Australia's cost problem

To meet ambitious export goals, the country must tackle cost inflation. Floating LNG may help

A LOOMING glut of liquefied natural gas (LNG) from projects in the US, as well as emerging export hubs in Canada and East Africa, has cast new doubt on the viability of supply expansion in Australia. Still, the nation is on track to overtake Qatar as the world's biggest exporter and looks well positioned to dominate the market into the next decade.

Although there is no shortage of potential competition from new international projects, the cost and schedule estimates for these new hubs remain too optimistic, leaving the door open for further Australian expansion, analysis from Bernstein Research shows.

In fact, although it is sometimes forgotten, Australia will be in a unique position at the end of the decade: it will have nine onshore LNG export plants, each with expansion potential, spread geographically across the continent.

It will also have pioneered new floating LNG technology (FLNG) on its doorstep, Chris Graham, an Australian-based upstream specialist with energy research firm Wood Mackenzie, told *Petroleum Economist.*

However, with increased competition and downward pressure expected on long-term LNG pricing, Australian export projects will have to become more cost competitive.

If all the approved projects are completed as planned, capacity will expand fourfold between 2011 and 2018 to 86 million tonnes a year (t/y) catapulting Australia ahead of Qatar (77 million t/y capacity) as the world's leading producer of LNG. But the pace of growth – much faster than Qatar achieved – is straining resources.

An unprecedented seven projects, expected to cost around $180 billion, are under development, many of which have been hit by escalating costs.

Consequently, Shell has been talking down expectations of a final investment decision at its proposed Arrow LNG scheme later this year as inflationary pressures have yet to ease off.

Meanwhile, the Woodside-led Browse venture has announced it will not sanction the development of the Browse LNG plant at James Price Point in Western Australia as soaring costs make the project uneconomic. The Perth-based operator did not disclose any numbers, but analysts believe the costs were significantly higher than the $40 billion needed for the project to be economic.

However, the Browse venture is considering other development options, including FLNG, piping the gas to existing liquefaction facilities at the North West Shelf complex, or a smaller onshore installation.

By delaying the final investment decisions on what would be Australia's last one or two onshore greenfield projects, the sponsors plan to get a better grip on their cost bases.

Before the Browse LNG announcement, Origin Energy and ConocoPhillips's Australia Pacific LNG project was the most recent high-profile casualty of Australia's inflationary cost cycle.

The 9 million t/y facility is now forecast to cost A$24.7 billion ($25 billion), up 7.4% from the A$23 billion estimated given in July 2012, as upstream costs soared on the back of competition for resources and revised government regulations. The higher capital cost was 25% larger in US dollar terms, up from $20 billion, given the strengthening Australian dollar.

Construction concerns

Cost over-runs tend to be the rule rather than the exception in Australia, but analysis by Bernstein Research of global projects over the past 10 years suggests the problem is not a uniquely Australian one. LNG projects across the world typically cost 30% more than original estimates, and tend to come on line 12-15 months later than the developers say they will.

Yet for all the eye-watering expense of new LNG developments, there is no hard evidence that costs have peaked. Despite Australian labour costs flattening amid cancellation of large mining expansions, competition for resources still remains tight as developers move towards final project delivery.

Graham thinks it is too early to think a stable cost base has emerged to underpin the next wave of Australian LNG, as over the next 12 to 18 months a significant chunk of committed capital ($75 billion) will be spent, allowing for more inflation.

But when the next wave does come, it's likely to be brownfield expansion of the producing LNG plants – North West Shelf, Pluto and Darwin – and the seven being built now, which includes Shell's FLNG scheme.

Brownfield projects could offer substantial savings, and allow Australia to remain competitive, at least on a unit-cost basis, adds Graham.

The Chevron-led venture building the 15.6 million t/y Gorgon scheme in Western Australia, which will cost $52 billion, $15 billion more than initially planned, expects to make a decision later this year to expand its capacity to 20.8 million t/y. Such an addition could improve the project's economics.

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However, in the longer run, FLNG offers a lower-cost solution for developing Australian gas, and is becoming a critical component of the country's LNG strategy, says Ann Pickard, head of Shell's Australian business.

By 2017, Shell aims to bring online what could be the world's first FLNG export plant. (Malaysian national oil company Petronas has ambitious plans to start up an FLNG liquefaction vessel off Malaysia in 2016, but the 1.2 million t/y unit pales in comparison to the Anglo-Dutch supermajor's scheme.)

Shell's Prelude FLNG project, which will be moved off northwest Australia, will certainly be the largest and most sophisticated FLNG liquefaction project in operation, if not the first.

The $3 billion floater will be the biggest offshore structure ever built, longer than a super tanker and heavier than an aircraft carrier, says consultancy Douglas Westwood.

Prelude, at just under 500 metres long, will be able to process 5.3 million t/y of liquids, including 3.6

The future of LNG: Shell's Prelude FLNG vessel

million t/y of LNG, 1.3 million t/y of condensate and 400,000 t/y of liquefied petroleum gas.

Other FLNG projects are expected to follow suit. Shell recently raised its interest in Woodside's Browse LNG venture, a move that many analysts say signalled the project will also be developed as an FLNG plant rather than an onshore facility.

The FLNG option appears the obvious fall back. Costs for FLNG, estimated to be in the range of $2,500-3,000 per tonne compared with onshore LNG in Australia at $4,000/t, mean the full development of Browse FLNG could cost around $30 billion to $36 billion, cutting capital expenditure by over $10 billion compared with the original onshore proposal, say analysts at Bernstein.

Bernstein says it is inevitable that Browse will be developed using floating technology as piping gas to the North West Shelf makes no sense, given partner alignment issues and ramp-up restrictions.

Despite the setbacks, recent deals suggest renewed confidence in Australian LNG, and Browse in particular. Farm-in values over the

Table 1: Existing LNG export capacity

Project	Operator	Capacity (million t/y)
North West Shelf	Woodside	16.3
Darwin	ConocoPhillips	3.6
Pluto	Woodside	4.3
		24.2

Source: Petroleum Economist

Table 2: Capacity being built

Project	Shareholders	Current capital cost	Capacity (million t/y)	Start-up	Type
Australia Pacific LNG (APLNG)	ConocoPhillips/Origin Energy/Sinopec	$25 billion	9.0	mid-2015 (Train 1)	Onshore
Gladstone LNG (GLNG)	Santos/Petronas/Total/Kogas	$18.5 billion	7.8	2015 (Train 1)	Onshore
Gorgon	Chevron/Shell/ExxonMobil	$52 billion	15.6	2015	Onshore
Ichthys	Inpex/Total	$34 billion	8.4	late 2016	Onshore
Queensland Curtis LNG (QCLNG)	BG Group	$20.4 billion	8.5	2014	Onshore
Wheatstone	Chevron/Apache/Kufpec/Shell/Kyushu	$29 billion	8.9	2016	Onshore
Prelude	Shell/Inpex/Kogas/CPC	n/a	3.6	2017	FLNG
			61.8		

Source: Petroleum Economist

past 12 months imply the 15 trillion cubic feet Browse resource is worth $16 billion or $5.50 per barrel of oil equivalent, far higher than recent LNG farm-in deals in East Africa, says Bernstein.

Last December, PetroChina bought a 10% stake in Browse for $1.6 billion, just weeks after China National Offshore Oil Corporation paid $2 billion for a stake in BG Group's Queensland Curtis LNG scheme. Japanese trading houses Mitsubishi and Mitsui bought into Browse in 2012.

Omar Sekkat, senior vice president of energy in Asia at Norwegian investment bank DNB, told *Petroleum Economist* that more greenfield schemes, including Browse, could proceed.

He added "even though there has been a lot of hesitation from sponsors and ownership transfers, the banks will still back these developments".

But Sekkat believes the main advantage of FLNG is that project sponsors have a good grasp of upfront project costs, given the fact that the facility is built in the closed environment of a shipyard.

With Asian yards set to scoop major contracting deals, multilateral and export credit agencies, as well as commercial banks, should support the new wave of FLNG development.

From a purely technical perspective, financiers should be able to get comfortable with FLNG technology, too. But the commerciality of the value chain remains a moot point.

"Among some of the shipping and offshore banks, there is a good awareness of how FLNG would work, but it's a question of how risk will be allocated to contractors, builders, buyer and operators. The value chain is not yet proven nor finalised," says Sekkat. Much attention will be on Shell as it moves Prelude from a concept to working reality over the next five years.

Under construction: BG's Queensland Curtis LNG facility

Aside from Prelude, at least five more FLNG liquefaction projects are proposed, including two new schemes that are on course to be sanctioned over the next two years.

Thailand's PTT Exploration and Production is due to start front-end engineering and design (Feed) work for its Cash-Maple project, while GDF Suez and Santos are in the pre-Feed stage for their Bonaparte development.

ExxonMobil is considering what would be the world's biggest FLNG floater as a potential solution for the deepwater Scarborough field, off Western Australia, while the Woodside-led Sunrise project in the Timor Sea could yet be developed via FLNG if an agreement can be reached with Timor Leste, which must also approve the project.

Some also believe that Shell's Crux field, another possible source of gas for Prelude, is big enough for a standalone FLNG floater, which could also form a hub for third-party gas. **DE**

Table 3: Planned and proposed capacity

Project	Shareholders	Capacity (million t/y)	Planned FID	Start-up	Type
Arrow Energy	Shell/PetroChina	9	late 2013	2018	Onshore
Browse	Woodside/Shell/BP/Mitsubishi Mitsui (MiMi)/PetroChina	n/a	late-2014	2019	Onshore/FLNG
Fisherman's Landing	LNG Limited	1.9-3.8	2013	2017	Onshore
Bonaparte FLNG	GdF Suez/Santos	2	2014	2018-2019	FLNG
Cash Maple FLNG	Pttep	2	2014	2018-2019	FLNG
Poseidon	ConocoPhillips/Karoon Gas/ PetroChina	n/a	2017*	2022*	Potential FLNG
Scarborough	ExxonMobil/BHP	6	2014*	2019*	Potential FLNG
Greater Sunrise	Woodside/Shell/ConocoPhillips/ Osaka Gas	4	n/a	2018	Potential FLNG
		24-25.9			

Source: Petroleum Economist

*estimated