

Australasia's Gas Liquefaction Plans Proliferate in Response to Global LNG Demand and Prices

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The past few months have seen numerous new gas liquefaction development projects announced across the Australasian region - in the traditional North and Northwest Shelf (NWS) basins and in the Queensland coal-bed methane (CBM) province of Eastern Australia, in Papua New Guinea – and an LNG import project in New Zealand. These projects are driven by three key factors: (1) tight medium-term supply in the global LNG market; (2) buyers' willingness to agree to long-term price indexation close to parity with oil; and, (3) international oil companies' (IOCs) being more comfortable with the political stability of Australasia compared to other gas-rich provinces.

Plenty of Enthusiasm – but the Pace is Slow for Some Projects

Table 1 identifies gas liquefaction projects under development and in planning in Australia, neighboring Papua New Guinea and in Indonesia's marine waters adjacent to Australia's border. The total potential capacity (some 90 million tonnes per annum – mtpa) is impressive when compared with global gas liquefaction capacity currently operational of some 175 mtpa. Even if it takes a decade or more to deliver this additional capacity it should have a big impact on what many see as a tight medium-term global LNG market with a growing gap to fill between surging demand and limited supply.

Australasia's Future Gas Liquefaction Projects in Planning						
Project Name	Operator	Joint Venture Partners	Capacity (mtpa)	Basin Location	Expected Start-up Year	
Northwest Shelf (NWS 5)	Woodside	BHP Billiton, BP, Chevron, Mitsubishi-Mitsui, Shell	2.4	Carnarvon	2008	
Pluto Phase 1	Woodside	Tokyo Gas, Kansai Electric	4.3	Carnarvon	2010	
Fisherman's Landing	LNG Ltd	Arrow Energy (+ LNG Buyer?)	1.3	Gladstone (CBM)	2011	
Pluto Phase 2	Woodside	Tokyo Gas, Kansai Electric	4.3	Carnarvon	2012	
Sunshine	Sojitz (Japan)	Sunshine Gas Limited	0.5	Gladstone (CBM)	2012	
Gladstone	Santos	none	3-4	Gladstone (CBM)	2013	
Onshore (Surat CSM)	BG Group	Queensland Gas Company	3-4	Gladstone (CBM)	2013	
Wheatstone	Chevron	none	5	Carnarvon	2013	
Ichthys	Inpex	Total	8	Browse	2013	
Sunrise	Woodside	Shell, ConocoPhillips, Osaka Gas	5	Timor Sea	2013	
PNG LNG	Exxon	Oil Search, Santos, Nippon Oil, AGL, PNG Landowners	6.3	Papua New Guinea	2013-14	
Browse	Woodside	BHP Billiton, BP, Chevron, Shell	15	Browse	2013-15	
Abadi (Indonesia)	Inpex	none	3-5	Timor Sea	2014-16	
Gorgon	Chevron	ExxonMobil, Shell	15	Carnarvon	2015	
Darwin Phase 2	ConocoPhillips	Inpex, Santos, Tokyo Electric, Tokyo Gas?	5-6	Timor Sea	2015+	
Scarborough	ExxonMobil	BHP Billiton	6	Carnarvon	2017+	
Prelude	Shell	none	3.5	Browse	2013+	

Note: Information based upon Q1 2008 media reports not operator press releases

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Table 1. Australasia's Gas Liquefaction Projects.

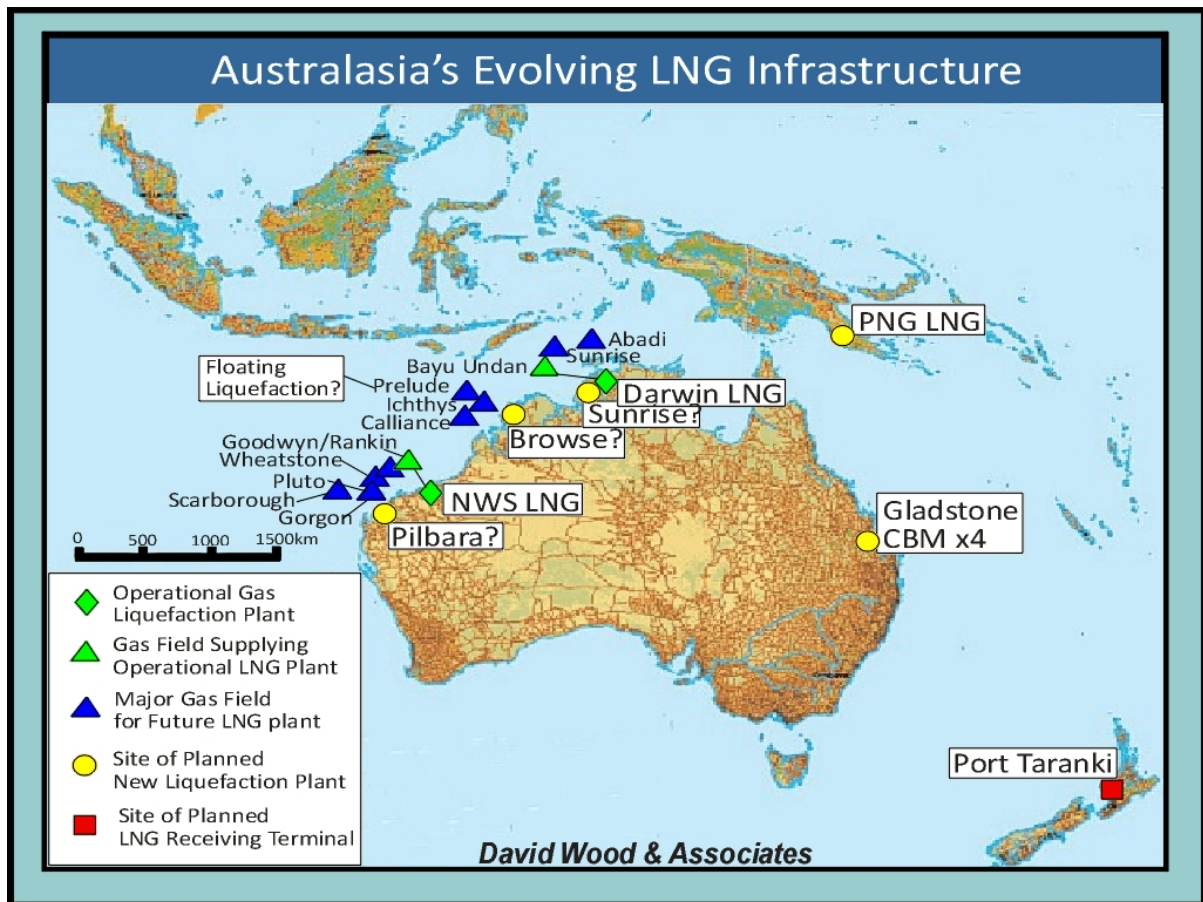


Figure 1. Location of Australasia's Gas Liquefaction Projects

Securing China (and India) as long-term customer has been strategically important to the development of Australia's gas resources in recent years. This was initiated by NWS LNG's 25-year fob supply deal with the Guangdong consortium buyer agreed in 2002 for 3.3 mtpa to Dapeng at a low price close to US\$3/mmbtu with limited escalation. In April 2008 NWS took delivery at Hudong-Zhonghua shipyard (Shanghai) of the Dapeng Sun, the first of three Chinese-built LNG carriers destined to transport that LNG to the Dapeng receiving terminal. Many of the liquefaction projects in Australia are seeking new contracts in China as well as to the traditional East Asian buyers, but at substantially better prices than the initial NWS deal.

Disparity between Short-term Action and Medium-term Plans

The Australian Petroleum Production and Exploration Association (APPEA) and Australia's Resources Ministry are promoting the aspiration that Australia should be exporting some 60 mtpa of LNG by about 2015, a five-fold increase on the early 2008 capacity. Apart from the more than \$100 billion of investment required, many doubt that adequate skilled human resources are available to achieve such growth in this timeframe.

The next project due on-stream later in 2008 is NWS project train 5 (4.4 mtpa - bringing Australia's total capacity to 16.3 mtpa). This is followed in about 2010 by the Pluto project

(4.3 mtpa), also operated by Australian independent Woodside. The Pluto offshore platform will export 1.6 bcfd of gas via a 36-inch subsea pipeline to an onshore single-train liquefaction plant.

Despite the large number of projects in planning the construction schedule for the remaining projects is more uncertain. Indeed some projects have been touted as imminent for so long (e.g. Gorgon, Sunrise, Browse) that some doubts are being expressed by the Government, and other analysts, about the commitment of the gas resource holders to develop these projects. Gas field remoteness (distance to shore), environmental and community objections (e.g. Gorgon, Ichthys) and challenges (CO₂ sequestration requirements), escalating costs, partner wrangles over development options and border disputes (e.g. Sunrise), uncertainty about floating gas liquefaction technology (Scarborough) are among the common excuses proffered by the operators.

Notice that the inability to secure long-term LNG sales agreements at favorable prices, the most common reason that much large remote gas reserves have in the past languished underdeveloped for many years, is no longer among the reasons given for delays. Sustained high Asian gas prices, and a spate of deals recently announced with East Asian buyers that involve LNG prices close to parity with oil prices, have even led to the emergent plans for several CBM-supplied projects feeding liquefaction facilities to be sited at Gladstone, Queensland. The CBM projects have prompted intense industry interest and competition.

BG Group, amongst those Impressed by Queensland's LNG Potential

In May 2008 UK-based BG Group made a US\$12 billion bid for Australia's Origin Energy Limited to consolidate its entry into the CBM play and the gas and power sector of Australia and New Zealand (Origin reports proved plus probable reserves of some 2.5 tcf, 90% of which are natural gas, 56% of that located in Queensland CBM fields, and it owns Contact Energy a major electricity retailer in New Zealand and initiator in 2008 of that country's first LNG import terminal). This follows the approximately \$8 billion development project announced earlier in 2008 in which BG and Brisbane-based Queensland Gas Co (QGC) plan to jointly develop a 3-4 million tonne/year LNG plant on Curtis Island near Gladstone linked by a 380-km gas pipeline to the Surat Basin CBM fields. BG Group will hold a 70% interest in the LNG facility and will offtake 100% of its initial planned production. In that deal BG, subject to completion, also acquires a 20% interest in QGC's gas assets and a 9.9% stake in QGC, for a total consideration of some US\$600 million.

Until 2008 BG had focused its growth as an Atlantic basin LNG operator (selling its small equity interest in Tangguh LNG Indonesia a few years ago). BG's 2008 strategic shift underlines the attractiveness of opportunities for gas liquefaction in Australia compared to LNG expansion options on offer in Africa and South America.

New Zealand, in spite of its aspirations to generate 90 percent of its power from renewable sources by 2025 is facing a medium-term shortfall in gas supply as the Maui gas field declines. Contact Energy and Genesis Power are seeking approval, in the face of environmental opposition, to build a 1.1 mtpa LNG receiving terminal at Port Taranaki. If

successful that facility would be a potential customer of Queensland LNG. BG's strategy is to be involved at all points along its LNG supply chains and this perhaps is one of its considerations in seeking to own Origin Energy.

Floating Liquefaction (FLNG) – Will it finally Make its Debut for Shell in Australia?

Following many false starts for FLNG over the past decade Shell is now keen to “fast-track” the development of its Prelude field discovered in 2007 in the Browse basin with up to 3 tcf of gas potential so far reported. A floating 3.5 mtpa gas liquefaction vessel, some 480m in length and linked with carbon dioxide sequestration, to be located some 450 km northeast of Broome, was unveiled by Shell in April 2008. In recent years other LNG projects have muted FLNG solutions (e.g. Scarborough, Sunrise, Timor Sea), but high costs have prevented these securing final investment decisions from the joint venture partners. Several factors give Prelude more chance of progress as Shell: (1) holds 100% of the equity; (2) needs to add Asian liquefaction capacity to its portfolio to benefit from the Asian demand surge and delays in Sunrise and Gorgon projects are frustrating this; (3) wishes to confirm its position as an LNG technology leader.

Further Delays in Gorgon Development

The Gorgon Project has a reported gas resource base of some 40 tcf of gas spread amongst several fields located 200km offshore in up to 1300m of water. The Gorgon joint venture—Chevron, ExxonMobil, and Shell — announced in January 2008 to increase the proposed LNG project facilities on Barrow Island to three trains of 5 million tonnes/year capacity. A phased-development of “Greater” Gorgon, beginning with the North Gorgon field, involves sub-sea wells tied back to a gravity-based platform, located in the shallower water depths to the east of the field, with the processed gas exported via a trunk line to the LNG plant. The 12% to 15% carbon dioxide content of the gas requires sequestration as part of the development plan. In 2005 the cost estimate was US\$10 billion, but for the project, as described in 2008, costs in excess of US\$25 billion and start-up delayed to 2015, based upon a 2009 final investment decision, seem more realistic.

The increased scale of the Gorgon project belies a long history of delays for a project that in the late 1990's was expected on-stream in 2003. Indeed Chevron has a track record of delays in making firm investment decisions in its large international gas development projects (e.g. Angola LNG and Escravos GTL in Nigeria seem also destined to see start-up delayed by as much as a decade from original plans), and has long since stopped providing schedules for these projects on its website. With so many other projects vying for contracts and resources, however, the Gorgon partners run the risk of missing the current window of opportunity for gas suppliers. Chevron's anxiety in this regard is perhaps reflected in its March 2008 announcement to develop its 100% equity owned, 4.5 tcf Wheatstone field (discovered in 2004) as a separate 5 mtpa LNG project. It may have trouble persuading Government, buyers and contractors that it can deliver this project in a more meaningful timeframe.

The main objections to LNG industry infrastructure developments by environmentalist groups in the past year have however been focused on the Browse basin following proposals by Woodside Petroleum, Inpex (Ichthys project), and others to establish plants at several locations along the Kimberley coast or on offshore islands. The Government favours a single site with multiple trains and developments will be delayed until that site is selected.

Papua New Guinea (PNG) LNG Agreements Reached

Meanwhile the pace of progress in the PNG LNG project has picked up in recent months. A consortium led by ExxonMobil (partners are: Oil Search, Santos, AGL Energy, Nippon Oil, Local Landowners) proposes to commercialise the Hides, Angore and Juha fields and the associated gas reserves at the operating oil fields of Kutubu, Agogo, Gobe and Moran in the Southern Highlands and Western Provinces. The proposed project will treat the natural gas at a conditioning plant at Hides and pipe the treated gas to a 6.3 mtpa liquefaction plant located about 20 km north west of Port Moresby. A joint operating agreement was signed by the partners in March and an agreement with the Government on fiscal terms was announced in April. The PNG Government is also expected to exercise its back-in right to a 22.5% equity in the gas fields. Start-up schedules are yet to be determined but 2013 seems the earliest that could be achieved depending upon sales agreements being secured and final investment decisions being made. Front-end engineering and design is likely to commence in 2008.

Investments made in the next few years in Australasia are clearly going to have impacts globally on LNG supply chains.

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