



# CSM aims for liquid assets

No one has yet produced LNG from coal seam methane, but big energy players are now confident that this will be a viable and profitable industry.

By **STEVE ROTHERHAM**

**J**ust how much room is there on the coal seam methane-to-liquefied natural gas bandwagon?

So far, five CSM-LNG projects have been proposed for Gladstone, Queensland, a regional centre of 30,000 people that is now prized for its proximity to CSM fields and its deepwater port.

Admittedly, the most recent of these projects – Canadian-owned LNG Impel, a proposed toll-for-service LNG plant – was announced only in May, and at first glance looks like an opportunistic attempt to cash in on Queensland CSM's snowballing growth.

But there is no doubt that international gas and LNG players are now taking Queensland CSM seriously.

## *Birth of an industry*

Things have moved very quickly since Arrow Energy managing director Nick Davies said in August 2006 that the company was looking at small-scale LNG as one option for improving its margins through downstream gas processing.

In an interview with *investorTV.com.au*, Davies said he expected future margins from selling gas into the electricity market to be tight, due to an oversupply of electricity and relatively low domestic coal prices. "We are going to concentrate on higher margins, in particular, we are going to look at different products from gas," he said. "Those products could be anything from compressed natural gas, small-scale LNG,

gas-to-liquids or environmentally advantaged power generation using environmental credits."

In April 2007, Arrow announced a move that it said could herald the beginning of a new industry – the supply of gas from its Daandine field for use as feedstock at a 365,000 tonnes per annum mini-LNG plant

being built by Norway's Liquegas that is scheduled to start production in 2009.

While this plant's output is intended for the domestic market – mostly for long-haul trucking as a diesel and LPG replacement fuel – the move made analysts and gas customers sit up and take notice.

In May 2007, Arrow went on to announce it would supply gas to the world's first CSM-LNG export project at Gladstone's Fisherman's Landing Wharf. The 1.6 million tonnes per annum (MMtpa) project is to be operated by LNG technology junior Liquefied Natural Gas Limited.

Proposals by other companies followed with each adding more credibility to the fledgling sector.

Santos was the next to announce its entry into CSM-LNG with its Gladstone LNG (GLNG) scheme that is planned to produce 3-4MMtpa initially but is planned to eventually expand to up to 10MMtpa.



Artist's impression of a tanker moored at Santos' planned GLNG project

It was then followed by Sunshine Gas, which teamed up with Japan's Sojitz to push the Sun LNG scheme. This small project has a relatively low profile and has escaped the attention of a lot of observers, but Sojitz is a 50% owner (with equal partner Sumitomo) of LNG Japan, which has been operating since the 1970s and handles most of Japan's LNG imports from Indonesia.

Then early this year, the entry in February of UK major BG Group (formerly British Gas) and its Australian partner, Queensland Gas Company, changed the dynamics dramatically.

Like GLNG, their Queensland Curtis LNG project is to be 3-4MMtpa initially but is planned to eventually expand to up to 10MMtpa. Importantly, this venture was BG's idea. QGC had not been planning to enter LNG for at least another couple of years.

Since then two other LNG majors have entered the sector with Malaysia's Petronas teaming up with Santos, and Royal Dutch Shell joining the Arrow and LNG Limited venture.

Brisbane-based WilsonHTM analyst Andrew Pedler says the entry of BG, Petronas and Shell shows that the sector must be taken seriously.

"Clearly large international companies are taking a very close look at the potential of coal seam gas as feedstock for LNG, and their due diligence has indicated that these resources are material and the projects are viable," he said.

With experienced LNG operators now involved in competing CSM-LNG export projects, the chorus of scepticism has become little more than a murmur.

### Why CSM-LNG?

How is it that this infant industry, which has not yet liquefied one molecule of coal gas, has managed to win the backing of so many big players?

When Arrow and Santos announced their projects last year, sceptics pointed out that no one had ever produced LNG from CSM, that CSM has a lower heating value than most conventional gas, and that a very large number of wells would be needed to feed any sizeable CSM-LNG project.

**“Shell’s not in this just to produce 1.3 million tonnes per annum, and neither are we”**

**Arrow Energy CEO  
 Shaun Scott**

Arrow's chief executive for Australian operations Shaun Scott acknowledged these concerns but said none of them were major issues.

"It's true that no one's ever done it before, but someone has to be the first," he said.

"Australia's coal seam gas sector has



grown largely through innovation and this is just another innovation, and a very logical one at that.”

However, he conceded that due to the absence of gas liquids, CSM (which is 99% methane) is not as energy-rich as most conventional gas, and is therefore less valuable.

“Coal seam gas is below the heating requirements of the Japanese gas reticulation system,” Scott said.

As Santos points out, US major ConocoPhillips has been exporting gas with a composition similar to CSM from Alaska to Japan since the late 1960s. The Japanese can use this gas by blending the pure methane LNG with liquid-rich LNG or by injecting petroleum liquids during regasification. Scott said this showed the Japanese market was still open to LNG that was almost pure methane. The composition of the LNG would not be an issue at all in other markets, according to Arrow.

“We will need to sell a bit more gas to get the same cash, but it will still be viable,” Scott said.

“You also have to take into account that coal seam gas is an excellent candidate for the liquefaction process and our up-front costs and ongoing costs will be lower.”

This is because CSM has less carbon dioxide and other impurities than conventional gas, and its simple composition makes processing cheaper and simpler compared to that of conventional gas. The upstream operations will also have some significant advantages over conventional LNG, according to Scott.

“Onshore fields are easier to develop than offshore ones,” he said.

“In addition, Gladstone and the coal seam gas fields are close to population centres and work forces. The big LNG players are working in deep water and in WA their onshore operations are in places where not many people want to live.”

While the CSM-LNG projects would need hundreds of wells each, this was not a big problem, according to Scott.

“In the Surat, it costs hundreds of thousands of dollars to develop a well, but offshore it can cost many millions,” he said.

“If you have problems with one big offshore well, you could be in serious trouble, whereas

with coal seam gas it’s easier to build in redundancy and you can add new wells very quickly and cheaply if you need to.”

The big drawback will be handling ramp-up gas but even this can be managed, according to Scott.

While all of the projects would be able to begin operating at about 50% of their nameplate capacity, CSM wells are difficult to shut off and then restart due to the need for water to be pumped from the seams to extract the gas. The wells begin producing gas slowly, but steadily increase production as more and more water is removed. Shutting down production can allow water to re-enter the seams.

WilsonHTM’s Pedler said the smaller projects – Sun LNG and the Fisherman’s Landing LNG scheme – were suited to the nature of CSM ramp-up.

The Shell–Arrow arrangement (at this stage there has been no arrangement between Shell and LNG Limited) was of

particular interest as Shell offered bonus payments for plant production of 1MMtpa, a target that would be well within the project’s ramp-up phase, he said.

“It’s a relatively small operation for a company the size of Shell that lets it test the technology on a small scale. If it works well it could be very significant,” he said.

Arrow said Shell’s entry into Fisherman’s Landing LNG signals that the rollout of further small trains in a modular fashion is likely to happen sooner rather than later.

“Shell is on board with the concept of smaller modules,” Scott said.

“But they’re not in this just to produce 1.3 million tonnes per annum, and neither are we.”

The Arrow–LNG Limited–Shell joint venture will have to deal with about 15-20 petajoules of ramp-up gas, but Arrow believed it would be able to use the bulk of this in its power stations.

Scott said he calculated that Sunshine Gas would have to dispose of about 10-15PJ of ramp-up gas, while the larger projects



Mitchell Drilling undertaking well completion activity for Arrow Energy

(Santos–Petronas and QGC–BG) would have 50-125PJ each of ramp-up gas to manage.

But Santos and QGC say that contrary to conventional wisdom, some relatively mature CSM fields, with free-flowing holes, can be shut down without damaging the productivity of the coal seams.

Scott acknowledged that this was an option for those two companies and said Santos could also shut in some of its conventional gas production.

In addition, Santos could store some of its gas in depleted reservoirs near Moomba, but Scott pointed out that this option has significant costs associated with it.

“You’re not just producing the gas once,” he said. “You’re also pumping it at pressure back into a reservoir, then reproducing it later, so you would tend to use this option only after you’d exhausted more cost-

effective possibilities.”

**“CSM has grown largely through innovation and this is just another innovation”**

Another possibility is that the larger CSM-LNG projects with longer timetables sell some of their ramp-up gas into the smaller projects as those projects themselves ramp up. This would be a win for both parties, with large players finding a market for their gas and the smaller ones running their plants at full capacity from the very beginning.



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Of course, this assumes that the smaller projects (Sun LNG and Fisherman's Landing LNG) keep to their timetables.

If the larger players – GLNG and Queensland Curtis LNG – have concerns on this score, they could seek to lease a floating LNG vessel.

With floating LNG seemingly imminent, liquefying gas via a ship moored at Gladstone is a real option during the ramp-up period, according to Norwegian company Flex LNG's Australian representative, Peter Dighton.

"There are real opportunities at Gladstone for using our LNG Producer vessels," he said.

"Coal seam gas companies ramping up production for LNG projects will have to find a market for the gas that is produced before the liquefaction plants are operational, and a floating LNG vessel based off Gladstone for a couple of years could meet that need."

**Where next?**

If Scott and other believers in CSM-LNG are right and the various hurdles can be overcome, what will this mean for the

Australian CSM industry and for eastern Australian gas in general?

"It's going to be busy," Pedler said.

"According to [independent experts] ACIL Tasman and RLMS, current eastern Australian gas demand is about 640 petajoules per annum. If the first trains of the [first] four proposed plants get up, they will add another 600 petajoules per annum in demand."

This could require the development of new gas provinces and might help drive the development of a new pipeline between southwest Queensland and the Hunter Valley in New South Wales.

"A pipeline directly connecting the Surat Basin to NSW would open up the Gunnedah Basin [in northwest NSW] for exploitation [of CSM]," Pedler said.

"It's very much early days in appraising the Gunnedah's potential but the work that has been done so far by Santos and Eastern Star Gas shows that the implicit potential is huge."

New gas provinces, such as the Gunnedah, will be needed if Pedler's appraisal of the LNG sector's likely growth is correct.

In a March commodity review, he said the



Artist's impression of Santos' Gladstone LNG





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ratio of LNG regasification to liquefaction capacity would grow rapidly over the next five years, leading to an increasing shift of power to LNG producers.

According to figures compiled by *Platts LNG Daily*, by the end of 2008 worldwide liquefaction capacity will be 191.5MMtpa, but regasification capacity will be 337.8MMtpa. By the end of 2013, liquefaction capacity will increase by about 60% to reach 315.9MMtpa, but regasification capacity will more than triple to 1018.6MMtpa.

This means the ratio of regasification to liquefaction facilities will increase from 2008's 1.76:1 to 3.22:1.

Pedler notes that not all planned regasification or liquefaction facilities will be built but says the trend is clear.

"Demand for LNG seems set to increase dramatically," he said.

It seems the LNG market will be big enough to support all of the planned Gladstone LNG projects – even the latecoming LNG Impel project, which proposes to act as a merchant system tolling suppliers' gas.

The questions are: can enough gas be found for each project, will each of them reach their long-term projected capacities, and will any projects merge?

Pedler said it was too early to say which projects will succeed, but they all now include partners with serious LNG track records.

He said it was reasonable to anticipate some joint development of common

infrastructure such as shipping, ports, loadout and dredging, but he did not believe merging of projects themselves was likely.

Finding the gas needed could be tricky, particularly for LNG Impel, as each of the other projects could at some point begin acquiring and processing third-party gas and the two smaller projects might be able to add new trains relatively quickly.

Another unanswered question was how Origin Energy would fit into the Queensland LNG sector.

"Origin was one of the first companies to successfully evaluate coal seam gas, and I believe it is likely to stay at the forefront of the sector," Pedler said.

"But it already achieves good margins as an electricity retailer and generator.

"I suspect its management and board have formed their own view and have a clear reasoning about how they plan to extract best margins. That may or may not be through LNG, and if Origin does enter LNG it will be looking to do so on its own terms."

Despite his general optimism – or because of it – Pedler said he would not be surprised to see one or more project timetables blow out.

"The attractiveness of the sector could work against it, with various projects competing for men, material and resources," he said.

"But we believe Queensland's LNG sector will have a strong future." P





Timeline	
<b>2007</b>	
April 11	Arrow and Liquegas announce a small domestic LNG plant
May 30	Arrow announces it will supply gas for LNG Limited's Fisherman's Landing LNG
July 18	Santos announces Gladstone LNG
December 10	Sunshine Gas announces Sun LNG partnership with Sojitz
<b>2008</b>	
February 4	QGC and BG announce Queensland Curtis LNG
April 29	BG makes \$12.9 billion takeover bid for Origin, which is later sweetened to \$13.8 billion
May 29	Santos announces partnership with Petronas
May 30	Origin rejects BG offer
June 2	Arrow and Shell announce gas supply deal
June 24	BG takes \$13.8 billion offer for Origin directly to shareholders

Planned Queensland LNG projects						
Project	Downstream operator	Upstream operator	Other partners	Output - initial	Output - eventual	Start-up target
Gladstone LNG	Santos-Petronas JV company	Santos	Petronas	3-4MMtpa	10MMtpa	2014
Queensland Curtis LNG	BG	QGC	-	3-4MMtpa	10MMtpa	2013
Fishermans Landing LNG	LNG Limited	Arrow	Shell	1.3MMtpa	-	2011
Sun LNG	Sojitz	Sunshine	-	0.5MMtpa	-	2012
LNG Impel Gladstone	LNG Impel	N.A.	-	0.7-1.3MMtpa	2.1-3.9MMtpa	2013