

Australian Institute of Energy Conference 2012

**Address by David Knox
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Fuelling Nations: The role of gas

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Slide 1: Disclaimer



Fuelling Nations – The Role of Gas

David Knox – CEO and Managing Director

AIE: 19th November 2012



Slide 2: Fuelling Nations – The Role of Gas

I'm very pleased to be invited by the Australian Institute of Energy to talk with you today.

Energy is often taken for granted, and yet it underpins our way of life. It sustains our economy and builds nations. This is why I commend the AIE on the role it plays in helping to increase the understanding of both Australia and Asia's energy landscape.

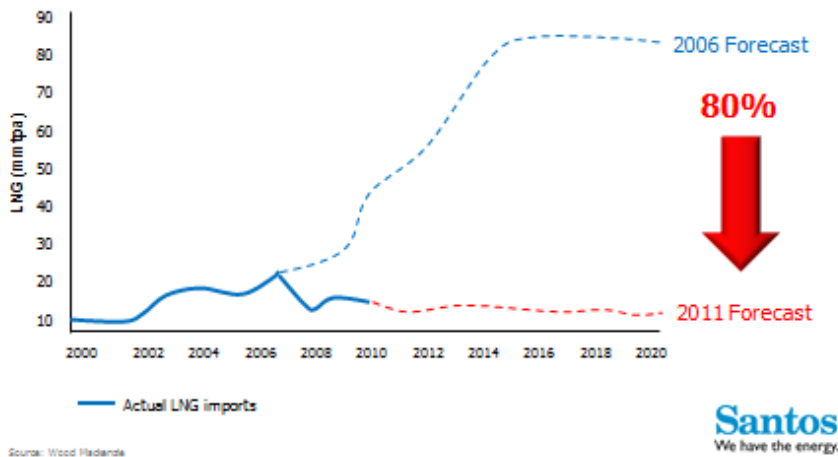
Today, I'd like to explore Australia's energy future with you by focusing on three important subjects that are essential in understanding how Santos, is working to define our country's energy future as well as our own.

1. **First** I'll look to the US, and discuss the massive change that is happening to their energy economy.
2. **Second**, I'll explore the energy challenge facing our region, and the pivotal role that gas is playing to address this.
3. **Third**, I want to look at what Australia can and must do to ensure we continue to attract the investment required to develop our gas resources and take advantage of Asia's transformation.

Shale gas has been a game changer in the US

The impact of US shale gas production on forecast LNG demand has been significant

US LNG Demand Forecasts - 2006 vs 2011



Slide 3: Shale gas has been a game changer in the US

Let me start with the US, and the surge in the availability of gas caused by the commercialisation of its vast shale gas resources.

It is worth pointing out that energy markets normally change slowly, by evolution rather than revolution. But if we look at the US – it was only six years ago that they were seeking to import LNG. In fact in 2006 the US was forecasting 85 mtpa of LNG to be imported in 2015.

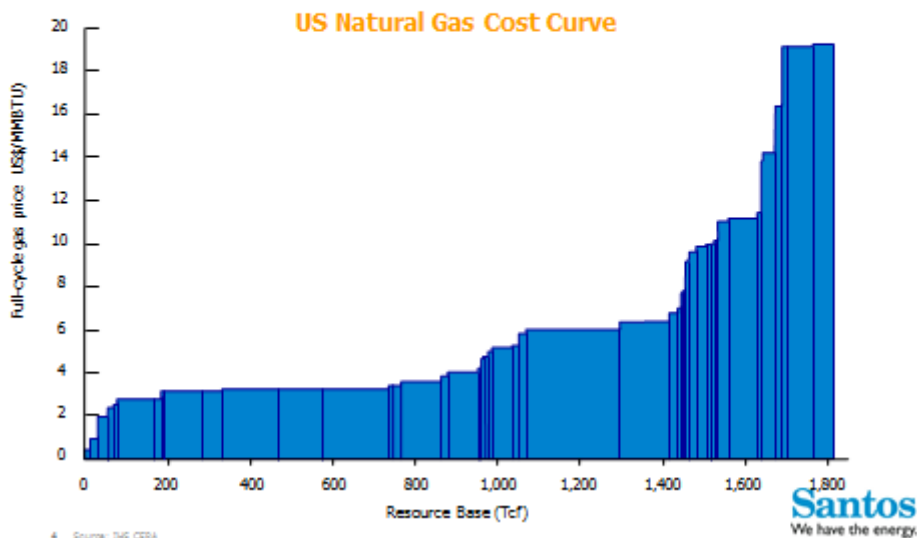
On the back of this forecast demand the world's largest exporter of LNG – Qatar, had devised a national gas strategy that was fundamentally based on exporting gas to Asia and to the US.

Some of you may remember the famous picture of John Howard shaking hands with Arnold Schwarzenegger, amidst discussions to win support for BHP's planned LNG import terminal off the coast of Malibu.

“California is desperate for LNG” or so the headlines ran.

That was in 2004. Roll the tape forward to 2012 and instead of importing LNG, the availability of shale gas has meant that the US is virtually self-sufficient in gas with 92% of the gas demand satisfied internally and about 8% imported.

US gas resource is now abundant



Slide 4: US gas resource is now abundant

It is not only an abundance of natural gas that characterises the US economy today, but the low cost to develop it.

Based on current consumption rates the US today is estimated to have more than 35 years of gas supply that could theoretically be produced at around \$4/mmbtu.

This is not to say that US domestic gas prices are expected to trade at \$4/mmbtu, or less, for 35 years, as there are other factors which impact the merit order in which gas reserves are developed and brought to market.

The current low cost which is revolutionising the US economy is not solely because of an abundance of gas. Of course you need the right geology, but it has also been the investment and innovation in the US gas sector which has contributed to unlocking this huge resource.

To understand where the US is today, you have to understand their journey over the last decade or so.

From 2000 until 2007, gas prices rose steadily from around \$2.50/mmbtu to about \$10/mmbtu, delivering the incentive for a massive exploration boom.

Santos today has the largest number of onshore drilling rigs in Australia and we have 11 operating today. At its peak in the US, around 1,500 drilling rigs were exploring for shale gas, with both local and International Oil Companies, together with an experienced and mobile drilling service sector – bringing new technology to play, along with a ruthless focus on low cost operations and an appetite for risk.

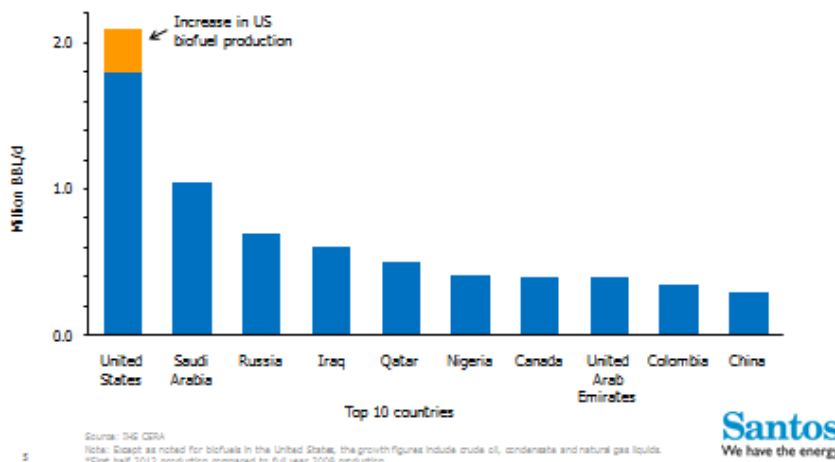
Commercialisation of this drilling success story was then facilitated by the existing network of pipelines which criss-crossed the country, allowing the gas to get to market – and to get there quickly, with limited need for additional infrastructure, planning permits or the capital investment that gas distribution requires.

It is this rapid commercialisation that allowed gas prices to fall so quickly to where they are today at circa \$4 per mmbtu.

Revival in US oil production

The US is the largest source of oil production growth since 2008

Oil production growth from 2008 to 2012



Slide 5: Revival in US oil production

Now this is not the end of the remarkable story. The success of the US gas story, the strength of its exploration capacity, and the development and subsequent transfer of the technology used for shale gas, has also led to a revival in US oil production.

The US has recorded the largest global oil production growth for any country in the past 5 years, driven in part by the increase in tight oil production.

Together with increasing efficiency in the combustion engine, and increasing use of gas for transport - forecasters are suggesting that the increase in tight oil production could result in the US and Canada becoming oil independent by 2025.

Forecasts are not for the faint hearted, but we shouldn't mistake the determination of the United States, its oil and gas industry and its Government to achieve this.

The implications of success are great not just for energy markets, American consumers or their industry, but for foreign policy as well.

Urbanisation is driving energy demand

Urban migration provides access to power and services increasing the per capital energy consumption



0.3
million
per
year



8.7
million
per
year



14.6
million
per
year



= number of people migrating to urban centres each year

Source: Wood Mackenzie based on 2012 forecasts

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Slide 6: Urbanisation is driving energy demand

Let me now move on to the energy challenge facing Australia and our region, and the role of gas in meeting this challenge.

Now, it goes without saying - Australia is not the United States of America. Our population is smaller, our domestic market for energy is smaller, and yet like the US, we are blessed with an abundance of natural resources.

As a result, Australia's future is very much linked to the pace and scale of economic and societal change taking place in the Asian region. A region which provides us with a large and growing market for our resources, and a region whose change is by any measure simply staggering.

The Prime Minister and the Australian Government should be commended for their initiative to map out the transformation taking place in Asia and to construct a narrative as to how our nation can grasp these opportunities through the “Australia in the Asian Century” White Paper.

The world we are a part of - is after all very different now. In the past 20 years, China and India have almost tripled their share of the global economy and increased their absolute economic size almost six times over.

I was struck by a comment made by Former Prime Minister Kevin Rudd recently on Radio National where he said that 30 years ago, China’s GDP was smaller than Australia’s, and at that time no-one would have dreamed that in 2012 they would be on track to replace the US as the world’s largest economy.

This growth is not isolated to China and India. By 2025, the region as a whole will account for almost half the world’s economic output.

So, what does this mean for the region’s energy future? Well, quite simply - energy trends broadly match economic trends. Growth rates in Asia are being matched today with a similarly fast-growing energy demand.

This growth in energy is borne by the growth in living standards Asia is experiencing today – by the literally millions of people across the region seeking a better way of life. By rural

communities migrating to urban centres and cities and people seeking access to heat, light and mobility.

Here again, China has led the pack - it is now the world's largest energy consumer, having gone from consuming less than half as much energy as the United States in 2000, to consuming slightly more today.

Energy choices



Slide 7: Energy choices

How this increase in energy demand is met, will be dependent upon how our Asian neighbours make choices about their fuel mix. Will their local growth be met by coal, oil, gas, nuclear power or renewables? Ultimately some combination of all the fuels will in my opinion be necessary to maintain security of supply.

These energy choices are being made in a changing world – the earthquake and Tsunami in Japan was a national disaster that I observed from afar with great sadness, but it is also one which has serious implications for the future use of nuclear power.

Similarly while the ratio of oil reserves to production has remained more or less the same for around 40 years, today's reserves are

found mainly in OPEC countries with little easy access to investment from International Oil Companies.

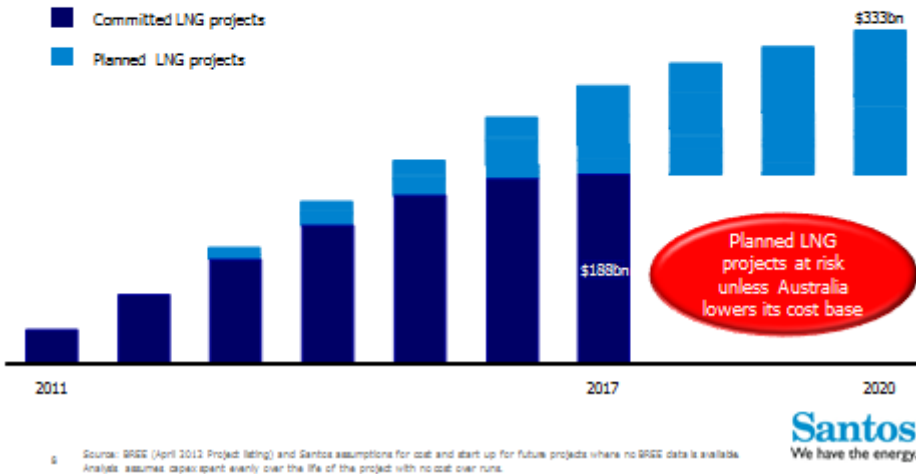
This lack of accessibility brings into perspective the United States' drive for energy self-determination. It also makes clear the considerable constraint on the world's ability to meet oil demand growth at reasonable prices.

In fact, inflation-adjusted, oil prices in 2011 were the second-highest on record. You have to go back not one but two centuries to find a higher year – way back to 1864.

Australian LNG projects

Planned investment is significant and would make Australia the world's largest supplier of LNG

Cumulative Capex US\$bn



Slide 8: Australian LNG projects

Asia's transformation and its energy challenges are resulting in global projections for gas demand skyrocketing. In fact the demand for gas is projected to grow by more than 50%, faster than any other fossil fuel in the 25 years to 2035.

This is where Australian natural gas comes into play. Australia has responded to Asia's energy challenge, and responded well. We now have seven LNG projects worth around \$180 billion currently under construction in Australia's west, north, and east.

And separately each of the seven LNG projects under construction represent some of the biggest projects ever undertaken in this country.

To put this in perspective, the iconic Snowy Mountains Hydroelectric Scheme has long been considered as Australia's largest infrastructure project. The Scheme took 25 years to build at the cost of around \$6 billion in today's money.

Santos has equity stakes in four LNG projects, three of which are in Australia:

- The operational Darwin LNG project led by ConocoPhillips.
- The sanctioned PNG LNG project led by ExxonMobil.
- The floating Bonaparte LNG project with our partner GDF SUEZ; **and**
- The two train - Santos GLNG Project in the state of Queensland.

Australia also has a lot of gas. And, let me make this quite clear to those claiming Australia does not have sufficient gas for both a domestic and export market. Gas in Australia is abundant. Based on projected demand Australia has more than 50 years of known gas reserves and resources to support both domestic and export markets.

Critically, this doesn't take into account Australia's status as the sixth largest holder of global shale gas resources with an estimated 400Tcf of shale gas resource.

My company, Santos, and the broader gas industry are seeking to bring on natural gas – such as coal seam gas and shale gas that requires scale, that requires advanced technology, and requires more of a manufacturing approach to development and production.

These resources while abundant are in reality more costly to produce.

If it were not for the export market, much of this gas would remain in the ground. It is this increase in demand from Asia and the ability to sell LNG into Asia at oil-linked pricing that has led to the unprecedented scale and pace of development of Australia's gas resources.

Australia's successful engagement in Asian energy markets has also contributed to building this country's relationships in the region. It has opened up opportunities for diplomacy, it has created opportunities for Australian companies to increase their understanding of the markets we are selling into, and it has developed the skills of Australians as they have travelled to and worked in a region so important to this country.

So let me be absolutely clear. Restricting the ability for Australia's gas developers and producers to continue to meet Asia's energy challenge and to access international markets would be simply counterproductive. No-one should be fooled, a gas reservation policy will create market distortions, inefficiencies and would lead to a shortage of gas in Australia, and ultimately higher prices than otherwise.

In my opinion a domestic gas reservation policy is the wrong approach to meeting our energy needs. It would also create further uncertainty for gas companies, their investors and lower confidence in Australia as a supplier of gas to the region.

I'm not saying we can duplicate the US experience here in Australia overnight. As I have said we are different – we may be of similar size, but Australia's gas infrastructure is much less developed. But by allowing the free market to work, attractive international gas prices will provide the incentive to producers such as Santos to bring in more rigs, to increase supply, to compete and to apply downward price pressure in the medium to long-term.

Any decision to restrict the free market would decrease Australia's competitiveness. This is not in Australia's interest. We must instead strive to be known as a country that has a stable regulatory and fiscal environment and is attractive to investors.

The economic benefits that are being delivered to the Australian economy as a result of letting the market work are under-recognised. The oil and gas industry is now a significant generator of wealth for all Australians, delivering more than 100,000 full time jobs this year and accounting for more than one third of all business investment.

What Australia needs to grasp is the potential for this economic contribution to grow. If the next wave of projects go ahead the oil and gas industry will add an additional \$150 billion of investment in the period to 2025, accounting for nearly two thirds of all business investment in Australia.

The industry's contribution to GDP would also grow substantially, with a projected contribution of \$260 billion over the same period to 2025. This means that Australians can look forward to an

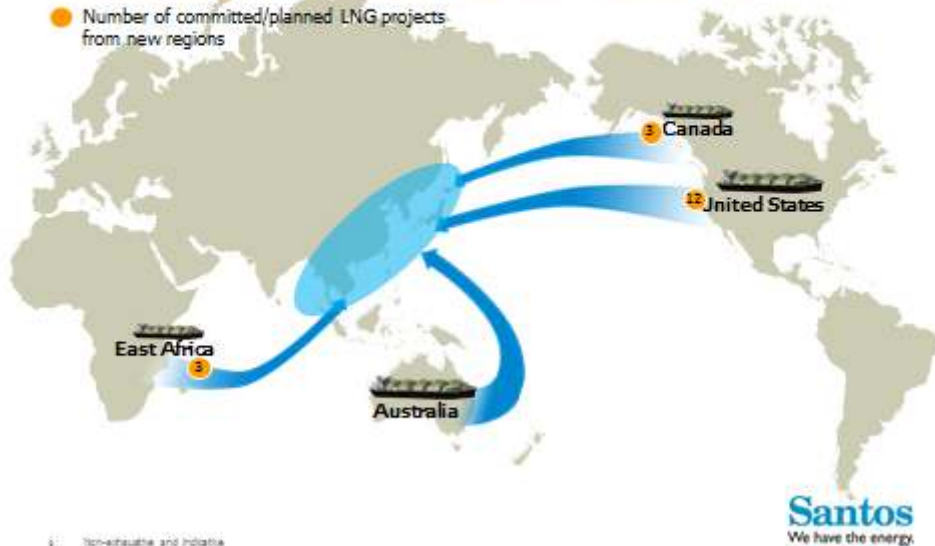
increase in GDP equal to circa 20% of the economy's current annual output, solely as a result of the proposed oil and gas investments and their projected output.

At the same time this tremendous level of investment creates the opportunity to develop a world class oil and gas sector, supported by an experienced and highly skilled service industry. Not only would this allow us to more efficiently and effectively develop Australia's oil and gas resources, but it would provide us with a firm seat at the Asian table – it would allow us not just to observe the Asian Century from afar, but to play an important role.

Competition from new regions of supply

Australia's role as a major supplier of LNG is not guaranteed

● Number of committed/planned LNG projects from new regions



Slide 9: Competition from new regions of supply

I would now like to turn to a critical point in my discussion with you today. How to ensure that the future pipeline of investment in Australia's gas industry is realised?

Beyond the committed projects, the pipeline of Australian LNG projects not yet sanctioned is remarkable.

Australia is however not a monopoly producer. As Asia seeks to increase its security of supply and diversify its supply sources for LNG, we are of course seeing the emergence of new suppliers including Canada, East Africa and the US.

The prize up for grabs for Australia and its competitors is nearly 90mtpa of uncontracted Asian LNG demand in 2020.

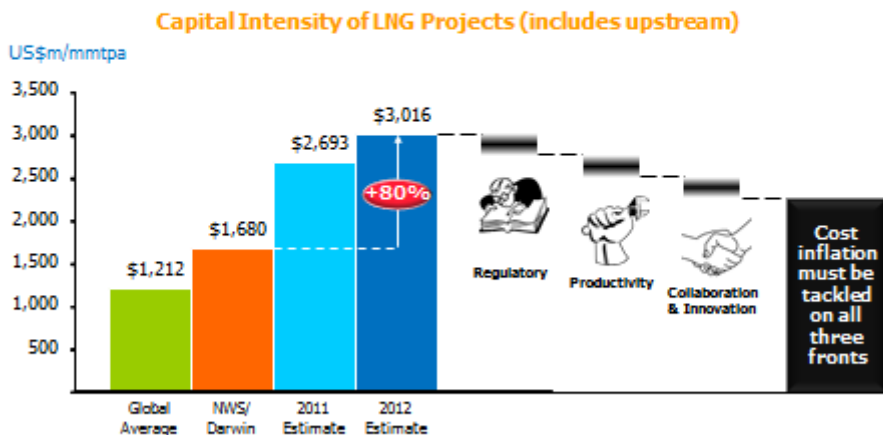
The challenge today is for Australian LNG to remain cost competitive so that new projects are sanctioned to meet both Asian and domestic demand. Without these additional projects going ahead, new investment in Australia's LNG industry will dry up in 2017.

This should not be an outcome we contemplate, and instead Team Australia – the oil and gas industry, the sectors servicing the industry and governments at all levels, need to ensure that we are as cost competitive as possible. This means delivering projects on time, safely and sustainably while keeping cost as low as reasonable.

Our challenge is to be competitive. Recent studies show that Australia is the most expensive offshore E&P location in the world today – three times as expensive as the US Gulf Coast, and slightly more expensive than Norway.

Australian LNG must address cost inflation

New Australian LNG projects are 80% more capital intensive than operating Australian LNG projects



Source: Deutsche Bank for Global Average (recently commissioned projects incl. Pluto T1), NWS/Darwin and 2011 Estimate (incl. Pluto T1) BRSS (April 2012 Project listing) for 2012 Cost (incl. Pluto T1)

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Slide 10: Australian LNG project cost inflation

And, Australian projects are getting more expensive. The Australian LNG projects currently under construction are now 80% more capital intensive than those already in operation.

A lot of this cost is labour, with the cost of Australian labour double that of many of our competitors, and productivity in most cases lower. At Santos' GLNG Project for example, labour costs make up between 50-60% of total project costs.

On this point I believe that all Australians should and can aspire to increased prosperity and wellbeing. Continued economic growth in Australia can achieve this, but it is not a given. Increased prosperity is only possible in the long run if growth is driven by an increase in productivity.

As individuals and organisations, and even governments – we need to be more productive, we need to continue to learn, apply ourselves better, and we need to be more disciplined and get value for our money. We shouldn't increase the reward for doing the same thing, but instead we should strive for and incentivize investment and innovation.

So what can Team Australia do?

Firstly, I believe there needs to be a marked change in the way in which the oil and gas industry is viewed by our governments, our businesses, and our society. The industry I work for should be seen as one of our nation's true strengths, and one which is driving long term growth.

Change is the necessary first step, but one that should be followed closely by governments working with industry to streamline regulations and remove unnecessary and costly barriers to development.

I recognise the commitment in the Federal Government's Energy White Paper to work to remove both red and green tape, but we must now move beyond commitments to actions.

Second, and from an industry perspective, we need to challenge ourselves. While the industry – Santos included has sought avenues to reduce costs, in many cases we have seen little progress. The status quo must be challenged. I don't believe the industry is lazy, or lacks the will to address this issue. However, I

believe that we should aim to go beyond cost control. We should aim to be competitive in this space and significantly reduce our costs. I believe this is achievable, and the US onshore gas industry showed the world how this could be done.

Through building scale, through actively learning new techniques and skills, through gathering and applying the best technology, and through supporting and fostering innovation within our businesses – we have the opportunity to find a better way to do things, and improve the cost effectiveness of our industry.

This need to improve should not be incumbent on oil and gas companies alone. Our suppliers need to understand our challenges, the areas that are driving costs, and be given permission to innovate. Ultimately as leading suppliers of technology have shown, it is the innovators in this space who have succeeded.

Third, we must address our skills challenge. One of our biggest hurdles, and contributors to cost inflation is Australia's lack of skilled labour, a shortage of experienced subcontractors, and a dearth of specialist suppliers.

Without the right people – projects ultimately experience further delays, and increased costs.

Let me say, this is not about a push to bring in cheap, unskilled workers from overseas. The oil and gas industry needs a combination of highly skilled and semi-skilled workers. A mix of the

brightest professionals and hardest working individuals with experience characterized by its depth and breadth.

To equip ourselves with these individuals we are right to continue to invest in skills development, education and training programs at home. This is necessary. But we also need to change the lens with which we view this challenge. It is not and cannot be just about developing talent at home. The scale, speed and effort involved in building major projects demand more talent, skills and human resources than our population can hope to deliver.

To successfully address the skills challenge we need to open our minds as a nation, and realize that there is no skills shortage if we truly see ourselves as a part of Asia. The skills and talent are plentiful in our region, and we are well positioned to take advantage of it. We simply have to give ourselves the permission, and realize that opening up as a nation has its true advantages.

I expect that considerable dialogue and discussion will be necessary if we are to take the big steps necessary to create greater access to the professional engineers, technicians, geologists and project managers that Asia can offer. But nothing important is ever easily gained.

Finally, we as an industry need to be more open to collaborating, especially in non-commercial areas where it makes good sense.

At Santos we're open to bigger and further collaboration, especially where it avoids duplication and creates synergies. Two strikingly obvious places for Santos to collaborate with others are in Gladstone – the site of our LNG plant and port for the GLNG Project, and Moomba the birthplace of Santos and the hub of activity for our Cooper Basin gas and liquids program.

My message to the industry on collaboration initiatives is simple –

“We're open for business”



Fuelling Nations – The Role of Gas

David Knox – CEO and Managing Director

AIE: 19th November 2012



CONCLUSION

So, thank you for your time today. And thank you again to AIE for the opportunity to be here.

I am confident that we are making progress to secure an energy future for Australia. But more needs to be done, and done now.

The challenge to our industry is not insignificant, we have to be competitive – there is no other option. We must do this to secure the next wave of investment in Australia's oil and gas industry, and to provide a platform of economic growth for our country.

As the US has shown, the challenge is not insurmountable, but it is one which requires both industry and government to play an active role.

It requires us to access Asian markets and to do so openly and without restrictions to labour markets. It requires the development of resources at scale, and it requires productivity leaps and a commitment from Team Australia to achieve this.

I believe that Santos and the oil and gas industry can remain competitive and do so in a way that is both safe and meets the high standards of regulation expected by all Australians.

But we can only achieve this with a change in mindset, and a change in attitude that recognizes that this industry can and does create wealth.

The opportunities to improve our competitiveness may not be endless, but through innovation and learning I firmly believe we can make the progress Australia requires.

Thank you.