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Manager of Company Announcements
ASX Limited
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By E-Lodgement

Wison Concept Study confirms Pandora LNG Project in PNG is technically and commercially feasible

Highlights

- Concept Study identifies two feasible LNG concepts for Pandora Gas Field (CMT: 40%)
- Pandora Gas Field has a 2C Contingent Resource of circa 800 BCF gas
- Project JV Partners include Talisman Energy, Kina Petroleum and Santos
- 1 mtpa offshore FLNG vessel with 170,000m³ storage to cost US\$900 – 1,100/ tonne
- LNG vessel design based on lean gas composition
- Near Shore LNG vessel with same capacity could be delivered for approximately US\$600/ tonne and requires offshore gas processing and pipeline
- Leading LNG industry participants have expressed interest in Build Own Operate (BOO) of LNG vessels at an indicative toll charge of US\$4/mmBtu
- Non-binding agreements pending with LNG industry participants to advance development of Pandora Gas Field
- Cott continuing discussions with JV partners to pursue joint pre-FEED

Papua New Guinea focused oil & gas development company Cott Oil and Gas Ltd (ASX: CMT) (“Cott” or “Company”) has received the final LNG Concept Study for the Pandora Gas Field from Wison Offshore and Marine Ltd (“Wison”).

Cott was awarded a 40% interest in the Pandora gas Discovery (PRL 38) in December 2014 which contains a gross 2C Contingent Resource of 792 BCF gas (132 mmboe). Other participants in the Pandora Project (“the PRL 38 Joint Venture”) include Talisman Energy (25% and Operator), Kina Petroleum Limited (25%) and Santos Limited (10%).

Wison has presented **two technically and commercially feasible concepts** based on a lean gas composition for consideration:

- A 1mtpa offshore Floating Liquefied Natural Gas (FLNG) vessel incorporating gas clean up, liquefaction and storage for 170,000m³; and
- A Near Shore LNG vessel with 170,000m³ of storage and with sufficient topside space to accommodate up to 2.5 mtpa of liquefaction capacity.

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Wison is currently constructing a 0.5 mtpa FLNG vessel for Exmar BV which will be completed in 2H 2014 and commences operations off the coast of Colombia in early 2015. Exmar is a diversified shipping group that operates a fleet of over 40 gas carriers and offers turnkey FLNG solutions in association with Wison and Black & Veatch. On completion, Exmar will provide toll liquefaction and storage services for the gas field owner, Pacific Rubiales Ltd (TSE:PRE).

Background

Discovery

The Pandora gas fields were discovered in 1988 and are located approximately 200km west of Port Moresby in the Gulf of Papua. The gas field comprises two discoveries in water depth of approximately 120m.



Figure 1: Location of Pandora in relation to Other Gas Fields and Developments

Reserves

The Pandora A structure is a 290m high Miocene-aged reef build up that was discovered in 1988 and was tested at 57 mmscfd. The top of the gas column was encountered at 1,392m total vertical depth. The Pandora B structure is a 110m gas column that was drilled in 1992 and tested at 43 mmscfd.

The gas field is mapped by 3D seismic which was acquired in 2009. Together, the two structures comprise a 2C Contingent Resource of 792 BCF.



Previous Studies

Substantial research and engineering work was undertaken on the field by the previous joint venture and specialist consultants including studies on metocean conditions, reservoir modelling, field development, pipelines and processing facilities with a focus on a traditional onshore development. Recent technological advances and cost reduction in floating LNG, particularly for small-mid scale projects, provide impetus for pursuing development of Pandora using offshore and near shore LNG concepts.

Offshore FLNG

Wison proposes an offshore FLNG vessel that would receive raw gas from a subsea gathering system for onboard processing, liquefaction, storage and offloading. The various components of this solution are described below.

Field Development

Previous reservoir studies confirm the field could be produced at 200-250 mmscfpd from a three-well development. Development would focus on the Pandora A structure which would require subsea completions and flow lines.

Gas Processing

The gas will need to be processed to remove impurities, including acid gas, mercury, water and heavy/liquid hydrocarbons, before liquefaction. These will be removed by a standard suite of processes installed on the vessel. Acid gas would be removed by an amine process and then re-injected into the reservoir.

Liquefaction

Wison proposes the use of the Black and Veatch PRICO™ Single Mixed Refrigerant (SMR) liquefaction technology. SMR is considered the most appropriate solution for small LNG facilities due to its high turn-down capacity, its efficiency and its small footprint. It is proposed that the vessel would have two 0.5 mtpa liquefaction modules.

Hull and Storage

While considerable savings can be achieved by converting an existing vessel into a FLNG vessel, there are significant limitations. The vessel will require sufficient storage to fill a typical LNG carrier (between 125,000 – 145,000m³) and contain sufficient buffer storage to maintain an LNG ‘heel’ and accommodate additional production in the event of offloading delays. In order to minimize the potential for ‘sloshing’ damage, the vessel would be equipped with either dual banks of membrane tanks or SPB Prismatic tanks.

Vessel Mooring

The vessel will operate in approximately 120m of water, and would be moored using an external turret allowing it to weathervane to face into the prevailing wind, waves and currents. A turret was considered preferable to spread-mooring as it minimizes the restrictions on side-by-side offloading.

Offloading and Transport

The LNG would be offloaded using a side-by-side or tandem configuration using cryogenic hoses, such as the Technip Amplitude-LNG Loading System. The offloading system used will be subject to metocean studies; however, the Gulf of Papua is outside the main cyclone corridor that affects northern Australia. LNG would be sold either on a Free On Board basis whereby the buyer is responsible for providing transport or Delivered Ex Ship to spot markets.



Near Shore FLNG

Wison also proposes a Near Shore LNG vessel which offers a lower cost liquefaction solution due to reduced mooring and offloading costs. However, additional costs would be incurred in offshore production facilities and pipeline.

Wison has determined that 2.5 mtpa of liquefaction capacity could be accommodated on a 170,000m³ hull creating the opportunity to use a Near Shore LNG vessel as an “LNG Hub” for gas from other fields.

Field Development

The same well configuration would be used to develop the field but, in this case, the well heads could be located on a gas processing platform. These dry trees would be less expensive than subsea completions and would permit cost-effective workovers and maintenance.

Gas Processing Platform (Buoyant Tower)

Wison’s US subsidiary, Horton Wison, has developed a “Buoyant Tower” designed to operate in water depths of 50-250m which could accommodate all production facilities. Its first Buoyant Tower is currently operating at the CX-15 project off the coast of Peru.



World’s first *Buoyant Tower* installation

Customer: BPZ Energy
Project: CX-15
Location: Peru
Water Depth: 54 meters
Year: 2012



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Figure 2: Horton Wison Deepwater Buoyant Tower

Pipeline

The clean gas would be transported approximately 175km by pipeline to the preferred near-shore location.

Liquefaction and Storage Vessel

Wison has developed and is constructing a 0.5 mtpa near shore LNG vessel for use with Pacific Rubiales’ Caribbean LNG project. This vessel has a modest amount of internal storage and is designed to work in conjunction with an LNG carrier as a floating storage unit. In the Concept Study, Wison proposes a liquefaction and storage vessel containing 170,000m³ of internal storage and the capacity to liquefy at least 1 mtpa. With significantly larger topside than is available on the Caribbean LNG vessel, the liquefaction



capacity could be increased to 2.5 mtpa either at the outset or by additional LNG barges in the event that there was demand to process gas from other gas fields.

Commercial Model

Cott is of the view that development of this project requires significant LNG industry expertise and that the field should be developed by bringing in parties that have relevant experience.

Cott has held discussions with several parties regarding the building, ownership and operation of the LNG vessel and other key infrastructure elements. Discussions with several parties are ongoing regarding a leasing and tolling agreement, with a potential tolling cost being no more than US\$4/mmBtu.

In addition, Cott has held discussions with engineering service providers that have a history of participation in upstream projects by funding development in return for a share of the project cash flows. The intention is that a large portion of the funding obligations will be borne by specialist owner/operators with Cott maintaining a significant interest in the project.

Capital Costs

The Capital Costs of each element of the development are summarised in the table below:

Table 1: Indicative Capital Costs for FLNG (Wison Offshore & Marine Ltd unless indicated) USDMM				
	Offshore		Near Shore	
	LOW	HIGH	LOW	HIGH
Field Development ¹	250	250	150	150
1 mtpa FLNG Vessel	900	1,100 ²	550	650 ³
Buoyant Tower			300	360 ⁴
Pipeline			350	418 ⁵
TOTAL	1,150	1,350	1,300	1,578

1 Cott estimate - 4 x wells (incl 1 x re-injection well) with subsea completions (offshore) or dry completions (Near Shore)

2 170,000m³ SPB storage, external turret-moored with tandem offloading, based on US\$900-1,100/tonne

3 170,000 m³ SPB storage, jetty/dolphin-moored with side by side offloading, based on US\$550 – 650/ tonne

4 Buoyant Tower incorporating up to 9,000T topside weight (dry trees, gas clean-up and reinjection) - Topside weight subject to review

5 Pipeline estimate based on IntecSea cost estimate for 24" pipe to Daru – subject to review

Cott has determined that the owner of the infrastructure (Vessel, Buoyant Tower and Pipeline) would need to recover the capital and finance costs within the life of the project and have assumed that the costs would be amortised at a rate of 8% per annum over 10 years.

Operating Costs

Fuel gas is one of the major costs of operating a processing and liquefaction facility and can be as much as 9% of raw gas. Production would be increased to approximately 150mmscf/d so that sufficient gas could be made available to the vessel operator without impacting the liquefaction capacity. Wison, which has undertaken several pre-FEED and FEED studies as well as being the developer of the world's first FLNG vessel, has provided estimates of the operating costs of the vessel and processing tower which include staffing, operating maintenance and chemicals and consumables and these are shown in Table 2 below.

Commercial Viability

Based on the capex and opex assumptions provided by Wison, Cott has prepared estimates of the minimum sales price required for gas delivered to a north Asian market.



Table 2: Indicative Break Even LNG Sales Price (US\$/mmBtu)				
	Offshore		Near Shore	
	LOW	HIGH	LOW	HIGH
Production Cost	0.75	0.75	0.75	0.75
Capital Cost	2.80	3.40	3.60	4.50
Operating Cost	2.00	2.50	1.50	2.00
Shipping Cost to North Asia	1.00	1.00	0.85	0.85
TOTAL	6.55	7.65	6.70	8.10

Source: Cott based on Wison CapEx and OpEx Estimates

Timeframe

Wison indicates that first gas could be delivered within 34 months of award of an EPCIC contract. Of this, detailed engineering would take 8 months with keel laying commencing 15 months after contract award. The vessel could be delivered within 16 months of keel laying and operational approximately four months after that.

Next Steps

Cott's next steps will be to discuss the Concept Study with the PRL38 JV and with the PNG Department of Petroleum and Energy. Cott is also holding discussions with potential BOO parties that have the necessary industry experience and track record in the LNG sector. The company expects to make an announcement in the near term regarding potential non-binding agreements in this regard.

While the Wison Concept Study demonstrates that the Pandora Gas Field is a viable project in its own right, Cott is also assessing additional projects adjacent to PRL 38 that may complement its plans for the development of the Pandora Gas Field.

For and on behalf of the Board,

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About Cott Oil and Gas Ltd

Cott Oil and Gas has a highly experienced management team and holds a strategically prospective suite of oil and gas projects in Papua New Guinea and offshore Australia. The Company's current portfolio includes:

Papua New Guinea

- 40% interest in PRL38 comprising the Pandora gas discoveries.
- PPL 437 (20%, KPL 80%) – an advanced permit adjacent to the Ketu, Elevala and Tingu wet gas discoveries.
- PPL 435 and PPL 436 which constitute large underexplored, strategic onshore acreage, held in 50/50 JV partnership with PNG specialist Kina Petroleum Limited (ASX:KPL).
- Cott's granted interests in PNG cover over 10,750km² (2.65m acres) on a net basis.

Carnarvon Basin

- Shallow drilling targets in the Rivoli gas field.

About Wison Offshore and Marine Ltd

Wison is an engineering and fabrication company based in Shanghai and Houston which designed and is constructing a 0.5 mtpa FLNG vessel for Exmar BV that will be based off the coast of Colombia from 2015. Its US subsidiary, Horton Wison Deepwater, specializes in the development of floating production units and has delivered production platforms that currently operate in water depths from 80 – 2,000m.

Wison principal fabrication yard is at Nantong and it has recently opened Stage 1 of a second fabrication yard at Zhoushan which, when complete, will encompass an area of 1.5 million and have nearly 2.3km of coastline. The new fabrication yard is intended to provide Wison with the capacity to leverage its FLNG expertise and deliver much larger FLNG vessels.