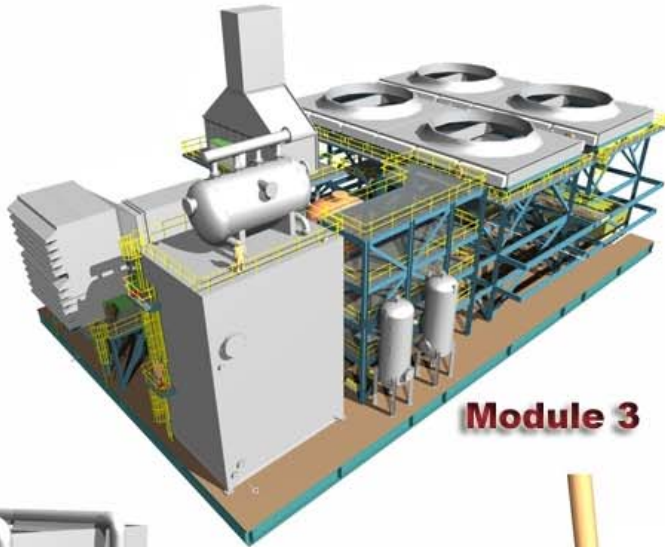
- ▶ **Construct an LNG facility of 8 mtpa (4 x 2 mtpa LNG Trains), using LNG Limited's low cost and highly efficient patented OSMR® technology**
- ▶ **Industrial Land with direct canal access at Port of Lake Charles**
- ▶ **Exclusive Option to Lease for up to 70 years signed in March 2013**
- ▶ **Large gas resource available with extensive existing pipeline infrastructure**
- ▶ **Gas suppliers flexible on gas feedstock pricing structures**
- ▶ **Gas will be treated, liquefied and stored on-site in LNG tanks, enabling LNG to be loaded onto LNG ships, barges and trucks**
- ▶ **US DOE authorisation received in Feb 2013 for exports to Free Trade Agreement countries up to 4 mtpa**
- ▶ **US FERC Pre-filing accepted in March 2013**
- ▶ **Draft Tolling Agreements submitted to several LNG buyers with competitive commercial structure. Current discussions exceed 4mtpa**
- ▶ **First LNG planned for late 2017**

# Conceptual Plant Design

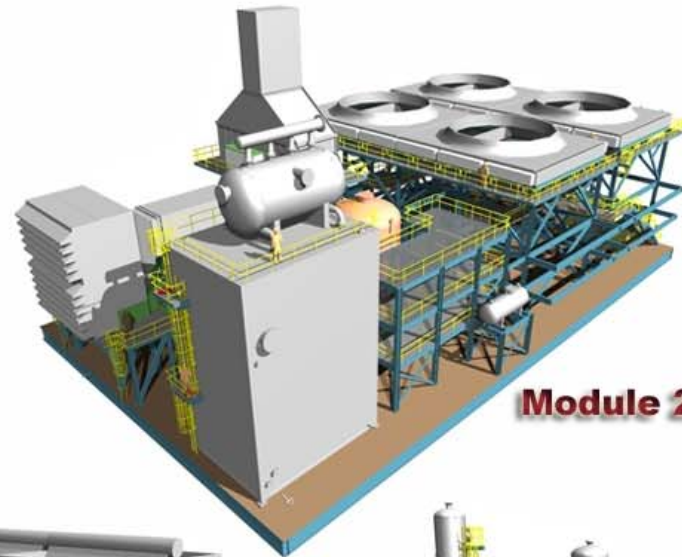
- ▶ **The conceptual plant design for the Magnolia LNG Project utilizes relevant parts of LNG Limited's Fisherman's Landing LNG Project in the Port of Gladstone, Queensland, Australia**
- ▶ **The main features are:**
  - ▶ 4 x LNG Trains - each LNG Train 2.0 mtpa (nameplate), 1.7 mtpa (guaranteed)
  - ▶ 2 x 160,000m<sup>3</sup> full containment LNG storage tanks (standard tank design, available from multiple suppliers)
  - ▶ Ship loading facilities capable for max. 180,000m<sup>3</sup> LNG ships
  - ▶ Barge and trucking loading facilities
  - ▶ Process and marine flare
  - ▶ Buildings: control room/administration/workshop
  - ▶ Supporting infrastructure and utilities
  - ▶ Gas gate station for incoming feed gas

# Modular LNG Plant

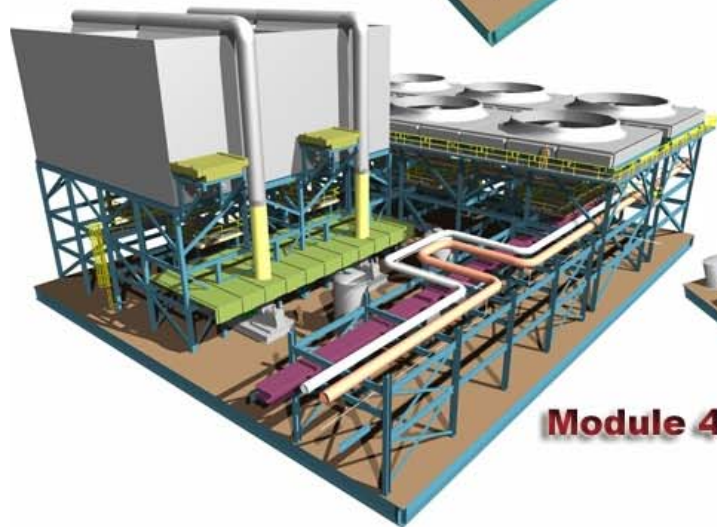
(2 mtpa LNG Train – 5 Modules)



**Module 3**



**Module 2**



**Module 4**



**Module 5**



**Module 1**

# Gas Supply

- ▶ Shale gas - gas trapped within shale formations (fine-grained sedimentary rocks containing rich sources of petroleum and gas)
- ▶ INTEK Report commissioned by US Energy Information Administration Report identified several shale gas plays ~ 750 trillion cubic feet

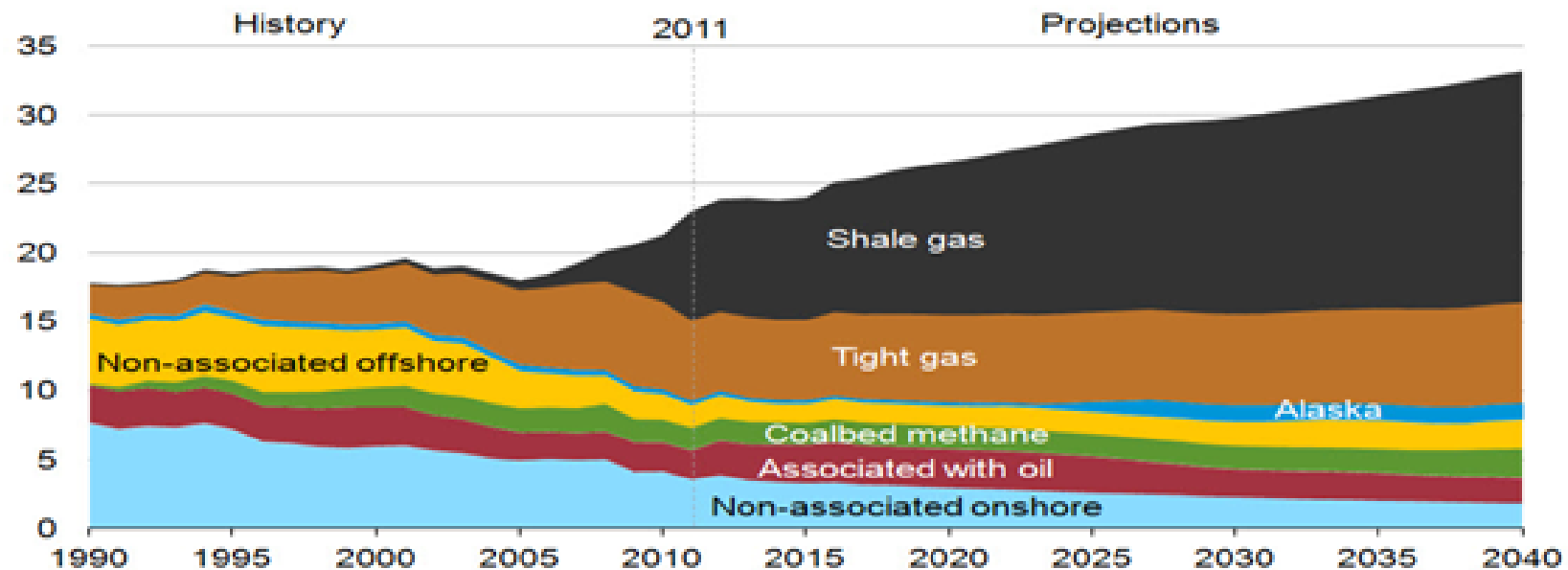


Source: Energy Information Administration based on data from various published studies.  
Updated: May 9, 2011

# Shale Gas Production

- ▶ Significant growth in shale gas production as graphed below (“Annual Energy Outlook 2013 Early Release”, Energy Information Administration)
- ▶ Magnolia LNG Project requires feed-gas volumes of 0.1 TCF per year (2 TCF over 20 years) for each 2 mtpa LNG train

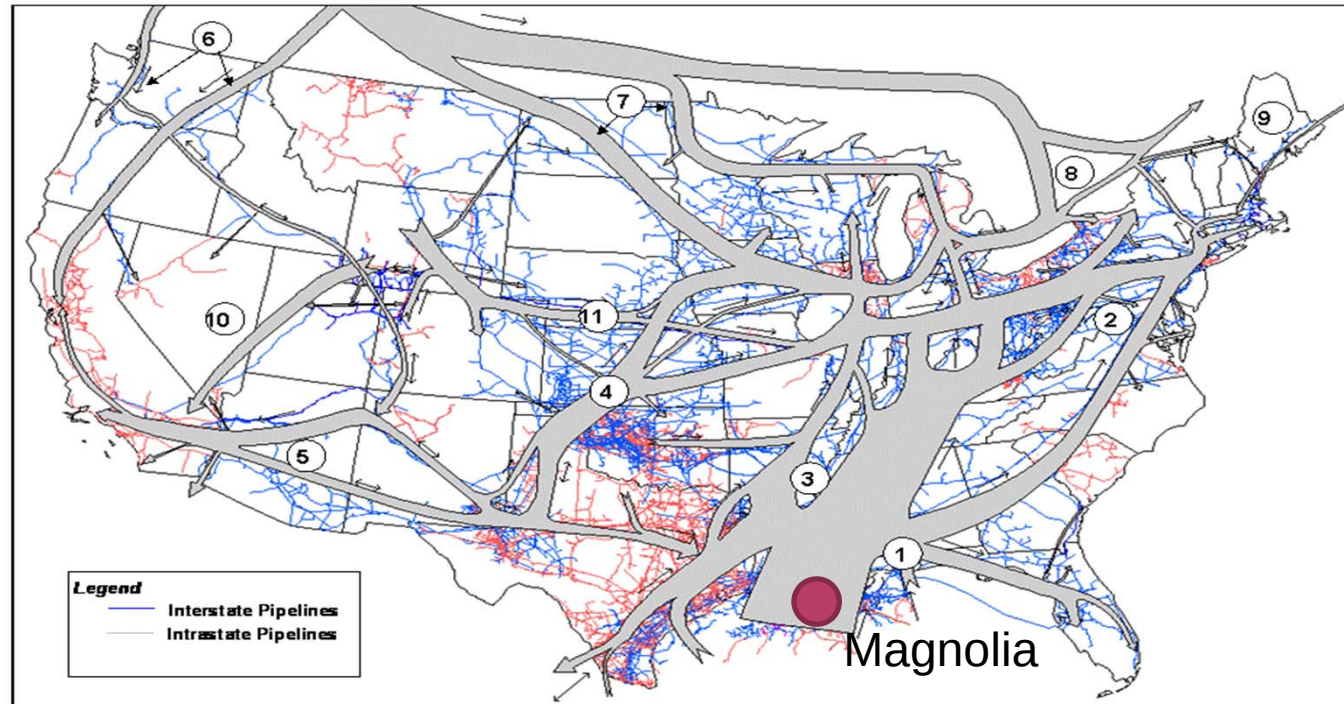
U.S. dry natural gas production  
trillion cubic feet



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2013 Early Release*

# Major Gas Corridors

- ▶ 11 major transportation gas “corridors”(illustrated below)
- ▶ This also demonstrates the capacity put in place by industry and government for the quantities of LNG that were expected to be imported into the US Gulf region



Source: Energy Information Administration, Office of Oil and Gas, Natural Gas Division, GasTran Gas Transportation Information System.

The EIA has determined that the informational map displays here do not raise security concerns, based on the application of the Federal Geographic Data Committee's *Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns*.

# Project Permits and Approvals

The five main Federal agencies that regulate LNG Projects in the USA are:

- ▶ **US Dept of Energy (DOE)** - *authorisation received for up to 4 mtpa*

Long-term permits to export LNG issued by the DOE

- ▶ **Federal Energy Regulatory Commission (FERC)** - *pre-filing granted*

Authorization from FERC for the construction & operation of the facility, and will include a comprehensive analysis of the environmental, operational & safety implications of the Project.

Air Quality Permit, issued by the Louisiana Department of Environmental Quality, as detailed under the Clean Air Act

- ▶ **US Dept of Transportation (DOT)** – *in progress*

- ▶ **US Coast Guard (USCG)** - *in progress*

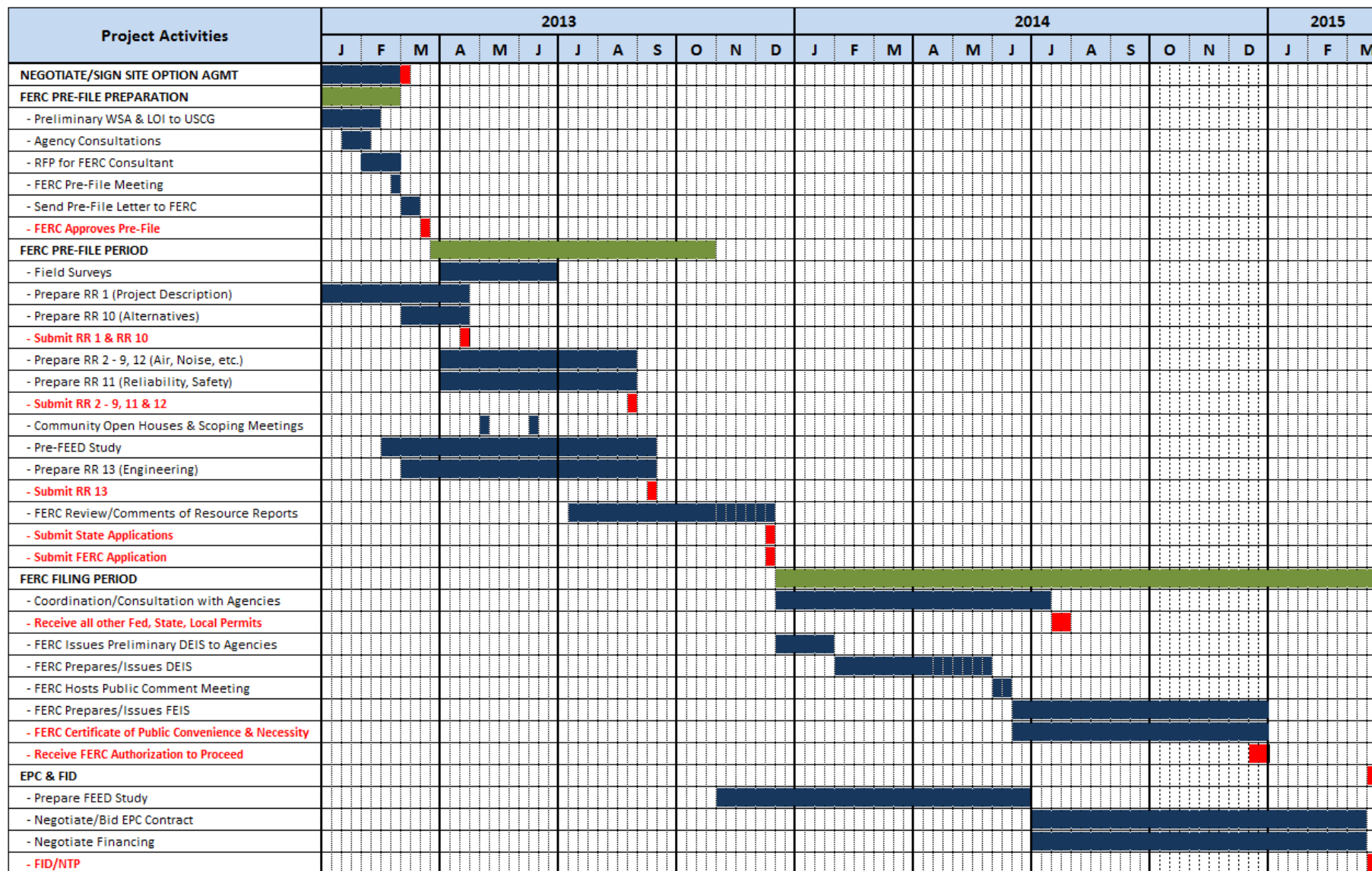
Permit from US Army Corps of Engineers for discharge of dredged and fill material, under the Clean Water Act

- ▶ **Maritime Administration (MARAD) of DOT** - *in progress*

Certification of compliance with the water quality standards (Clean Water Act)

A Coastal Use Permit issued by the Louisiana Department of Natural Resources

# Indicative Project Schedule to FID



10-May-2013

# Magnolia LNG Project- Outlook and Objectives

- ▶ **Tolling Partners**

Draft Tolling Agreement Term Sheets have been submitted to several LNG buyers with a competitive commercial structure

- ▶ **Tolling Arrangement:**

Tolling party responsible for gas delivery, LNG marketing and sales and LNG shipping

Tolling party pays the Magnolia LNG Project a fixed monthly capacity fee, plus a process fee for all LNG production, storage and loading

- ▶ **Approval Process**

Continue to progress the FERC environmental and other approval processes

- ▶ **Project Partners**

Negotiations are well advanced with cornerstone equity investors

- ▶ **Project Funding**

To finalise funding for the Magnolia LNG Project through to a final investment decision

# Strategic Features

- ▶ **The Project site is:**
  - ▶ Located in an existing LNG shipping channel and opposite the existing Trunkline LNG Import Terminal
  - ▶ Accessible by road and is near the intersection of Henry Pugh Blvd and Big Lake Road
  - ▶ Located within 3 miles of three major gas pipeline systems: Kinder Morgan, Trunkline and Gulf South
  - ▶ Extensive US gas pipeline network provides access to substantial US gas resources
  - ▶ Located close to major fabrication facilities
- ▶ **The Project site is well positioned to provide access for the loading of:**
  - ▶ LNG Ships for export, which have access to deep water via the main channel and industrial canal
  - ▶ LNG Barges for marine distribution to LNG refuelling stations
  - ▶ LNG Trucks for potential road distribution to LNG refuelling stations within Louisiana and other surrounding US states
- ▶ **No environmental, community, construction and/or operational issues are foreseen**

# Fisherman's Landing LNG Project (Australia)



# LNG Project Site



# Project Status

- ▶ **Project suspended in March 2010 when Shell/Petro China make take over offer for Arrow Energy Ltd. Take over completed in July 2010**
- ▶ **In July 2011, CNPC subsidiary, HQC invested \$20.2 million at \$0.378 cents/share into LNG Limited to take a 19.9% shareholding**
- ▶ **In January 2012, LNG Limited appointed HQC to update EPC FEED based on module design for a 1.5 mtpa (guaranteed) LNG train**
- ▶ **In August 2012, HQC's sister company, PetroChina executed a Tolling Agreement Letter of Intent, with LNG Limited, for gas supply to the Fisherman's Landing LNG Project**
- ▶ **In November 2012, PetroChina purchased Molopo Energy gas assets for \$42 million to supply to the Fisherman's Landing LNG Project**
- ▶ **PetroChina Australia and the Company continue to co-operate, under the Letter of Intent, to secure gas for the Fisherman's Landing LNG Project**
- ▶ **LNG Limited, in its own right, is continuing to directly pursue other potential gas supply sources, including discussions with WestSide Corporation**

# Fisherman's Landing LNG Project Path Forward

## ▶ **Gas Supply**

LNG Limited's major focus remains to secure adequate gas supply for the first LNG Train either through the PetroChina Australia Letter of Intent and/or directly under Gas Sale Agreements/Tolling Agreements with third parties

## ▶ **Lease Agreement**

Satisfy Gladstone Ports Corporation Limited's conditions to allow the Agreement for Lease over the Fisherman's Landing LNG Project site to be extended

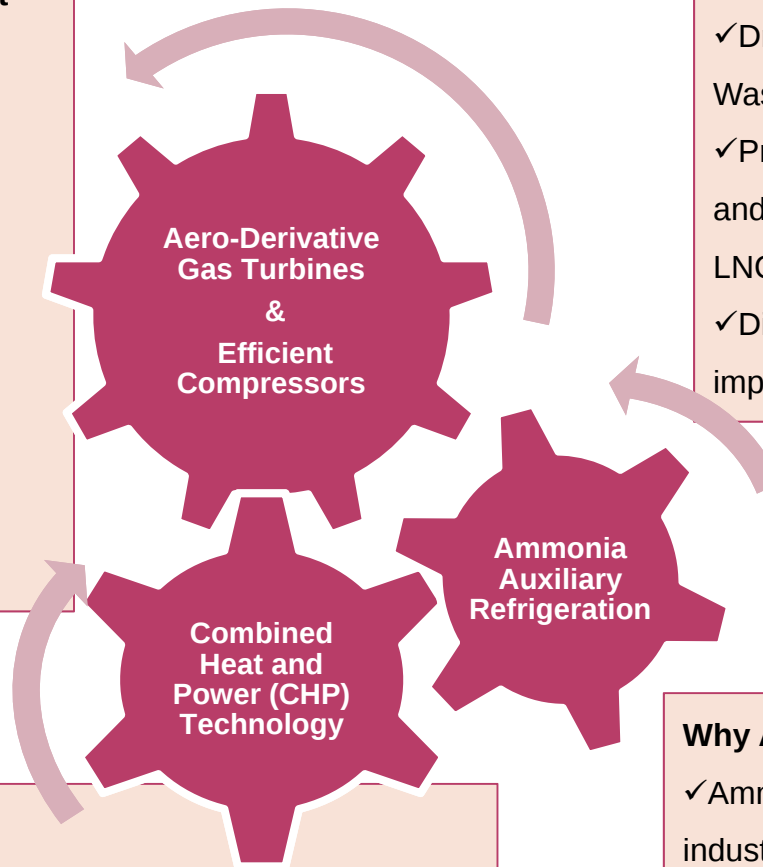
## ▶ **EPC Contract**

Ongoing work, with HQC to finalise a fixed price engineering, procurement and construction contract

# Features of OSMR<sup>®</sup> LNG Technology

## Aero Derivative Gas Turbines Efficient Compressors

- ✓ Better fuel efficiency compared to Industrial Turbines.
- ✓ Higher reliability and availability.
- ✓ Smaller foot print and weight.
- ✓ No gear box, no helper motor, single-stage (no inter-stage cooler/scrubber).
- ✓ Compact modular design reduces installation and commissioning time and ensures ease of maintenance.



## Ammonia Refrigeration Plant

- ✓ Driven by Steam Turbines from Waste heat powered CHP plant.
- ✓ Pre-cools single mixed refrigerant and feed gas streams to increase LNG production by 20%.
- ✓ Direct Cooling of GT inlet air to improve GT power output by 15%.

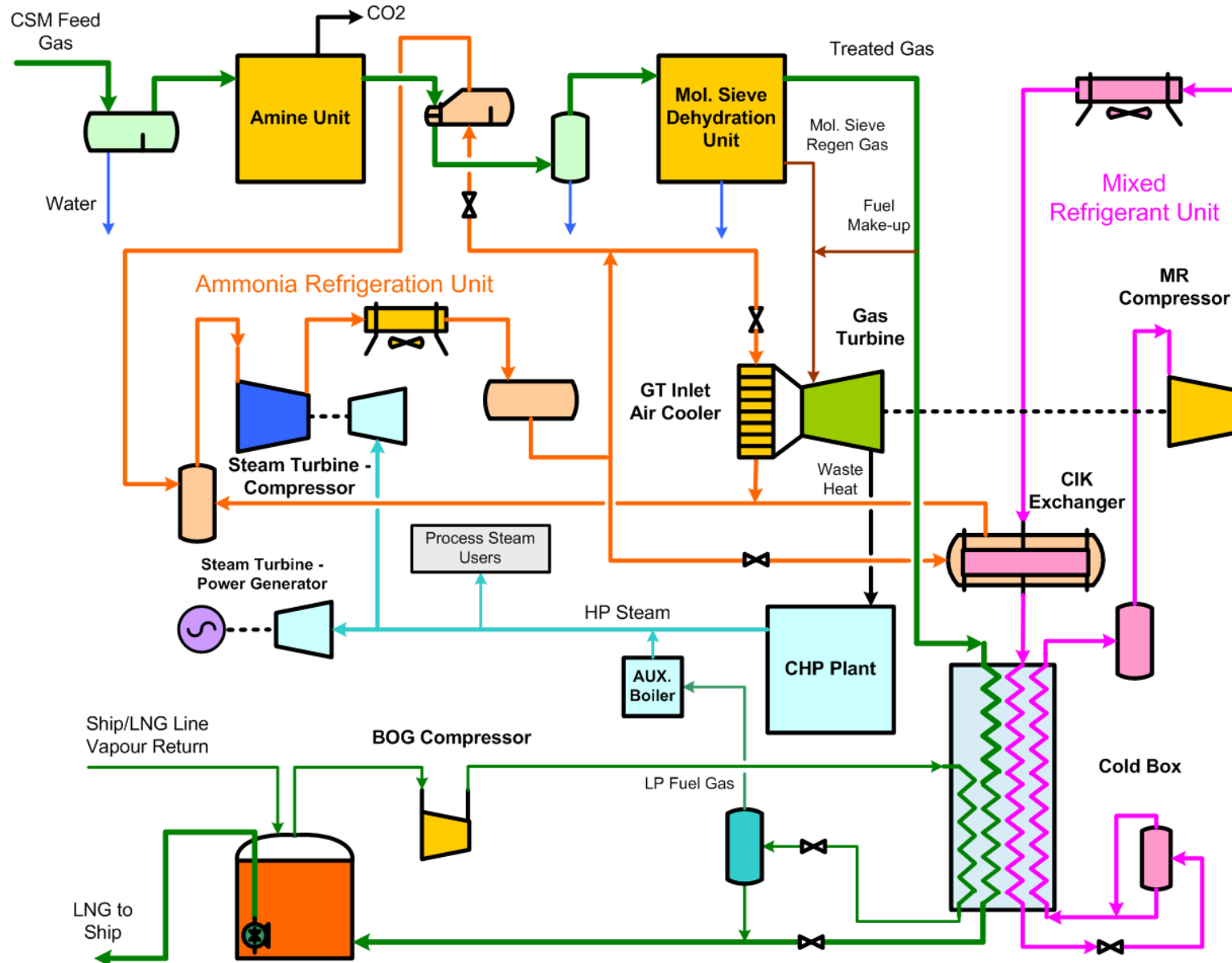
## Combined Heat and Power Plant

- ✓ Waste heat recovery using Once Through Steam Generators from Gas Turbine exhausts.
- ✓ Steam Turbine drivers for Ammonia Refrigeration Compressors.
- ✓ Steam Turbine driven power generation.
- ✓ Process Steam used for heating – smaller heaters.
- ✓ Auxiliary boiler for startup also uses N<sub>2</sub> rich end flash gas as fuel.

## Why Ammonia ?

- ✓ Ammonia is a commonly used industrial refrigerant.
- ✓ Superior refrigerant properties allow smaller air-cooled condensers, exchangers and plant size.
- ✓ Smaller overall plant foot print compared to a Propane system.

## Process Flow Schematic Diagram



## OSMR® vs Conventional LNG Plants

|                                                                                                                            | APCI – C3/MR                                   | CoP- Cascade                                                       | OSMR                                                           |
|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------|
| Train Size (mtpa)                                                                                                          | 4.1                                            | 3.9                                                                | 1.9                                                            |
| Refrigeration Power <ul style="list-style-type: none"> <li>•Gas Turbine (x Nos)</li> <li>•Steam Turbine (x Nos)</li> </ul> | 85 MW Frame 7 (x2)<br>n/a                      | 32 MW LM2500 (x6)<br>n/a                                           | 32 MW LM2500 (x2)<br>8 MW (x2)                                 |
| Plant Power Generators <ul style="list-style-type: none"> <li>•Installed</li> <li>•Running</li> </ul>                      | Gas Turbine Driven<br>70 MW<br>30 MW           | Gas Turbine Driven<br>30 MW<br>25 MW                               | Steam Turbine Driven<br>8 MW<br>6 MW                           |
| Plant Fuel Usage (% of Feed Gas)                                                                                           | 9-11 %                                         | 8-9 %                                                              | 6%                                                             |
| Heat Exchanger Types <ul style="list-style-type: none"> <li>•Pre-cooling (x Nos)</li> <li>•Main Cooling (x Nos)</li> </ul> | C3 Tube in Kettle (x3)<br>MR Spiral Wound (x1) | Brazed Aluminum<br>C3 Core-in-Kettle (x2)<br>C2, C1 Cold Box (2+2) | Brazed Aluminum<br>NH3 Core-in-Kettle (x2)<br>MR Cold Box (x2) |
| CAPEX (\$/tpa)                                                                                                             | 1000-1200                                      | 1000-1200                                                          | 500-600                                                        |

*LNGL's OSMR® process provides an alternative which is simple, efficient and low cost and uses proven conventional technologies.  
Smaller Train sizes allows easy modularisation and economic project development.*

# OSMR® Technology Reviews/Reports

## Independent Engineer's Technology Reviews/Reports

The following independent reports are included in the data room:

- LNG Industry Article (March 2010)
- Foster Wheeler – Gladstone LNG - OSMR Study Report (June 2009)
- CHIV - Evaluation of OSMR LNG Process (October 2008)
- Arrow-WP - Interim Review of Fisherman's Landing LNG Plant (December 2009)
- Evaluation Report of LNG's OSMR Gas Processing and Liquefaction Technology  
- I. Aoki
- SKEC - Evaluation of the OSMR Process for Gladstone (June 2009)
- Technical Review Group (TRG) Final Report (August 2009)

# OSMR<sup>®</sup> Process Technology

## PATENT APPLICATION SUBMITTED / GRANTED



### Patents Granted

OSMR<sup>®</sup> Process patents have been granted in Australia, China, OAPI, Eurasia, Hong Kong, New Zealand, Singapore, South Africa and Ukraine.

BOG Treatment Process patents have been granted in China, OAPI, Eurasia, Hong Kong, New Zealand, Singapore, South Africa and Ukraine.

# COMPANY VALUE INITIATIVES

## **Magnolia LNG Project (United States):**

- ▶ LNG Limited has laid the foundations for an 8 mtpa LNG export project in the dynamic US gas and LNG sectors, which feature significant uncommitted gas resources and extensive integrated gas pipeline network
- ▶ Significant interest in exporting LNG out of the US

## **Fisherman's Landing LNG Project (Australia)**

- ▶ Securing gas supply is the primary focus to unlock and deliver the project's potential value. In this regard, LNG Limited is:
  - Working in close cooperation with PetroChina Australia (under a Letter of Intent) and HQC (the company's largest shareholder) to secure gas supply for the project
  - Independently pursuing gas supply for the project and in discussion and/or negotiation with several potential gas suppliers

## **OSMR® LNG Process Technology**

- ▶ Aside from utilising the low cost and highly efficient LNG process technology in its Magnolia LNG Project and Fisherman's Landing LNG Project, LNG Limited is exploring all opportunities to licence the technology (for a Licence Fee) to third party LNG projects

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**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.