

**Ministerial Council on Mineral and Petroleum  
Resources / Ministerial Council on Energy Joint  
Working Group on Natural Gas Supply**

**Final Report**

**September, 2007**

## Abbreviations

ABARE	Australian Bureau of Agricultural and Resource Economics
AEMA	Australian Energy Market Agreement
AEMO	Australian Energy Market Operator
COAG	Council of Australian Governments
CSM	Coal-seam Methane
JWG	Joint Working Group on Natural Gas Supply
GAPR	Gas Annual Planning Report
GJ	Gigajoules
GMLG	Gas Market Leaders Group
GSOO	Gas Statement of Opportunities
LNG	Liquefied Natural Gas
MCE	Ministerial Council on Energy
MCMPR	Ministerial Council on Mineral and Petroleum Resources
MMA	McLennan Magasanik Associates
MOWG	MCE Market Operator Working Group
NEMMCO	National Electricity Market Management Company
NGL	National Gas Law
NGR	National Gas Rules
NNGP	National Natural Gas Plan
NOPSA	National Offshore Petroleum Safety Authority
NT	Northern Territory
NWS	North-West Shelf
PJ	Petajoule(s)
PJ/yr	Petajoule(s) per year
PRRT	Petroleum Resources Rent Tax
P(SL)A	Petroleum (Submerged Lands) Act
Qld	Queensland
SA	South Australia
SCO	Standing Committee of Officials
SOO	Statement of Opportunities
STTM	Short-Term Trading Market
UPGS	Upstream Petroleum and Geothermal Subcommittee
WA	Western Australia

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## Introduction

With the rapid growth of the Liquefied Natural Gas (LNG) export market and moves by state and territory governments to increase Australia's percentage of gas fired power generation as part of the national greenhouse response, the future demand and supply of gas for domestic use has emerged as a high priority issue. In addition, the availability of competitively priced gas supplies is also essential to encourage new industry investment and sustained economic growth for the nation.

In September 2006 the Ministerial Council on Mineral and Petroleum Resources (MCMPR) agreed that there was a need to examine how domestic demand might be met. Accordingly, the Council endorsed the formation of a Joint Working Group (JWG) of senior officials from the Ministerial Council on Energy (MCE) and the MCMPR to consider issues surrounding domestic gas supplies for existing and future markets, including new gas industries and specifically addressing the issue of balancing the exploitation of resources for export with the supply of domestic natural gas for Australia's long term needs.

This report presents the findings of the JWG, which seeks to identify and address issues that may impact on Australia's ability to realise the twin goals of becoming one of the world's leading LNG exporters and ensuring the long term supply of gas for domestic users. Membership of the Working Group is outlined in Appendix A.

## Terms of Reference

The Joint Working Group's terms of reference are to:

1. Investigate and quantify the likely demand for domestic gas against supply (including conventional sources and non-conventional sources such as tight gas and coal seam methane) for existing and future markets, including new gas industries using a multi-scenario approach.
2. Using a multi-scenario approach, review the benefits, costs and risks associated with both exporting LNG and ensuring domestic gas security (including drawing on the work done previously by MCMPR SCO on gas supply issues) in order to:
  - Understand, at an Australian regional and State level, the structure, scope and size of
    - a) the Australian upstream gas industry/market, and
    - b) the Australian domestic gas market.
  - Analyse the pricing differential between the export market and domestic gas markets.
3. Investigate barriers to domestic gas supply including upstream supply infrastructure and outline practical strategies that will ensure the availability of competitively priced gas to every State/Territory as required.
4. Analyse the risks and benefits to the States, Territories and Commonwealth jurisdictions with regard to the development of major inter-jurisdictional gas projects.
5. Consider options that deliver natural gas resources for export and the supply of domestic natural gas to meet jurisdictional and national long term needs and taking into account national energy security issues consistent with COAG's National Energy Policy Framework, including the need for a national gas plan.
6. Deliver a final report to the MCMPR/MCE SCO for subsequent consideration by Ministers in Council in 2007.

## Work Program

The JWG held its first meeting in December 2006 and continued to meet on a monthly basis until September 2007.

In order to develop a clear understanding of the issues and options for future action the work of the JWG was progressed under two concurrent consultancies. The Australian Bureau of Agricultural and Resource Economics (ABARE) undertook a quantitative analysis and forecasts of the Australian gas market; and McLennan Magasanik Associates (MMA), a qualitative analysis of barriers to domestic gas supply, risks and benefits of major inter-jurisdictional gas projects and strategies to deliver enhanced supply for both the domestic and export markets.

In developing its report, MMA undertook consultation with the Gas Market Leaders Group and gas industry stakeholders, to identify industry issues and perspective. MMA also worked closely with each JWG member to ensure a jurisdictional perspective was captured.

The consultants' reports were delivered to the JWG in July 2007 with the MMA report released for targeted stakeholder consultation soon after.

Based on consultant findings and stakeholder feedback, the JWG prepared this report, which is now released for wider consultation over a one month period.

5 December 2006	First meeting of the JWG
February 2007	Consultants engaged
13 July 2007	Consultants' reports delivered to JWG
17 July 2007	MMA report forwarded to targeted stakeholders for comment
31 July 2007	Feedback received
9 October 2007	Final JWG and MMA report released for 4 week consultation period
5 November 2007	Close of consultation period
14 November 2007	Final JWG report and recommendations to Ministers

## Summary of Findings

### 1. Domestic Gas Supply and Demand in Australia.

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#### *Australia has substantial gas resources....*

Total Australian gas resources (proved, probable and contingent), including the Timor Sea, were approximately 173,000 PJ as of August 2007, of which approximately 35,000 PJ are now contracted. Maximum future committed production rates, including North West Shelf (NWS) Train 5, are approximately 2,500 PJ/year, at which rate the resources have a life of 66 years (excluding any future discoveries). With the recent development of Coal Seam Methane (CSM) as an additional source of gas, and the likelihood that further exploration will lead to additional discoveries and verification of reserves, Australia appears to have an abundant supply of gas for the foreseeable future. However, it should be noted that there are barriers to easily accessing and commercialising a significant proportion of such reserves. The location of major gas resources is shown in Figure 1.

Australia's primary gas consumption increased from 76 PJ in 1970-71 to 1063 PJ in 2005-06, an average growth rate of 7.8 percent per year. Over the past two decades, the gas market in Australia has matured and consumption growth has slowed. However, this is projected to increase strongly over the next 25 years. Since 1989-90, primary gas consumption increased on average at 2.7 percent per year (Source: ABARE).<sup>1</sup>

*... but there is no national gas market. Rather there are a number of distinct regional markets with very different characteristics.*

Figure 1, below, shows Australia's gas resources are largely decentralised and that the transmission pipeline network is not wholly integrated across all jurisdictions. Therefore, gas is not delivered to consumers via a single national network. Rather, the Australian gas market is actually three distinct regional markets:

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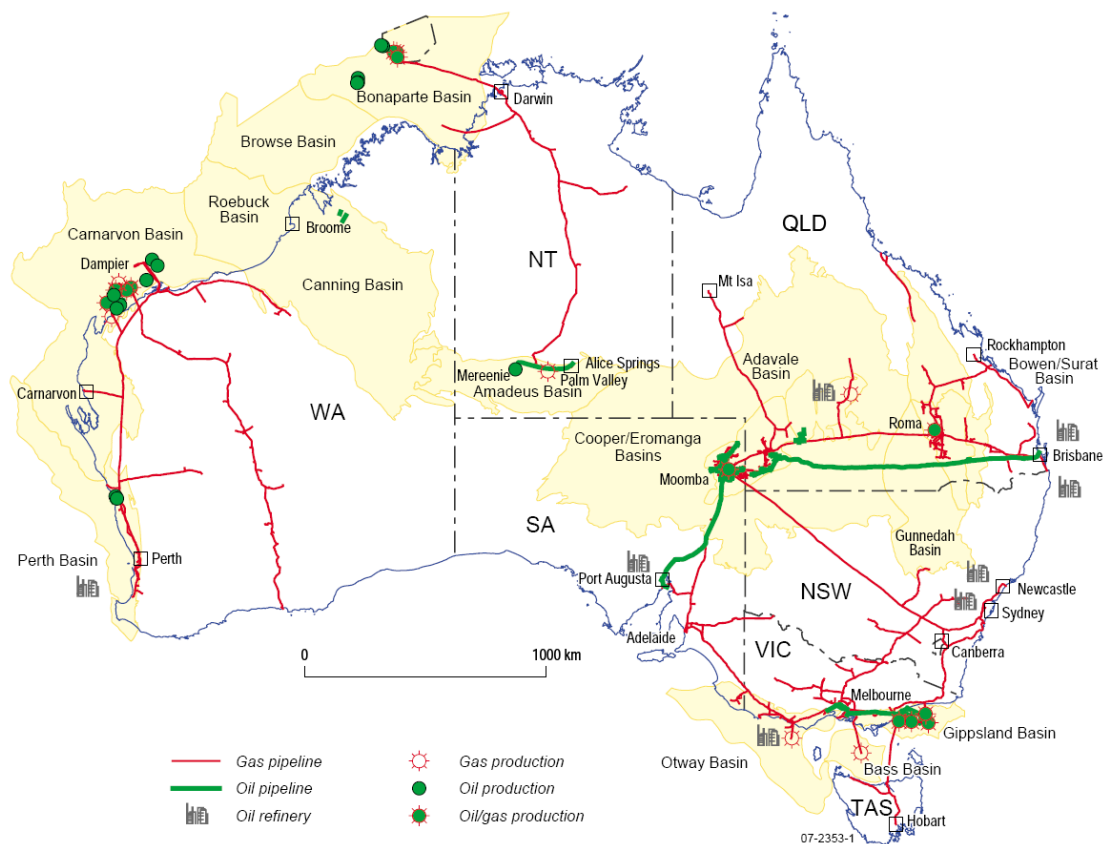
<sup>1</sup> A. Copeland, K. Donaldson, L. Hogan, E. McGinn, K. Penney & S. Thorpe, 'Australia's gas supply and demand balance: gas security and pricing issues – ABARE report for the Joint Working Group on Natural Gas Supply', Australian Bureau of Agricultural and Resource Economics, July 2007, P. 5

- the Eastern market, comprising Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia and Tasmania;
- the Western market, comprising Western Australia; and
- the Northern market comprising the Northern Territory.

The Western and Northern markets also support LNG facilities, thus these regions supply foreign gas markets.

As a result of these regional differences, analysis of the supply/demand situation at an aggregated national level will fail to recognise a number of important issues arising in individual regional markets. It is therefore important to review each of the regional markets individually.

**Figure 1: Location of Australia’s oil and gas facilities<sup>2</sup>**



<sup>2</sup> Geoscience Australia



***The Eastern gas market has been relatively benign but is beginning to change...***

**The Eastern gas market** has approximately 24,000 PJ of gas resources, contributed to by multiple basins and/or pipelines. This 24,000 PJ is comprised of approximately 12,900 PJ of conventional gas and 11,000 PJ of CSM. The Eastern gas market accounted for 37 percent of Australia's primary gas production (conventional and CSM) and 61 percent of Australia's primary gas consumption in 2005-06. Gas reserves are spread across seven basins; Sydney, Gippsland, Otway, Cooper, Adavale, Bass and Surat-Bowen and a significant interconnected network of gas transmission and distribution infrastructure has evolved, and is still evolving to support the development of a competitive gas market.

The rapid growth and development of CSM reserves over the past decade has significantly added to and diversified the region's gas supply options. Two important factors have impacted on the increased supply of CSM into the Eastern Gas market: the demise of the Papua New Guinea Gas Pipeline, and the introduction of a 13% target for gas fired power by the Queensland Government.

Development of CSM resources has the potential to significantly add to and increase the diversity of the region's gas supply options.

The announcement of two potential LNG terminals using CSM has the potential to impact on both supply and price in the Eastern gas market. Some potential upsides include an increase in energy exports, and a potential increase in exploration to identify additional resources

MMA concluded that the Eastern market supply outlook is relatively benign and that buyers and sellers appear willing to contract ahead to avoid supply shocks. As a result, it is expected that supply for the market will be sufficient to meet demand in the medium to long term. Concerns primarily relate to long-term supply and the possibility that higher costs will increase future contract prices.

***...while the Western gas market is currently experiencing a very tight gas supply situation...***

**The Western market** contains the majority of Australia's conventional gas resources and has an estimated 126,000 PJ of P50<sup>3</sup> resources that support both the domestic and export market. The region accounted for 59 percent of Australia's primary gas production and 37 percent of Australia's gas consumption in 2005-06. Western Australia's domestic demand for gas is higher than those of other states in Australia and has a significant component directed toward mineral processing. Natural gas supplies approximately 53 percent of WA's non-transport primary energy, excluding gas used in oil and gas production.

The North West Shelf Venture is the dominant supplier in the Western market, accounting for around 65 percent of the domestic market, as well as currently being Australia's largest exporter of LNG. The Western market has experienced low domestic gas prices for some time as a result of competition between the NWS and a number of smaller producers dedicated to the domestic market. In recent times, however, a significant imbalance has arisen with growing demand for new and replacement contracts at a time when most of the existing producers have fully contracted all of their developed reserves. As a result prices have more than doubled, with recent short-term contracts reported as being negotiated at a price of more than \$7/GJ.

MMA therefore concludes that Western Australia is in urgent need of new production commitments and that the market will face difficulties in achieving a demand/supply/price balance until at least 2010. The contingency of many new supply options being dependent on associated export project commitments has exacerbated this problem.

***...and export market competition and focus on LNG is hindering the further development of the Northern gas market.***

**The Northern gas market** holds 16 percent of Australia's demonstrated gas resources and began producing in the early 1980s through the development of the Amadeus basin. Production in the region increased significantly in 2005-06 with the

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<sup>3</sup> Probable reserves have been variously designated as 'indicated' or P50 reserves, the latter referring to reserves which are estimated to have a better than 50% chance of being technically and economically producible. (<http://www.bp.com/sectiongenericarticle.do?categoryId=9017934&contentId=7033489>)

development of the Bayu-Undan field in the Bonaparte Basin solely for LNG export. The region accounts for four percent of Australia's primary gas production and two percent of consumption in 2005-06.

MMA concludes that demand from existing end users appears to be covered by supply contracts for up to 15 years. The market faces problems, however, in sourcing additional supplies of gas to support major industrial projects due to competition for supply with export LNG projects.

***But there is a range of major factors that will affect the supply/demand outlook across regional markets***

Global and domestic demand for natural gas is likely to increase as a result of increased economic growth and the attractiveness of gas as a relatively cheap, abundant and low emission transition fuel as more countries establish schemes to reduce greenhouse gas emissions.

Nationally, Australia's primary gas consumption and LNG exports are projected to increase at an average annual rate of 2.7 and 7.8 percent, respectively, between 2005-06 and 2029-30.

Domestic supply of and demand for natural gas will be dependent on a range of factors, including:

- the timing and design of a national emissions trading regime (or other forms of carbon pricing);
- technological developments (such as adoption of gas-to-liquids fuels to supply the transport market); and
- further discoveries of gas resources and changes in the commerciality of gas fields; and
- further development of Australian gas markets and pipeline infrastructure.

## 2. Benefits, costs and risks associated with both exporting LNG and ensuring domestic gas security

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A key issue for Australian governments is to manage competing demands for Australia's gas resources as both world and domestic demand for gas are projected to grow relatively strongly over the next 25 years. According to ABARE forecasting, gas is to become increasingly important in meeting Australia's energy requirements over the next 25 years. Over this period the share of gas in Australia's total primary energy consumption is projected to increase from 19 percent in 2005-06 to 24 percent in 2029-30.

A major challenge will therefore be to ensure that the exploration, development and production of Australia's gas resources is optimised over time by enabling an appropriate allocation of these resources to the international and domestic markets.

A number of important **benefits** associated with Australia's upstream gas industry supplying both the domestic and international markets have been identified. These include:

- **Substantial economic gains to the Australian economy from trade** — access to both domestic and export markets provides increased economic incentives for the upstream gas industry to invest in gas exploration, development and production compared with the outcome if international trade opportunities were limited. LNG exports enhance Australia's export earnings and benefits our terms of trade.
- **Increased diversification in both energy production and consumption in Australia** — increased gas production and domestic use enhances Australia's long-term energy security by diversifying energy markets.
- **Environmental benefits** — increased gas use in Australia and overseas can lead to a lower level of greenhouse gas emissions than would otherwise be the case by using current technologies/fuel sources.

- **Technology development** – increased investment in innovation, R&D and skills development as a result of projects proceeding from exploration through to development.

However, there are also a number of important **costs and risks** in the long term gas outlook in Australia. These include:

- **Limited flexibility in supply given long term contracts for LNG exports** — LNG exports are typically based on long term supply contracts to support the high investment costs associated with LNG plants for gas producers (LNG exporters) and re-gasification plants for gas consumers (LNG importers). Long term contracts are an important risk management mechanism, but the use of such contracts limits the flexibility of gas producers in switching gas supply between the domestic and export markets. There is likely to be some increased flexibility over time as new, more flexible contracts are negotiated and the spot market for LNG continues to develop, although spot trade is likely to remain a relatively small component.
- **There is limited flexibility for domestic use** – flexibility of supply for the domestic market is similarly limited since major pipeline expansions and extensions are also considered on the ability of pipeline owners to engage in long-term contracts with gas users.
- **Gas demand side risks in the outlook assessment** — an important risk in the long term outlook is the extent to which future climate change policy initiatives will increase the demand for gas.
- **Gas supply side risks in the outlook assessment** — an important risk to consider in the long-term outlook is the availability and cost competitiveness of Australia's gas resources, including both conventional gas and CSM. Australia has significant gas resources, but gas is a non-renewable resource that needs to be discovered before it can be developed and produced for either domestic or overseas use. The supply/demand outlook in eastern Australia is also evolving rapidly with the recent upgrading of natural gas and coal seam methane reserves now projected to meet demand into the 2020's. Should plans

to develop export LNG projects on the east coast come to fruition, this will likely exert upward pressure on prices as Eastern Australia would then be connected to the global market.

The terms of reference for the JWG required the use of a multi-scenario approach to review the benefits, costs and risks associated with both exporting LNG and ensuring domestic gas security, such as those identified above. The JWG also notes that there are several new developments, which have the potential to significantly alter the dynamics of natural gas markets in Australia. These include:

- the introduction of a national greenhouse gas emissions trading scheme at some point in the future;
- the possible development of export LNG projects in the Eastern market, introducing a new dimension of export price competition into that market;
- technological developments which could result in new markets for natural gas, particularly in the transport fuels sector; and
- the development of previously uneconomic resources as market prices increase.

Given that the nature and implications of the above developments, particularly in relation to the design and implementation of a national emissions trading scheme, are likely to become much clearer over the next 6-12 months, the JWG believes that there would be value in deferring further consideration and modelling of alternative gas market scenarios until mid-2008.

### 3. Barriers to Domestic Gas Supply.

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Following discussions with jurisdictions and key industry stakeholders, MMA identified 16 potential barriers to the supply of domestic gas in Australia.

These barriers fall into four main categories:

- Export competition
  - Price competition and acreage management.
- Market structure and operation
  - Market concentration, joint marketing, vertical integration, retail market gas balancing mechanisms, and non-standardisation of gas markets across jurisdictions.
- Project development barriers
  - Capital costs and skill shortages, taxation reform, greenhouse gas reduction schemes and gas reserves accessibility.
- Gas transmission and distribution infrastructure
  - Aging infrastructure, delivery point capacity access, pipeline regulation, infrastructure approvals processes and gas quality specifications.

Each of these is examined in more detail below.

- Export Competition

The MMA report found that, in locations where gas resources are suitable for development as export LNG projects (primarily in the Western and Northern gas markets), rising international LNG prices may have an adverse impact on domestic gas supply in two ways:

- Through *price competition*, with flow through price increases to the domestic market; and
- Through the *withholding of gas from the domestic market*, from fields suitable for domestic development on a commercial basis using the retention lease system. This has implications for the current system of **acreage management**

The effects of *price competition* are already being felt in Western Australia. Gas prices in WA have increased to around double the prices in the Eastern market, where exports of gas are not presently viable. It is also a factor in the inability to obtain gas for major industrial developments in the Northern Territory. Export price competition is also likely to be experienced in the Eastern market if proposed LNG projects become a reality.

MMA suggests that affected jurisdictions should look to promote the development of additional sources of domestic gas supply through measures such as:

- Increased funding for pre-competitive geological data acquisition in relevant basins;
- Provision of infrastructure supporting exploration, such as roads;
- Project facilitation, eg granting Major Project Facilitation status; and
- Royalty reductions or holidays for onshore production.

**The JWG is of the view that export price competition can improve the economics of gas field developments, thereby increasing the total supply of available gas. Priority should be given to measures that promote the development of existing gas resources and actions that facilitate the delivery of gas into domestic markets. These are further addressed below. Decisions regarding priorities for geoscience expenditure, infrastructure support and royalty/taxation treatment are best left to individual jurisdictions.**

A number of stakeholders consulted by MMA believe that the current system of *acreage management*, in particular retention leases, are creating barriers to domestic gas supply. While most stakeholders accept the principles behind the use of retention leases, many believe that commerciality criteria are not being adequately assessed under the current system.

Options suggested by MMA to address this issue include:

- Requesting re-evaluation of commerciality under the terms of lease
- Non-renewal of retention leases



- Considering a minor Petroleum (Submerged Lands) Act 1967 amendment to remove a loophole<sup>4</sup>
- Considering replacing the lease renewal process with an auction to evaluate commerciality.

Feedback received following the limited release of the MMA report showed strong support from some sectors of industry, other than upstream industry, for the recommendation to review the retention lease system. Several stakeholders expressed their support for a “more efficient acreage management process”, which will provide a “higher level of transparency” on the commerciality test used to assess whether to extend a retention lease.

**The JWG acknowledges the important role that retention leases play in protecting the interests of companies that discover gas resources, which are not commercially viable in the short to medium term. It also recognises that the market environment has changed significantly in recent years. As a result, there is an expectation that the prospects for commercialising many known gas resources have improved substantially. In these circumstances, it would appear appropriate for the Joint Authority to review the commerciality information submitted in support of existing retention leases and, where considered appropriate, to request a mid-term re-evaluation of commercial viability in accordance with s38H of the Petroleum (Submerged Lands) Act 1967. The April 2007 MCMPR Upstream Petroleum and Geothermal Subcommittee (UPGS) meeting endorsed the preparation of a guidance note advising industry that commercial viability claims for retention lease applications will be given greater scrutiny.**

**The JWG supports further investigation into improving the current acreage management process, in particular the granting and renewal of retention leases to ensure that processes are transparent and that tests of commerciality are rigorously applied and enforced. Proposed changes should be assessed in terms of the degree to which they are likely to have a positive impact on petroleum exploration and production in Australia.**

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<sup>4</sup> “It is noted that s38E and s38H are silent in regard to reviewing the second retention lease criterion, namely whether production is likely to become commercially viable within 15 years. Thus if the Joint Authority forms the view that production is not commercial at present nor is it likely to become commercially viable within 15 years, it is not empowered to cancel the lease, even though the second criterion is not met. As other parties may take a different view of commerciality to both the current lessee and the Joint Authority, Governments should consider whether the P(SL)A should be amended to include review of the second criterion as well as the first, so that the Joint Authority can cancel leases where it is of the view that production is not commercial at present nor is it likely to become commercially viable within 15 years.” R. Lewis, M. Goldman & R. Farmer, ‘Report to the Joint Working Group on Natural Gas Supply: Natural Gas in Australia’, McLennan Magasanik Associates, July 2007, P. 63.

- Market Structure and Operation

MMA found that the structure and operation of the gas market can result in barriers to domestic gas supply. These include:

- Market concentration and joint marketing;
- Vertical integration;
- Retail market gas balancing mechanisms; and
- Non-standardisation of gas markets across jurisdictions

*Market concentration* among both sellers and buyers has been put forward by stakeholders consulted by MMA as both a barrier to domestic gas supply and to gas market efficiency. Concentration of gas purchasing appears to be slightly lower than upstream concentration due to the number of small to medium industrial and generation purchasers, however, the gas retail market remains highly concentrated.

MMA believes that separate marketing would reduce upstream market concentration in the Eastern market but would not be of assistance in the Western market owing to the limited number of producers in the domestic gas joint ventures. MMA recommends greater exploration and discovery of additional reserves as a more effective means of reducing concentration.

Stakeholders generally agreed that joint selling arrangements can reduce competition by reducing the number of sellers to the domestic market and would allow Joint Venture partners to monetise their portion of the gas reserves at different rates thus creating a commercial opportunity for more gas capacity to enter the market when prices are high. Several stakeholders pointed out that further analysis and clarification of the impacts of *joint marketing* is required.

A number of stakeholders also promoted the concept of a gas purchasing aggregator as a means of reducing the imbalance of market power between sellers and buyers in WA.

*Vertical integration* has also been raised by stakeholders as a barrier to gas supply and market efficiency. MMA did not find strong evidence of vertical integration currently causing problems but acknowledged that further vertical integration would be a concern as it could clearly increase concentration levels beyond that created by joint marketing, resulting in greater market power for remaining producers and further reducing market efficiency. Ultimately, if all participants sought to be vertically integrated and not to trade with one another, the wholesale gas market would disappear.

MMA believes that options that improve market efficiency, such as the introduction of short-term trading via a Short Term Trading Market (STTM), and ensuring that market concentration is maintained or reduced so that both buyers and sellers have willing counterparties, should reduce the tendency for vertical integration.

Most stakeholders, including the relevant retail market operators, agree that the current *retail market gas balancing mechanisms* in NSW/ACT and SA do not operate efficiently and present high barriers to retail market entry and thereby, to gas supply efficiency. This does not appear to be an issue in WA or Qld, which are effectively supplied by single transmission pipelines and the markets may therefore be expected to be more effective.

The STTM has been conceived as a means of replacing the problematic physical balancing arrangements in NSW and SA with a price based approach. MMA also raise an alternative approach widely used in the United States - the use of operational balancing arrangements between transmission pipelines supplying distribution zones. This approach has been used in NSW but failed after a number of years and the concept has not been revised. MMA conclude that this approach would not offer the other features of the STTM, such as price transparency.

Though *non-standardisation* is widespread in the gas industry and creates significant inefficiencies, MMA does not see this as a definitive barrier to gas supply. MMA believes that the STTM holds strong potential to resolve the multiplicity of market arrangements outside Victoria, but will not have any authority over upstream or pipeline matters. MMA recommend that Government should encourage the industry

to establish a standardisation board to work with the Australian Energy Regulator and other authorities to remove the inefficiencies caused by different gas days, nomination/bid timing and procedures.

Stakeholder feedback agreed that a lack of standardisation has a significant adverse impact on the development of the Australian gas market as it increases the cost and complexity for market participants, which impacts on the capacity for new entrants to enter the market. These barriers to entry and participation in the gas markets have an adverse impact on liquidity.

Feedback from industry was supportive of the concept of a STTM as a consistent approach to gas balancing across jurisdictions.

**The JWG considers that market structure and operation barriers will be largely addressed by policies and projects that are currently being developed by the MCE, including the development of a gas Bulletin Board and a STTM, the establishment of an Australian Energy Market Operator (AEMO) and the introduction of economic and non-economic legislative packages through the National Gas Law (NGL) and National Gas Rules (NGR). Consideration needs to be given to the development of similar arrangements tailored to the specific characteristics of Western Australia's gas market.**

- Project Development Barriers

MMA identified a number of barriers to gas supply that may arise from the development of gas projects such as:

- capital costs and skills shortages;
- taxation regimes; and
- other factors such as the impact of a likely greenhouse gas reduction scheme and the availability of gas reserves are also potential barriers to the development of gas projects.

MMA identifies that one of the most critical factors affecting gas markets is the rapid rise in production costs due to increasing *capital costs and skill shortages* and demand on equipment resources as a near-term factor. MMA recognises that Australian Governments can do little to materially change the situation with the

supply of oil and gas equipment, but recommends better resource planning and investment in training to tackle the skills shortage issue.

MMA identified *taxation reform* as an important initiative to enhance domestic gas supply. Junior gas explorers, currently handicapped by the tax system, would benefit from the introduction of a “flow-through” share scheme. MMA also recommend that the tax changes proposed by APPEA could enhance project economics and that a review of the application of transfer pricing in Petroleum Resources Rent Tax (PRRT) should be undertaken to see where distortions in favour of exports have arisen due to the differences between upstream and downstream taxation regimes.

**The JWG notes that a flow-through share scheme is not currently supported by the Commonwealth Government. Other tax measures proposed by APPEA as part of its Upstream Petroleum Industry Growth Strategy are currently under consideration.**

Stakeholders consulted by MMA identified the inconsistency and uncertainty of Australia’s *greenhouse gas reductions schemes* as a barrier to investment in infrastructure and therefore a barrier to gas supply. MMA believes that the work undertaken by the Prime Ministerial Task Group on Emissions Trading (the recommendations of which are now being further progressed by the Commonwealth Government) and the National Emissions Trading Task Force should resolve this issue for the gas industry.

**The JWG notes that agreement on the design and implementation of a national emissions trading system has been given urgent priority, recognising that uncertainty on this issue has the potential to significantly impact the level of uncertainty faced by potential investment in Australian gas projects.**

*Gas reserves availability* is an issue where export projects may be developed in remote areas (such as the Browse Basin) and may not be accessible to domestic markets. Options for addressing this include discussions with developers to promote the shared use of infrastructure to connect to either new or existing onshore facilities.

**The JWG notes that this is a matter best addressed by individual jurisdictions in accordance with the specific circumstances of individual projects. For example, the JWG notes that WA is already taking action to examine and promote the concept of a hub development for Browse Basin gas projects.**

- **Gas Transmission and Distribution Infrastructure**

MMA have identified a number of barriers to gas supply that relate to gas transmission and distribution including:

- aging gas transmission;
- delivery point capacity access of pipelines;
- pipeline regulations;
- infrastructure approvals processes;
- gas quality specifications.

**Aging infrastructure** can contribute to a failure of assets causing short-term supply disruptions. While this highlights the need to properly maintain and upgrade infrastructure, the MMA report also refers to a number of options for improving the management of gas supply failure that have been identified in previous studies and are being or have been implemented.

**Delivery Point Capacity Access** issues such as the inability to access pipeline capacity (for example, because it is fully booked by other users) was identified as a market barrier by a number of stakeholders. While MMA considers that the STTM may partly ameliorate this problem by improving capacity utilisation efficiency, it also suggests a number of additional measures for consideration, including;

- changes to the NGR relating to provision of capacity information;
- new entrants to use interruptible capacity;
- use it or lose it provisions; and
- a requirement that delivery points be owned by distribution companies.

With respect to **pipeline regulation**, stakeholders are in general agreement that recent revisions to the Gas Pipelines Access Law (through the greenfields incentives) and

further changes to the NGL and NGR (such as new form of light handed regulation for covered pipelines) will reduce the disincentives to *new* pipeline investment.

Concerns have been raised by stakeholders that the current pipeline regulations arrangements discriminate against the expansion of existing pipelines. MMA suggests flexible rules to ensure optimal expansion of capacity in existing pipelines should be considered.

**The JWG notes this issue has recently been addressed through amendments to the “new capital investment criteria” (formerly the “new facilities investment test”) in section 83 of the second exposure draft of the NGR, which specifies new provisions that improve the incentives for expansion of existing covered pipelines.**

**The JWG considers at this point in time, the above transmission and distribution-related barriers will be sufficiently addressed by policies and projects that are currently being progressed by MCE, including the development of a gas Bulletin Board and a detailed design for a STTM, the establishment of the AEMO and the introduction of the NGL and NGR.**

**Infrastructure approvals processes** have been identified as time consuming, particularly when multiple jurisdictions are involved, and therefore hindering the development of additional sources of gas supply. MMA also suggests that harmonisation of regulations across jurisdictions would facilitate the appointment of a single jurisdictional authority for approvals of cross jurisdictional projects and/or the appointment of cross-jurisdictional single function regulators along the NOPSA (National Offshore Petroleum Safety Authority) model.

**The JWG notes cooperative arrangements between jurisdictions have resulted in effective management of a number of recent cross-border pipeline approvals processes. The JWG further notes that technical regulation is uniform across the states, with all states adopting AS 2885 in accordance with the 1994 COAG agreement**

A specific issue has also been identified in relation to the **gas quality specifications** in Western Australia, which have been identified as a barrier to entry for gas from certain fields. MMA has recommended that the WA government consider revising its

gas standards regulations in line with the national standard (AS4564) and that the specifications for the Dampier to Bunbury Pipeline subsequently be broadened to match the new specification.

**The JWG notes that the WA government has commenced a review of the State's safety regulations governing gas quality specifications. The JWG supports the introduction of measures that will result in closer alignment of WA specifications with national standards and facilitate access to additional sources of gas supply for the WA market.**



## 4. Risks and Benefits of Inter-jurisdictional Gas Projects.

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There has been a significant increase in inter-jurisdiction gas projects in the Eastern gas market since the mid-1990s. These have helped the overall development and expansion of the market, increasing the diversity of supply for customers, providing suppliers with access to new markets and allowing supply and demand to be balanced more effectively.

Construction of further inter-jurisdictional pipelines is considered by MMA to be highly likely, and will also include linkages between gas developments in Commonwealth waters and onshore facilities in Victoria, Western Australia and the Northern Territory.

In MMA's assessment, the most effective strategy for Governments to mitigate the risks and maximise the benefits from inter-jurisdictional gas projects will be to:

- Engage in project studies with industry to investigate in greater detail the opportunities presented in a national natural gas plan
- Initiate projects which studies show to be viable but for which there are no industry proponents
- Provide support with and streamlining of approvals processes.

**The JWG is of the view that the primary risks associated with inter-jurisdictional developments are the potential for conflicting approvals and regulatory requirements between individual jurisdictions and the exposure to changes in one or more of these regimes once a project has commenced operation. In many ways, they are simply an amplification of the issues faced by intra-jurisdictional projects. Many of these issues can be effectively addressed through the implementation of the NGL and NGR, although it is recognised that the NGL does not cover exploration/production regulation or safety standards/approvals in the construction of pipelines.**

**Development of a national Gas Statement of Opportunities (see next section) and the adoption of other measures for removing barriers to the supply of natural gas (as per section 3) should also aid in the development of inter-jurisdictional gas projects.**

## **5. Options to Balance Domestic and Export Needs.**

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At present consumption levels, Australia's proved gas reserves have a life substantially longer than the estimated 40 years since the initial natural gas discoveries were made. The MMA report states that this represents sub-optimal exploitation of the resource, both from a national perspective and from the perspective of resource lease and licence holders. While domestic demand growth for power generation could be substantial, gas exports as LNG currently represent the major opportunity for increasing gas exploitation.

MMA notes that a balance between gas for domestic and export use cannot be achieved by developing gas separately for each market – in Western Australia and the Northern Territory export development is required to fulfil domestic needs as well.

Even if 'market failure' in the strict sense is not present in the WA gas market, the relatively small domestic demand for gas, relative to the optimal supply from even one reasonable-sized LNG project, means that the focus of such projects will be on exports not on supplying the domestic market. Further, to minimise risk these large LNG projects will typically seek to contract as much of their supply upfront as possible. In such a scenario, meeting small domestic demand would be viewed as a residual to LNG production, possibly leading to a shortfall in domestic supply in the absence of countervailing policies

Policy should therefore have the objective of facilitating gas development for both export and domestic use.

Options identified by MMA to facilitate gas development include:

- Project facilitation (Major Project Facilitation Status);
- Improved infrastructure approvals processes;
- Commonwealth Government assistance with overseas project approvals and contract negotiation;
- Investment in training oil and gas industry personnel; and
- Ensuring that retention lease principles are rigorously applied so that commercial fields are developed. If the domestic market is under supplied and

there is any field that can supply the market on a commercial basis, this mechanism is the last resort to ensure supply in the current framework.

MMA believes that these options and others identified under “Barriers to gas supply” provide the best means to ensure balanced exploitation of gas for export and domestic uses over the next decade.

**The JWG supports MMA’s conclusion that policy should have the objective of facilitating gas development for both export and domestic use. Many of the options identified by MMA for facilitating gas developments (such as improved approvals processes, skills training, and project facilitation) are not limited to the gas sector but apply economy-wide. There are number of initiatives being pursued at both national and individual state and territory levels to address these issues. Encouraging supply diversity into the future will also facilitate competition.**

- A National Natural Gas Plan? – Gas Statement of Opportunities (GSOO)

MMA suggests that current gas planning and decision-making processes can be characterised as:

- Distributed – undertaken by individual participants; or
- Confidential – planning documents are not available for public scrutiny.

MMA believes that a National Natural Gas Plan (NNGP) will be of value to governments and gas users, as well as to the gas industry, as an independent means of communicating on gas supply security with Governments.

MMA suggests that a NNGP should have broad objectives covering:

1. Capacity adequacy: to indicate short-term domestic demand/supply imbalances and the options open to redress them within the available timeframe; and
2. Reserves adequacy: to indicate long-term domestic and export demand growth potential and the implications for supply, taking into account current reserves, likely new discoveries and potential imports.

The features MMA suggest could be contained in a NNGP include:

- Supply/demand projections;
- Supply/demand balance indicators;
- Constraints and capacity development requirements; and
- Measures of reliability and supply security.

The NNGP, as explored by MMA, broadly echoes the concept of the Gas Market Leader's Group's (GMLG) proposed annual gas supply/demand statement including that:

- It should be an indicative plan only and there should be no obligation or authority to implement it; and
- It could be modelled on VENCORP's Gas Annual Planning Report (GAPR) or NEMMCO's Statement of Opportunities (SOO).

Further:

- It could present a forward view of constraints and possible solutions but not a preferred solution;
- Resources used and data required from industry should be reasonable; and
- Plans do not need to make price projections (neither GAPR nor SOO rely upon price projections).

Stakeholder feedback was generally supportive of MMA's approach to a NNGP with many stating that they favoured the market driven approach over a centrally planned and regulated approach to meeting emerging energy demand. As one stakeholder pointed out, market-based approaches have historically worked well in the gas industry and any moves to develop a national gas plan may have unintended consequences in terms of interfering with efficient market-based outcomes. Other stakeholders believed that the NNGP should either incorporate, or be accompanied by, a National Vision for Gas Development in Australia.

There also appeared to be support for MMA's proposed 'traffic light' scheme in a Natural Gas Plan in initiating government policy.

**The JWG notes that the basic purpose and objectives of an NNGP as described by MMA, have been articulated and recommended by the GMLG, in its report to MCE SCO on 30 June 2007, as being an annual gas supply/demand statement.**

**It is also expected by the MCE Market Operator Working Group (MOWG) to be produced by AEMO.**

**The JWG supports the development of what could be called a Gas Statement of Opportunities (GSOO) that at least emulates the purposes and elements of, where possible, existing opportunity statements for the electricity (NEMMCO's SOO) and gas (VENCORP's GAPR) sector. It recommends that the AEMO be assigned this task.**

**The JWG echoes the general views of the GMLG, that the GSOO would not form a basis for centralised planning of gas infrastructure, but would provide a source of information to assist industry participants and other interested parties in their planning and identification of potential investment opportunities.**

**The JWG notes that the Western Australia Government and industry is still considering the appropriateness and benefits of transferring its current gas market operator (REMCORP) to the new AEMO governance structure, the resolution of which may have a bearing on the arrangements established for developing an effective national GSOO.**

## 6. Conclusions and Recommendations

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The development and utilisation of Australia's natural gas resources, including active participation in the global LNG market, produces important benefits through:

- increasing Australia's level of energy security;
- contributing to Australian and global efforts to reduce greenhouse gas emissions;
- and
- providing economic benefits through export revenues, the attraction of investment, and the payment of royalties and taxes.

Australia has considerable resources of natural gas, well in excess of those required for domestic purposes even with significant increases in future domestic consumption. Therefore, to optimise the benefits to Australia, it is appropriate that these resources also be developed to meet demand from both international and domestic markets. Natural gas, like oil, is becoming a global commodity and will increasingly take on the characteristics consistent with the global oil market. In addition, pricing of energy sources will become more aligned.

Economies of scale that can be achieved by access to export markets will be critical in determining the economic viability of developing much of Australia's gas resources. The JWG is therefore of the view that in addition to domestically focussed gas projects, the development of new export LNG projects will assist in bringing on additional sources of gas for the domestic market, particularly in Western Australia and the Northern Territory.

In the context of the domestic market, the objectives of the inter-governmental Australian Energy Market Agreement (AEMA) include the "establishment of a framework for reform to further increase the penetration of natural gas, to lower energy costs and improve energy services, particularly to regional Australia, and reduce greenhouse emissions."

Natural gas is an important part of Australia's energy mix, already being the primary fuel for electricity generation in a number of markets. In an increasingly carbon-constrained world, the importance of natural gas to economic development will

continue to grow. In such an environment, access to natural gas resources represents an area of potential competitive advantage for Australia. Security of gas supplies will therefore be an important consideration for future investment decisions in the energy generation, transmission and industrial sectors of the economy.

The functioning of markets for natural gas, at both the international and domestic levels, remains somewhat immature. This is a result of a number of factors including:

- the remoteness of many major gas resources and the significant costs involved in developing them;
- the geographical separation of major sources of gas supply from gas markets and the associated costs of transporting gas over large distances; and
- the relative immaturity and illiquidity of gas distribution and trading systems, particularly in Australia.

These factors can result in supply/demand imbalances such as the one currently being experienced in Western Australia. Despite being adjacent to the majority of Australia's gas resources, gas consumers in WA are experiencing difficulties obtaining gas and are facing steep price increases, with recent contract prices being more than double those prevailing in the Eastern market. The Northern Territory, with its relatively small market size, is also experiencing difficulties in securing gas for future domestic consumption.

The supply/demand outlook in Eastern Australia is also evolving rapidly and there is insufficient information available to conclude that what appears to be a relatively stable market will be maintained into the future. In particular, it is unclear how the market will respond to new climate change policies (such as an emissions trading scheme or the Queensland Government's 13 percent gas scheme, recently announced to be increased to 18 percent by 2020). This is especially true if plans to develop export LNG projects in the East Coast come to fruition. This will likely exert upward pressure on prices as Eastern Australia would then be connected to the global market.

Recent signals of significant changes to the market, including proposals for new gas transmission pipelines and field development of sources like CSM and conventional

gas in the Eastern market, will require further consideration by governments to understand the implications for the long-term supply/demand outlook in this region.

The MMA consultants report has identified a number of barriers affecting the supply of natural gas for the domestic market and suggests a range of possible options for improving the development and operation of markets for natural gas in Australia.

After considering the MMA report, and feedback from stakeholders, the JWG recommends that attention be centred on the following key priorities:

### Recommendation 1: Acreage management

- The JWG acknowledges the important role that retention leases play in protecting the interests of upstream companies that discover gas resources that are not commercially viable in the short to medium term. It also recognises that the market environment has changed significantly in recent years. As a result, there is an expectation that the prospects for commercialising many known gas resources have improved substantially. In these circumstances it would appear appropriate for the Joint Authority to review existing gas retention leases, implement a more transparent application of existing guidelines, and, where considered appropriate, to request a re-evaluation of commercial viability in accordance with s38H of the Petroleum (Submerged Lands) Act.
- The JWG supports further investigation into improving the current acreage management process, in particular the granting and renewal of retention leases to ensure that processes are transparent and that tests of commerciality are rigorously applied and enforced. Proposed changes should be assessed in terms of the degree to which they are likely to have a positive impact on petroleum exploration and production in Australia. The JWG recommends that the MCMPR Upstream Petroleum and Geothermal Subcommittee be assigned this task, with a requirement to report back to the MCMPR SCO by 1 March 2008.



## Recommendation 2: Improving the operation of existing market structures

- The JWG supports the development and implementation of a Short Term Trading Market for natural gas and a Bulletin Board covering all major gas production fields, major demand centres and transmission pipeline systems. The proposed introduction of these measures should significantly enhance the transparency and operation of the Eastern gas market. Consideration needs to be given to the development of similar arrangements tailored to the specific characteristics of Western Australia's gas market. The MCE should ensure that appropriate systems are set up to monitor and review the effectiveness of these measures once they have commenced operation.
- The JWG supports moves by the WA government to review safety legislation governing the State's gas quality specifications, with a view to aligning them more closely with national standards. Moving to a broader standard will facilitate access to additional sources of gas supply for the WA market.

## Recommendation 3: Development of annual National Gas Statement of Opportunities

- There is significant stakeholder support for increased transparency in gas market operations. The JWG therefore supports the development of a national Gas Statement of Opportunities (GSOO) that emulates existing opportunity statements for the electricity and gas sectors. The objectives of a GSOO will be to assist existing participants and potential new entrants to identify investment opportunities and manage their positions in the market. It will also be available as an information tool for policy makers examining the projected short and long-term reliability of the nation's gas supply.
- The JWG notes that one of the proposed functions of the soon to be established AEMO is the production of an annual national supply/demand statement for gas and therefore supports the development of this function. A similar role should be

considered for any future gas market operator in Western Australia. Arrangements for the sharing of information between the AEMO and any Western Australian gas market operator would allow for the effective production of a national GSOO.

- The JWG recommends that AEMO be required to produce a national Gas Statement of Opportunities on an annual basis, with an outlook of at least 10 years. The GSOO should contain information on:
  - Short and long-term demand and supply projections, considering both capacity and reserves;
  - Supply-demand balance indicators;
  - Major production and transport projects and their status;
  - Major announced contracts, including volumes and duration;
  - Constraints and capacity development requirements; and
  - Measures of reliability and supply security, e.g. a traffic light scheme.
  
- Consideration should also be given to incorporating LNG export demand growth potential and the implications for domestic supply in the GSOO. If incorporated, the GSOO would ideally require full coverage of export markets.

#### **Recommendation 4: Obtaining a better understanding of new market developments**

- The JWG notes that there are several new developments that have the potential to significantly alter the dynamics of natural gas markets in Australia. These include:
  - the introduction of a national greenhouse gas emissions trading scheme at some point in the future;
  - the possible development of export LNG projects in eastern Australia, introducing a new dimension of export price competition into that market; and
  - technological developments which could result in new markets for natural gas, particularly in the transport fuels sector.

- The JWG notes that agreement on the design and implementation of a national emissions trading system has been given urgent priority, noting that uncertainty on this issue has the potential to significantly impact potential investment in Australian gas projects.
- Once the details of an emissions trading system have been determined, the JWG recommends that economic modelling be undertaken of the likely impacts of the trading system on Australian gas (and other energy) markets.
- The JWG also recommends that additional work be undertaken in identifying and evaluating the impact on national gas markets of possible future scenarios, including proposed east coast LNG developments and increased use of gas as a transport fuel.
- The JWG recommends that the relative costs and benefits of pursuing different development options, such as gas as a feedstock for downstream processing or for transport fuel, should also be analysed in order to better understand the full benefits of utilising Australia's natural gas resources.
- The JWG recommends termination of the Joint Working Group on Natural Gas Supply following the conclusion of planned activities and acceptance by MCE and MCMPR of the Final JWG Report.

**Table 1 - Recommendations**

Recommendation	Responsibility	Estimated Completion	Comment(s)
<p>1. Joint Authority to review existing gas retention leases and, where considered appropriate, to request a re-evaluation of commercial viability in accordance with s38H of the P(SL)A</p>	<p><b>Joint Authority</b></p>	<p><b>30 June 2008</b></p>	<p>Leases within 6 months of renewal will not be reviewed as commerciality will be examined as part of the renewal assessment.</p>
<p>2. JWG supports further investigation into improving the current acreage management process, in particular the granting and renewal of retention leases to ensure that processes are transparent and that tests of commerciality are rigorously enforced... The JWG recommends that the MCMPR UPGS be assigned this task, with a requirement to report back to the MCMPR SCO by 1 March 2008.</p>	<p><b>MCMPR UPGS</b></p>	<p><b>1 March 2008</b></p>	<p>To be discussed at UPGS meeting</p>
<p>3. The JWG supports the development and implementation of a Short Term Trading Market for natural gas and a Bulletin Board covering all major gas production fields, major demand centres and transmission pipeline systems. The MCE should ensure that appropriate systems are set up to monitor and review the effectiveness of these measures once they have commenced operation.</p>	<p><b>MCE</b></p>	<p><u>Bulletin Board</u>  <b>Implement 1 July 2008</b>  <b>Review 1 July 2010</b></p> <p><u>STTM</u>  <b>Implement 1 July 2009</b>  <b>Review 1 July 2011</b></p>	<p>GMLG is progressing both the Bulletin Board and the design for the STTM.</p> <p>GMLG is expecting to provide final advice to MCE by end-2007 on the feasibility of implementing the STTM.</p>

4. The JWG supports moves by the WA government to review safety legislation governing the State's gas quality specifications, with a view to aligning them more closely with national standards. **WA Government Q3 2008**

5. JWG recommends that the AEMO be required to produce a national Gas Statement of Opportunities on an annual basis, with an outlook of at least 10 years. **AEMO June 2010**

COAG timetable provides for AEMO to commence operations on 1 July 2009.

6. Once the details of an emissions trading system have been determined, the JWG recommends that economic modelling be undertaken of the likely impacts of the trading system on Australian gas (and other energy) markets. **MCE 1 December 2008**

Further details of an emissions trading system are likely to become much clearer over the next 6-12 months, modelling therefore should be delayed until mid-2008.

7. The JWG also recommends that additional work be undertaken in identifying and evaluating the impact on national gas markets of possible future scenarios, including proposed east coast LNG developments and increased use of gas as a transport fuel. **MCMPR 31 December 2008**

8. Relative costs and benefits of pursuing different development options, such as gas as a feedstock for downstream processing or for transport fuel, should be analysed in order to better understand the full benefits of utilising Australia's natural gas resources. **MCMPR 31 December 2008**

# Appendix A

## Composition of the Joint Working Group on Natural Gas Supply

### **WESTERN AUSTRALIA**

Jim Limerick (Chair)  
Director General  
Department of Industry and Resources  
MCMPR

Dianne Forde (Executive Officer)  
General Manager, Industry  
Department of Industry and Resources  
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Jason Banks  
A/Coordinator of Energy  
Office of Energy  
MCE

Rolando Custodio  
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### **VICTORIA**

Kathy Hill  
Director, Geoscience Victoria  
Department of Primary Industries  
MCMPR

Marianne Lourey  
Executive Director, Energy Division  
Department of Primary Industries  
MCE

Peter Naughton  
Director, National Energy Market Development  
Department of Primary Industries  
MCE

### **TASMANIA**

Dr Tony Brown  
Director, Mineral Resources  
& State Chief Geologist  
Department of Infrastructure, Energy & Resources  
Both Councils

## **NORTHERN TERRITORY**

Bob Adams  
Principal Advisor Minerals & Energy  
Department of Primary Industry, Fisheries & Mines  
MCMPR

Brian Cann  
Assistant Director, Gas Industries (A/g)  
Major Projects, Asian Relations and Trade Division  
Department of the Chief Minister  
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## **NEW SOUTH WALES**

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## **COMMONWEALTH**

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Bob Pegler  
General Manager, Offshore Resources Branch  
Department of Industry, Tourism & Resources  
MCMPR

Drew Clarke  
Head  
Energy and Environment Division  
Department of Industry, Tourism & Resources  
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## **SOUTH AUSTRALIA**

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Director  
Petroleum & Geothermal  
Department of Primary Industries & Resources  
Both Councils

**QUEENSLAND**

Gayle Leaver

Principal Policy Officer

Department of Mines & Energy

Both Councils

Kay Gardiner

Manager Gas Policy Industry & Markets

Department of Mines & Energy

MCMPR



## Bibliography

A. Copeland, K. Donaldson, L. Hogan, E. McGinn, K. Penney & S. Thorpe, 'Australia's gas supply and demand balance: gas security and pricing issues – ABARE report for the Joint Working Group on Natural Gas Supply', *Australian Bureau of Agricultural and Resource Economics*, July 2007.

'energy update 2007: australian energy production, consumption and trade, 1973-74 to 2005-06', *Australian Bureau of Agricultural and Resource Economics*, July 2007.

R. Lewis, M. Goldman & R. Farmer, 'Report to the Joint Working Group on Natural Gas Supply: Natural Gas in Australia', *McLennan Magasanik Associates*, July 2007.

'State of the Energy Market 2007', *Australian Energy Regulator*, 2007.