The Australian Gas Association

Submission to the Joint Standing Committee on Treaties:

Inquiry into the Kyoto Protocol

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Executive Summary

The Australian Gas Association (AGA) shares general community, industry and government concern over the possible impacts of global warming from an enhanced greenhouse effect on the social, physical and economic environment.

The AGA welcomes this opportunity to take part in the inquiry by the Federal Parliamentary *Joint Standing Committee on Treaties*, and to profile the role which natural gas can play in Australia's efforts to achieve national and regional economic growth while simultaneously responding to the increasing greenhouse constraints on that growth.

The AGA has noted the findings to date on climate change by eminent bodies such as the CSIRO and the Intergovernmental Panel on Climate Change. These bodies have found there is measurable climate change occurring that is attributable to human activity, particularly the burning of fossil fuels and deforestration, and that this change is likely to have adverse environmental, economic, social and regional effects. The AGA does not dispute the conclusions drawn by these eminent bodies.

While it is recognised that the associated negotiations will be complex, the AGA believes that ratification of an appropriately finalised Kyoto Protocol (with the caveats as set out in this submission) and the introduction of concomitant national strategies and programs are needed to curb greenhouse gas emissions growth in Australia.

Further, the AGA can demonstrate that increased natural gas use as a substitute for high greenhouse gas (GHG) emissions fuels and for future energy demand is part of the solution to the challenge of maintaining economic, regional and industrial development while curbing the growth of harmful greenhouse gas emissions.

The AGA has recently released a greenhouse gas abatement policy that is incorporated into this submission. The AGA has urged Federal and State governments to use these policy principles in the Kyoto Protocol negotiations and when formulating domestic and international policies and responses to climate change.

In brief, the AGA policy states:

- Uncertainties associated with the implementation of the Kyoto Protocol should not diminish government community and industry commitment to work towards reductions in greenhouse gas emissions;

- A least-cost approach to reducing emissions is strongly preferred, acknowledging the challenge of meeting Australia's growing energy needs simultaneously with meeting a target for emissions;

- The natural gas industry is well placed to be a significant part of the least-cost solution but until energy markets factor in the cost of emissions, more GHG-intensive fuels will continue to dominate the market and limit emission reduction opportunities;

- Emissions trading would appear to be the best mechanism through which the market can discover the lowest marginal cost options for abatement rather than cruder and less market oriented measures such as a carbon tax;

- A domestic emissions trading scheme should be introduced only in concert with an international scheme, and contain: incentives to switch to lower emitting fuels such as natural gas;, measures to maintain the international competitiveness of Australia's LNG industry; and, an enhancement of the role of the Clean Development Mechanism (CDM) and Joint Implementation (JI);

- An emissions trading scheme that doesn't involve all LNG trading nations may threaten the viability of Australia's LNG export industry. This threat must be deflected and governments must work to maintain the international competitiveness of this important industry;

- Prior to the introduction of an emissions trading scheme, governments must act to encourage emission reductions through a national policy which draws together and builds on a number of existing policies associated with greenhouse and energy reforms;

- A full life-cycle approach to the measurement of greenhouse gas emissions in assessing the relative merits of development proposals should be adopted by all governments and industry;

- The Federal Government should clarify its position on credit for early action and 'no disadvantage' for industry's voluntary abatement action; and

- State and Federal Governments' greenhouse requirements should be consistent so as to ensure that natural gas entities can achieve compliance in all operations across all States without unnecessary cost.

This submission also deals with a number of specific matters identified in the Inquiry's Terms of Reference such as grandfathering, trading credits and carbon credits. The submission does not focus on revegetation and land management issues, although the AGA acknowledges that these are important issues in determining overall government and community support for ratifying the Kyoto Protocol and for setting baselines to measure future progress in curtailing emissions.

The forthcoming round of negotiations (COP 6) in November in The Hague will be dealing with a number of outstanding matters relating to the details of the Kyoto Protocol. Such issues relate to emissions trading, compliance mechanisms for parties who ratify, penalties for non-compliance, North-South cooperation issues such as CDMs, technology transfer and seeking to involve major developing countries in efforts to limit emissions.

If the Kyoto Protocol is implemented, the AGA believes that a major element of the adjustment process should include growth in natural gas usage because of its low GHG emissions qualities, its commercial and technological versatility and its availability to the market now as an abundant and reliable energy source.

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1. Introduction and Background

1.1 Introduction

The Australian Gas Association (AGA) encompasses all sectors of Australia's natural gas industry – including gas network owners/operators, gas retailers, pipeliners, manufacturers of gas appliances and equipment, gas producers and exporters of liquefied natural gas (LNG).

The AGA shares community, industry and government concern over the possible impacts of global warming from an enhanced greenhouse effect on the social, physical and economic environment domestically and internationally. The AGA acknowledges that while the negotiations are likely to be complex it believes that ratification of an appropriately negotiated Kyoto Protocol and the introduction of concomitant national strategies and programs are needed to curb emissions growth in Australia.

Therefore the AGA welcomes the opportunity to take part in the inquiry by the Federal Parliamentary Joint Standing Committee on Treaties, and to profile the role which natural gas can play in Australia's efforts to achieve national and regional economic growth while simultaneously responding to the increasing greenhouse constraints on that growth.

Further, the AGA looks forward to an opportunity to appear before the Committee if public hearings are to be part of the Inquiry process.

The inquiry comes at a critical stage as Australia prepares to participate in the forthcoming Sixth Conference of the Parties meeting on the Kyoto Protocol in The Hague in November (COP 6). This next meeting builds on the previous progress on the Protocol particularly COP 3 in Kyoto where Australia was able to get agreement to a number of beneficial features in the Protocol. These included a concept of differentiation in the treatment of different nations according to their particular circumstances; the inclusion of sinks; and a +8% emissions growth target by the first commitment period (2008-2010) recognising Australia's circumstances.

The AGA understands the Australian government position at this stage is that it wants to see a number of issues resolved before ratifying the Protocol and bringing it into force. These issues include: acceptance of the flexibility mechanisms in meeting targets; the rules for such mechanisms; the extent to which sinks should contribute to meeting targets; what compliance system should apply and the consequences for non-compliance; and the role of developing countries under the Protocol. Most of these issues are due to be discussed and possibly resolved at COP 6 in November.

1.2 Background

1.2.1 Sketch of the Natural Gas Industry

Australia's natural gas industry is a large and diverse energy supply industry. The natural gas industry is a major contributor to both the domestic economy, through the efficient supply of clean and abundant energy to Australian businesses and households, as well as being a major foreign trade income earner through the export of liquefied natural gas (LNG).

Estimated recoverable reserves of natural gas (as at December 1998) stood at around 109,000 petajoules (PJ), equivalent to over 90 years of supply. In addition, Australia has huge reserves of coal seam methane gas which are only just starting to be utilised.

Production of natural gas in Australia is around 1200PJ annually from fields in the Gippsland Basin, the Bass Strait, the North West Shelf, Cooper Basin, Eromanga Basin and a number of other basins in central Queensland, and the Otway region.

Natural gas' share of primary energy consumed in Australia is around 18 percent compared with Oil (34%), Black Coal (29%), Brown Coal (13%) and renewables (6%). The major uses of natural gas are for industrial purposes (especially in chemicals and minerals processing), electricity generation, and residential and commercial water and space heating applications. More recently the transport sector has emerged as a potentially significant market for natural gas in the future.

Australia's natural gas transmission and distribution networks continue to expand throughout regional and urban Australia, reaching a total of 87,680 km in mid 1999. Both networks are likely to continue to grow as new projects currently in planning and development begin to be constructed. Please note the attached **map** of Australia showing the extent of the industry's reach.

The expanding transmission and distribution networks have allowed the natural gas industry to gain approximately 3.1 million customers throughout Australia, comprising over 3 million residences (approximately 6 million people) and around 90,000 businesses.

1.2.2 What is Natural Gas?

There are two main types of gas used in Australia for energy purposes:

- natural gas; and
- liquefied petroleum gas or LPG.

Natural gas consists primarily of methane (CH_4), which is the simplest hydrocarbon. Other constituents may include ethane, propane, butane, pentane and traces of carbon dioxide and nitrogen. It is supplied predominantly through underground pipes directly from gas fields to consumers. Methane becomes a liquid at -161°C and, in this form, is suitable for shipping overseas as liquefied natural gas (LNG). Australia is a major exporter of LNG via dedicated marine tanker vessels.

LPG consists primarily of propane and/or butane and is often supplied in bottle-cylinders. While the relationship between the LPG and natural gas markets is important, this submission deals mainly with the natural gas industry.

1.2.3 Climate Change Science

As stated, the AGA shares general community, industry and government concern about the potential impacts of climate change. The AGA has not commissioned any separate scientific research on climate change and the enhanced greenhouse effect. However, the AGA has noted the conclusions on climate change by eminent bodies such as the CSIRO (see for example its submission to the Senate Inquiry into Global Warming, March 2000) and the Intergovernmental Panel on Climate Change (see it's Second Assessment Report 1995 and it's report to the 12th Session of SBSTA, June 2000).

The AGA understands the IPCC is soon to release its Third Assessment Report. It would be useful for the Inquiry Committee to seek to get advanced copies of this new report to assist in this aspect of the terms of reference.

These bodies have concluded there is measurable climate change occurring that can be attributed to human activity, particularly the burning of fossil fuels and deforestration, and that this change is likely to have adverse environmental, economic, social and regional effects.

The AGA does not dispute the conclusions drawn by these eminent bodies.

2. Greenhouse Gas Emissions and Natural Gas

Greenhouse gas emissions worldwide can be reduced significantly through the increased utilisation of natural gas rather than coal or oil. Natural gas is the cleanest of all the fossil fuels. It produces the lowest greenhouse gas emissions per unit of energy produced of all the major fuels currently available to meet the high load requirements of Australian residential, commercial and industrial users. Successive Life Cycle Assessment studies have confirmed this fact.

2.1 National Greenhouse Gas Inventory and Opportunities for Emissions Reductions

According to the recently released 1998 National Greenhouse Gas Inventory Report (July 2000), the key areas for greenhouse gas emission reductions in Australia are the stationary energy and transport sectors which alone account for 79.6 % of Australia's total CO_2-e emissions.[1]

[1] Australian Greenhouse Office, July 2000, *National Greenhouse Gas Inventory Report – 1998.*

Within the stationary energy sector, which accounts for nearly 57% of emissions, natural gas has the potential to meet much of the growing energy needs of Australia whilst assisting the national commitment to greenhouse gas reduction. Similarly in the transport sector, natural gas has the capacity to significantly reduce greenhouse gas emissions, while at the same time delivering cleaner urban air quality and less particulate pollution.

Table 1: CO_2-e Gas Emissions by Sector

Sector and Subsector	**Mt CO_2-e**	**Percent**
1. All Energy (Combustion and Fugitive)	**362.9**	**79.6**
Stationary Energy	258.7	56.8
Transport	72.6	15.9
Fugitive Emissions from fuels	31.5	6.9
2. Industrial Processes	**9.8**	**2.2**
3. Solvents and other Product Use	**NA**	**NA**
4. Agriculture	**92.2**	**20.2**
5. Forestry and Other	**-24.5**	**(5.4)**
6. Waste	**15.5**	**3.4**
Total	**455.9**	**100**

Source: 1998 NGGI, July 2000, AGO.

The Inventory also contains new and very positive data for the natural gas industry on trends in **fugitive emissions** of greenhouse gases. Fugitive emissions from flaring, venting and from pipes in the gas industry and from coal mining operations have been identified as an important source of emissions that need to be minimised. In the 1998 data, such emissions accounted for 6.9% of total national emissions.

However, the recent Inventory reports that fugitive emissions from oil and gas sector have decreased by 5.8% between 1990 to 1998 and that this decline has occurred at the same time as an increase in activity levels (page A-16). The reductions have results from improvements in gas distribution systems (with improved pipe work and seals cutting seepage) and a reduction in the emissions from flaring.

Details of the 1998 NGGI are not set out here in any detail but the full document can be viewed on the AGO website (www.greenhouse.gov.au).

The benefits of increased fuel switching to natural gas are not confined to within Australia or from domestic activities. The export of LNG can assist other nations reduce their greenhouse gas emissions from other more greenhouse-intensive fossil fuels while gaining significant export earnings for the Australian economy.

The demonstrated greenhouse gas savings of natural gas over coal on a full fuel cycle basis are discussed in some detail in this submission. The merits of additional mechanisms for reducing greenhouse gas emissions, such as an emissions trading regime, Joint Implementation and CDM, and issues relating to a possible greenhouse trigger, are also canvassed.

2.2 Natural Gas and Life Cycle Assessment Results

Australia's energy consumption is expected to increase by around 27 per cent in the next 15 years[2] (ABARE 1999), much of this coming in the form of stationary energy production. Fuel switching from oil and coal to natural gas fired power generation and substituting gas for electricity or diesel in many other direct applications could significantly assist Australia meet its energy needs whilst reducing Australia's greenhouse gas burden.

The environmental benefits of natural gas are fully documented in a comprehensive study of greenhouse gas emissions from both natural gas and coal over the full fuel cycle.[3]

[2] ABARE, 1999, *Australian Energy – Market Development and Projections to 2014-15*, Research Report 99.4, Canberra.
[3] Energetics (2000), *Assessment of Greenhouse Gas Emissions from Natural Gas. Final Report*, 17 February.

The report, which was commissioned by the AGA in 1999 from Energetics Pty Ltd, tracks the greenhouse gas emissions associated with the production, transport, combustion and conversion to electricity of both natural gas and coal in Australia. This report has now been reproduced as AGA Research Paper No.12, *Assessment of Greenhouse Gas Emissions from Natural Gas*, May 2000.

Four case studies were developed for natural gas and coal that reflected variations in different production fields, transport methods and technology.

The report covers three main areas:

1. The full fuel life cycle of both natural gas and coal, where all emissions released or produced are tracked from production, transmission and combustion to give a comparative emission factor (kg CO_2-e/gigajoule energy delivered);

2. Greenhouse gas emissions associated with the conversion of that energy to electricity (expressed as kg CO_2-e /megawatt hours delivered); and

3. Emissions arising from the use of that electricity or direct gas in space and water heaters.

In all four case studies and in all three areas, the greenhouse advantage of natural gas is clearly demonstrated.

The AGA notes a recent study by the Australian Coal Association on the *Environmental Credentials of Coal* concluded that natural gas fired power stations (both open cycle and combined cycle) do indeed have a distinctly lower greenhouse gas emissions than all of the coal alternatives (reference and page no. 9).

The recently released NGGI Report contains a useful table on end use CO_2 Emission Factors for various fuel types (Standard Data Table 1 – 1998, Energy 1A). This table shows the end use emission factor for natural gas as 50.9 Gg/PJ compared to 90.7 Gg/PJ for black coal, 93.3 Gg/PJ for brown coal, 73.6 Gg/PJ for fuel oil and 69.7 Gg/PJ for diesel.

2.2.1 Full fuel emission factor

Natural gas production, transmission and combustion in Australia releases from 57.1 to 70.7 kg CO_2-e for every gigajoule of energy delivered. This compares to 90.8 to 95.8 kg CO_2-e for black and brown coal (Table 2).

Table 2 Full fuel cycle emission factors for natural gas, black coal, and brown coal (kg CO_2e/GJ)

Fuel	**Natural Gas**			**Black Coal**				**Brown Coal**
Source	National Major User	National Mixed User	PNG Pipeline	Hunter Valley	National	NSW	Qld	Vic
Total Fuel Cycle	64.1	70.7	57.1	90.8	95.8	93.8	92.7	95.8

Source: Energetics (2000)

For every gigajoule of energy delivered for a national user of black coal in Australia, 95.8 kg CO_2 is produced whereas for every gigajoule of energy delivered for a national major user of natural gas (such as an electricity generation facility), 64.1 kg is produced. In effect an extra 31.7 kg of CO_2 is produced per gigajoule of energy delivered through reliance on black coal over natural gas.

In 1995/96, the energy content of electricity produced by black coal power stations in Australia, was 951,038 TJ. This was the equivalent of 30.4 million tonnes of CO_2 equivalent or 7.2% of Australia's net greenhouse gas emissions of 419 million tonnes of CO_2 equivalent in 1996.

In 1995/96, the energy content of electricity produced by Australia's brown coal power stations amounted to 13.8 million tonnes of CO_2 equivalent. This was the equivalent of 3.3% of Australia's net greenhouse gas emissions in 1996. Hence, if Australia's black and brown coal power stations had been replaced by gas fired power stations in 1995/96, then Australia's greenhouse gas emissions in 1996 could have been reduced by nearly 11%.

This potential for natural gas to reduce Australia's greenhouse gas emissions has been highlighted in an independent study by the NSW Sustainable Energy Development Authority. It concludes that Australia's Kyoto greenhouse commitments would be satisfied if all new major generation capacity were to be fired by natural gas rather than coal, and if 4000 megawatts of aging coal capacity were to be replaced by natural gas as it reaches 30 years in operation.[4]

2.2.2 Electricity generation

The use of natural gas for electricity generation brings even greater greenhouse gas emission savings, when the above lower full fuel emission factors are combined with the higher thermal efficiencies of gas-fired turbines. Natural gas fired generators can produce less than half of the CO_2-e produced by coal fired generators (Table 3).

Table 3 Greenhouse gas emissions from electricity generation for selected supply scenarios

Technology	Efficiency %	GHG Emissions (kgCO_2e/MWh)
Natural gas		
WBP CCGT (500MW)	52.0	395 – 444
ABP CCGT	40.0	514 – 577
WBP OCGT (200 – 300 MW)	35.5	579 – 650
ABP OCGT	35.1	586 – 658
Coal		
WBP Supercritical steam	41.7	800 – 810
WBP Sub-critical steam	37.7	885 – 896
ABP Black coal	36.8	907 – 918
ABP Brown coal	27.7	1,246

Source: Energetics (2000)

While Australian best practice brown coal generators produce around 1200 kg CO_2-e/MWh, Australian best practice combined cycle gas turbines produce around 550 kg CO_2-e. Even the best practice black coal generators produce about 300 kg CO_2-e/MWh more than open cycle gas turbines.

2.2.3 Space and Water Heating

The residential sector accounts for almost one fifth of Australia's total greenhouse gas emissions. The second largest source of emissions within the home is from hot water heating. While whole of life studies have shown the greenhouse gas emissions associated with gas-boosted solar systems are superior in energy efficiency and lower greenhouse gas emissions[5], the Energetics study showed that without switching to solar heating, home-owners can make a significant contribution if their electricity is sourced from a gas-fired generator or if they use direct gas for water heating purposes.

A water heater using energy sourced from a NSW black coal generator will produce around 1500 kg of CO_2-e more a year than a heater using electricity sourced from a natural gas generator (Table 4).

A water heater using energy sourced from Victorian brown coal produces around 2890 kg CO_2-e each year more than a water heater using electricity sourced from a natural gas generator.

Furthermore, if natural gas is used directly to heat water, those savings are in the order of 3900 kg CO_2-e a year.

[4] AGA 1998, 'Natural Gas Likely Winner from Kyoto' *The Australian Gas Journal,* 62(2).
[5] AGA 1999, 'Residential Water Heating Systems' *The Australian Gas Journal,* 63(3).

Table 4 Full Fuel Cycle Emissions for Water Heating

Technology	Efficiency	Maintenance Rate (MJ/hr)	Annual Energy Use (MJ)	Annual Emissions (kg)
Natural gas				
1 star	70	1.14	28,884	2,042
3 star	75	0.80	24,840	1,756
5 star	80	0.44	20,797	1,470
Electricity	100	510 kWh/yr[1]	15,587	—
(Generation technology, Fuel source)				
WBP CCGT (500 MW), National major user				1,922
ABP OCGT, National major user				2,499
ABP Black coal, NSW black coal				3,975
ABP Brown coal, Victorian brown coal				5,393

[1] Estimate of standing heat loss derived from Energetics

Source: Energetics (2000)

The Energetics study also determined the emission factor for space heaters using electricity sourced from natural gas and coal fired generators as well as those fuelled from natural gas directly (Table 5). This showed that a space heater using electricity sourced from a coal fired generator produces up to 187 kg CO_2-e more for every gigajoule heat delivered than the same heater sourcing its electricity from an Australian best practice open cycle gas turbine. Significantly, the emission factor for a direct natural gas ducted heater was only 88.4 kg CO_2-e /GJ heat delivered or just one third of that from black coal.

Table 5 Full Fuel Cycle Emission Factor for Space Heating

Technology	Efficiency (%)	Emissions Factor (kg CO_2e/GJ delivered heat)
Natural gas		
Ducted Heater	80.0	88.4
Flueless	90.4	78.2
Electricity	100	—
(Generation technology, Fuel source)		
WBP CCGT (500 MW), National major user		129
ABP OCGT, National major user		192
ABP Black coal, NSW black coal		276
ABP Brown coal, Victorian brown coal		379

Source: Energetics (2000)

2.2.4 Liquefied Natural Gas

The abundant reserves of natural gas within Australia have enabled the growth of an important export trade in this commodity. Because it is not practical to ship gas in its vapour form overseas, natural gas is super chilled and transported as a liquid (LNG). Extensive processing facilities and vessels have been developed for the efficient and safe transportation of natural gas overseas. Australia has developed a large scale LNG export market in Japan, and was the fourth largest exporter of LNG within the world in 1997.

A life cycle comparison was commissioned by Woodside Energy Ltd in 1998. This study compared the greenhouse emissions associated with electricity generation in Japan using either LNG imported from the Woodside's facility on the North West Shelf, coal imported from Australia or oil imported from the Middle East. This study, conducted by CSIRO, concluded that the greenhouse emissions associated with LNG based power were up to one third less than those generated from coal-fired power stations in Japan and significantly less than those emitted when oil was used. This study included the greenhouse emissions associated with the production and transport of those fuels to Japan as well as the actual power generation process.

The study further highlighted the importance of a full life-cycle analysis of greenhouse gas emissions and the role that the natural gas industry can play in promoting economic growth while reducing emissions not just locally but internationally as well.

2.2.5 Summary Comments on Life Cycle Assessments

The whole of life-cycle approach to power generation and energy use is very useful in highlighting the assistance natural gas can give to the nation in meeting the emissions targets. WA, SA, the NT and more recently Queensland have been leading the way in gas fired power generation. The more populous states of Victoria and NSW are still very coal focussed.

As long as governments continue to approve new coal-fired generators or facilitate the upgrade of aged facilities, opportunities for least-cost emission reductions will be lost.

The Life Cycle Assessment approach demonstrates:

- Approval of new power generation (including renewables) should take into account the full life cycle implications for greenhouse gas emissions, i.e. there should be some recognition of GHG impacts when assessing projects; and,
- The debate should be more about favouring low emissions energy sources over high emissions energy sources rather than focussing exclusively on fossil fuels versus renewables.

Importantly, the Energetics research can be used to show what the GHG savings will be over time. It shows that if the ABARE projections on gas consumption growth out to 2015 are met (ie annual average growth rates of around 4% - increasing gas' share of energy consumption from 18% to 29%) then there will be a reduction in the growth in Australian total emissions of over 20 Mt compared with what would occur if energy shares remain constant.

3. Beneficial Features of the Kyoto Protocol

In the development of the Kyoto Protocol, especially through COP 3 in late 1997, Australia was able to get beneficial agreement in a number of areas. These included a concept of differentiation in the treatment of different nations according to their particular circumstances; the inclusion of sinks; and a +8% emissions growth target by the first commitment period (2008-2010) recognising Australia's particular circumstances.

The AGA understands the Australian government position at this stage is that it wants to see a number of issues resolved before ratifying the Protocol and bringing it into force. These issues include: acceptance of the flexibility mechanisms in meeting targets; the rules for such mechanisms; the extent to which sinks should contribute to meeting targets; what compliance system should apply and the consequences for non-compliance; and the role of developing countries under the Protocol. Most of these issues are due to be discussed and possibly resolved at COP 6 in November.

3.1 Flexibility Mechanisms under the Kyoto Protocol

One of the more advantageous features of the Kyoto Protocol is the explicit inclusion of three very important flexibility mechanisms that are crucial for Australia and industries such as the natural gas sector. These mechanisms are Emissions Trading, Joint Implementation, and the Clean Development Mechanism. The operational details governing the application of these mechanisms are still being negotiated.

Sensibly developed and applied, these GHG mitigation tools should provide significant opportunities to leverage the best possible environmental and economic outcomes from a range of co-operative international activities at a lower economic and social cost than blunt regulatory measures such as carbon taxes or prescriptive emissions standards. The mechanisms are aimed at facilitating future greenhouse gas reductions in a more cost-effective manner than if the Parties to the Protocol were limited to acting alone via domestic initiatives.

The Clean Development Mechanism (CDM) has been established to assist developing countries (non-Annex 1 countries) to reduce emissions through co-operative projects with Annex 1 countries. Annex 1 countries can use the certified emissions reductions achieved to meet their own commitments.

Similarly, Joint Implementation (JI) provides the opportunity for developed countries (Annex 1 countries) to generate credits and to work together in undertaking emission reductions projects, with the use of credits to offset national emission commitments.

These approaches will allow countries (like Australia) with relatively high-unit emission abatement costs to participate in projects in countries with lower marginal costs of emission abatement and count some or all of the emission reductions towards their own abatement commitments. JI and CDM can potentially lower the adjustment costs for the investing (or source) country, provide investment and technology in the host country and reduce the global cost of achieving greenhouse emission reduction targets.

Australia's natural gas industry is a strong supporter of maintaining and developing these flexibility mechanisms for the eventual Protocol. Indeed when Australia negotiated its emissions target it was very much influenced by the inclusion of these mechanisms as integral components of the Protocol. Australia, like many other countries, has said it will only consider ratifying a Protocol after a number of matters are resolved. One such matter relates to the rules and modalities of these flexibility mechanisms.

The Australian gas industry, particularly those involved in exporting LNG and other international market ventures, are critically interested in negotiations now underway (in the lead up to COP 6) to firm up the details of how these mechanisms will apply.

The AGA wishes to see these mechanisms developed fully and flexibly to give greater scope for least cost, market based abatement outcomes. The counter push to limit the scope of these measures and to place unnecessarily restrictive conditions on how these measures may apply once the Protocol is ratified is not supported.

3.2 Emissions Trading

It is often stated that emissions trading will impose costs on industry and the community. It is not trading *per se* that imposes costs. The costs are imposed if Australia accepts an international obligation to constrain its carbon emissions to a certain level. Once that happens, the question becomes *how do affected parties get the lowest possible cost outcome?* Emissions trading has the potential to achieve given targets at the lowest possible cost.

Emissions trading is an economic instrument designed to achieve a fixed environmental goal among a number of sources of emissions. It aims at minimising the total cost of achieving that goal by allowing sources to trade emissions reductions. For the system to deliver its full economic efficiency, all participating sources must have accurate information about their own cost of reductions. And thus receiving broader industry support.

The AGA believes some form of emissions trading is inevitable and desirable although it should only occur together with an equivalent international scheme and in line with a number of design features set out below.

Emissions trading is generally seen by the industry as being preferred over other blunter, more regulatory instruments such as carbon taxes or blanket emissions standards. As a market based mechanism, there is more likelihood that it will generate least cost emissions control outcomes with low transaction costs while maintaining economic efficiency.

From the gas industry's point of view, the success of any emissions trading scheme will be measured by the degree of fuel switching from high emissions coal to low emissions natural gas.

The AGA supports the implementation of an emissions trading regime but subject to the inclusion of a number of general design features and principles.

Initial Allocation of Permits

- The initial allocation of permits should act as an incentive to new gas-based entrants in the power generation, minerals processing sectors and elsewhere. Every effort should be made to avoid (unintentionally or otherwise) erecting barriers to growth in natural gas consumption and efficient fuel switching opportunities through the permit allocation method selected.

- The most appropriate way to meet these objectives may well be to have an initial allocation process that is constructed to achieve desired policy outcomes. This would probably mean ruling out a full auction system that may lead to economic shocks without gaining the desired outcomes. It should also rule out allocations based solely on compensating fully for historical emissions alone, as this could create a perverse outcome in the quest for lower emissions, by erecting barriers to entry for new lower emissions creating energy sources.

Transaction Costs

- Transaction costs should be at the lowest level consistent with credible compliance and verification measures.

Permit Acquittal

- The optimal point of permit acquittal cannot be finally determined until scenario planning and economic analysis is done to identify market depth at various parts of the supply chain for an efficient acquittal process to be constructed and to determine least cost maximum abatement outcomes.

International Issues

- A national regime must follow only after the development and introduction by developed countries of an international emissions trading scheme that includes fully developed and implemented CDM and JI arrangements.

- As part of this international scheme it would also be highly preferable that developing countries also accept the need for targets in the near future and set clearly defined paths to meeting these targets.

- Failing these developments, the AGA believes the introduction of a domestic emissions trading system alone would be detrimental to Australia's competitiveness and would be ineffectual in achieving effective international emissions controls.

Early Abatement Action

- There should be no disadvantage suffered by industry for taking early abatement action such as those being achieved by participants of the successful and strongly supported Greenhouse Challenge program.

Theoretically, a trading system should be able to be designed that would (1) include these principles; (2) assist in curbing GHG emissions; and (3) encourage the greater uptake of natural gas in a range of applications particularly for power generation, minerals processing, cogeneration and transport.

However, these objectives and opportunities may be missed if the scheme is designed in such a way as to act as a disincentive to fuel switching and gas market growth. In particular, if free allocation of permits based on historical emissions alone is adopted (ie a form of blanket grandfathering), existing emitters such as oil and coal fired power plants could become more (rather than less) entrenched relative to new gas fired projects. This will be because new gas fired power plants will not have any historical emissions and will have to purchase emissions in the market, thus creating a barrier to entry.

The AGA contends that this would create perverse outcomes - counterproductive to the task of curbing emissions and counterproductive to encouraging less carbon intensive forms of power generation and industrial processes.

3.3 Clean Development Mechanism

The specific rules and modalities of CDM are the subject of ongoing negotiations in the Framework Convention process and will be a major feature of the COP6 negotiations.

The Protocol, however, does outline **certain requirements for CDM projects** including:

- The project must provide 'real, measurable, and long-term reductions' in greenhouse gas emissions growth in the developing nation.
- Emissions reductions must be 'additional' to those that would otherwise occur in the absence of the project.
- CDM projects should enhance capacity building and sustainable development in Non-Annex 1 countries;
- CDM projects should promote technology transfer among Parties.

The Protocol also outlines a certification process involving 'Operational Entities' and an 'Executive Board' intergovernmental approval body to grant final certification and to issue credits. One may anticipate a process involving preparation of appropriate materials for review by these bodies, the final details of which are under continuing negotiation.

A UNFCCC workshop on CDM held in Abidjan, Cote D' Ivoire in October 1998 discussed the CDM review and certification process. The Abidjan workshop also discussed the types of supporting information that should be submitted in a CDM project proposal and listed several steps the sponsors will need to take in getting a CDM project approved through the UNFCCC.

They include:

- Inception and approval of a proposed CDM project;
- Validation and review of the project proposal;
- Monitoring of the project; and
- Verification and certification.

Addressing the additionality criterion for CDM is expected to be a critical hurdle in project qualification. The establishment of baseline emissions (emissions without the project) is needed to address the requirement of reduction of emissions growth below what would otherwise have occurred.

The AGA and the international natural gas industry has been pushing for the following points to be accepted when finalising the rules for CDM in the Protocol:

- Commercial projects can be important contributors to the objectives of the UNFCCC and the Kyoto Protocol. It is important that CDM rules admit such projects.

- Use of natural gas as a substitute for higher carbon fuels can provide substantial GHG and other environmental benefits, particularly when the projects utilises an otherwise unused gas resource (such as flared co-produced gas).

- The potential value of CDM credits can be an important added revenue stream enabling higher cost-higher quality fuels to displace those of lower cost and quality. CDM could be a key instrument in enabling projects such as WAGP to compete for scarce capital resources.

- Additionality becomes very complex if financial or commercial-viability criteria are applied. Additionality should be limited to the ability of a project to demonstrate additional environmental benefits in accordance with the objectives of the Kyoto Protocol and the UNFCCC.

- Establishing project emissions baselines is greatly facilitated by focusing in on an individual project (whereas establishment of generic baseline rules spanning across many projects would be far more difficult). Many governments have growth projections and approved project information which can aid establishment of emissions baselines.

- Monitoring and verification of emissions reduction benefits for individual projects can also be reliably accomplished (e.g. by linking emissions benefits to the amount of gas travelling through the pipeline).

3.4 Joint Implementation

Joint Implementation (JI) provides the opportunity for developed countries to generate credits and to work together in undertaking emission reductions projects, with the use of credits to offset national emission commitments. JI can potentially lower the adjustment costs for the investing (or source) country, provide investment and technology in the host country and reduce the global cost of achieving greenhouse emission reduction targets. These approaches will allow countries like Australia, with relatively high-unit emission abatement costs, to participate in projects in countries with lower marginal costs of emission abatement and count some or all of the emission reductions towards their own abatement commitments.

4. Impediments to Natural Gas Market Growth

In addition to ratifying and implementing an acceptable Kyoto Protocol and pursuing a number of direct programs and policies focussed on curbing greenhouse emissions, indirect measures should also be considered, including addressing barriers to growth in the natural gas market.

Although this is not the place to deal with the following in detail it is worth listing a number of issues that retard gas market growth in power generation and elsewhere. If overcome there is likely to be an added fillip to the nation's greenhouse abatement efforts.

Briefly some of these are:

- A lack of a nationally integrated energy and greenhouse strategy;
- Electricity market rules that disadvantage cogeneration and other gas fired power options – such as transitional vesting contracts, and electricity network and transmission pricing rules;
- Very low coal and coal based electricity prices;
- Overcapacity in electricity generation in major states;
- Gas market regulation that threaten to stifle new investment in essential gas supply infrastructure;
- Uncertainty over taxation and depreciation rules for new gas infrastructure investment.

A number of these issues are expected to receive considerable attention in the Senate Global Warming inquiry report due out soon. The AGA stands ready to elaborate on these issues if required.

5. Other Issues

5.1 A Greenhouse Trigger?

The AGA believes a proposal to include a greenhouse trigger in the *Environment Protection and Biodiversity Conservation Act 1999* may not sit well against other more desirable measures to curb greenhouse emissions such as an emissions trading scheme and other flexibility mechanisms under development. The AGA generally favours market driven mechanisms rather than regulatory mechanisms as proposed with the greenhouse trigger.

If the Kyoto Protocol negotiations stall and the prospects for an international emissions trading system in the near term fade then other temporary, and *second best* solutions may need to be considered. In the absence of a well-designed emissions trading scheme at the international and domestic levels through a ratified Kyoto Protocol, the AGA may accept suitable interim arrangements that included the introduction of a greenhouse trigger in the Act. This would particularly be the case where both the full fuel life-cycle implications are taken into account and where subsequent project approvals also factor in the international competitiveness and economic and regional implications of proposals.

5.2 The Commonwealth's +2% Renewables Measure

While renewable energy sources could provide a possible long term basis for future supplies of energy, natural gas offers a cost-competitive, proven and abundant fuel with low greenhouse gas emissions now and for the medium term.

Renewables are currently not cost-competitive nor are their environmental and greenhouse credentials always what they seem.

In particular, the move to boost the contribution of the renewable energy industry to Australia's electricity supply by +2 percent through mandatory targets may undermine the growth of the natural gas market share of power generation and cogeneration.

Cogeneration is the simultaneous production of electricity and heat (typically via steam) from the same primary energy source. It uses the heat that is otherwise wasted in conventional power generation and can achieve an overall efficiency of up to 85%.

Cogeneration is an important option for major industrial users of natural gas and can also be an attractive option for commercial energy users such as hospitals, buildings, hotels and other community facilities.

To harness the environmental benefits offered by cogeneration, the following are required:

- accurate price signals to encourage efficient cogeneration
- fair and reasonable grid connection fees; and
- equitable treatment of operators wishing to supply electricity into the established grid.

The economic and environmental benefits of cogeneration using natural gas are significant, and it would be a pity if those benefits are unrealised in favour of a far less predictable switch to renewables.

For instance, a study[6] conducted in 1999 concluded that power generated from natural gas would generate less greenhouse gas emissions than that of a proposed tidal power plant. The two major sources of emissions for the tidal project relate to fossil fuel requirements to meet demand during neap tides and the impact of the decay of mangroves with the release of carbon dioxide that had previously been sequestered within the mangrove biomass. During the decommissioning of the tidal power station this process is repeated again as the original equilibrium is restored.

The study also showed that it would take around 27 years of operation before the tidal option had a greenhouse benefit relative to the gas option and that within this period it is likely that other, more efficient and viable technologies would be available.

The imposition of the +2% renewable energy target should be accompanied by a life-cycle analysis of the greenhouse implications of this policy.

A better approach to mandating energy types to lower greenhouse gases is that being pursued in Queensland with its recently released energy policy statement, *A Cleaner Energy Strategy* which is set out below.

5.3 Queensland's *Cleaner Energy Strategy*

The energy sector has been nominated as a priority by the Queensland Government in limiting the growth in greenhouse gases. The Queensland policy proposes a number of new initiatives to help reduce the greenhouse intensity of Queensland's energy.

These include:

- conditions on electricity retailers that operate in Queensland to ensure that they source 15 percent of their electricity sales from gas or renewable sources (13 percent and 2 percent respectively);
- measures to assist the coal industry to capture and use waste mine gas; and
- promoting investment in forests as a way of offsetting greenhouse gas emissions and encouraging power station developers (utilising fossil fuels) to plant forests to offset carbon emission.

These initiatives are expected to reduce greenhouse gas emissions by more than 30 million tonnes over ten years. This would have the same effect as removing one million cars and their exhaust emissions from our streets. In a future world of price penalties for greenhouse gas emissions, the Queensland policy could save the State economy around $80 million per year by 2008, totalling $320 million by the end of the first assessment period in 2012.

The AGA welcomed the Queensland policy announcement that it will broaden the state's energy mix with an increase in the use of natural gas and coal seam methane. The Queensland policy is to be applauded for taking the next logical step in the drive to lower greenhouse gas emissions, i.e. supporting clean energy (such as natural gas) over high carbon emissions energy sources.

The AGA has consistently argued that, for Greenhouse policy, the differentiation between fossil fuels and renewables is an antiquated concept. Rather, the focus should be on emissions levels. Low carbon intensive energies such as natural gas will be critical in meeting Kyoto Protocol abatement targets. In the long term well beyond the Kyoto first commitment period (2008-2010), renewables may have a greater role, but this is yet to be proven.

5.4 Greenhouse and the Transport Sector

The other significant area of greenhouse gas emissions is in the transport sector. At 17 per cent of total greenhouse gas emissions, the transport sector is a substantial producer of emissions.

Compressed natural gas (CNG) offers great savings in greenhouse gas emissions as well as a reduction in pollutants. Trials of CNG buses by the Sydney Transit Authority over the last five years show a reduction in greenhouse gas emissions of 20 per cent[7].

The environmental benefits are accompanied by economic advantages. TransAdelaide, which has on trial 110 CNG buses, has seen a saving of $7,700 per bus per year compared to its diesel fleet.

[6] Greenhouse Gas Lifecycle Analysis of LNG and Tidal Power Generation Options in the West Kimberley Region"

[7] State Transit Authority advice based on known fuel consumption and greenhouse gas emission factors, 1999.

The environmental and economic benefits of CNG have seen a number of recent decisions in favour of CNG. TransAdelaide will be adding a further 103 CNG buses to its 103 strong fleet, Brisbane City Council intends to purchase 120 new CNG buses over the next three years and the Western Australian Government has announced it will trial five new buses. Finally, Sydney Buses is well into its delivery program that will see 150 new CNG buses delivered by September and a further 150 buses by 2002.

While the use of CNG buses in public transport has brought environmental benefits to some of Australia's major cities an greater contribution could be made in the conversion of Australia's light commercial vehicle fleet.

The Commonwealth Government's *Alternate Fuels Infrastructure Program* and *Compressed Natural Gas Infrastructure Program* are moves in the right direction. Efforts should also be maintained to continue price relativity of CNG to diesel, support the establishment of refuelling infrastructure, and continue to expand the trialling programs for CNG buses and trucks.

6. The AGA's Greenhouse Policy Statement

As mentioned in the Executive Summary, the AGA recently released a concise Greenhouse Policy Statement incorporating 10 core principles. The AGA has urged the Federal and State governments to use the policy principles in the Kyoto Protocol negotiations and when formulating policies and responses to climate change. This statement is reproduced fully below.

1. In light of scientific and community concern about the possible environmental, social and economic impacts of climate change brought about by the enhanced greenhouse effect, the AGA urges governments to work toward reducing Australia's contribution to anthropogenic sources of greenhouse gas emissions. The AGA accepts that while the Kyoto Protocol is only the first step toward stabilisation of greenhouse gases in the atmosphere, it is a most important step. Uncertainties and difficulties associated with the implementation of the Kyoto Protocol should be expected and should not diminish government and industry commitment to work towards real reductions in greenhouse gas emissions. Rather, government and industry should combine their efforts in order to develop effective and economical measures to reduce greenhouse gas emissions.

2. The AGA supports a least-cost approach to reducing emissions, acknowledging that the challenge of meeting Australia's growing energy needs over the next ten years and meeting an internationally recognised target for emissions will not be readily or simplistically resolved. Least cost does not mean no-cost and the AGA appreciates there will be some winners and some losers in the move away from greenhouse-intensive fuels, technologies and practices. This does not imply the promotion of further movement beyond no-regret activities that provide no benefit to Australia under the Kyoto Protocol.

3. The natural gas industry is well placed to be a significant part of the least-cost solution. The value of natural gas lies not only with its abundance, its clean-burning characteristics or with the best practice technology associated with it but also, importantly, with its low greenhouse gas-intensity. Until, however the market recognises and factors in a cost for producing greenhouse gas emissions, more greenhouse gas-intensive fuels, such as oil and coal, will continue to dominate the energy sector and limit emission reduction strategies.

4. The AGA believes that emissions trading is the best mechanism through which the market can discover the lowest marginal cost options for abatement. While structural and administrative changes to the energy market may also help natural gas and other low emitting fuels challenge the dominance of oil and coal as a primary energy source, the most direct opportunity will come through the market establishing a cost for greenhouse gas emissions.

5. The AGA supports the introduction of a domestic emissions trading scheme in concert with an international scheme, which provides:
   - an impetus to switch to lower emitting fuels such as natural gas;
   - measures to maintain the international competitiveness of Australia's LNG industry and;
   - an enhancement of the role of the Clean Development Mechanism (CDM) and Joint Implementation (JI).

6. In the period prior to the introduction of an emissions trading scheme, the Commonwealth must act to encourage greenhouse gas emission reductions. A national energy policy which draws together and builds on a number of existing policies associated with greenhouse and energy reforms should be prepared which:
   - addresses the close link between energy and greenhouse gas emissions;
   - ensures greenhouse programs and measures encourage fuel-switching;
   - ensures that project approval processes take into account the greenhouse implications of proposals;
   - removes regulatory structures and market rules that currently inhibit new gas entrants into the generation and co-generation sectors; and
   - requires energy providers to identify greenhouse gas emissions on energy bills to help make the "cost" of energy supply more visible and more real to commercial and residential consumers.

7. The AGA supports a full life cycle approach to the measurement of greenhouse gas emissions when assessing the relative merits of development proposals.

8. The AGA believes the Federal Government must clarify its position on credit for early action and no disadvantage for industry's voluntary abatement action. Without clarification, the Government risks discouraging the continuance of voluntary abatement work.

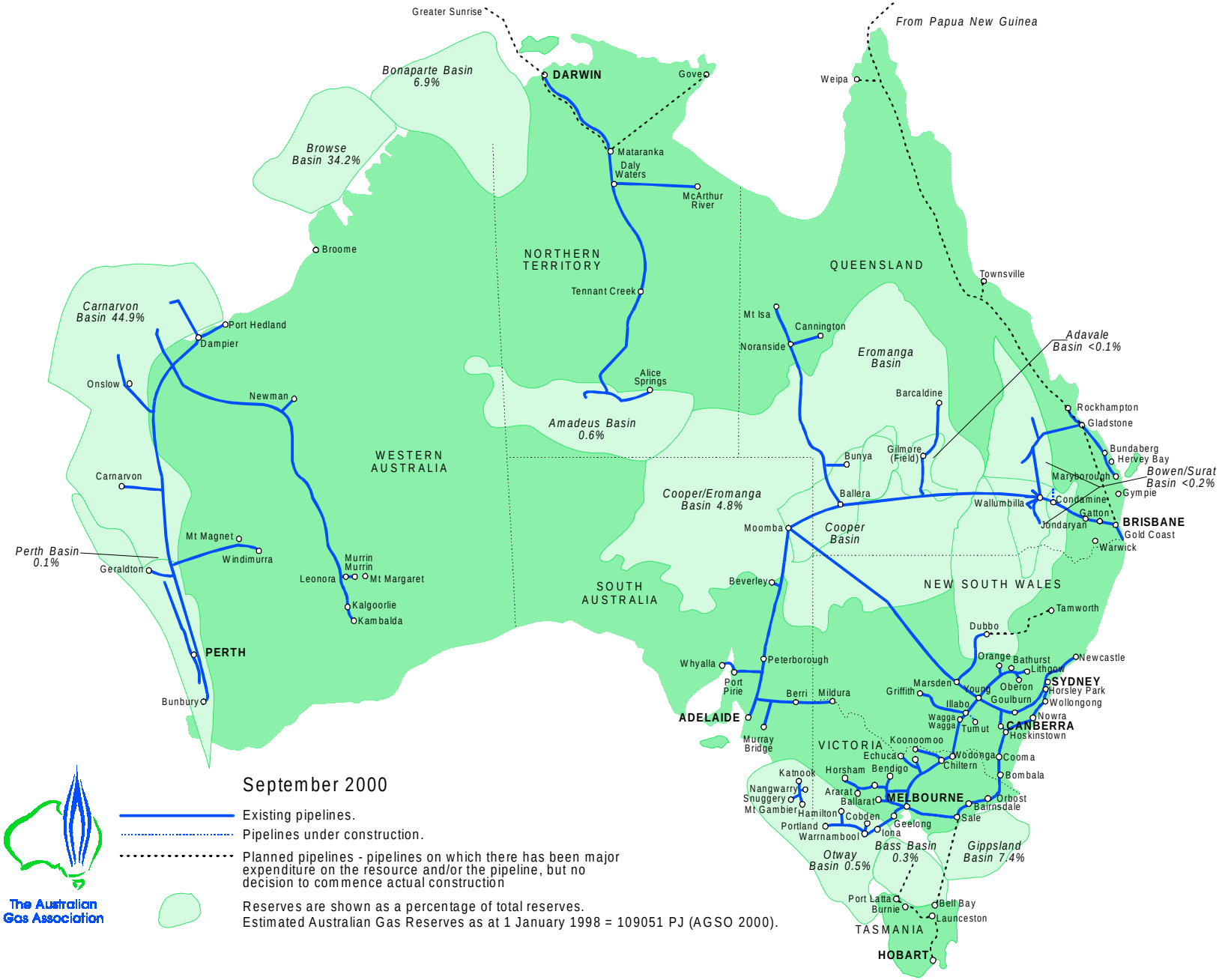
9. While the AGA supports emissions trading as the least cost approach to reducing greenhouse gas emissions, the AGA recognises that an emissions trading scheme that doesn't involve all LNG trading nations may threaten the viability of Australia's LNG export industry. This threat must be deflected and governments must work to maintain the international competitiveness of this important industry. LNG exports will be expected to play a significant role in reducing global greenhouse emissions in addition to bringing significant economic, employment and regional benefits to Australia.

10. State and Federal Governments' greenhouse requirements should be consistent so as to ensure that natural gas entities can achieve compliance in all operations across all States without unnecessary cost. There is currently significant variation between the States in their approach and regulation of greenhouse gas emissions. In addition, measures taken under State requirements should receive Federal recognition.

The Australian Gas Association
30 August 2000

Glossary of Terms and Abbreviations

ABP	Australian best practice
AGA	The Australian Gas Association
CCGT	Combined cycle gas turbine. In the combined cycle gas turbine, the hot exhaust gases from an open cycle gas turbine driven generator is passed through a boiler to raise steam, and the steam is then used within a turbine to drive a separate generator.
CDM	Clean Development Mechanism (Article 12 of Kyoto Protocol)
CH_4	Methane, the main component of natural gas.
CNG	Compressed Natural Gas
Cogeneration	Combined production of heat and power.
CO_2-e	Carbon Dioxide Equivalent
CSM	Coal Seam Methane
ET	Emissions Trading (Article 17 of Kyoto Protocol)
GHG	Greenhouse Gases
JI	Joint Implementation (Article 6 of Kyoto Protocol)
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
OCGT	Open cycle gas turbine. This is the simplest form of gas turbine based power generation, and consists of a gas turbine connected to a generator.
PJ	petajoules
WBP	World best practice


Greater Sunrise
From Papua New Guinea
Bonaparte Basin 6.9%
DARWIN
Gove
Weipa
Browse Basin 34.2%
Mataranka
Daly Waters
McArthur River
Broome
NORTHERN TERRITORY
QUEENSLAND
Townsville
Tennant Creek
Carnarvon Basin 44.9%
Port Hedland
Dampier
Mt Isa
Cannington
Noranside
Adavale Basin <0.1%
Eromanga Basin
Onslow
Newman
Alice Springs
Barcaldine
Rockhampton
Gladstone
Amadeus Basin 0.6%
Bundaberg
Hervey Bay
Bunya
Gilmore (Field)
Maryborough
Bowen/Surat Basin <0.2%
WESTERN AUSTRALIA
Carnarvon
Cooper/Eromanga Basin 4.8%
Ballera
Gympie
Wallumbilla
Condamine
Gatton
Mt Magnet
Moomba
Cooper Basin
Jondaryan
BRISBANE
Gold Coast
Perth Basin 0.1%
Windimurra
Warwick
Geraldton
Murrin Murrin
Leonora
Mt Margaret
SOUTH AUSTRALIA
Beverley
NEW SOUTH WALES
Tamworth
Kalgoorlie
Kambalda
Dubbo
PERTH
Orange
Bathurst
Newcastle
Whyalla
Peterborough
Lithgow
Port Pirie
Marsden
Griffith
Young
Oberon
SYDNEY
Horsley Park
Berri
Mildura
Goulburn
Wollongong
Illabo
Wagga Wagga
Tumut
Nowra
ADELAIDE
CANBERRA
Hoskinstown
Murray Bridge
VICTORIA
Koonoomoo
Echuca
Wodonga
Cooma
Chiltern
Katnook
Horsham
Bendigo
Bombala
Nangwarry
Ararat
Snuggery
Ballarat
MELBOURNE
Orbost
Mt Gambier
Hamilton
Cobden
Bairnsdale
Portland
Sale
Geelong
Warrnambool
Iona
Otway Basin 0.5%
Bass Basin 0.3%
Gippsland Basin 7.4%
Port Latta
Burnie
Bell Bay
Launceston
TASMANIA
HOBART
Bunbury
The Australian Gas Association
September 2000
Existing pipelines.
Pipelines under construction.
Planned pipelines - pipelines on which there has been major expenditure on the resource and/or the pipeline, but no decision to commence actual construction
Reserves are shown as a percentage of total reserves.
Estimated Australian Gas Reserves as at 1 January 1998 = 109051 PJ (AGSO 2000).