Questions on notice

- Are NSW consumers required to pay an access fee in circumstances where they are able to access a gas line but opt not to connect to the network? (pp. 15-16)

NSW customers do not pay an access fee if they are not connected to gas, even if a gas main is located close to their property.

It is a similar situation under the Victorian Regional Development Scheme. Consumers in towns where the VRD scheme has contributed to the extension of the gas network to that regional town, and who have a gas main run close to their property, are not charged a fee if they chose not to connect to gas.

- Can APIA provide the Committee with some general information in relation to liquefied natural gas and compressed natural gas? (p. 7)

APIA considers it appropriate to refer the Committee to Gas Energy Australia (GEA), the national peak body that represents all aspects of the LNG, CNG and LPG fuel industries. GEA is well placed to provide the Committee with general information on the use of LNG and CNG as vehicle fuels and may be able to provide forecasts of potential demand.

Supplementary question

- APIA's submission states that the current gas distribution network is more than adequate to meet the current and future needs of the State's gas demand, which is forecast to decrease over the next few years. What measures can be taken to increase commercial and residential gas consumption in NSW?

An obvious issue that is already impacting the NSW energy market is the expectation that the NSW gas market is likely to experience a shortage of gas over coming years. The impact of this shortage is already being felt, with many customers already seeing increase in their gas prices.

The reason for the price rise, therefore, is relatively straight forward, in as much as when supply falls (or is expected to fall), demand initially remains the same (or could even increase). Prices then rise and then demand will fall due to businesses reducing demand, either through conserving gas; reducing production; switching fuel; closing the business or moving interstate or offshore.

The question becomes, how do we increase gas supply to the NSW market, thus hopefully mitigating the price increases?

Firstly, APIA's fundamental policy position on this matter is that adequate levels of gas supply must be made available. This can be encouraged through:

- A supply-side policy – the Government should establish technology neutral energy investment policy that allows renewables, clean coal, low-emission gas and other clean technologies to compete for funding on the basis of emissions reduction and energy supply.

- A demand-side policy – a technology neutral emissions intensity electricity sector scheme should be established to provide appropriate signals to investors. In the case of gas, it would provide all investors, including explorers, with the signal that low-emission gas technology has an important role to play in the electricity sector.

- Improvements to regulatory and administration regimes, including tenement management, taxation, land access and information.

More detailed information is available in APIA's policy report, Gas Supply for Australia, which is attached.

Secondly, in Victoria, the government sees the importance of gas 'reach' to such an extent, that it has implemented a program to expand the Victorian gas network into regional areas, as set out in Schedule (1). The Regional Development Victoria (RDV) program provides for gas network extension, after conducting a process that identifies the lowest cost provider, to extend the gas network to specific locations. The process effectively provides funds to projects that would not otherwise proceed, because the project does not meet the economic criteria set by regulators. The RDV process effectively funds the shortfall.

Thirdly, under COAG agreements made between Australian governments some years ago, restrictions were introduced to limit the installation of electric hot water systems (EHW). The NSW government did subsequently introduce restrictions in regard to the installation of EHW in *new* homes, but regrettably decided in late 2012, not to proceed with its original intention to also introduce a EHW policy in *existing* homes.

This policy change is significant to gas network companies, as gas hot water systems make up approximately 50% of gas use, in a typical NSW home. Without this gas load, system utilisation is diminished and as an outcome, the ability of the gas network to grow is diminished.

Fourthly, gas network companies tend not to be involved early in planning proceses, particularly for new developments. Others typically involved include relevant government departments; local Councils; electricity network companies and developers. The benefit of including gas networks in such a process is that not only can operational matters be dealt with better, e.g. common trenching, but also there is potential to reduce the otherwise required amount of electricity infrastructure through the use of technologies such as co-generation and tri-generation; gas powered air conditioning etc.

This will directly reduce electricity tariffs for NSW customers, as well as reduce greenhouse gas emissions.

Interestingly, the Queensland government has recently endorsed a very similar approach to new developments, under its *Total Energy Planning (TEP)* approach, which it is currently trialling in various developments in Queensland. The Queensland Government in its reply to the Interdepartmental Committee on Electricity Sector Reform of May 2013 (which looked at cost reduction opportunities within Energex and Ergon Energy), accepted the recommendation that the concept of Total Energy Planning (TEP) should continue to be trialled for new developments. These trails would involve key participants such as Ergon Energy and Energex, but also government departments like Department of Energy and Water Supply, Department of State Development Infrastructure Planning, local government and land developers.

As a simple and logical extension, APIA would recommend that gas network businesses should be closely involved in the same process.

Fifthly, the NSW government through the Office of Environment and Heritage (OEH) is conducting a review of a proposed rule change, as well as a general review, into its Energy Savings Scheme (NSW's

energy efficiency scheme). Significantly, the scheme does not currently provide for gas opportunities, although the rule change has stated that it will model itself more closely on the equivalent Victorian Energy Efficiency Scheme – which does include gas appliances in in its scheme. The Victorian scheme also acknowledges the value of reporting greenhouse emissions, as electricity use is reduced.
If the NSW government was to actively support the OEH, in its endeavours to include gas into the ESS, and to also use an emission metric (tonnes of CO2 reduced), as well as the energy efficiency measure(kWh reduced), this would help gas growth in the residential, commercial and industrial markets in NSW.

APIA provides these relatively brief responses to the above supplementary question. APIA encourages the Committee to speak further with APIA, if the Committee requires more detail on any aspect of this response.

Schedule (1)

Regional Development Victoria (RDV) Scheme

Over the past decade, the Victorian Government has been actively encouraging the extension of gas reticulation to regional Victorian towns, through its $100 million "Energy for the Regions Program". As far back as 2003, the Victorian government funded the Natural Gas Extension Program, which even at that time, had $70 million of funds available. Given it is still going strongly today, it suggests that the concept continues to prove its worth to government.

This infrastructure initiative is obviously a substantial commitment by the Victorian Government. The scheme directly addresses issues in regard to the economics of growing gas networks in regional areas.

The initiative reflects the Victorian Government's view, that access to natural gas is crucial to sustainable economic growth for regional communities. The scheme is ultimately funded by the Government's Regional Growth Fund, which has a total budget of $1.0 billion.

Regional Development Victoria (RDV) was assigned the role of executing the program. It began this task by identifying 12 "priority towns" and from there invited submissions from potential providers to reticulate these towns with natural gas.

As an outcome to date of the current program, the scheme has seen the RDV enter into agreements for the supply and reticulation of natural gas to a number of Victorian towns. For example, Envestra is expanding supply to Mildura, and is currently involved in discussions with RDV, in regard to the reticulation of another two towns, with negotiations proceeding encouragingly.

Significantly, as a result of the 2003 program, Envestra was able to extend its network to eight towns in regional Victoria, including Bairnsdale, Paynesville, Balnarring, Balnarring Beach, Merricks Beach, Somers, St Andrews Beach and Hurstbridge.

Crucially, without the support of the program, these towns would not have been connected.

Notably, just recently Peter Reith's report "Gas Market Task Force – Final report and recommendations – October 2013", into the Victorian gas market, recommended that "The Victorian Government continues the Energy for Regions Program to extend the access of gas to regional Victoria."

Securing Australia's Gas Future

Lower emissions

Higher efficiency

July 2013

Australia has abundant supplies of natural gas and it is an essential part of Australia's energy mix, with tremendous benefits:

- **Low emission energy**
- **Security of energy supply**
- **Economic efficiency**

Natural gas in Australia provides heat and power, efficiently and cleanly.

Natural gas is a major export earner for Australia.

It is time to ensure that the best policies are in place so that Australia can make the most efficient and effective use of natural gas for the national economy and the nation's people.

the australian PIPELINE industry association Ltd

Report released July 2013

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Executive summary

Australia's gas markets are in the midst of their largest structural change since the privatisation of gas infrastructure assets in the 1990s. This latest structural change is driven by the expansion of liquefied natural gas (LNG) export facilities in Australia's west and north and by the development of LNG export facilities in the east for the first time. Australia is currently the world's third-largest LNG exporter and is on track to be the largest exporter by 2018. Australia is now a major participant in the international gas market. The benefits of increased LNG exports will be felt by Australians in the form of increased Government revenues from taxes and royalties.

Australia's relatively (on a global scale) small local gas markets are dwarfed in comparison to the demand created by these export facilities, which require massive investments and enable the shipping of LNG to energy hungry global markets, particularly those of Asia. The demand for gas from the existing and new LNG facilities will be almost triple that of the entire domestic market. This means that the fortunes of the domestic market are now inextricably linked to the ability of gas producers to meet the demand of their export facilities.

The rapid expansion of coal seam gas development and related infrastructure has increased demand for resources which has challenged the capacity of the Australian gas industry and resulted in rapid escalation of costs. Severe weather events in Queensland have pushed back production schedules. While the outcome remains unclear, the expectations of stakeholders in the domestic gas market are that the presumed readily available ramp-up gas from the LNG projects might be difficult to achieve. Already, in the current market, domestic gas users are facing prices for long-term supplies of gas that are double that of the long-term average.

These issues may be resolved relatively simply or could continue for some time. With the surge in demand continuing for the next few years, increasingly difficult, and expensive, reserves of natural gas will need to be accessed in order to meet the demand. However the supply-demand balance is achieved, it is apparent that the structural change will have short- and long-term consequences.

Development of Australia's natural gas resources is a positive for the industry and the economy; however, policy makers must develop an informed view about the costs and benefits associated with the export of natural gas and the use of natural gas in the economy. The direct impact on Government revenue from exports is clear and positive. The indirect impacts of high gas prices on Australia's domestic industries are not clear.

The Federal Government's *Energy White Paper* sets out the challenges for Australian gas markets and notes they are currently experiencing a transition period. It states that there is no evidence of market failure to justify government intervention and that the Government will monitor markets closely to ensure the timely and adequate supply of gas to meet domestic needs. The *Energy White Paper* does not identify

what market conditions would provide evidence of a market failure and what the Government would do if it occurs.

If a market failure does occur in gas supply, the Government will need to act swiftly and decisively to minimise its impact. A market failure of supply would be characterised by unsustainably high prices in domestic markets with a potential for permanent demand destruction. This has direct and indirect implications for Australia's manufacturing, agricultural and construction sectors. There are very few options to address a failure of gas supply in the short term. Each would involve market intervention.

In the long-term, it is apparent that the impacts of the structural change currently under way can be minimised by Government encouraging gas supply, putting in place regulatory systems, administration and policies that will improve the efficiency of the regulatory environment and accelerating the development of Australia's extensive gas reserves. It is clear there is sufficient gas in Australia to meet the needs of domestic and export markets; it is incumbent on Government to ensure the appropriate conditions are in place to facilitate the necessary investment.

In addition to creating a positive environment for gas investment, it is also vital that the Government provide the necessary signals to investors that natural gas has a long-term role in Australia's energy mix. The low emissions intensity of electricity generated from natural gas, the highly efficient heating capacity of natural gas in direct applications, the economic and environmental efficiency of the transmission pipelines that carry natural gas can all contribute to rapidly reduce Australia greenhouse gas emissions at very low cost if the appropriate policy environment exists.

Planning for electricity investments that will supply electricity post 2020, must begin soon, given the lead times (at least three years) required for long lived infrastructure. In the absence of useful signals from Government, industry could make short-term, less efficient decisions. The Government should commence development of an emissions intensity based electricity sector scheme to ensure appropriate energy investment in 2020 and beyond. Such a scheme would be technology neutral, supporting all technologies that reduce the average emissions intensity of electricity generation.

Australia is fortunate to have large reserves of natural gas, a stable regulatory environment, efficient infrastructure and well-developed downstream gas markets; it is important to establish an environment that maximises the nation's ability to exploit this energy source for economic and environmental benefits.

APIA is of the view that, in addition to structural changes in Australia's gas markets, policy failure is exacerbating future challenges. In light of this, government should consider the policy intent of recent regulatory interventions and the policy establishing market frameworks.

To date, policy makers have been tempted to focus on what appears to be simple solutions – making the domestic market work better, drawing comparisons with the US market. However, this assumes the domestic market requires improvement, and there is no evidence of this. Both in a practical sense and economic sense, such a small (compared to the US), illiquid market must have the security of long-term contracts in order to underwrite or provide the finance for infrastructure, thus

facilitating expansions as required. The gas transportation system works: suppliers and users reach an agreement and the infrastructure will be expanded or constructed to meet requirements – usually well before the completion of the facilities that require the gas.

Pipelines are built to meet peak capacity and are usually fully utilised during peak periods. However, there is available capacity for shippers to move gas during non-peak periods, and this "interruptible" capacity is readily available either from the pipeline owner or the gas user which has purchased capacity to meet peak requirements but will not use that capacity during non-peak periods.

To address the short term transitional issues in Australia's gas markets, APIA recommends:

- The Federal Government work with gas stakeholders to establish and implement effective monitoring of gas markets, with clearly identified triggers (such as price) for potential market failure;

- As a matter of urgency, the Standing Council on Energy and Resources identify the policy mechanisms it would use to respond to a short-term gas supply shortfall if the monitoring provided evidence of this.

To address the long-term issues created by the structural changes in Australia's gas markets, APIA recommends the Federal Government should prepare policy to increase the efficiency of gas supply and consider policy that will accelerate the development of Australia's gas reserves. Such policy should include:

- A supply-side policy – the Government should establish technology neutral energy investment policy that allows renewables, clean coal, low-emission gas and other clean technologies to compete for funding on the basis of emissions reduction and energy supply.
- A demand-side policy – a technology neutral emissions intensity electricity sector scheme should be established to provide appropriate signals to investors. In the case of gas, it would provide all investors, including explorers, with the signal that low-emission gas technology has an important role to play in the electricity sector.
- Improvements to regulatory and administration regimes, including tenement management, taxation, land access and information.

Table of Contents

1. Natural gas is an essential fuel for the Australian economy 7

2. The current situation 8

3. The importance of unlocking gas supply 11

   3.1 Lower gas prices 11

   3.2 Lower greenhouse gas emissions 12

   3.3 Improved energy security 14

4. Increasing gas supply 15

   4.1 Accelerating innovative investment 15

   4.2 Other measures to encourage supply development 17

   4.3 Delivering efficient power generation investment 19

5. Mitigating the effects of potential transitional pressures 22

   5.1 The case for Government intervention in markets 22

   5.2 Analysis of the short-term situation 23

   5.3 Easing short-term transitional pressures 24

   5.4 The policy settings for Australia's gas markets 24

6. Recommendations 26

APPENDIX A: Overview of natural gas in Australia 28

APPENDIX B: Analysis of the GGAS Scheme 34

APPENDIX C: Discussion of market failure in the east Australian gas market 36

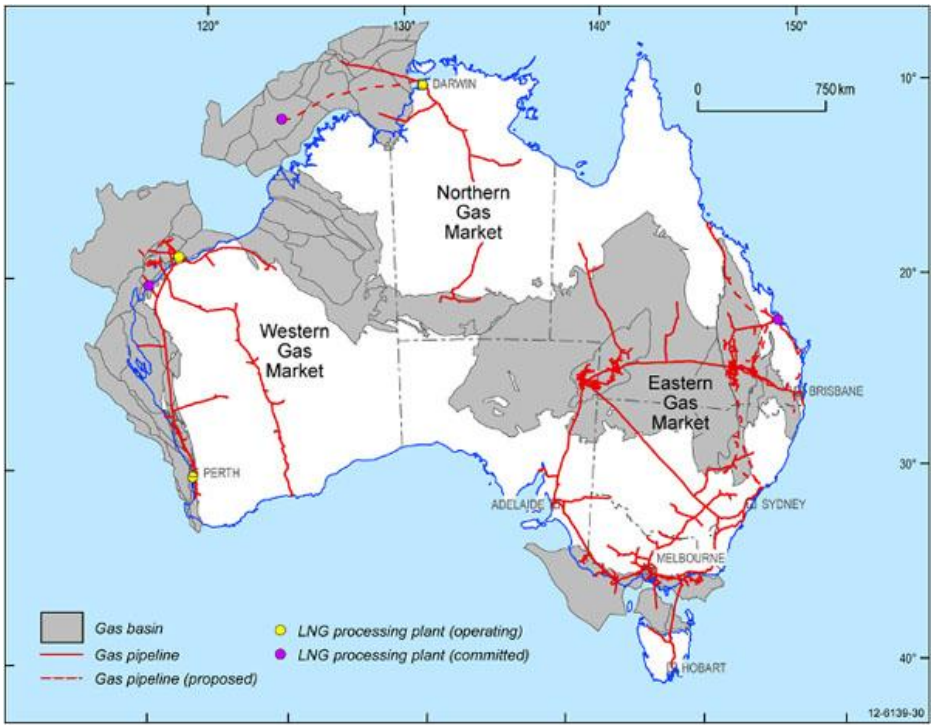
ATTACHMENT 1: Australia's Natural Gas Supply: an assessment of current policy issues and options – ACIL Allen Consulting

1. Natural gas is an essential fuel for the Australian economy

Natural gas is an essential part of Australia's energy mix. In 2010/11, 1515 petajoules (PJ) of natural gas was consumed in Australia, comprising 24.8% of our primary energy needs[1]. Appendix A contains further background information and details of gas in Australia.

In Australia, there are three distinct geographical areas that can be considered separate markets. These are the eastern market, the western market and the northern market, displayed on the map below.

Figure 1: Australia's Gas Markets



Source: RET, GA & BREE (2012).

The eastern gas market, the focus of this document, is the largest and most mature market. There are multiple demand centres and source basins spanning the states of Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia and Tasmania. A number of major transmission pipelines connect sources and demand centres between these states. The development of CSG reserves and LNG export facilities is a major activity underway in this market.

[1] Energy in Australia 2013

2. The current situation

The current circumstances of gas markets in Australia, particularly east coast markets, have been discussed at great length. The development of an LNG export industry will see east coast natural gas demand increase from around 700PJ/annum to almost 2,500PJ/annum in less than 5 years. The work required by the production industry to meet this new demand is extensive, and can be impacted by environmental and water controls, extreme weather events, disproved forecasting and community and political reaction to the expanding CSG industry. This challenging demand growth occurs at a time when the long-term gas supply contracts of many existing Australian gas users are due to expire. Gas users are faced with new risks in regard to terms and price; the only certainty being that existing arrangements will not continue.

The Australian Government's *Energy White Paper* (Nov 2012) summarises the issue as follows:

> *Australia's eastern gas market has entered a period of extended transition as new CSG reserves and LNG developments reshape market dynamics and structure. LNG supply requirements are sharpening competition for gas and will remain the main driver of market expansion for the next decade or longer.*
>
> *Many domestic large-user contracts expire from 2014 onwards, and new supply contracts have yet to be negotiated. The impacts of carbon pricing and lower than previously expected electricity demand on the prospects for gas-fired power generation are also unclear. While there may be a need for additional 'peaking' plant, new gas-fired base-load capacity may not be needed until later this decade (or beyond) if overall demand remains subdued. The combined impact that these factors will have on final demand for gas is not yet clear, although overall growth is expected.*

The *Energy White Paper* states that the structural changes in the market are likely to have long term effects on gas prices:

> *The cost base of the market is also increasing because new production is from higher-cost resources. However, demand competition from LNG expansion is also expected to become a more significant driver of prices, which are widely forecast to increase towards LNG netback levels by the second half of the decade. The 2012 Queensland gas market review modelled domestic gas prices ranging from $6.50/GJ to $10/GJ by 2015, depending on the LNG development outlook. ACIL Tasman has projected regional gas prices rising to $11 and above by 2030.*
>
> *While developing CSG remains challenging, there is projected to be enough gas to meet all expected demand well beyond 2035 if known reserves can be brought on, and there is good potential to identify further commercially viable CSG and new shale and tight gas resources.*

The *Energy White Paper* also identified the potential for a gas price spike in the short term:

> *Nonetheless, pressures are emerging in the market. Recent floods in Queensland slowed CSG production, and some LNG producers have begun to supplement contracted reserves in the ramp-up period from conventional supplies in the Cooper Basin. The 2012 Queensland gas market review has pointed to suggestions that some LNG producers may also be building contracted gas positions to preserve options for further LNG train development. Meeting project development*

schedules is resource intensive and remains a principal focus of business development for these producers. These factors suggest conservative supply positioning.

Recent market assessments suggest that this could result in transitional supply tightness from 2015, potentially until 2020. However, given current uncertainties about future demand and the timing of new supply, including the extent of additional LNG expansions and CSG flows, it is not yet clear how material that risk may be.

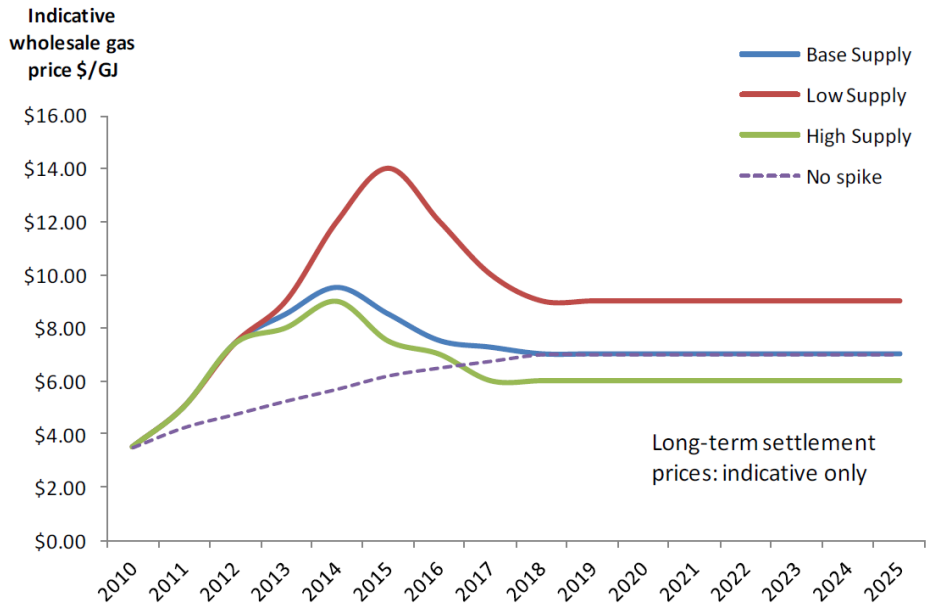
In these circumstances, large industrial gas users without existing upstream positions are particularly exposed to rising prices and may face ongoing difficulties in securing long-term contracts at prices they deem to be acceptable. Residential customers will also face rising gas prices over the decade. Increases in residential prices are likely to be proportionally less than rises for industrial customers because fuel costs are only around 30% of the delivered gas price.[2]

These issues have been addressed extensively by many gas industry stakeholders and do not need to be covered in further detail here. The ACIL Allen report, accompanying this document at Attachment 1, also provides information.

Since the *Energy White Paper* was written, it has become apparent that the risk of transitional supply tightness from 2015 is becoming more likely. Regardless of how much gas will be available in the long term for domestic applications, high gas prices resulting from supply tightness could, even if temporary, pose issues for large gas users and, possibly, the wider Australian economy.

The final resolution of gas supply and its impact on price is unknown, it is generally accepted that future prices will be higher than those previously experienced. ACIL Allen has developed illustrative scenarios that demonstrate the broad relationship between supply and price and the potential trajectory of a short-term gas price spike.

Figure 2: Schematic of potential intensity and duration of gas price spike



Note: Prices are illustrative only—not based on modelling

SOURCE: ACIL ALLEN

[2] Australian Government, Energy White Paper, p140-141.

The occurrence of a price spike is not certain. The severity and timing of any price spike are uncertain and will be influenced by a number of factors including:

- the extent of the supply/demand mismatch;
- the speed with which new gas production can be brought to market (which in turn involves both technical and commercial issues around the proving up and development of new gas reserves, whether conventional or unconventional); and
- future oil and international LNG prices.

As ACIL Allen notes[3]:

> *The transient gas price spikes illustrated in Figure 5* (Reference to figure in Attachment 1) *reflect complex interactions of commercial, technical and inter-temporal factors that are likely to determine how the gas supply/demand balance in eastern Australia plays out in practice over the next five to ten years. The price profiles shown in this diagram are illustrative only and are not based on detailed modelling. However they represent, in our view, a plausible range within which local gas prices could move, rising sharply before easing to a lower long-run equilibrium level as new supply (stimulated by high price) comes into the market.*
>
> *The Base Supply case illustrates what might be expected under reasonable assumptions about the supply/demand balance through the period of LNG ramp-up. Prices rise in anticipation of LNG plant commissioning, but do not reach levels higher than estimated long-run (capital inclusive) LNG netback prices of around $9.50/GJ. After LNG start-up, full CSG supply to meet plant requirements is established quickly and incremental supply becomes available to meet domestic demand, with competition between alternative sources pushing prices below full long-run LNG netback.*

The high and low supply scenarios are then guided by the likely impacts of supply exceeding or failing to meet expectations respectively.

Figure 3 in Section 3 of this report shows the potential trajectory of gas prices in high and low supply scenarios in the absence of a gas price spike.

Full detail of ACIL Allen's scenarios is included in Attachment 1, Section 2.1.

In this environment, it is appropriate for government to revisit existing policy and regulation affecting gas supply, assess whether it is sufficient and consider the introduction of new, innovative policy to address both the long-term issues posed by the structural changes in the gas market, and the short term transitional issues.

[3] Attachment 1, p15

3. The importance of unlocking gas supply

The east Australian gas market is facing short term transitional pressures and these may need to be addressed. More importantly, actions need to be taken to increase the development of gas supply in the long term.

The Australian economy benefits from producing more gas rather than less gas. In the long term, an increase in gas supply will be vital to ensuring that the demands of both exporters and domestic users can be met. Given there is a constraint on how much gas can be exported as LNG, increased gas supply should lead to decreased gas prices for domestic gas users, which most stakeholders contend is desirable.

It is important to emphasise that there is a permanent structural change underway in Australian gas markets. LNG exports from the east coast are expected to lead to higher gas prices in eastern markets in the long term, as they have in Australia's west coast market. However, a smaller increase in gas prices is better than a larger increase for Australian gas markets, users and the broader economy.

Understanding how increased gas supply can benefit the Australian economy will help to assess the importance and priority of addressing supply issues. There is a range of benefits of increased gas supply in the long term, including:

- Lower gas prices;
- Lower greenhouse gas emissions; and
- Improved energy security.

3.1 Lower gas prices

Actions taken today to increase future gas supply should result in a long-run average price that is lower than these estimates, reducing the direct and indirect costs to the Australian economy.

ACIL Allen has performed some modelling on the accelerated development of Australia's gas reserves and found that the impact on price is beneficial. ACIL Allen has modelled three gas supply scenarios:

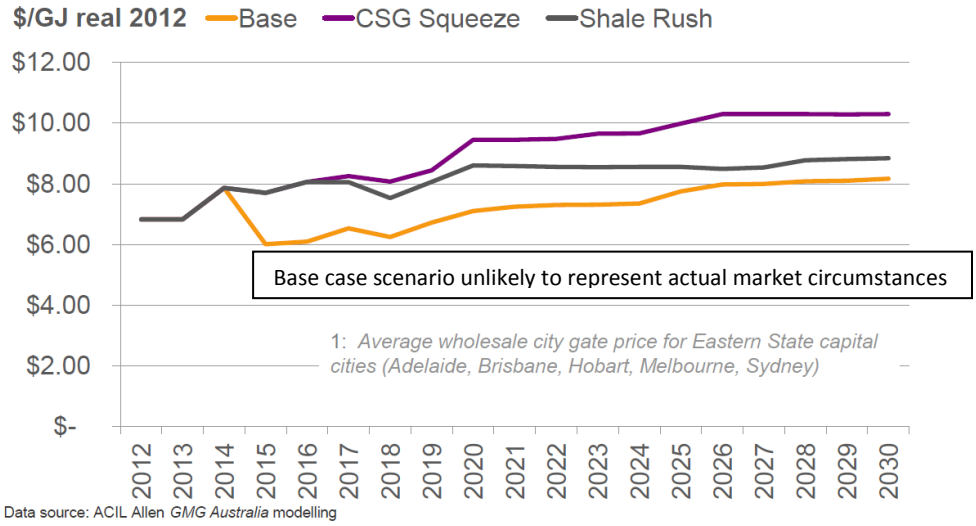
- A base case scenario, comprising latest gas powered generation forecasts, supply/cost assumptions, commercial pricing behaviour by LNG proponents and other variables. In this scenario shale gas production from the Cooper Basin is limited to 50PJ/annum with a median production cost of $7/GJ. It is increasingly likely that the base case scenario represents a 'best case' scenario that is no longer achievable, with current gas prices suggesting there are constraints on CSG supply leading to higher prices.

- A 'CSG squeeze' scenario, comprising a 20% reduction in Qld and NSW CSG production capacity and reserves on the base case. This is likely to be more representative of current gas supply circumstances.

- A 'Shale Rush' scenario. Building on the CSG squeeze scenario, the Shale Rush scenario includes Cooper Basin gas expanding to 450PJ/annum within 15 years and at 20% lower production cost.

All other things being equal, modelling these scenarios shows that the Shale Rush scenario has around $1.80/GJ lower gas prices than the scenario without accelerated shale gas production.

Figure 3: Potential prices arising from CSG Squeeze and Shale Rush Scenarios



Data source: ACIL Allen *GMG Australia* modelling

Further detail is in Attachment 1, Section 2.1.2.

It is clear that measures to increase gas supply should exert downward pressure on gas prices. The ACIL Allen modelling indicates that accelerated development of shale gas alone would lead to increased production and lower costs of production (largely brought about by economies of scale and increased capabilities) that can lower Australia's long-term gas prices by more than 20%. It would appear that there is an overall positive benefit to the Australian economy from having a lower gas price rather than a higher gas price, and therefore any measure to increase supply should be explored.

3.2 Lower greenhouse gas emissions

The increased availability and therefore use of natural gas could deliver substantial environmental benefits. In particular, the increased utilisation of gas for electricity generation could significantly reduce the emissions intensity of Australia's electricity sector.

Electricity generation

Combined-cycle gas turbines (CCGT) are a mature technology that can utilise Australia's substantial gas reserves to produce electricity at one-third the emissions

intensity of brown coal and one-half that of black coal. CCGT will have a long-term role in Australia's energy future.

Figure 4: Average emissions intensity of electricity generation Australia, 2010

Fuel	*Emissions intensity (t CO_2/MWh)*
Brown coal	1.20
Oil	0.97
Black coal	0.92
Gas	0.54
Renewables	0.00
Australian coal average	**1.00**
Australian fossil fuel average	**0.92**

Sources: ABARES (2011); Frontier Economics (unpublished data); Productivity Commission estimates.

In terms of emissions intensity, gas sits between coal and renewables. However, it should be noted that as the majority of electricity produced from gas generators is currently sourced from less-efficient open-cycle gas turbines (OCGT), the average emissions intensity of electricity sourced from CCGT is even lower. The 2012 Australian Energy Technology Assessment places CCGT emission intensity at 0.357 t CO_2/MWh, a 70% reduction on existing brown coal and a 61% reduction on existing black coal emission intensity.

If effective carbon emissions reduction measures were in place and if gas was in plentiful supply, demand for gas-fired electricity should increase. This is not currently the case. The gas supply issues currently being experienced, combined with uncertainties in regard to energy and carbon reduction policy and declining demand forecasts, have led to a halt in the progress of all base-load gas fired electricity projects.

It is unlikely that these issues will be resolved until at least the end of the decade, leaving base-load low emission power generation investors in a state of flux. Measures to increase gas supply will address some, but not all, of these uncertainties.

In addition to the direct environmental benefits of gas as a clean-burning fuel, there are also environmental benefits due to the higher transmission efficiency of using CCGT generation. Gas transmission losses are around 1%, whereas electricity transmission losses are typically above 5%. When CCGT power stations are placed close to geographic demand areas, overall energy transmission losses are lower, further improving economic and environmental efficiency.

Direct applications

The emissions intensity of natural gas used in direct applications is around half that of electricity generated by natural gas and well under four times lower than the average emissions intensity of Australia's electricity. This is because direct applications of natural gas are not affected by conversion losses.

If natural gas is not available, or priced so high that alternatives such as diesel fuel or electricity (largely sourced from coal) become competitive for direct applications, there will be an unnecessary increase in Australia's emissions.

3.3 Improved energy security

A diverse mix of energy sources improves Australia's energy security. The higher the availability of gas supply, the more of a role gas can play in Australia's energy mix. It is in Australia's interest to maximise the choice of energy sources and to minimise the cost of these options. An increased gas supply enhances the role gas can play in securing Australia's energy future. As highlighted in the *Energy White Paper,* Australia's energy security can be improved by:

- continuing supply and demand-side market reforms to maximise investment and improve the flexibility and resilience of energy markets;
- encouraging diversity of supply and infrastructure reliability for supply chain resilience;
- attracting the necessary capital investment and skilled labour to meet future energy demand.[4]

The recommendations set out by APIA in this paper are aimed directly at achieving these outcomes.

[4] *Energy White Paper,* p48

4. Recommendations for a response to structural change

There is a range of policy options available to improve gas supply and minimise the impacts of the long-term structural change driven by increased exports from Australia's gas markets. Below are some of the more fundamental options.

4.1 Accelerating innovative investment

It is accepted that high gas prices will lead to increased exploration and development activity, which in time can be expected to apply downward pressure on prices. However, any supply response will take some years, as gas production projects have long lead times, and the overall downward impact on gas prices is likely to be delayed and mitigated by structural changes.

The situation experienced in the US gas market can serve as an example of what may occur in Australia. A combination of factors caused US energy prices to rise rapidly in 2004/05, including a high level of global energy demand driven by China, severe, long winters and diminishing traditional US domestic fields. A sustained abnormally high price period for gas persisted from early 2005 through to 2009, relieved only by the development and rapid deployment of technology that unlocked the potential of shale gas. This is the anticipated 'supply' response that would be desirable in the east Australian market.

There are several factors that may impede such a response in Australia. US demand remained relatively stable during this time, there was no new domestic demand driving prices higher. The development of an LNG export industry in Australia is creating new demand, tripling east coast demand over a period of three or four years. This means the supply response must be relatively stronger and more rapid to achieve effective impacts on domestic gas prices in Australia. Further compounding the issue, the Australian gas industry is much smaller and the infrastructure necessary to facilitate development of remote reserves is not as developed as in the US. Therefore, the Australian gas industry has lower capacity to adjust to change than does the US gas industry, in large part due to the market characteristics raised in Appendix A.

There is clear evidence that potential future gas supply pressures are influencing the price of gas available to the domestic market. Some of this evidence is discussed in section 5.2. What has not been identified by Government or stakeholders are genuine solutions to accelerate the development of gas reserves and ensure the provision of timely and adequate domestic gas supply.

Accelerated development of gas reserves would increase gas supplies in the long-term, therefore minimising any increases to long-run average gas prices.

Higher gas prices do have winners – gas suppliers enjoy increased revenue and governments receive increased royalties, resource tax payments and company tax payments. ACIL Allen[5] estimates the NPV of all Government taxes paid by a 6-train

[5] ACIL Tasman (2012b), *Economic Significance of Coal Seam Gas in Queensland*, report to

LNG industry in Queensland to 2035 will be $66 billion. But there are ways that the windfall Government revenues from high gas prices can be invested by Government to increase gas supply and enhance the availability of gas to the domestic market, ensuring the balance between export and domestic requirements is more easily achievable.

It is clear that there are substantial external benefits available to the gas industry and the broader Australian economy from the discovery of new opportunities and capabilities from innovative activities such as shale gas development in central Australia.

Policy which accelerates the development of Australia's remote and unconventional gas reserves will help ensure a timely and affordable supply of gas, creating lasting economic and environmental benefits for the Australian economy. Bringing forward gas supply will be an efficient and effective measure to mitigate higher gas prices in the long term.

The environmental benefits of gas as an energy source are outlined in section 3.2. For the environmental benefits of gas as an energy source to be maximised, both upstream and downstream investors must face a higher degree of certainty about future prices than currently exists. The development of gas supply will need to be brought forward in order to mitigate pricing concerns.

The Government should establish consistent policy across its energy funding programs, such as a single fund to enable the accelerated development of desirable energy projects. Current programs are not technology neutral, being largely directed towards renewable and "clean coal" technologies. However, all technologies that reduce Australia's emissions from the energy sector should be encouraged. APIA believes that there should be the opportunity for such programs to be used to fund increased gas development. This would benefit the wider economy by alleviating long term pricing pressures, which would, in turn, encourage the use of gas as a cleaner, economical energy source.

Access to the fund would be on the basis of competitive bidding – with Government selecting the projects based on return on investment, emissions reduction and other criteria. APIA believes gas would be a competitive low-emission energy source under such a policy. While this policy would obviously not be limited to gas projects, this paper focuses on the benefits relating to gas projects.

APIA's proposal would achieve the stated purpose of accelerating development of gas reserves by:

- Reducing the risk of new gas investment. Government co-investments, requiring lower returns than those required by private investors, would effectively reduce project costs and therefore the risk faced by private investors, making such investments more attractive to the private sector. This would stimulate supply, bringing otherwise marginal gas basins on line earlier.

- Improving the efficiency of investment. Government investment or underwriting of projects would enable them to take advantage of economies of scale, a particularly large potential benefit to gas pipeline projects. For a slightly higher

initial cost, substantially more capacity can be built, lowering the transportation costs of all gas in a region.

Increased supply from unconventional gas reserves would increase competition in the domestic gas market, reducing price pressures earlier, and enabling the increased use of gas as a clean, reliable and economical energy source.

Similar principles apply to other forms of energy. There are numerous Government energy funding programs, largely focused on 'picking winners', that could be improved by allowing all technologies capable of achieving the programs' intent (usually emissions reduction) to compete on an equal basis.

This proposal can be structured to have a positive impact on Government finances. As gas prices increase, Governments receive windfall revenues. These revenues can be used to establish a fund that focuses on accelerating the development of remote energy reserves.

It is not proposed that the fund be used to provide grants to projects. It is proposed that the Government co-invest in projects that have national importance on a competitive bidding basis. If Government sets its required return at a slightly higher level than the government bond rate it achieves a better return on investment than it would otherwise receive, and industry effectively has a lower cost of debt.

As shown by ACIL Allen in Figure 3 (Section 3) the accelerated development of shale gas should deliver genuine downward pressure on gas prices.

4.2 Other measures to encourage supply development

4.2.1 Optimising land access

An issue of increasing concern for gas supply is the political response to community opposition to gas development. This has materialised primarily in NSW, where the Government announced a two-kilometre exclusion zone around residential zones and further exclusion zones around viticulture and equine industry clusters to prevent new coal seam gas exploration, assessment and production activities.

This type of response does not reflect the industry's safe processes and its strict regulations. It does not recognise the urgent need for increased gas supplies, and poses a risk to gas supply activities.

Governments must work rationally and sensibly to ensure all land uses are made available. At the same time, the industry must work to develop and maintain the social licence necessary to conduct gas development activity, and work with government to provide appropriate information to affected landholders.

4.2.2 Reducing red and green tape

A key improvement often cited is the need to reduce red tape and green tape. Much of the regulatory regime overseeing gas supply is duplicated across federal and state levels and this decreases efficiency. The exploration and production industry is impacted by these inefficiencies. As APIA's membership is not always a direct participant in gas production, APIA does not have detailed analysis of which areas require most improvement. The Australian Petroleum Production and Exploration

Association's (APPEA's) 2012 State of the Industry document contains a comprehensive treatment of this issue in Section 3.4[6]. Some specific areas for improvement include the duplication of approvals, particularly environmental, processes between state and federal governments and the timeliness of approvals.

4.2.3 Improving exploration information deficiencies

Gas exploration is a high-risk activity, with significant capital investment required to locate and prove reserves. If successful, the rewards are sufficient to justify the investment and risk. Early availability of information can help increase investment and ensure it is directed to the most prospective regions.

Through Government geoscience organisations, a range of information is available. Geoscience organisations both fund the gathering of new data and receive data from current explorers, the latter usually being subject to confidentially arrangements to give early movers appropriate financial security.

Government can improve information arrangements by increasing funding and release of its own data and reducing the timeframes for release of privately captured data. This would increase the efficiency of exploration by:

- Better allocation of scarce exploration resources through government provision of increased early-stage data on prospective regions;
- Improved competition by increasing the release of privately captured data into the public domain.

More information on exploration information deficiencies is available in Attachment 1, Appendix C.

4.2.4 Changes to management of exploration tenements

The majority of Australian gas exploration tenements are offered on the basis of work bidding, with the proponent offering to do the most exploration in an area being awarded the tenement. This system has been put in place on the assumption that early and more exploration work is desirable. However, tenement allocation systems designed to increase the pace of exploration can lead to a misallocation of exploration resources, with proponents committing to more than necessary exploration work to secure a tenement. This misallocation leads to other areas not receiving enough exploration resources, diminishing the size of Australia's total gas reserves, gas supply and tax revenue.

A thorough reform of exploration tenement regimes is necessary in order to avoid misallocation and resource rent dissipation. More information on management of exploration tenements is available in Attachment 1, Appendix E.

4.2.5 Royalty and taxation reform

There are multiple forms of taxation that apply to the gas supply industry. At the Federal level, the company tax and petroleum resource rent tax regimes apply. At the State level, multiple royalty tax regimes are in place. These tax regimes distort incentives to explore, invest and extract. For example, different royalty rates in different states may direct investment toward one state over another, all other matters being equal.

[6] http://www.appea.com.au/images/stories/Publications/state%20of%20the%20industry%202012_web.pdf

As an additional consideration, different tax regimes apply to different resources, despite the fact the resources may be in competition. Relevant examples are the tax regimes that apply to gas and coal extraction. Gas and coal compete as fuels for electricity generation but the tax regimes for extraction are very different and impact the relative competiveness of the commodities.

Comprehensive reform of royalty, PRRT and company tax regimes, along with resolution of federal-state issues, is essential to maximise efficiency of gas supply. The Henry Tax Review provided a reasonable model[7]. An alternative is to base taxation models on economic profits rather than resource production. More information on tax regime reform is available in Attachment 1, Appendix D.

4.3 Delivering efficient power generation investment

In light of the investment co-ordination issues commonly experienced in the resources sector, where project development and market demand are co-dependent, a policy which strengthens domestic demand for gas should encourage the increased development of supplies in the long term. This will provide investors in new gas projects with confidence that there will be strong, long-term demand for gas in Australia, which is easier to supply than the demand of overseas LNG buyers. The investment co-ordination issue is discussed by ACIL Allen in Attachment 1, Appendix C.

It is apparent that the size of future gas demand will have an influence on activity to increase gas supply. In particular, there are uncertainties around the role gas will have in Australia's electricity supply. Clear signals from the Government that gas has a strong role to play in Australia's electricity mix will provide shale and other conventional and unconventional gas project proponents with confidence that there will be a market for the development of their discoveries.

Such signals are currently absent in relation to gas fired generation, due to several factors. The Australian Energy Market Operator's 2012 Electricity Statement of Opportunities substantially downgraded forward estimates of electricity demand. These forecasts have been further downgraded in the 2013 release.

As the levels of electricity generation mandated under the Federal Government's Renewable Energy Target (RET) were based on earlier estimates, the Australian generation sector is now faced with the unforeseen situation where the RET is effectively requiring that an oversupply of new energy generation to 2020. This is neither the original intention of the RET nor an efficient economic outcome for the Australian generation sector, as it does not encourage other cleaner and economically competitive generation sources, such as gas.

Additionally, input prices and electricity prices are not acting as earlier forecasts anticipated. Gas prices are rising, coal prices are falling. Wholesale electricity prices are at record lows. The carbon price will not be as high as originally planned and there is a high likelihood it will be abandoned. Uncertainty in international carbon policy has resulted in the EU scheme carbon price being forecast to remain at around €6 to €8 until 2020. Australia will be able to source 50% of its liability from

[7] Henry Tax Review, Chapter 6, May 2010

international markets but will require material domestic abatement activities for the remaining 50% to meet significant emission targets.

It is therefore timely to revisit the intentions and assumptions of earlier policy decisions in order to assess the influence of complimentary policies, reflect the current outlook and enable Australia's generation sector to transition to lower emission intensity technologies as efficiently as possible.

APIA believes the Government should commence development of policy to lower the long-term emissions intensity of the electricity sector. Given there is little new demand to be met prior to 2020, the focus of this policy should be on influencing electricity generation beyond 2020. There are currently no signals to the investment market as to what electricity projects should be planned once the RET has achieved its goals in 2020. Current demand forecasts (which can change) indicate new base-load investment will be required in 2020. Government policy has an increasingly large influence on investments in the electricity sector and clear advance signals need to be provided to the market in order to guide investment in 2020 and beyond.

A single, technology neutral, electricity sector emissions intensity based carbon reduction scheme should be prepared for deployment in 2020. Such a scheme would influence the costs and output of existing and future generators and provide the market with clear signals that investment in low emissions electricity will be encouraged.

Such a signal would also give shale and other gas project proponents sufficient confidence in the long-term viability of gas-fired power generation and assure them of a growing domestic demand to justify investment in gas supply. This would help to address the issue of co-ordination. Increased investment in unconventional gas is needed today, in order to influence gas supply in future years. That investment cannot occur unless there is confidence in future demand.

Such a policy would reduce uncertainty in the market, leading to more efficient investment outcomes. AGL has identified in 2010 that greater certainty would lead to more economically efficient generation investment in the National Electricity Market[8].

This policy would also ensure delivery of the environmental benefits of gas as a clean energy source, addressing the need to reduce emissions across the electricity sector and in the economy in general.

It is acknowledged that any policy aimed at reducing emission intensity in the electricity sector will exert upward pressure on electricity prices. This is already occurring through programs such as the RET. It is also clear that a policy that allows the market to choose the methods to achieve emissions reduction in the electricity sector will encourage pursuit of the lowest cost options. A policy which is technology neutral should have a lesser impact on electricity prices than policies which do not let the market decide on technology investments.

APIA believes that a scheme that functions in a similar way to the NSW and ACT-based Greenhouse Gas Reduction Scheme (GGAS), applying to electricity generators,

[8] AGL's Paul Simshauser, *Capital adequacy, ETS and investment uncertainty in the Australian power market*, 2010

should be implemented. Such a scheme would serve to encourage the increased use of gas fired generation if it is efficient, in contrast to the unintended effect of the RET, and by doing so would also encourage the increased development of gas supplies, including the associated economic benefits. Analysis of the existing GGAS scheme is contained in Appendix B.

The benefits of an emissions intensity scheme for the electricity sector post-2020 are three-fold:

- *Environmental benefits*. In the current climate it is difficult to determine a $ value for this benefit, but it is known that emissions reduction will remain an international issue. Policies and actions to reduce emissions and increase investment in emissions reduction practices today are useful and will increase in utility.

- *Investment efficiency benefits*. Provides signals to the electricity sector in regard to the direction of future investment.

- *Increased gas supply development*. Provides certainty to the gas supply sector that domestic markets for gas will continue to grow as long as CCGT remains competitive economically and on an emissions intensity basis. This would provide the basis for investment in gas projects today that might not begin supplying gas for several years. Increased gas supply development will help to mitigate the effects of the structural shift in the east Australian market, reducing long term pricing pressures.

Additionally, gas-fired generation has two further unique benefits. CCGT turbines are able to respond rapidly to changes in electricity demand – while coal boilers can take days to be ramped up or down, CCGT turbines take only hours. Also, gas transmission is generally more economical to build than electricity transmission and, importantly, the investment frameworks for each mean that the costs of gas transmission are better attributed to the parties that create the need for the infrastructure. These efficiencies are explored in detail in Chapter 8 of the Australian Energy Market Operator's 2011 National Transmission Network Development Plan[9].

[9] http://www.aemo.com.au/Electricity/Planning/Archive-of-previous-Planning-reports/2011-National-Transmission-Network-Development-Plan/Report-Chapters

5. Mitigating the effects of potential transitional pressures

5.1 The case for Government intervention in markets

The policy refinements and proposals suggested in the above two sections are not forms of market intervention and would not have an immediate impact on gas markets, as it would take time for their effects to impact gas supply. They would, however, create favourable conditions to improve the efficiency of new supply and, if successful, accelerate the timing of new supply.

There have been numerous calls for market intervention in response to recent anticipated short term transitional issues in the east Australian gas market. Market intervention is an option of last resort and should not be entered into lightly. Interventionist measures should only be undertaken if demonstrated market or policy failures have occurred. Clearly, evidence of such market or policy failures must first be identified.

According to the *Energy White Paper*:

> *Market interventions should always be a matter of last resort and undertaken only where there is clear evidence of market failure. In the government's view, those conditions do not currently exist in Australia's gas markets.*
>
> *However, the government does not dismiss the potential risks associated with emerging pressures, particularly the ongoing lack of liquidity in the long-term contract market on the east coast and the impact that might have on existing large users.*
>
> *Therefore, it will work as a matter of priority with the relevant jurisdictions and gas market bodies to further develop gas market arrangements as described above and to closely monitor market conditions to ensure that markets are delivering against stated objectives, particularly the provision of timely and adequate domestic supply.*[10]

This raises four questions:

1. What constitutes clear evidence of market or policy failure in Australia's gas markets?

2. How will the Government closely monitor market conditions to ensure that markets are delivering against stated objectives, particularly the provision of timely and adequate domestic supply?

3. If monitoring produces evidence of market or policy failure, what action will be taken by Government to address this?

4. What are the policy objectives of Australia's gas markets and do they need to be re-examined?

[10] Australian Government, Energy White Paper, p144-145

Detailed discussion of these questions is contained in Appendix C, and a brief summary of APIA's views are shown below.

Based on the National Gas Objective and *Energy White Paper*, two of the key purposes of Australian gas markets are to:

- ensure the provision of timely and adequate supply; and
- maximise efficiency in natural gas services, including supply.

If gas markets are not achieving these purposes, it is likely there is a market or policy failure. APIA therefore believes that inadequate gas supply, reflected by substantially increased prices, can be used to identify market or policy failure in Australia's gas markets, as this would be a result of the market failing to ensure 'the provision of timely and adequate domestic supply'[11]. Logically, a long-term domestic gas price above the LNG netback price (the price of gas paid by overseas LNG buyers, less the costs associated with converting and transporting the LNG) would constitute evidence of a market or policy failure. This would be indicative of Australian gas supplies failing to meet demand from LNG producers.

5.2 Analysis of the short-term situation

In the case where there is clear evidence of market or policy failure, and in order to avoid potential damage caused by short-term price transitional pressures, a short-term policy intervention has been proposed.

Clearly, in the long term, there would be a supply response to high prices and the market would be seen to respond. However, in the short term, a dramatic price hike could lead to demand destruction in some domestic industries that would be expected to survive in the longer term, but not through a short-term major price increase.

LNG netback is believed to be around $9/GJ, and market reports place domestic customers currently entering long-term purchase contracts at prices up to $9/GJ. If it is taken that prices above LNG netback indicate a failure of the market or policy to ensure adequate and timely supply of domestic gas, then there is a risk that market failure will occur in the next few years, leading to a period of natural gas prices above LNG netback.

The market itself will, in time, respond to the high prices caused by a failure in gas supply by increasing exploration and production efforts to capitalise on the high prices. This should invoke a classic 'supply response', leading to an oversupply and reducing price pressure. However, such a response will not be timely. Given the timeframes associated with gas projects, it can take many years. In the meantime, demand destruction may occur in the Australian economy.

Increasing the provision of gas supply is a medium- to long-term endeavour. There are very few efficient short-term responses that can increase gas supply. A market failure of gas supply requires two responses, one with an immediate response to address the price effects and one with a longer-term response to promote increased supply. Both responses are necessary to limit the detrimental effects of limited

[11] Australian Government, Energy White Paper, p145

supply. In Section 4, medium- and long-term measures to improve gas supply arrangements have been addressed.

5.3 Easing short-term transitional pressures

APIA believes that the Government should work with stakeholders to implement effective price and contract monitoring to fully assess the supply-demand balance in Australia's gas markets. Government should also seek to define trigger points and therefore identify evidence of market failures which justify market intervention. APIA suggests domestic gas prices above LNG netback would constitute such a sign, though it is likely there are other trigger points that may be considered.

In the very short-term, it may be that the only efficient option available to address the high prices created by a market failure in gas supply is some form of temporary, targeted demand side compensation package. This would ensure the, presumably temporary, high prices do not cause long-term or permanent damage to gas price sensitive sectors of the Australia economy. The permanent loss of long-term viable industries due to short-term pressures is a sub-optimal outcome for the Australian economy.

The basis for, and further details of, such an intervention are set out in Section 3.7 of the ACIL Allen report at Attachment 1.

5.4 The policy settings for Australia's gas markets

An effective, efficient market is one that responds to supply tightness with higher prices. The supply is allocated to the users that value it most. The higher price is also an incentive to increase supply, and eventually – as supply begins to exceed demand – reducing prices.

Markets are designed within a policy framework. When there is perceived "unfairness" or failure within a market, often when there is a shortage of supply and prices rise, the point is usually made that "allowing the market to work" will eventually see the higher prices generate increased supply, so that prices then fall.

However, a focus on the actual policy framework for a market is often overlooked because this is a more difficult and substantive challenge.

Australia's east coast gas market is a case in point. The National Gas Objective is to:

> *'promote efficient investment in, and efficient operation and use of, natural gas services for the long-term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.'*

Open, competitive markets will be able to ensure that the highest price for a commodity is achieved, but may be unable to give consideration to broader issues that may form part of a market's purpose or objectives. Government policy, such as the intent embodied in the National Gas Objective, defines the purpose of a market and sets the boundaries in which competition should occur.

The gas market policy settings for Eastern Australia have been developed in an environment where producers were focussed on the domestic market and supply to large gas users. The market environment has changed to one where the largest producers are focussed on export markets far bigger than the domestic market. The

policy settings framing the markets have not changed and thus require reconsideration.

The policy framework for the Eastern Australian gas market was developed without consideration of gas exports. In fact, it was assumed that gas would be imported from Papua New Guinea or from Western Australia. This was prior to the development of coal seam gas in Queensland, which has supplied the domestic Queensland market for many years. The early development of coal seam gas to supply the Eastern Australian market was not a challenge to the policy framework – it merely factored out imports from PNG or WA to address demand issues.

For good reason that policy framework, with no changes, allows producers to sell gas to the users that value it most highly. That is an appropriate market outcome when producers themselves do not have a major interest in downstream demand. With the establishment of an LNG export industry in Eastern Australia, major producers are now the primary suppliers and the source of the largest gas demand.

This challenges the existing policy framework. It is set out in the Energy White Paper that a primary purpose of the gas market is to ensure timely and adequate domestic supply. If producers have larger incentives, both price-driven and contractual, to pursue export markets it is possible that due consideration will not be given to providing timely and adequate domestic supply.

If there is a shortage of gas, producers have a choice between the export and domestic markets. There is nothing in the policy framework for the Eastern Australian market that ensures Australian gas users (consumers/manufacturers/generators) will have access to that gas – even if they are prepared to pay the LNG netback price.

Efficiency and flexibility adjustments in the domestic gas market do not address the fundamental question of the choices made by producers regarding allocation of this (artificially) scarce resource. While adjustments are being made to the domestic gas market, the gas being supplied to that market is diminishing and the adjustments provide no solutions to the actual amount of gas being supplied. It is appropriate to revisit the policy framework governing wholesale gas markets to ensure the appropriate incentives are in place to enable the timely and adequate provision of domestic supply.

6. Recommendations

The transitional period being experienced in Australian gas markets is creating new uncertainties around long-term gas prices, gas availability and the future demand for gas. There are a number of actions that can be taken by Government to address these uncertainties and in doing so provide confidence to investors in gas production and use, that the Government values the timely and adequate long-term supply of gas to the Australian economy.

APIA is of the view that, in addition to structural changes in Australia's gas markets, policy failure is exacerbating future challenges. In light of this, government should consider the policy intent of recent regulatory interventions and the policy establishing market frameworks.

To address the short term transitional issues in Australia's gas markets, APIA recommends:

- The Federal Government work with gas stakeholders to establish and implement effective monitoring of gas markets, with clearly identified triggers (such as price) for potential market failure;

- As a matter of urgency, the Standing Council on Energy and Resources identify the policy mechanisms it would use to respond to a short-term gas supply shortfall if the monitoring provided evidence of this.

To address the long-term issues created by the structural changes in Australia's gas markets, APIA recommends the Federal Government should prepare policy to increase the efficiency of gas supply and consider policy that will accelerate the development of Australia's gas reserves. Such policy should include:

- A supply-side policy – the Government should establish technology neutral energy investment policy that allows renewables, clean coal, low-emission gas and other clean technologies to compete for funding on the basis of emissions reduction and energy supply.
- A demand-side policy – a technology neutral emissions intensity electricity sector scheme should be established to provide appropriate signals to investors. In the case of gas, it would provide all investors, including explorers, with the signal that low-emission gas technology has an important role to play in the electricity sector.
- Improvements to regulatory and administration regimes, including tenement management, taxation, land access and information.

Appendix A – Overview of natural gas in Australia

Natural gas is an essential part of Australia's energy mix. In 2010/11 1515petajoules (PJ) of natural gas was consumed in Australia, comprising 24.8% of our primary energy needs[12]. Whilst primary energy consumption is the standard metric by which a fuel's contribution to the economy is judged, it does not tell the full story. According to the Australian Government's publication, Energy in Australia 2012, the usable energy provided directly to the economy by natural gas in 2009/10 was 740PJ. The usable energy provided by the electricity sector was 756PJ. Given that 15% of electricity is generated by natural gas, it is apparent that more usable energy is provided to the economy by natural gas than by the entire electricity sector. Importantly, the delivered price of gas for households is around one quarter of that for electricity on a $/GJ of energy basis.[13]

Natural gas is transported from producing basins around the country to industrial demand centres and cities through 30,000km of high-pressure steel gas transmission pipelines. Only the very largest industrial gas users, manufacturers, minerals processing facilities and power stations connect directly to this infrastructure. In remote mining regions, natural gas transmission infrastructure often provides the only link to larger energy markets.

More than 4,350,000 residential and small commercial and industrial customers and 2000 large industrial and commercial customers are supplied natural gas through Australia's 87,000km of gas reticulation networks, the distribution networks running through cities and towns providing access to gas[14]. These gas users depend on natural gas for a large part of their heating needs. In households, cooking, space heating and hot water are the primary uses of natural gas. Commercial uses of natural gas include heating of buildings, cooking, large-scale laundry facilities and much more. Hospitals, with their large scale heating, cooking, hot water and laundry requirements are particularly dependent on natural gas to provide low cost energy.

Industrial uses of natural gas include those where natural gas is used directly as feedstock to manufacture chemicals and other materials such as basic chemicals, fertilisers, explosives, paints, pharmaceuticals, soaps and detergents, cosmetics, rubber products and plastic products. Where direct application of heat is required in a manufacturing process, natural gas is the fuel of choice. Dependent manufacturers include the cement, brick, tiles, glass and plasterboard industries. In the mining and minerals sector, natural gas is used both for on-site energy (including electricity generation) and to fire smelters and ore processing facilities around the country.

[12] Energy in Australia 2012
[13] AER, State of the Energy Market 2012
[14] Energy Supply Association of Australia, Electricity Gas Australia 2012

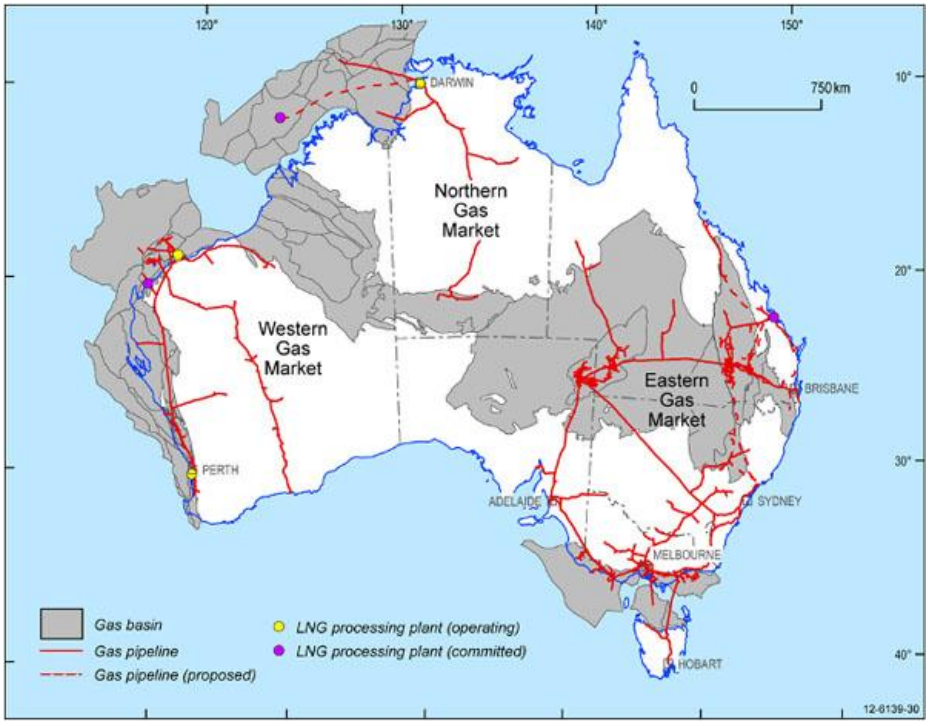
Last but not least, more than one third of natural gas demand is for use in electricity generation, providing low emission electricity that plays a vital role in responding rapidly to the short-term variations in electricity demand. In addition to 'peaking power', combined cycle gas turbines have the potential to transform the emissions intensity of Australia's electricity, by playing an increasing role in providing economic electricity at well under half the emissions intensity of Australia's dominant electricity source, coal.

Gas Exports

Gas is also exported from Australia in the form of Liquefied Natural Gas (LNG). Around 1085PJ/annum[15] of natural gas is exported as 24 million tonnes of LNG from export facilities in north-western Australia and Darwin. This capacity is expanding rapidly, with developments in existing locations and in Queensland forecast to increase Australia's export potential to over 50 million tonnes/annum by 2017. 25 million tonnes of this new capacity is being built in Queensland alone.

Australia's gas markets

There are three distinct geographical areas that can be considered separate markets. These are the eastern market, the western market and the northern market, displayed on the map below.



Source: RET, GA & BREE (2012).

The eastern gas market is the largest and most mature market. There are multiple demand centres and source basins spanning the states of Queensland, New South Wales, Victoria, South Australia, Tasmania and the Australian Capital Territory. A number of major transmission pipelines bring a level of interconnectivity to these sources and demand centres. The development of coal seam gas (CSG) reserves and LNG export facilities is a major activity currently underway in this market.

[15] Energy in Australia 2013

The western gas market is almost entirely served by gas from the north-west self, with two major pipelines bringing gas south to the demand centres of the south-west and central regions of Western Australia. With existing LNG export facilities, the western market is currently the largest producer and exporter of gas.

The northern gas market is Australia's smallest gas market and is centred on the major demand centre around Darwin, with gas primarily being supplied by offshore fields. There are existing and planned LNG facilities.

There are further distinctions between these markets. Each gas processing facility represents a market for supply, and if serviced by multiple pipelines may represent multiple markets. Each gas transmission pipeline services a specific demand centre at the end of the pipeline. Each LNG facility has an export market to service. There are managed markets: in Victoria there is the Declared Wholesale Market and in three capital cities there are Short Term Trading Markets. Currently under development is a Gas Supply Hub in Queensland.

Each of these markets has its own attributes and issues. Collectively, they can be called Australia's gas markets, the means by which natural gas supply and demand are balanced. The term 'domestic market' is also used for Australia's gas markets. This should not be confused with the residential market, which accounts for a small portion of total Australian gas demand.

There are several key factors that shape Australia's gas markets:

- Remoteness of gas supply basins. The majority of Australia's main gas-producing basins are remote from population centres. They typically serve one or two demand centres through a very long and narrow diameter (by international comparisons) single pipeline to each centre.

- Concentration of population. The majority of Australia's population lives in coastal capital cities separated by long distances. This concentrates energy demand in regions around these cities. The distance of capital cities from the locations of gas supply means no single pipeline serves more than one major demand centre. (Nevertheless, it should be noted that the eastern centres are connected. The Adelaide, Sydney and the Victorian markets are serviced by more than one pipeline and Brisbane has access to gas from other centres through the linkage of the transmission pipeline system.)

- A relatively low gas demand, by international comparisons. Australia has a small population, a small manufacturing sector, an electricity sector primarily fuelled by coal, and a temperate climate. These factors contribute to a relatively low gas demand, meaning most demand centres can be easily served by a single larger pipeline or two smaller pipelines, noting that a large pipeline by Australian standards is half the diameter of a typical large pipeline in the US or Europe.

To further clarify the size of Australia's gas market, it is useful to compare Australia's gas markets to those in the United States of America. Australia and the US have a similar geography and both have substantial reserves of natural gas. The US is home to the most sophisticated gas market in the world, the Henry Hub. The Henry Hub, located in Louisiana, is the deepest and most liquid gas market in the world, one of the few true 'spot' markets for gas and often referenced by Australian policy makers

as the model gas market Australia should aim toward. Whilst this seems a reasonable goal, the factors listed above and the facts provided below suggest it may be inappropriate to compare Australian gas markets with others.

Comparison of gas market characteristics: Australia, USA and Louisiana

	Australia	USA (lower 48)	Louisiana
Area(sq km)	7,692,024	8,080,464	134,642
Population	23,022,387	306,675,006	4,533,372
Gas consumption (PJ)	1,515	27,450	1,576
Gas export (PJ)	1,086	1,782	6183 (to other US states)
Major pipelines	12	210	30
Pipeline length (km)	28,500	488,000	78,500
Storage facilities	2	400	21

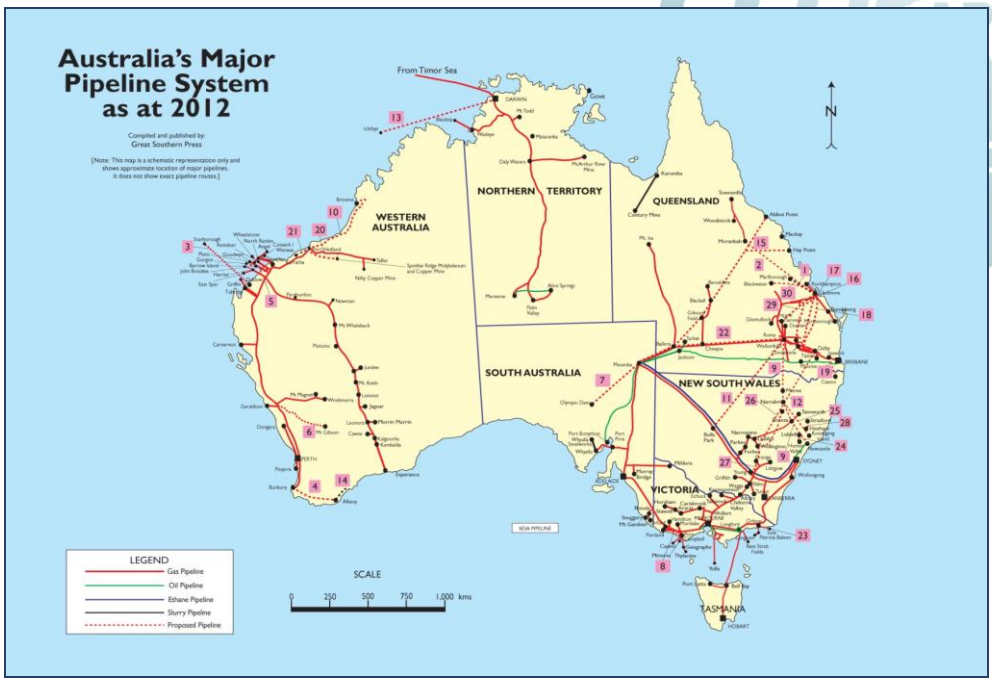
Source[16]

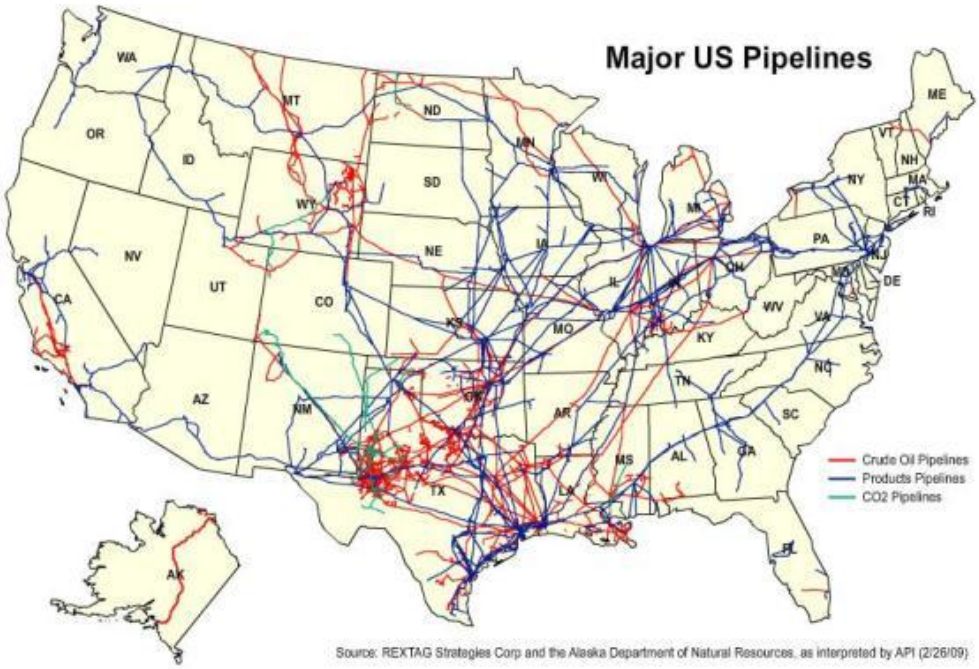
Louisiana is roughly half the size of Victoria, has a local gas demand exceeding Australia's, exports around 6 times as much gas as Australia; and has a pipeline network almost 3 times as long as Australia's. On its 30 major pipelines there are 75 regulated gas transportation entities[17]. It is a deep and liquid market. The environment for Australia's gas markets to evolve or develop the sophisticated markets seen in the US simply does not exist.

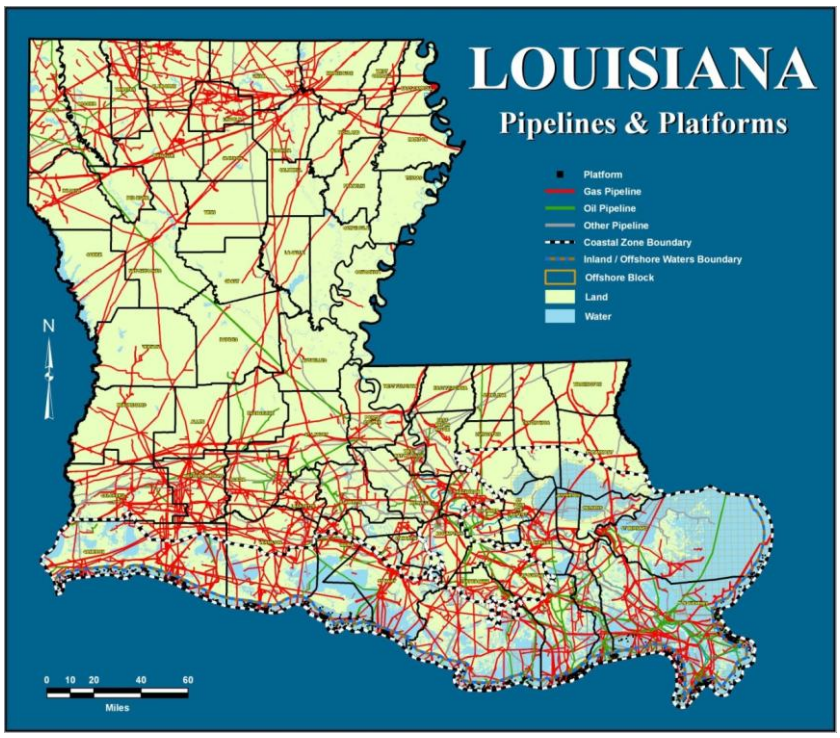
The following maps help illustrate the facts.

[16] Australian gas statistics are from *Energy in Australia 2013* and APIA's pipeline data, US and Louisiana gas statistics are sourced from the US Energy Information Administration. Population statistics : Australian Bureau of Statistics and US Census Bureau (2010 Census). Area statistics: United Nations Statistics Divisions and US Census Bureau (2000 Census)

[17] Louisiana Department of Natural Resources


Australia's Major Pipeline System as at 2012
Compiled and published by: Great Southern Press
[Note: This map is a schematic representation only and shows approximate location of major pipelines. It does not show exact pipeline routes.]
From Timor Sea
WESTERN AUSTRALIA
NORTHERN TERRITORY
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
N
LEGEND
Gas Pipeline
Oil Pipeline
Ethane Pipeline
Slurry Pipeline
Proposed Pipeline
SCALE
0 250 500 750 1,000 kms


Major US Pipelines
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
ME
VT
NH
MA
CT
RI
NJ
MD
DE
AK
Crude Oil Pipelines
Products Pipelines
CO2 Pipelines
Source: REXTAG Strategies Corp and the Alaska Department of Natural Resources, as interpreted by API (2/26/09)


LOUISIANA
Pipelines & Platforms
Platform
Gas Pipeline
Oil Pipeline
Other Pipeline
Coastal Zone Boundary
Inland / Offshore Waters Boundary
Offshore Block
Land
Water
N
0 10 20 40 60
Miles

Appendix B – Analysis of the GGAS scheme

The Greenhouse Gas Reduction Scheme (GGAS) commenced operation in NSW and the ACT on 1 January 2003. The intention of the GGAS scheme was to reduce the annual carbon dioxide emissions of the electricity sector in NSW to a benchmark of 7.27t CO_2 per person by 2009. It was implemented through a 'baseline and credit' system, whereby electricity retailers and some other organisations are legally required to surrender offset certificates (NSW Greenhouse gas Abatement Certificates or NGACs) if the CO_2 emissions associated with the electricity they supply exceed their benchmark. The firm-level emissions benchmark is determined by market share.

NGACs are intended to represent a one tonne reduction in CO_2 emissions and can be established based on the following rules:

- the generation rule
- the demand-side abatement rule
- the carbon sequestration rule
- the large user abatement rule (which allows large electricity customers to claim certificates for reducing on-site emissions from non electricity-related industrial processes at sites they own and control).

It is important to note that the PC study focussed on electricity, so the implicit abatement subsidy for GGAS was determined only considering NGACs produced by the generation rule.

In short, for the generation rule, average emissions intensity of electricity sourced from the electricity grid in NSW is determined, then all electricity produced at lower emissions intensity generates NGACs. In 2010 the average emission intensity was 0.97 tonnes CO_2 /MWh. Renewable energy in NSW would generate NGACs at a rate of 0.97 NGACs/MWh. A gas fired power generator, at the Australian average of 0.52 tonnes CO_2 /MWh, would produce 0.43 NGACs/MWh. The cleaner the energy, the more NGACs produced.

The three additional rules allow an electricity firm to source emissions abatement from alternative sources if it is more economical to do so than through emissions reduction from generation source.

The NGACs required to be submitted by a firm are determined by that firm's share of electricity generation. An open market to trade NGACs sets the price.

In essence, the GGAS is an electricity sector emissions intensity based scheme. Such schemes are generally accepted as an efficient method of achieving reductions in greenhouse gas emissions. Its primary advantage is that it has a lower impact on

electricity prices (economic efficiency) and its primary disadvantages are that it creates uncertain abatement (final abatement is dependent on electricity demand) and it only affects the electricity sector.

Nevertheless, such a scheme should be pursued because:

- It is technology agnostic, rewarding the cleanest forms of energy and punishing the dirtiest;
- It is the most efficient way of reducing emissions in the electricity sector;
- The electricity sector comprises around 50% of Australia's emissions, so it would be effective; and
- It can be used to achieve the desired emissions intensity of the electricity sector by imposing gradually increasing costs of emissions.

Appendix C – Discussion of market failure in the east Australian gas market

The objective of Australia's gas markets

In order to determine whether there is a market or policy failure in Australia's gas markets, the purpose of the gas markets must first be defined. The *Energy White Paper* does not explicitly state the purpose of Australia's gas markets, but it does make some statements that can put this into context:

> *'Our gas markets have provided reliable and competitively priced gas…'*[18]
>
> *'Security of supply to consumers is vital…'*[19]
>
> *'…ensure that markets are delivering against stated objectives, particularly the provision of timely and adequate domestic supply.'*[20] *(There appears to be no specific statement that explicitly sets out the objectives of Australia's gas markets)*

The *Energy White Paper* identifies that policy success will produce:

> *'more competitive and efficient gas markets…'*
>
> *'adequate supply to meet current and projected domestic and export needs.'*[21]
>
> *'an investment schedule in gas development, processing and transmission pipeline and distribution infrastructure that can meet projected demand in all three geographical markets.'*[22]

If policy success will produce these results then it can be presumed they are fundamental purposes of Australia's gas markets.

Further to this, Australia's formal gas trading markets, currently comprising the Declared Wholesale Gas Market in Victoria and the Short Term Trading Markets in Adelaide, Brisbane and Sydney (the gas supply hub in Wallumbilla is still under development) are all established and operated under the National Gas Law (NGL). Gas transport infrastructure is also regulated under the NGL. The NGL and National Gas Rules (NGR) are in place to ensure the National Gas Objective (NGO) is achieved. The NGO was established to:

> *'promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.'*

Whilst the NGO only explicitly applies to markets governed by the NGL and NGR, it seems reasonable that, as a National Gas Objective, the principles it states are more

[18] Australian Government, Energy White Paper, p134
[19] Australian Government, Energy White Paper, p134
[20] Australian Government, Energy White Paper, p145
[21] Australian Government, *Energy White Paper*, p145
[22] Australian Government, *Energy White Paper*, p145

widely applicable to the entirety of Australia's gas markets. A natural gas service is defined in the NGL to be:

(a) a pipeline service; or

(b) the supply of natural gas; or

(c) a service ancillary to the service described in paragraph (b),

In December 2012 the Standing Council of Energy and Resources (SCER) issued a Statement of Policy Intent in response to its Expert Panel's review of the Limited Merits Review Regime that affirmed:

> *'that, in interpreting the National Electricity Objective and the National Gas Objective, the long-term interests of consumers (with respect to price, quality, safety, reliability and security of supply) are paramount in the regulation of the energy industry.'*[23]

Therefore, based on these statements from legislation and policy documents, it can be concluded that two of the key purposes of Australian gas markets are to:

- **ensure the provision of timely and adequate supply; and**
- **maximise efficiency in natural gas services, including supply.**

While these are not the only purposes of Australia's gas markets, they:

- are likely to be agreed by all stakeholders; and
- are being affected by the current structural changes underway with the rapid development of the LNG export industry.

What constitutes market or policy failure in the east Australian gas market?

Evidence of market failure is difficult to define and identify. What is a failure in Australian gas markets and how do we know one has occurred? The following contributions should assist the debate.

It is likely all stakeholders can agree that the provision of timely and adequate domestic supply is a fundamental purpose of Australia's gas markets. If the market cannot supply enough gas to meet demand then a market failure has occurred. This would be evidenced by very high prices, with price becoming a rationing mechanism by which a limited amount of gas is allocated to those who value it most highly.

This means the gas price is a particularly important matter to consider when assessing a market failure of this nature. If a pure approach is taken, higher gas prices maximise economic benefit and are desirable. This is true if there are no constraints on gas supply. At some point, it can likely be agreed that the gas price is too high because gas supply cannot meet all demand. In such an event, the market has failed to ensure '*the provision of timely and adequate domestic supply*[24]'. The question becomes, at what price can we determine that a market failure occurred?

[23] SCER Statement of Policy Intent, December 2012
[24] Australian Government, Energy White Paper, p145

The concept of 'LNG netback' is familiar to the industry. It is the price of gas paid by LNG importers minus the specific costs associated with converting gas to LNG and transporting LNG. These specific costs are open to debate. Only LNG producers (and possible LNG importers) know the details, but in general they are believed to be around $7/GJ.

Similarly, only the parties to an LNG supply contract know the exact price paid for LNG and each contract would have a unique price influenced by the particular terms of the supply arrangement. The price of Australian LNG exports to Asian markets is generally assumed to be around $16.

This places the LNG netback price at around $9/GJ. This is essentially the price producers receive for gas that enters their LNG trains. It is appropriate for market observers to make their own assessment of LNG netback when considering it as a sign of market failure.

Presumably, LNG producers are willing to sell gas that is surplus to their needs at this LNG net back price. As the amount of gas that can be exported as LNG is limited by the capacity of LNG trains, the greater the gas supply, the greater the competition to sell gas for purposes other than LNG, likely leading to Australian gas users paying a lower price than LNG netback.

If gas supply cannot meet the capacity of the LNG trains, then LNG producers will have difficulty meeting the requirements of their LNG supply contracts. In such a circumstance, the priority will be ensuring the terms of the contract are met and there is the likelihood that LNG producers would be willing to pay above LNG netback prices in Australia's domestic markets for available gas in order to meet these contract obligations.

Therefore, a gas price above LNG netback could be considered a market failure in Australian gas markets. It is noted that a key purpose of the gas market to balance supply and demand through price and that the appearance of high prices as a response to tight supply is a sign the market is working effectively. Indeed, this is a common point raised by market participants not concerned by high prices. If the only purpose of the gas market was to allocate supply to those that value it most highly this would be true. As the *Energy White Paper* points out, the provision of timely and adequate domestic supply is an objective of Australian gas markets. The clearest signal of the failure of the market or policy to achieve this objective is high domestic gas prices and prices above LNG netback are ones that can be deemed unacceptably high.

Obtaining evidence of market or policy failure

There are three pieces of evidence that could aid assessment of whether gas supply is failing to achieve its objective.

Firstly, gas prices themselves could be observed. However, there is no easy way to publically observe contracted gas prices in Australia. Two options available are media reports and prices at gas hubs.

Current media reports indicate domestic users are entering into gas supply contacts up to $9/GJ. A commonly cited transaction is the supply of gas by Origin Energy to MMG (2012). As a resource firm, MMG is relatively insensitive to gas prices, as long

as the gas price is lower than the alternative (likely to be diesel fuel) it is willing to pay.

The price of gas paid at gas hubs is not a reliable indicator of the ability of supply to meet demand. It should be noted that those spot markets for gas in Australia that do exist are unlike international, high volume markets. There is not a concentration of demand and competition of supply in any single region that would enable the development of a deep, liquid market. The STTM hubs are balancing markets, attempting to improve market efficiency by assisting gas users to account for marginal changes in day-ahead forecast gas requirements in a market arrangement. STTM prices do not, and are not designed to, reflect currently available long-term gas contract prices, and it is the latter price that will influence the gas market.

Secondly, production forecasts may be analysed, though these may not be readily available. It relates to the ability of LNG producers to meet their contracts. These contracts were entered into on the back of production forecasts that LNG producers used to assess the amount of gas available. Information about how current production is tracking according to those forecasts would be very informative for the market.

Gas producers must report actual well production to state Governments. It may be possible to use this data in association with other derived information to achieve a better understanding of LNG producers' ability to meet production forecasts. This may not be necessary; the current prices being levied on large Australian gas users suggest that, in the absence of actual supply constraints, LNG producers are unsure about their ability to meet production forecasts.

Thirdly, industry consultation could be utilised. A further option to help establish a view on current gas prices is to maintain a program of industry consultation with gas producers and large gas users. This would enable a market observer to access confidential information and receive direct feedback from market participants.

ATTACHMENT 1: Australia's Natural Gas Supply: an assessment of current policy issues and options – ACIL ALLEN CONSULTING