

# Address to the

# Australia Israel Chamber of Commerce

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NATURAL GAS:

# 40 YEARS ON AND LEADING THE WAY TO A CLEANER FUTURE

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It is a pleasure to join you today and thank you to the Australian Israel Chamber of Commerce for your kind invitation.

Today I would like to do three things. They are:

- Take you back 40 years to recall what was for Santos and, I would argue, South Australia an auspicious moment;
- (2) Outline the substantial but largely ignored potential of natural gas in a carbonconstrained world; and
- (3) Propose a Low Emissions Target for South Australia that will lead Australia's efforts towards decarbonising its energy grid.

At the outset, I'd also like to acknowledge the presence today of:

- Senator Simon Birmingham, Chair of the Senate's Environment Committee; and
- Members of the Board of our Joint Venture partner in the Cooper Basin,
  Beach Petroleum, including the Chairman, Bob Kennedy, Managing Director
  Reg Nelson and CEO Hector Gordon.

### **MOOMBA'S 40th ANNIVERSARY**

Let's start with a journey back in time.

1969 was a year of many significant achievements:

- Man set foot on the moon;
- Golda Meir became Israel's 4th Prime Minister;
- Rod Laver won Wimbledon; and
- Monty Python was formed

Something else momentous happened that year.

In November 1969 the first molecules of sales gas left the Cooper Basin and successfully travelled the 780 kilometer pipeline to Adelaide, as they have been doing ever since.

The turbines of Torrens Island Power Station turned, delivering a new and valuable source of power to Adelaide.

And the Cooper Basin Joint Venture received its first cheque from the then SAGASCO.

It is this event these six men, two with pipes, are celebrating.

From left to right, we have R Wagstaff, General Manager of SAGASCO, John Bonython – the Chairman of Santos, A J Knights, Managing Director of Santos, (both looking very satisfied), W Hilburn, Sales Manager of Santos (looking somewhat more disbelieving), D Partingon Santos' Finance Manager and G Boyle, Santos' Technical Manager

#### (Slide Two)

2009, therefore, marks the 40th anniversary of commercial production from the Cooper Basin.

Since that time, the Basin has gone on to provide clean natural gas to millions of Australians, warming homes, heating stoves, fuelling industry, and generating the power we need to run our economy.

Or, as The Advertiser put it in its 5 May 1969 edition:

"Soon Moomba will be home, for three-quarters of their lives for about 50 <u>men</u> whose job will be, in essence, to see that the stoves of Adelaide housewives burn steadily"

How times have changed - after all, now its home to 700 men and - I'm pleased to say - women.

A pipeline network extends from Moomba, taking this gas into the heart of Adelaide and Sydney, and acting as a key hub for the eastern Australian gas market, including Queensland.

#### THE COOPER BASIN AND ITS FUTURE

It's worth reflecting for one moment on the significance of Moomba. It is, after all, an iconic part of Australia's energy infrastructure. In today's dollars, the investment in the plant and pipelines exceeds \$9 billion.

The Cooper Basin's success has also been a South Australian success. The Basin has generated well over \$1.1 billion in royalties to the State Government.

At the same time, it is true that production in the Cooper Basin is currently on a gentle decline. In industry speak, it is a "mature Basin".

But, to paraphrase Mark Twain, reports of the Cooper Basin's death are greatly exaggerated.

We at Santos – and I know this sentiment is shared by our Joint Venture partners, Beach Petroleum and Origin Energy – believe there is still plenty of potential in the Basin yet.

#### (Slide Three)

Allow me to explain.

The reality is that even after 40 years of production, we have only produced just over half of what we think might be possible from conventional gas reservoirs in the Cooper Basin.

That said, just because its there doesn't mean we will produce it! That will ultimately depend upon commercial and technical factors.

From this chart, you will see that we have produced 5.8 Trillion Cubic Feet (or TCF) of sales gas since 1969.

• By way of context, Australia's annual consumption of gas is approximately 1 TCF, which is equivalent to roughly 1,000 PJ.

In addition, yet to come is another 1.1 TCF in the "pipeline", so to speak, and largely representing forward contracts.

We are also targeting another 4.2 TCF of recovery from conventional gas reservoirs. This is our 'aspirational' target and equates to a 75% recovery factor of our conventional gas-in-place in the Cooper Basin. I am very confident about this volume of gas.

Now you can see that if we add up our "pipeline" plus our "aspiration" that equates to almost as much future gas production as that which has been produced over the last 40 years.

In addition to this conventional gas potential, Santos and its partners are also looking at the unconventional gas resource potential of the Cooper Basin. By that, I mean gas found in deep shales, in very tight rock or deep coal. It is this type of gas, as well as market conditions, which has transformed the US gas industry in recent years, highlighted by a rapid increase in US gas reserves. Estimated US gas reserves jumped 35% over the last two years, the largest such increase in over 40 years.

In January this year Santos booked its first unconventional contingent resource of 590 million barrels of oil equivalent.

From this chart, you can see that we believe there could be as much as 4.7 TCF of unconventional contingent resource and an even larger, ultimate, amount of resource potential in both the conventional and unconventional reservoirs of the Cooper Basin. This amounts to a significant quantity of further potentially recoverable gas.

I can't give you any certainty about securing the latter potential. But, just as some thought the pioneers of Santos – such as Reg Sprigg, Sir Douglas Mawson and John Bonython - would never find gas, the responsibility and challenge I have, and the determination of my team and Joint Venture partners, is to be modern-day pioneers.

In addition, when we are talking about the Basin's future let's not forget its carbon storage potential. Santos has previously highlighted the potential to store as much as 20 million tonnes of CO2 per annum (or nearly double SA's annual carbon emissions from power generation) in the Basin, and for as long as 50 years. That's 1,000 million tonnes of CO2.

I have no doubt the Basin's geology is as well understood as any geology anywhere in the world. 40 years of seismic, drilling and production buys you a <u>lot</u> of, if not unparalleled, knowledge.

And the relevant storage technology is our bread and butter. We have been injecting and storing sales gas in our reservoir system for over 15 years, with a capacity equivalent to some 60% of NSW's annual gas demand.

Now, whether carbon sequestration can be done economically is another thing altogether. Unquestionably, it would require many billions of dollars in investment. But whether there is ever a sufficient carbon price and commercial driver to justify that level of investment, only time and policy will tell. In the short to medium term, however, we have to focus on the things that have sufficient commercial certainty and will take Santos to a position of even greater strength.

So what will take Santos to greater strength?

#### THE ROLE OF GAS

It's very simple: Santos will focus on developing a business built around a product that will be at the core of the global transition to a cleaner energy platform.

It's the product we've been selling for forty years – a product that in some respects has got old before its time.

So please allow me to outline briefly why natural gas is ideally positioned to be at the centre of Australia's climate change response.

I need that time because, and if I may be frank, I can't for the life of me understand why this potential is not better understood, and why politicians aren't taking more notice of it, and why it is not a much greater part of our climate change narrative.

Many would, of course, expect the CEO of Santos to say that. But let me present a few thoughts, hopefully objective, for you to consider. They are built around what we call the "4 x 4" gas proposition.

These are the four key opportunities for Australia's natural gas industry - the "why":

- as an <u>immediate</u>, proven way to transform baseload power generation away from highcarbon coal to low-carbon gas, buying-time for advances in renewable technologies;
- as a natural partner to support the integration of intermittent renewable power generation into Australia's energy grid;
- 3) supplying growing **Asia-Pacific demand for natural gas**, helping to displace higheremission fuels; and
- 4) to build an industry that becomes a major domestic economic driver, generating tens of thousands of new skilled jobs, tens if not hundreds of billions of dollars of new investment and more again in additional export revenue and government taxes and royalties.

#### (Slide Five)

How will this occur, you may ask. Simple. These are the four key features that underwrite the compelling potential of Australian natural gas:

- 1) the low carbon, water and land-use intensity of gas-fired power generation;
  - a) only 15 hectares of land are required to build 1,000MW of gas-fired power, which then use less than one-third of the water used by existing coal generation
- a large resource base, equivalent to several hundred years of current use, close to domestic (and Asian) demand points and linked by an extensive and growing pipeline network;
- its status as a reliable and proven power generation technology across the full load spectrum (baseload, intermediate and peaking);

- a) This means gas is best placed to smooth out the inevitable oscillation in the supply of renewable energy
- its competitive **affordability** as a power source, with gas prices in eastern Australia amongst the cheapest in the OECD.

Here are a few charts that demonstrate the "how" in more detail.

First, it is critical to understand why power generation is so important to the climate change debate in Australia.

#### (Slide Six)

In this slide you can see that power generation accounts for nearly 35% of Australia's total carbon emissions and that over 80% of Australia's power comes from baseload coal – predominantly black, but with brown coal in Victoria and here in South Australia.

In short, if we are serious about addressing climate change, we **<u>must</u>** lower the carbon intensity of baseload power generation.

Simple as that.

To do that, what are our options? The reality is that there are only two energy sources capable of providing baseload power in Australia today recognizing that hydro's potential is now relatively limited. Those two sources are coal and gas. The technology for gas is known as Combined Cycle Gas Turbine or CCGT.

Let me cut to the chase. We all share the ambition of zero-emission baseload – but it simply is not available in Australia and it will be many years, possibly decades, before there is sufficient commercial confidence about such a technology,its affordability and widespread deployment.

Nuclear power I hear you thinking. Right now, it's illegal in this country. I don't know anyone who seriously thinks that is going to change any time soon or that we are going to have nuclear power in our energy grid within the next decade at a very minimum.

One thing I would note about advocates of nuclear is that they often ignore natural gas and its role in power generation. Often, they gloss over the existence of gas and simplistically abbreviate the debate to one of 'if renewables fail, then we have to go nuclear' as was reported in last week's Advertiser.

Gas already delivers close to 70% of the carbon intensity reduction that a shift from coal to nuclear would achieve in eastern Australia, but at far less expense and with none of the socio-political challenges.

In short, the real competitor to nuclear power in Australia will be natural gas.

#### (Slide Seven)

On the topic of carbon intensity of power technologies, this slide is, I think, very compelling about the immediate value of natural gas.

We hear much about 'clean coal', otherwise known as coal-fired power generation with carbon capture and storage. Let there be no mistake, CCS is a vital technology. Countries such as

China and India, which will continue to rely heavily on coal, will be prime beneficiaries when CCS is viable.

But let's also be clear: it is neither critical nor a pre-requisite for Australia's efforts to take significant steps towards de-carbonising its power system.

As this slide illustrates, CCGT already delivers some 80% of the carbon reductions that could be achieved were CCS technology were retrofitted to the existing coal fleet average.

One major problem with 'clean coal' – no one knows when such technology will be available let alone at what cost. But even the optimists are not expecting any meaningful contribution before the end of the next decade.

#### (Slide Eight)

I'd now like to deal with a few outdated and inaccurate perceptions regarding natural gas.

One of those concerns whether gas-fired power technology can provide sufficient energy security. Returning to my earlier point, a recent opinion piece in the Australian Financial Review by the head of the Australian Uranium Association suggested there were only three technologies capable of supplying "the basic needs of societies" available in the world: coal, nuclear and hydro.

Has anyone been to Singapore lately? The last place I would have thought that seems short on electricity!

This table neatly illustrates that gas has significant penetration in many major economies, including the UK, the US and Italy, including a whopping 70 plus % in Singapore.

And in Australia, South Australia gets the gold medal. I'll come back to this shortly.

What the chart does not illustrate is that gas is actually unique in that it can fuel all three forms of power generation: peaking, intermediate and baseload.

It is, quite simply, the most versatile fuel choice available – which is a critical aspect of its partnership potential with renewable energy. And it's reliability is second to none.

#### (Slide Nine)

What about the myth that Australia is running out of gas? Only just recently an opinion piece in The Advertiser titled "Why nuclear power is the answer" stated that "We recognize the <u>fact</u> that our natural gas supplies are limited."

I ask you to digest the following slides. In short, Australia is blessed with enormous gas potential, one that will take us well into the next century and probably one or two well beyond that.

There is nothing 'limited' about it. And there is certainly no fact to the contrary. We, in the gas industry, believe there is ample and affordable natural gas in Australia to meet both growing domestic and export requirements.

### (Slide Ten)

Just look at what is happening in Queensland with coal seam gas alone (ie. ignoring for one moment all of the conventional gas in the Cooper Basin and offshore Victoria).

Queensland's coal seam gas reserves have gone from virtually nothing in 2000 to over 30 times eastern Australia's <u>total</u> annual demand!

Indeed, Queensland CSG reserves have jumped by nearly 20% in less than six months, with CSG now supplying about 85% of Queensland's natural gas market!

A similar search for coal seam gas in NSW has only just begun and looks similarly promising.

And what better reflection of the changing times than the fact that only three years ago, eastern Australia was thinking of importing gas from PNG.

Today, we expect that in 2014 LNG tankers will arrive in Gladstone Harbour and take shipments of Australian natural gas and help fuel key Asian economies.

By doing so Australia will be, in effect, exporting clean energy to the world – helping to displace dirtier burning fuels. Prime Minister Rudd and the Federal Energy Minister, Martin Ferguson, made the point recently that for every ton of CO2 produced in Australia to make LNG it displaces 4 and 9 tonnes in Japan and China respectively when used to replace coal.

#### (Slide Eleven)

The gas world is changing. Just look at the US and its rapid rise in coal seam gas production. Indeed, approximately half of US gas production comes from CSG and other unconventional gas sources such as those I spoke about earlier, up from 20% in 2000. What the right hand chart illustrates is how large domestic demand in the US is underwriting rapid CSG production growth. Australia's market, of course, is considerably smaller and that places a limit on production growth. But we are countering that by targeting LNG export markets. That demand creation will deliver faster production growth than would otherwise be the case, and in so doing underwrite security of supply for the eastern Australian gas market.

On the left is a recent opinion piece in the Financial Times by Robert F Kennedy Jr, who some of you may recall was keynote speaker at last year's Solar Cities Conference in Adelaide. His message is simple:

"Converting rapidly from coal generated energy to gas is President Barak Obama's most obvious first step towards saving our planet and jump starting our economy. A revolution in natural gas production..."

...and on he goes.

## (Slide Twelve)

In short, Australia has abundant gas resources that are located close to Australia's major demand centers and which is already and largely connected by an integrated eastern Australia transmission network.

Opportunity beckons...

## SOUTH AUSTRALIA - LOW EMISSION TARGET

Allow me to now bring the "why" and the "how" closer to home.

Today I want to outline a realistic leadership opportunity for South Australia.

One that builds on the already very strong commitment of our Premier to climate change leadership, including South Australia's recent 33% renewable energy target.

In short, I see no reason why South Australia cannot be the first State to adopt a "Low Emission" target for all its power – and by that targeting a 2020 emissions average of no more than 0.4 tonnes of CO2 per MWh, or half the current emissions intensity of 0.8.

Is this possible? To my mind its eminently doable and would demonstrate to the rest of Australia that there is a realistic, reliable and affordable path that leads to significant cuts in power generation emissions.

Let's look at where we are at right now.

#### (Slide Thirteen)

South Australia gets just over half of its power from natural gas. Torrens Island is the largest plant, capable of delivering over 1,200MW of power into the system. Pelican Point delivers another 480MW.

You will recall it was Torrens that received those first molecules from Moomba 40 years ago. So it's a pretty old plant – and the reality is that there is now much cleaner burning gas technology than that currently installed.

The rest of the fossil fuel power generation comes from coal – namely brown coal at Northern and Playford, both south of Port Augusta, with some imported from Victoria over the inter-connector.

Northern's capacity is 540MW and Playford, thankfully, given its status as one of, if not, the most emissions intensive generator in eastern Australia, provides 240MW.

Over 12% of SA's power comes from wind – with over 54% of Australia's installed wind power capacity now in South Australia. This is a truly remarkable and significant accomplishment.

But despite only providing 34% of South Australia's power, nearly half of South Australia's power emissions come from coal.

#### (Slide Fourteen)

Compared against mainland eastern Australia SA just nudges out Queensland for the lowest carbon intensity in power generation.

Let's face it, no one can beat Tasmania and its hydro, let alone water-starved South Australia!

It is South Australia's exposure to brown coal (and some old gas-fired technology) that is holding it back from its potential to be a clear leader on the mainland in terms of lowest carbon intensity of power generation.

So, why don't we just fix that!

The beauty of Power Point is that we can do just that!

Let me explain these charts.

On the left, we have the evolution of South Australia's power generation by source since 2000.

Since 2004 we see an emerging role for wind (in green). We see imports from Victoria tapering off (dark brown). South Australian coal has remained relatively steady (light brown), while gas has taken a step up over the 50% mark (blue).

Now, examine the chart on the right.

What we have done here is convert the 2008 generation by source data into a breakdown of emissions, represented in the first bar.

The dotted line marks South Australia's 2000 emissions from power generation, just over 12mt CO2e.

Obviously there are no emissions from windand it is largely the introduction of wind power that has enabled South Australia's 2008 emissions to fall below 2000 levels

Now look at the three separate scenarios reflected in the next three bars.

Next to the 2008 emissions figure is what 2008 would look like with the Premier's 33% renewable energy target in place.

Emissions would be 62% of 2000 levels.

Now look at a scenario of what 2008 would look like if the <u>only</u> change was to replace coal generation with new CCGT technology.

Emissions drop to 56% of 2000 levels.

But it gets better.

What if we deliver the 33% renewables target within a Low Emission intensity target of <0.4tCO2e/MWh for all of South Australia?

This would effectively mean that South Australia would derive its power from renewable technologies and latest generation gas-fired power (CCGT).

The impact is striking. 2008 emissions shrink to only 33% that of 2000

#### (Slide Sixteen)

To illustrate this point let's return to our earlier Slide that outlined the relative carbon intensity of power generation across Eastern Australia.

Now let's apply the Low Emissions Target to South Australia and see what happens. This is what Santos means when it says that natural gas and renewables represent Australia's next comparative advantage in power generation.

Alright, enough Energy Policy by Power Point.

Can this really be done? What would be the cost? Is there enough gas to do this?

### (Slide Seventeen)

Rather than answer those questions in detail – let me conclude with a short answer.

Yes, it can be done.

We believe the cost of building new CCGT, and assuming a modest carbon price is in place, will likely be less than building new generation coal power stations – let alone 'clean coal' - and there is plenty of gas to fuel a Low Emission South Australia.

Indeed, I would argue that there is enough gas to fuel a Low Emission Australia.

The bigger question is how quickly do we want to achieve this.

What I can assure you is that Santos has the energy – literally and figuratively – to play its part in reducing Australia's carbon emissions today.

Thank you.



































