



25th World Gas Conference

AUSTRALIAN GAS INDUSTRY TRUST – PARTICIPANT REPORT

A report covering the experiences and learning's of the AGIT delegates during the 25th World Gas Conference in Kuala Lumpur, Malaysia.

4th – 9th June 2012.

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1. INTRODUCTION

The World Gas Conference (WGC) is a triennial event where thousands of industry and political leaders, gas executives, specialists and exhibitors gather to learn and debate key issues of interest to the gas industry. Organised by one of the International Gas Union charters, the WGC is the most important world gas event.

The Australian Gas Industry Trust (AGIT) sponsored the attendance of five delegates to the 25th World Gas Conference which was held in Kuala Lumpur from the 2nd to 8th June 2012. With the theme “Gas: Sustaining Future Global Growth”, and in light of the extensive preparation by the Malaysian Gas Association and the International Gas Union, as AGIT delegates we recognised the amazing opportunity AGIT’s sponsorship of our attendance represented. At the outset, we would like to thank AGIT for providing us with this opportunity.

As noted Datuk Abdul Rahim Hashim, President IGU, global demand for clean, more efficient and cost effective energy sources is increasing and will continue to expand in line with rising population, urbanisation and economic growth. Gas plays a fundamental role to meet this energy demand. The 25th WGC was an opportunity for the AGIT delegates to gain a deep understanding of the issues facing the gas industry, and global energy requirements more generally.

The WGC consists of a technical program, exhibition and, importantly for us delegates, social activities.

The AGIT delegation for the 25th WGC was:

- Ian Little, AGIT Chairman and Envestra Managing Director,
- Graeme Bethune, AGIT Director and Energy Quest Managing Director
- Cheryl Cartwright, AGIT Director and Chief Executive, Australian Pipeline Industry Association.



The AGIT participants at the 25th WGC (from left to right in above picture) were:

- Matthew Clemow, Business Manager - Gas Assets, TRUenergy
- Claire Halsey, Manager GLNG Shareholder, Santos
- Mark Lackenby, Pipeline Engineer, APA Group
- Neil Gardner, Commercial Manager Upstream, Arrow Energy
- Jamie Doyle, CSG Exploration and Geoscience Manager, Origin Energy

This report provides a summary of our experience at the 25th WGC.

2. TECHNICAL PROGRAM

Grouped into four key sub-themes, the WGC technical program provided us with an excellent opportunity to explore those areas of the gas industry of interest, and to learn something new from industry leaders and specialists. The technical program was prepared by the various IGU technical committees and separated into key note sessions, luncheon addresses, strategic panels, expert forums, task force sessions, interactive expert showcases and committee sessions. Of particular interest to the AGIT participants were the committees focused on sustainability, strategy, LNG, and Exploration and Production.



1. Foundation for Growth

The technical sessions held under this sub-theme sought to highlight that natural gas has an important role in the current energy mix. As noted by the IGU, “we all need energy and natural gas... can provide one of the best sources of [that] energy.”

As AGIT delegates, we attended many sessions, including:

- The Strategy Committee Session on “Wholesale Gas Price Formation – How the World Prices Gas”, where panellists including Elizabeth Spoomer, BG Group and Nicholas Blessley, Qatar Petroleum enjoyed a lively discussion on global price formation mechanisms, and whether Asia LNG prices are likely to move to parity with Henry Hub (all agreed that if they knew this answer, they wouldn’t be on the panel!).
- Natural gas exploration and production, which highlighted the plethora of significant new gas discoveries around the globe. Conventional gas reserves are currently estimated to have the capacity to sustain global energy needs for the next 120 years, but with the industry-changing advent of unconventional reserves, that time frame now extends out to 250 years.
- The increasing role of gas as a generation fuel, including gas storage, which is being driven by higher levels of wind generation and the need for a back-up when the wind stops blowing.
- The Youth Roundtable Forum, which showcased the talent of the next generation of gas professionals by inviting a cross-section of newly baptized entry level staffers to share the stage with and interrogate a panel of well seasoned experts on current issues. While there was no winner on the day, there were plenty of learnings to be gained from both the youth and the experience.

A key take-away from this part of the WGC was that all forms of energy will be needed to meet world energy demands, but that gas is expected to form a corner stone of these needs as based on current reserves it is abundant, sustainable, relatively clean, and flexible as a fuel source. However, these sessions also highlighted that for gas to step up to being the 'golden fuel', it must meet the challenges of regulatory framework, technology and innovation requirements and human talent constraints.

2. Securing Gas Supply

Despite the abundance of natural gas, securing the supply requires shared understanding of the political and technical difficulties if gas is to become the fuel of the future. The sessions held under this sub-theme were focused on geopolitical influences on the gas industry, the impact of unconventional gas resources and the need for energy security. Some of the highlights from this topic were:

- In Strategic Panel 4, global industry leaders including Santos's David Knox and Schlumberger's Kyel Hodenfield considered the topic of "Unconventional Gas: a game changer of a global bubble?". This high quality session provided great insight into how industry leaders view unconventional plays and the global differences that apply. There appeared to be general agreement from the panellists that the US experience (the 20 year revolution) in unconventional oil and gas will require technological and cost changes if it is to be replicated on a global basis.
- Integrating renewable gases into the natural gas industry, which was a session that brought together the complete spectrum of the gas industry in terms of multinational E&P companies, analysts and academic experts. All panellists agreed there is a considerable niche in global energy supply that can be filled by renewable gas, especially biogas and especially in the European and Russian markets. This niche market is crucial as it provides an alternative to the traditional fossil fuels where in remote areas removed from national gas grids, stand-alone biogas cells provide much needed, self-sustaining energy year round.
- Security of supply is driving projects such as Europe's North Stream gas pipeline that runs under the Baltic Sea between Russia and Germany to bypass less stable nations – former Malaysian Prime Minister Dr. Mahathir Mohamad made an amusing comment during a panel discussion regarding "recalcitrant" countries shutting in the gas supply to another.
- Meanwhile the Chairman and Managing Director of India's GAIL, Sh. B. C. Tripathi said that he expects India to become the largest importer of LNG if it China does indeed have 1.5 times more shale gas than the USA. However he lamented that "the tiger is hungry and looking for food, but it needs food that it can afford" in reference to the current oil linked pricing for LNG.

3. Enhancing Gas Demand

Gas is a means to an end, the end being energy. These sessions dealt with the important issue of whether the virtues and uses of natural gas are well understood by customers and policy makers or influence future energy markets, both nationally and at a global level. Some of the highlights from this topic include:

- Innovation and new technology: the key to increase the gas business. This session focused on the flexibility and adaptability of gas as an energy source and in particular displayed how gas can rise to the challenge even in Japan where this heavily industrialised nation can switch from a reliance on nuclear energy to a gas powered future in a matter of just a few years. The perfect example is Tokyo, which harbours an aspiration to launch a hydrogen-based automotive network by 2015, sourced from LNG imports. A feat that goes beyond incredible considering the technology leap required and the shift to being a gas importer of global significance.
- Some conference sessions also discussed the future transportation uses for natural gas. LNG is expected to emerge as the main fuel for merchant ships as regulations will severely limit sulphur emissions. Ship bunker fuel contains approx. 3.5% sulphur, which is well above the proposed limits for international waters (0.5%), and some controlled areas (0.1%). By 2015 approx. 80% of the cost of running a large container ship is expected to be fuel. From 2014 both Singapore and Rotterdam will start offering LNG for ship fuel. In the US, after a slow start, low natural gas prices are driving a move to gas fuelled vehicles. A waste management company is converting 18,000 rubbish trucks from diesel to CNG. The option price for a natural gas engine in new trucks is coming down rapidly.

4. A Sustainable Future

The sessions held under this sub-theme brought together the role of gas as an available, affordable and acceptable fuel source that will help to mitigate climate change. Renewable energy is expected to play a larger role in the global energy market, but this will require the support of other flexible and reliable fuels, such as natural gas. This is likely to result in an increasing market share of natural gas as an energy source.

The first keynote speaker GDF Suez's Jean-Marie Dauger talk was titled "A natural choice for a sustainable future" which highlighted:

- Natural gas can be flexible in complementing renewables
- Further innovation is required to meet market demands
- Natural gas can supply cost effective energy to Europe with relatively low CO2 emissions and high efficiency
- Australia will play a role with the Australian Petrel, Tern and Frigate field developments and the floating Bonaparte LNG project

Total's Christophe de Margerie continued the theme with a talk titled "Challenges along the Gas Chain" which highlighted:

- Future gas production will come from projects which are increasingly complex and costly to develop.
- Financing those projects requires visibility on the long-term value of LNG. This is the core of the debate on price formulas, with Europe, Asia and America having significantly different pricing formulas.
- The Australian Inpex Ichthys project was used as an example where strong economics is supported by a liquids contribution and with LNG sold on long term contracts indexed to oil price (Asian pricing model).

The luncheon address by IHS Cambridge Energy Research Associates Daniel Yergin was titled "The paradox of gas" which succinctly summed up how the energy market is tight, but gas supply is in abundance. LNG production worldwide has doubled in eight years with 75% of all that liquefaction in Australia. Daniel reviewed the significant changes in the last three years since the last conference such as Qatar reaching 77 MTPA, the Fukushima nuclear accident resulting in LNG cargoes being diverted to Japan, political reshaping of Middle East, and the shale gas revolution (which has been 25 years in the making). Predicting the future of gas in the short term is not entirely straight forward with the largest 70% of gas reserve discoveries being made in East Africa.

3. IMAGE OF GAS

The image of gas was the topic of many discussions throughout the conference. The crucial role that gas will play as oil becomes more scarce is recognised, but people aren't sure what this actually means or how this role should be presented to the public. Typically gas has been classed as a 'bridging' fuel which will help pave the way from oil to renewables. But this suggests that gas only has a short term future.

Different presenters at the conference attempted to change this 'bridging' name to 'destination' fuel, 'partner' fuel or 'foundation' fuel, but this was not readily adopted by delegates due to the differing messages. The industry will need to work together to make a decision on how it wants to be seen and how this message should be sent out to others in the near future.

Some of the key points raised during the panel discussion and through out the conference on the image of gas include:

- It is felt that the gas industry is at a turning point. People recognise the limitations and decline that oil faces and the requirement for an alternative future energy source. Eyes turn hopefully towards renewables, but the economics and technical limitations of these are recognised.

- A company's reputation can be one of its biggest assets. This is also true for an industry. In the gas industry it is important what we recognise and strengthen our relationships with our stakeholders.
- There is no one common view shared by our stakeholders. Some may love the gas industry, some may hate it, others need us, and others can use gas without giving much thought to the industry. When working with stakeholders it is important to enter conversations with an open mind and to look at the situation through their eyes.
- People generally protest when they feel threatened and are worried or concerned. People rarely protest when they just don't like a company or industry. It is therefore important that the gas industry works together to address peoples' concerns and to increase awareness of both what we do, and what others perceive we do.
- Bombarding people with facts (called 'fact bashing') does not always get the message across. As an industry we love facts, big pictures of huge drill rigs, vast infrastructure, graphs and hard factual figures. Our audience may not share this enthusiasm. Instead we need to tailor and adapt our messages, making gas more relatable and relevant to the public.
- The marketing issues that gas faces include:
 - Price – clarity of our pricing and the volatility
 - Emissions – Gas is part of the solution, but also part of the problem
 - Shale – the benefits to the US are well known but so are the environmental concerns that need to be addressed
 - Greenhouse gases – the industries' preference is to talk about efficiency and innovation, as opposed to emissions. Attempting to change the message to address audiences' concerns.
- Most support for nuclear is found in locations where nuclear plants are located. There should be learnings in this for the CSG/CBM and shale gas industries (particularly around community engagement).
- Royal Dutch Shell is still called 'Shell Oil' in some locations, yet this year (2012) Shell will produce more gas than oil.
- Shell has more Facebook members than Greenpeace globally. Engaging the community via social media like this is a key strategy being employed by many firms in the industry.
- The image of gas has declined in recent years due to a lack of investment and co-ordinated effort between major producers.
- Coal was the fuel of the 19th Century, Oil was the fuel of the 20th Century. Will Gas be the fuel of the 21st Century?
- The key concerns surrounding gas globally are Shale gas fracking and Arctic drilling.
- One obstacle the industry faces is that we are selling old fuel to a new world. The terminology we have adopted shows this and does not strengthen our case, i.e. 'Coal' seam gas or 'unconventionals'.
- A future issue for the gas industry could be methane emissions, due to the significantly higher greenhouse warming effect of methane compared to carbon dioxide. This could be the next key topic used by protestors.

It is felt that gas is key to renewable energy, however the industry is divided on whether it should be in alliance or in competition with renewables. Some feel we need to work together to be in alignment but still separate to renewable energies. Some went as far as to suggest the two industries work together to 'kill coal'.

4. NEW TECHNOLOGY AND NEW FRONTIERS

The Golden Age of Gas has undoubtedly been made possible by the recent quantum leap in technology, both in terms of exploring for and producing natural gas. Add to this the extraordinary growth in LNG trade and an energy hungry world eager to secure a safer and more prosperous future for generations to come, and it becomes clear that gas has truly become a super power in the energy industry.

New gas resources are being discovered on every inhabited continent on the planet with volumes being accumulated in the tens of trillions of cubic feet every year. The leader in the pack is unconventional gas, which comes in various forms including coal seam gas (coal bed methane), shale gas and basin-centre gas. All of these continuous resource plays have long been identified in abundance across the world, but the advent of more effective, low permeability recovery methods is at last making them commercial. Improved fracture stimulation techniques, smarter well completion designs that can be remotely operated and complex well trajectories have all played roles in monetising what used to be considered at best marginal, if not merely troublesome and hazardous gas-bearing formations.

North America represents the new standard in maturing unconventional reserves with the new gas-rush being shale gas. Success in this new phenomena was first achieved in the last decade and has gathered astonishing momentum. It started with only 1% of total gas supply in 2000, has grown to 35% today and is estimated to reach 50% in 2035. Total ultimate recoverable reserves of shale gas in North America are estimated to be greater than 482 trillion cubic feet (TCF), which is four times larger than the total remaining oil reserves and could self sustain the United States alone for another 100 years.

While the cost of drilling an individual well could be as high as ten million dollars (drill, multi-stage fracture stimulation, completion and tie-in), the rewards from that single well could be three to four times that cost in return. However, success has come at a price with the United States domestic gas prices tumbling from >\$5/MMBtu in 2010 to <\$2/MMBtu in 2012 due to the oversupply of shale gas. Many operators now target liquids rich shale plays instead and some even sell the associated gas for free to save on cost.

There is no denying though, this dramatic fall in domestic gas price has stimulated the manufacturing sector of the United States' economy, sustaining them through this latest economic down-turn and providing a platform to return to a growth status. A new wave of investment in petrochemical plants including Dow's US\$4 billion for ethylene plant in Freeport, Texas has been announced. The US steel industry is picking up due to the demand for gas pipe and the low gas price is making US production more economic.

Australia has also played a considerable role in the growth of unconventional gas in the industry with four mega-scale, coal seam gas projects maturing in Queensland. More than 40 TCF of proved and probable reserves have so far been booked with the majority of these reserves already secured under LNG sales contracts with Asian buyers. In addition, approx. \$60 billion dollars has passed through final investment decisions to mature and produce these reserves from acreage positions that span hundreds of thousands of square kilometres and impact a multitude of communities across regional areas of the country.

The regulatory conditions number in the thousands and the environmental, safety and logistical challenges are extraordinary, but the success of coal seam gas is deemed imperative to sustain Australia's current economic success and inject much needed revenue streams into regional areas. Technology advances in coal seam gas development have also contributed with low cost drilling methods, refined fracture-stimulation techniques and water treatment options including reverse osmosis, irrigation and brine reinjection.

New frontiers are also being entered in the search for additional conventional resources of gas as well. The most challenging and possibly exciting are the offshore, Arctic Circle discoveries being made today off northern Russia. The rewards are huge, but the challenges include six months of darkness, icebergs, 32 metre high seas, pack ice and extreme remoteness (>600 km) that prevents helicopter transport due to fuel range constraints. Additionally, the inability to have permanently manned facilities may require fully subsea developments with remote controlled submarines for ongoing maintenance, i.e. not a single human hand on site.

China is also cashing in on the technology boom with >30 TCF of tight gas reserves matured annually through improved low permeability drilling. Multilateral well designs coupled with pinpoint, multi-stage fracture stimulations are allowing new basins to be explored, relegating their country's considerable shale gas plays to a distant second.

Ultra deepwater drilling in offshore East Africa has also uncovered a new potential gas province with more than 10 TCF already discovered in 2012. Even Israel now has a new super giant gas field, Leviathan in the Levant Basin where 16 TCF of gas reserves have been discovered at depths of ~5000 metres. Even greater potential has been identified below 7000 metres, beneath a thick salt layer. Drilling operations at these offshore depths through thick salt accumulations requires considerable engineering skill at considerable cost, but the rewards are obvious.

With success piled on success, it is clear to see that technology has inspired the gas industry to reach to greater heights, and to drill to greater depths to unlock and commercialise new resources of both conventional and unconventional gas. With increasingly larger reserves being discovered every year across the planet, it is easy to see why we are now entering what has been termed the Golden Age of Gas. The only remaining question is: When will it end?

5. TECHNICAL TOUR TO BINTULU, SARAWAK

At the end of the conference, Petronas hosted a half-day visit to the Petronas LNG complex at Bintulu, Sarawak. This is currently the second largest LNG production facility in the World with a combined production capacity of 25.7 MTPA across 8 trains, although Petronas claim that it is still the largest because Qatar's production is from two ventures: Qatar Gas and RAS Gas.

For some of the AGIT delegates this was our first visit to an actual LNG facility so provided an ideal opportunity to view what many of us are working towards in Australia. It provided hands on experience to a critical part in the supply chain and gave us a greater appreciation both of what we are trying to achieve, but also greater clarity of the supply and demand implications of the Asian market to Australia.

It was an early start getting to the airport on Saturday morning, especially considering we had the conference closing celebrations the night before. The chartered flight into Sarawak however was worth it as we flew in over lush forests and clear sea and gained that important new stamp in the passport. A procession greeted us upon arrival to welcome us with singing, scarves and flowers.

A police escort then led us to lunch where more traditional singing and dancing was performed while we ate and caught up with fellow delegates and staff from the Bintulu complex. The tour around the complex itself was well managed, informative and insightful. A variety of personnel and management from the plant joined the tour so were able to ensure all questions were answered.

The key learning's from the experience were:

- The size of the plant. The majority of the LNG projects which have recently gained or are working towards FID are 2 x 4 MT trains. Less than 1 third of the size of the Bintulu complex.
- There are many commercial JV agreements in place over the complex, across a range of different products, outlining the complexity of managing and financing a venture



like this.

- Gas supply comes from offshore Northern Sarawak. A 500 km pipeline is also underway to supply gas from Sabah state.
- A huge array of ancillary infrastructure is required to support an LNG plant. Other oil and gas related processing plants are also adjacent to the complex utilising its position and established infrastructure (e.g. Shell middle and wax processing plant, fertilizer plant etc.).
- Going to a conference each day and partying (networking) each night for a whole week, then spending a day flying to Sarawak and viewing a plant in the humidity with a belly full of good local food is tiring. I don't think anyone was awake on the flight back to KL.

6. EXHIBITION

The huge exhibition was spread amongst 10 halls with over 300 exhibitors. The gas producers certainly had the flashiest stands with Gazprom using some age old marketing techniques to bring in the crowds. The exhibition comprised mainly of gas production, transmission and distribution companies, equipment manufacturers and service providers.

The exhibition provided an excellent opportunity to meet with other companies and discuss the current market environment and to showcase innovative technology. Of particular interest were the scale models of future floating LNG production facilities. Shell was promoting the cautious approach of taking time to get the design correct, whilst Petronas were clearly keen to get to the market first. There was an uncanny similarity between the two designs, brought about in part by common designers and suppliers of some modules.



7. SOCIAL ACTIVITIES

To complement the conference program, a number of social activities were attended including:

- Kuala Lumpur city tour taking in the new King's Palace, the Islamic Arts Museum (with an impressive display of Islamic architecture), the National Mosque, Independence Square and the Craft Centre
- Opening ceremony attended by the Prime Minister, followed by a high energy dinner party
- Cocktail function at the Malaysian Petroleum Club high up in one of the Petronas twin towers that was hosted by the Australian High Commission and AusTrade. This presented a great opportunity to network with other Australians working in Malaysia or visiting Malaysia for business
- Participating in the CNBC's Energy Opportunities debate which resulted in some lively discussions between participants regarding how to increase the market share of gas
- The closing ceremony featuring an impressive singing display followed by the closing party
- Numerous shopping and eating excursions in a city renowned for its western style mega malls and extensive culinary temptations, along with trying to locate the best bar with skyline views



8. CONCLUSION

The 25th WGC was an amazing event with very high quality sessions and interaction on topical industries facing the industry. As AGIT participants we will take the key learnings, including that gas is truly a global industry, and apply these in our jobs.

We really appreciated the opportunity to learn, network and enjoy KL that AGIT provided to us.