



POTEN & PARTNERS

INTRODUCTION & REQUEST FOR INPUT

FLOATING LNG BERTHING & LOADING

A PROPOSED JOINT INDUSTRY PROJECT

FLNG SOLUTIONS PURSUED WORLDWIDE

Floating LNG has obvious attractions for development locations that are far offshore, face high onshore construction costs, and target moderate resource sizes. Five FLNG facilities are now under construction. FLNG has also been selected for the Browse, Scarborough, and Mozambique developments. Worldwide, FLNG is being considered for projects now in concept-selection. But sponsors have struggled for an attractive risk-return trade-off—leading to cancellation of several FLNG projects. How the risk-return balance evolves will be influenced by the performance of FLNG units now under construction. If a positive reliability track-record develops, sponsor risk, project financing and insurability should improve in virtuous circle. Conversely, if ventures have low reliability and high downtime, FLNG may be marginalized. The LNG industry has a strong common interest in the first outcome.

OPEN SEAS CARGO TRANSFERS ARE A KEY FLNG CHALLENGE

Regular cargo transfers from a FLNG facility to LNG carriers on high seas will be very different from normal terminal operations. FLNG will be both more difficult and less forgiving, with issues at the loading point likely to have major implications further up and down the value chain.

Normal LNG berthing & loading	FLNG berthing & loading
Sheltered waters	Open seas
Stable loading facilities	Moving loading facilities
Usually ample storage buffer	Tight storage buffer
Large and loose facilities footprint	Tight and dense facilities
Large distance from plant to upstream	Tight coupling of plant, upstream and reservoir

THE JOINT INDUSTRY APPROACH TOWARD MEETING THE CHALLENGE

Poten proposes to lead a Joint Industry Project (JIP) to avoid the pitfalls of a pure ‘go-it-alone’ approach:

- Inadequate sharing of essential reliability and safety experiences, understandings and practices
- Lack of ability to adequately address full value chain consequences
- Biases hiding weaknesses of adopted solutions due to organizational silos or group-think
- Missed chances to minimize the risk of a major incident will occur, causing collateral reputational damage to all industry participants
- Duplication of effort in evaluation of alternative solutions and technologies, at a time when budgets have been slashed due to low oil prices

GOAL SETTING

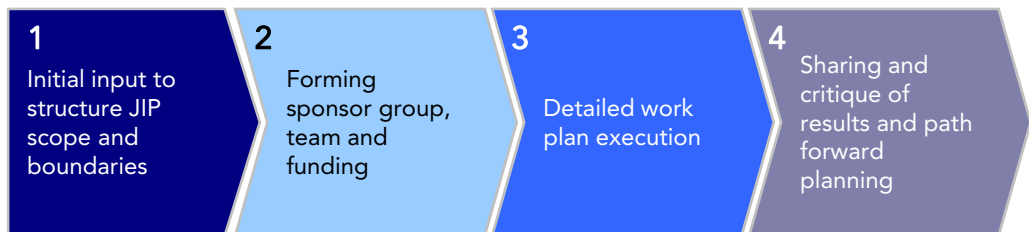
The JIP will be developed and executed in order to achieve the following objectives:

- Create positive impulse to develop and implement best practices
- Counterbalance tendencies for organizational silo-ing
- Promote standardization where appropriate
- Allow deepest deliberation and debate on key issues
- Leverage budgets for early evaluation of solutions and technologies
- Creation of tools and protocols for detailed, site-specific evaluations
- Steer technology development in directions likely to deliver the most industry benefit
- Proactively generate timely guidance to industry and investors

PHASES AND NEXT STEPS – YOUR INPUT IS REQUESTED

Please provide your input by completing and returning the attached questionnaire. You may also request a Microsoft Word™ version.

The JIP is currently in the first phase of a four-phase process



ABOUT POTEN

Poten & Partners delivers high quality advice on LNG infrastructure, market trends and transactions to developers, sponsors, sellers, buyers and financiers. We support clients with commercial, technical and strategic expertise from the wellhead to the energy consumer and through all stages of project lifecycles. In the past ten years, Poten & Partners has advised on more than 580 LNG and natural gas projects across the entire value chain.

CORE STUDY TEAM

- Chuck White, Project Lead; former Global Director, Enhanced Field Development Solutions (WorleyParsons/INTECSEA); prior leadership roles with IOCs in major JIPs (e.g., DeepStar)
- Capt. Doug Brown, LNG shipping lead; former General Manager of China LNG Shipping (International), Marine Operations Manager for Angola LNG (BP) and Technical Advisor (SIGTTO)
- Capt. John Cumming, Senior Shipping Advisor, former Marine Project Manager (Shell), Technical Advisor (SIGTTO)
- Nityanand Maharaj, former LNG technology specialist, Bechtel Center of Excellence
- Will Pulsford, Upstream; former Gorgon LNG facilities planning team lead (Chevron)
- Manon Dumontier, former Commercial Manager, LNG Shipping (GDF Suez)
- Ming Cai, quantitative analysis and modelling specialist



Chuck
White



Capt. Doug
Brown



Capt. John
Cumming



Nityanand
Maharaj



Will
Pulsford



Manon
Dumontier



Ming
Cai

JIP INTEREST QUESTIONNAIRE – PLEASE SUBMIT BY 31 MAY 2015

Poten & Partners seeks your input to define the work program and deliverables for the proposed Joint Industry Project on Floating LNG Berthing and Loading. Please share your insights and suggestions below, scan and email to cwhite@poten.com

Part A

Topic	Importance	Comments
	<div style="display: flex; justify-content: space-around; align-items: center;"> 1 2 3 4 5 </div> <p>'5' means most important. Tick boxes below as suits your perspective</p>	Eg: what deliverables would you seek if the issue is investigated
Understanding the differences between in shore (normal) port and exposed location operations	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Identifying the gaps in existing guidance covering exposed location systems and operations	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Generating proactive guidance for berthing at exposed location terminals	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Simulation of Moss-type ship behaviour in tandem berthing schemes	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Simulation of Moss-type ship behaviour in breasting (side-by-side) berthing schemes	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Understanding data (eg. vessel, helm, DP system, metocean) needed for accurately simulating berthing at floating LNG facilities	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Understanding metocean data needed for assessing operating safety and efficiency *	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Identifying relevant risks and anticipating risk mitigation measures	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Testing and assessing effectiveness of risk mitigation measures for most serious risks	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Understanding the impact of potential and actual loading interruptions on topsides and upstream system performance and design	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

* Based on economic case studies

Part B

Topic	Importance	Comments
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Understanding the economic drivers and 'pinch points' regarding berthing efficiency and reliability *	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Understanding the combined effect of forecasting uncertainty and safe disconnect lead time on operational efficiency and economic performance *	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Having a functional decision model compatible with best-in-class decision quality practices to support selection of competing options	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Knowing the options for berthing systems and methods, the associated risks, and their technical readiness status	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Approaching these matters in stages, ie. using multiple phases to advance insights and guidance	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
More topics to consider. Please state reasons why.		
Please provide your name, title, company name, email and telephone contact details. Name: _____ Title: _____ Company: _____ Email: _____ Direct telephone number: _____		

* Based on economic case studies



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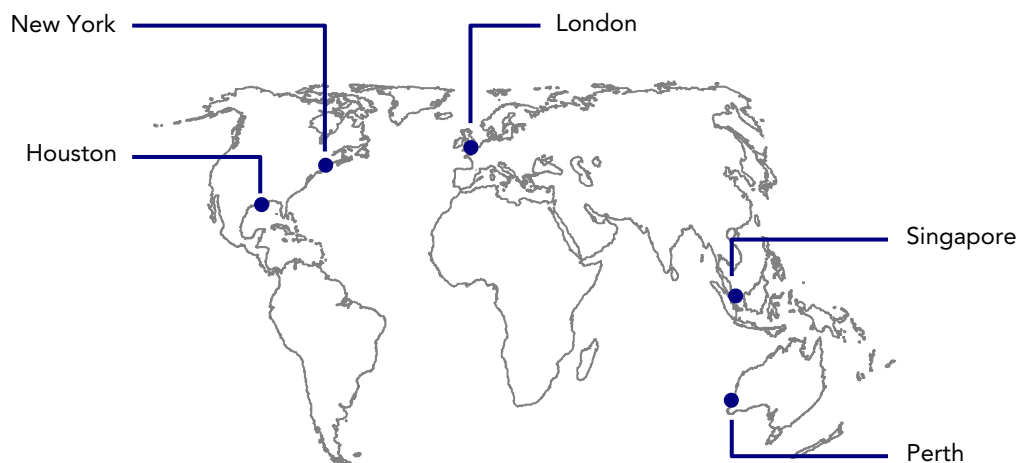
CONTACT US

Chuck White
Perth office
cwhite@poten.com
Tel: +61 8 6143 1137
Mobile: +614 0201 6580

Doug Brown
Houston office
dbrownn@poten.com
Tel: +1 713 344 2378
Mobile: +1 281 889 2237

Stephen Thompson
Perth office
sthompson@poten.com
Tel: +618 6468 7942
Mobile: +614 5108 2505

LNG & Natural Gas Consulting, worldwide presence



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ENERGY AND OCEAN TRANSPORTATION INDUSTRIES

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