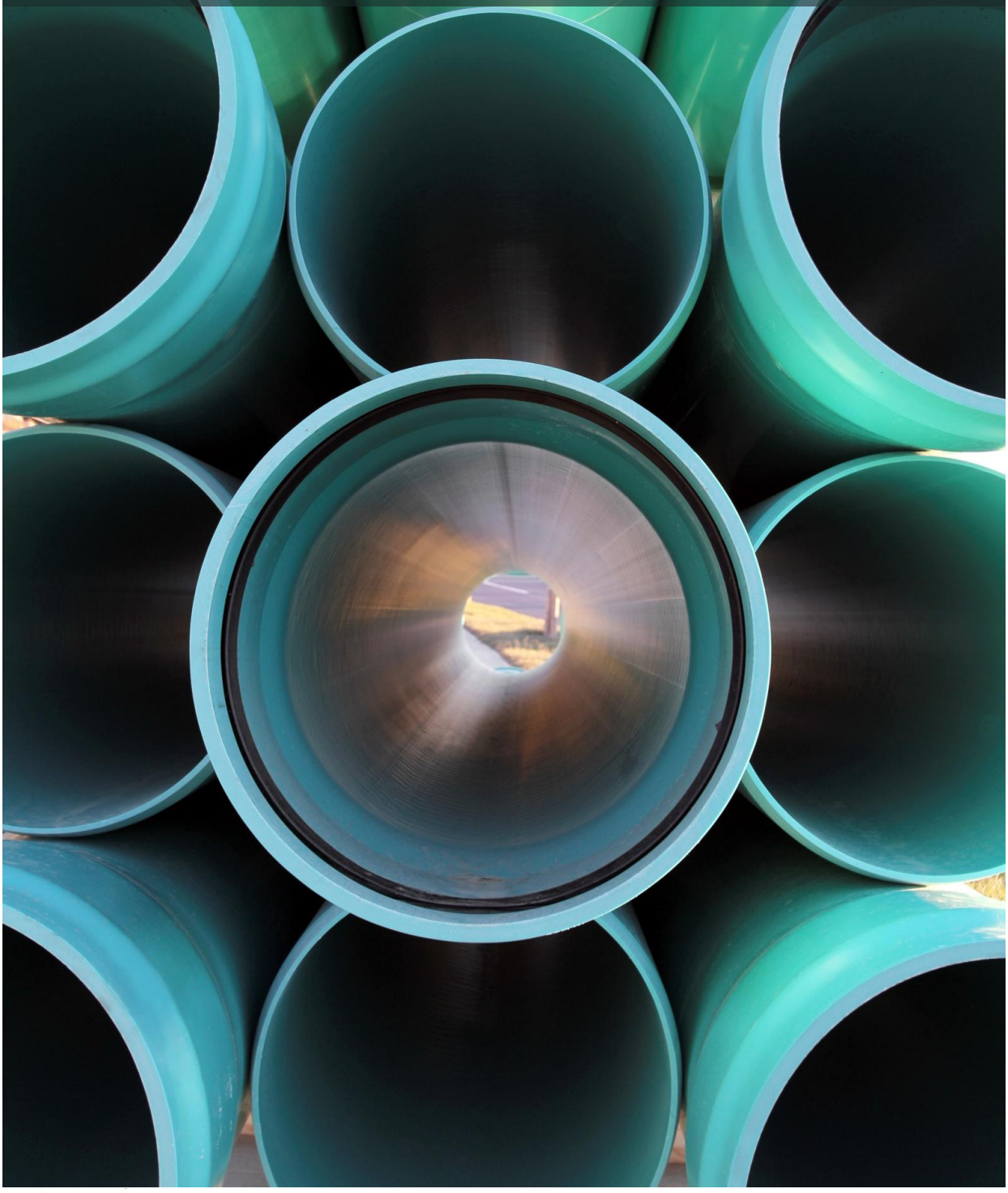
MAKING THE GAS CONNECTION

AN INTRODUCTION TO THE GAS SECTOR FOR CONSUMER ORGANISATIONS

October 2013



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CUAC thanks Bev Hughson (Darach Energy Consulting Services), Jenny Riesz (Centre for Energy and Environmental Markets, University of New South Wales), and Carolyn Hodge (Public Interest Advocacy Centre) for their comments and feedback on a draft version of this report. Views and errors remain ours alone.

An appropriate citation for this report is:

CUAC (2013) *Making the Gas Connection*, Consumer Utilities Advocacy Centre, Melbourne

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

2P	Proven and probable reserves
3P	Proven, probable, and possible reserves
ACCC	Australian Competition and Consumer Commission
AECO	Australian Energy Consumers Organisation
AEMA	Australian Energy Market Agreement
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AIG	Australian Industry Group
APPEA	Australian Petroleum Production and Exploration Association
BREE	Bureau of Resources and Energy Economics
COAG	Council of Australian Governments
DRET	Department of Resources, Energy, and Tourism
DTS	Declared Transmission System (aka VTS)
DWGM	Declared Wholesale Gas Market
ERA	Economic Regulation Authority (of Western Australia)
GHG	Greenhouse gas
GJ	Gigajoule
IMO	Independent Market Operator
IPART	Independent Pricing and Regulatory Tribunal (of New South Wales)
LNG	Liquefied Natural Gas
MCE	Ministerial Council on Energy
MMBTU	Million British Thermal Units
NECF	National Energy Customer Framework
NEM	National Electricity Market
NGM	National Gas Market
PJ	Petajoule
REMCo	Retail Energy Market Company
SCER	Standing Council on Energy and Resources
STTM	Short Term Trading Market
VTS	Victorian Transmission System (aka DTS)

INTRODUCTION

Australia has large quantities of natural gas relative to our population, and our lack of ability to export that gas has meant Australian consumers – particularly those in the eastern and southern states – have enjoyed gas prices significantly lower than in many other countries; anyone producing gas in eastern Australia has had little choice but to sell it to people living here.

However, over the next 5-10 years international gas export capacity on the east coast will expand, linking domestic markets more closely with international markets. Producers will have the choice to continue selling gas within Australia, or selling overseas to customers willing to pay more. At the same time, a number of long term contracts between producers and retailers with historically low prices will expire. This is expected to cause Australian gas prices to both rise and become more volatile. Relatively high levels of committed (contracted) reserves also raise the possibility of supply shortages.

These developments have raised concerns within the consumer and community sectors about the role of gas as a cheaper secondary household fuel for cooking, space heating, and hot water; assets becoming stranded should gas become too expensive; and the potential policy implications for governments in encouraging gas uptake, providing concessions for energy efficient non-gas technology, and securing affordable supply. Such issues are of particular concern in Victoria, where dual-fuel households (electricity and gas) are common and where the great majority of Australia's residential gas consumption occurs.

Households with lower or no direct gas use may also be affected through the increased costs of gas-fired electricity. And while gas is seen as a 'cleaner' fuel than coal, its use may still have undesirable environmental effects.

As the price rises in electricity have forewarned us, the effects of rising gas prices on consumers (as an essential service) will become a larger part of public debate and governments will be called upon to consider policy responses. This report does not attempt to articulate the "consumer view", but to encourage consumer organisations to inform themselves about these issues. Further work is required in the form of research, analysis, and discussion to develop fully articulated consumer perspectives.

How to read this report

Making the Gas Connection provides a high level, easily understandable introduction to the gas sector for consumer and community organisations. It covers gas resources, gas usage, regulation, markets and networks, current issues in gas, future price forecasts, and opportunities for policy engagement. *Making the Gas Connection* is intended to provide readers with a broad understanding of these topics, allowing them to explore individual areas more deeply through the sources referenced and inform their individual positions. It need not be read 'cover to cover', nor in sequence, though the first half of this primer should enable a deeper understanding of the second half.

Section 1 explains what natural gas is and the differences between 'conventional' and 'unconventional' gas. Section 2 describes the location and extent of natural gas resources in Australia, while Section 3 covers how and where they are used. Section 4 provides an overview of regulatory arrangements, and

Section 5 explains the structure and operation of the main Australian gas wholesale markets. Section 6 looks at cost components of gas production, transportation, and delivery.

A key motivation for writing this report was the realisation that Australia faces significantly higher gas prices in the near future. Section 7 provides an overview of current issues in natural gas, including many that will contribute to higher prices, and provides references to key reports for further reading. In the context of these developments, Section 8 compiles forecasts of future gas prices in different regions and the associated increases in household gas bills. Section 9 lists opportunities to engage with key stakeholders on the issues raised, and Section 10 concludes.

1. TYPES OF GAS

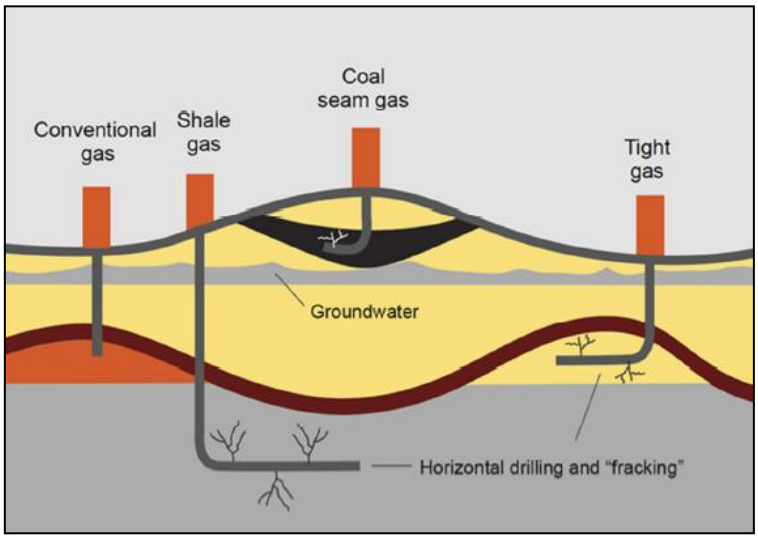
This section explains what natural gas is and the differences between various types of gas, such as 'conventional' and 'unconventional' gas.

Natural gas forms from decomposed organic material and is conventionally extracted from large underground reservoirs, the tops of which are non-porous rock. Drilling through the top layer allows the gas – methane or other hydrocarbons (e.g. propane, butane) – to escape to the surface.[1]

Deposits of gas not in contiguous chambers, but in smaller, separate bubbles are known as 'unconventional gas'. Types of unconventional gas include coal seam gas (CSG), shale gas, and 'tight' gas. Coal seam gas is trapped in seams of coal by the pressure of surrounding water, which must be pumped off before the gas can escape. Shale gas and tight gas are found in layers of rock with low permeability, such as sandstone or denser types. Figure 1 illustrates the differences.

Because unconventional gas isn't found in one large chamber and doesn't flow well, it is usually necessary to drill many more wells than for conventional gas. To increase the flow of gas from unconventional deposits, producers sometimes inject fluid into the rock under pressure to hydraulically fracture ('frak') it.[2] This is sometimes referred to as "fracture stimulation".

Figure 1: Conventional vs. unconventional gas



Source: (Wood, Carter, & Mullerworth, 2013, p. 7)

Gas can be measured in cubic metres, but is more commonly referred to by energy content (joules). Households may burn several megajoules (MJ) of gas per day, or several gigajoules (GJ) over the year (see Section 3, Usage); readers with gas at home are encouraged to refer to their household usage to get a sense of scale. Industrial use may be in the order of terajoules, and reserves are in the order of petajoules (PJ).[3]

[1] (Berry, 2009)
[2] (Wood, Carter, & Mullerworth, 2013)
[3] One petajoule = one thousand terajoules = one million gigajoules.

Unless otherwise specified, references in this report will be to *proven plus probable* (2P) gas reserves. The terms *proven* (or *proved*) and *probable* relate to reserves anticipated to be commercially recoverable, in decreasing order of likelihood. Proven reserves (1P) have at least a 90% probability that the quantities recovered will equal or exceed the low estimate; probable reserves (2P) at least 50%; and a third category, *possible reserves* (3P), at least 10%.[4] Reserves are regularly reclassified according to changes in geoscience, engineering, and operating conditions; rising gas prices, for example, make larger quantities of gas profitable to extract.

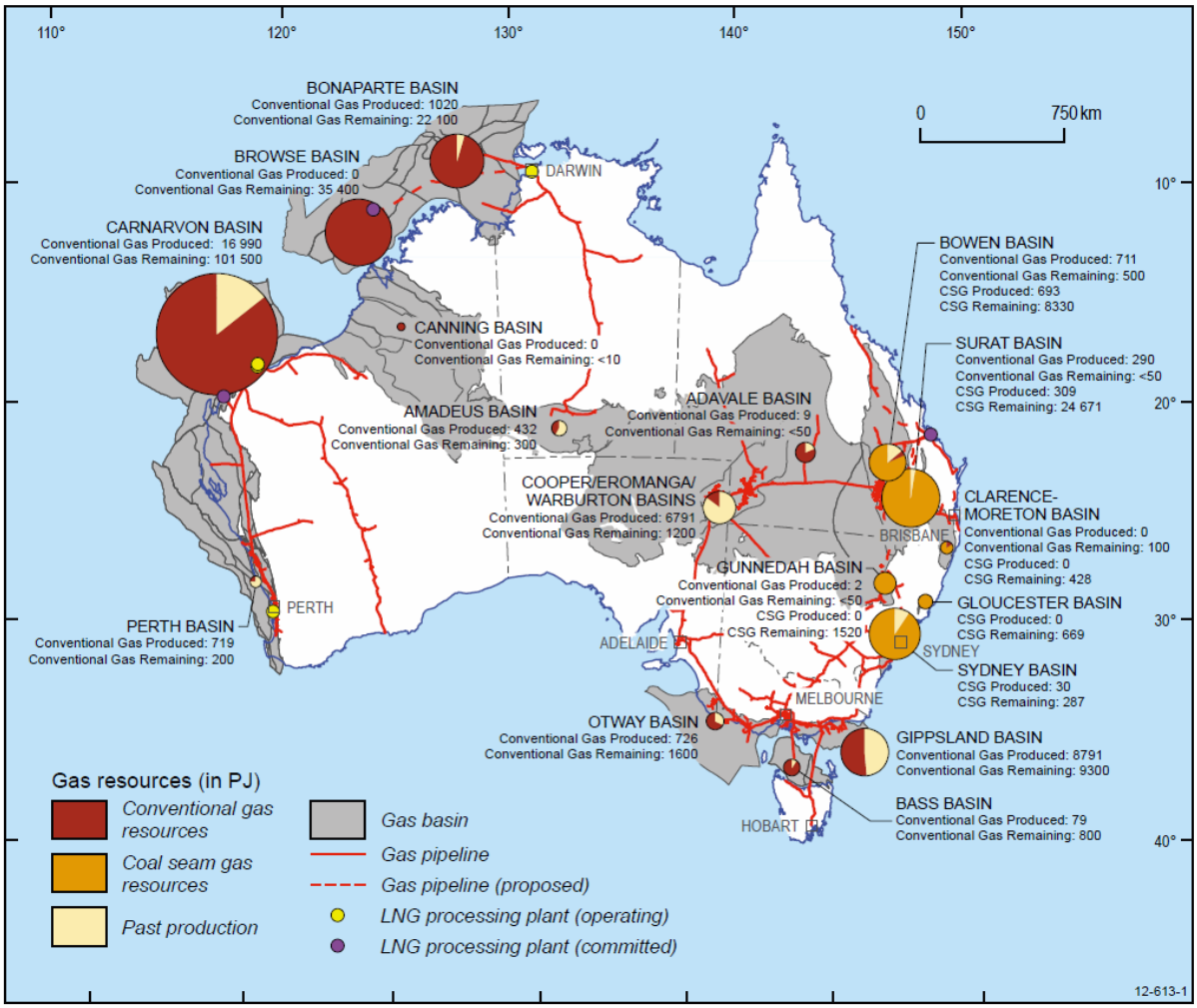
[4] (Geoscience Australia and BREE, 2012, p. 51). For a useful diagram of resource classification terms, see p.18 of Hogan, L., et al. (1996) *Net Economic Benefits from Australia's Oil and Gas Resources: Exploration, Development and Production*, ABARE Research Report 96.4.

2. RESOURCES

This section describes the location and extent of natural gas resources in Australia.

Australia's gas reserves can be separated by their location in eastern, western, and northern Australia (see Figure 2).[5] These are also separate regional markets, as the large distances between them make it uneconomic to link them (see Section 5, Wholesale markets).

Figure 2: Australian gas resources and major pipelines, 2012



Note: For remaining resources, conventional gas values represent total demonstrated resources (economic and sub-economic); CSG values show 2P reserves

Source: (Geoscience Australia and BREE, 2012, p. 2)

The majority of Australia's (2P) gas is in conventional basins, of which the largest are Western Australia's Carnarvon basin (51.8% of total reserves) and Browse basin (12.4%).[6] The next largest conventional gas reserves are Victoria's Gippsland basin (2.9% of total reserves), the Cooper basin

[5] Eastern Australia includes Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia, and Tasmania.

[6] (AER, 2012, p. 87). As of August 2012.

(1.2%) spanning South Australia and Queensland, North Australia's Bonaparte Basin (0.8%), and the Victoria Otway/Bass basins (0.8% combined).

Almost 30% of Australian gas is in coal seams: Queensland has 27.8% of total Australian reserves in the Surat-Bowen basin, while NSW has a further 2.0% across its basins. CSG forms the bulk of both Queensland's and NSW's gas reserves.

AEMO estimates that "eastern and south eastern Australia have sufficient gas resources to meet demand over the 20-year outlook period to 2032, based on industry developing 2P reserves in a timely way to meet growing demand from both the domestic and LNG export markets." (AEMO, 2012a, p. iii)

3. USAGE

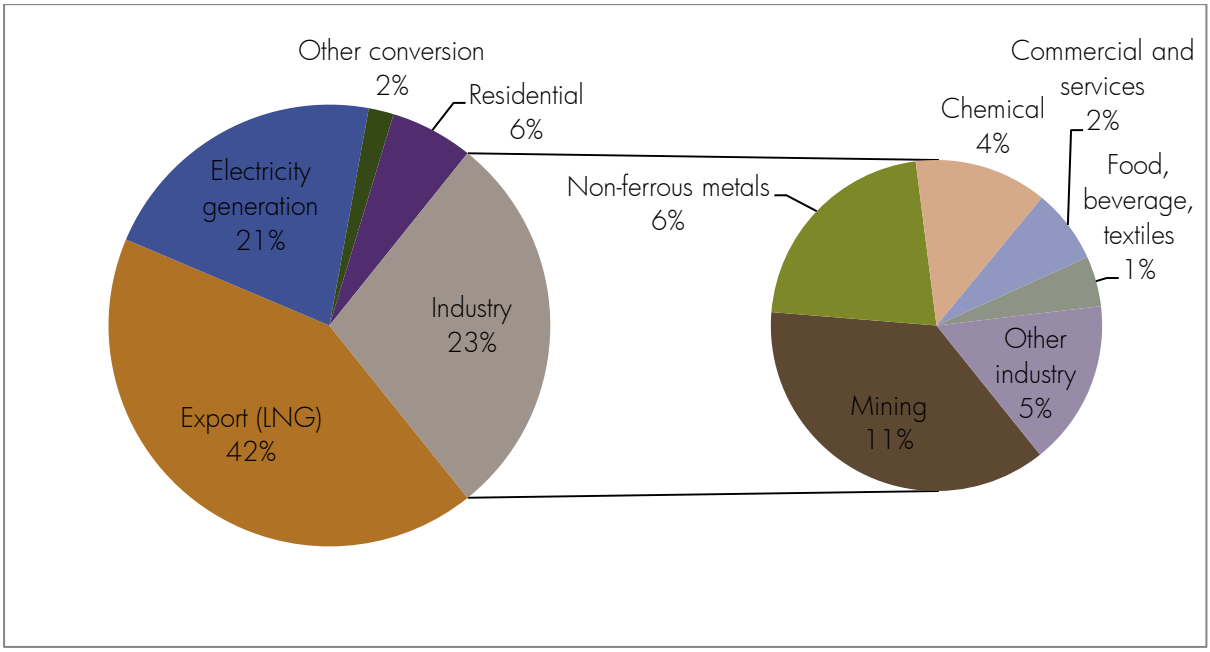
This section explains how and where Australian natural gas is used.

The four main uses for gas nationally are:

- conversion to liquefied natural gas (LNG) for export;
- industrial use (e.g. in mining or fertiliser production);
- power generation and other conversions; and
- residential use (space heating, water heating, and cooking).

Figure 3 shows their relative share of gas usage.

Figure 3: Gas consumption in Australia by usage category, 2011-12



Note: Percentages are of 2011-12 domestic gas production (2270.2 PJ) net of imports (+232.4 PJ) and stock changes (-16.1 PJ) = 2486.5 PJ.
Source: (BREE, 2013a)

Exports

All Australian exports of gas (as LNG) currently come from offshore basins in Western Australia and the Northern Territory; 99% of LNG exports stem from WA's Carnarvon basin.[7] This is expected to change as gas liquefaction facilities and export terminals are completed on the eastern seaboard from 2014 onward (see Section 7, Price pressures and current issues).

Electricity generation

The use of gas for power generation is chiefly in peaking plants, which operate non-continuously to produce electricity when prices rise high enough (typically during demand peaks). This is due to a combination of economic and technical reasons. Gas power plants generally cost less to build than the

[7] (AER, 2012)

other traditional power plant type, coal, but have higher fuel costs; they're therefore more profitable running only to meet peak demand. Additionally, the generation from gas peaking plants can be increased/decreased more rapidly in response to demand (price) fluctuations than generation from other sources.

The (small) number of gas baseload plants was expected to increase in the future, as carbon pricing made coal less competitive. However, recent developments have placed that in question (see Section 7, Price pressures and current issues), including the recent election of a Coalition Government, which has indicated that it plans to rescind the carbon price and develop a new Energy White Paper.[8]

Residential

Two thirds of all residential gas use occurs in Victoria, forming roughly one third of total state gas consumption. In other states, residential demand is much smaller.[9] This is due to a combination of historical, geographical, and climatic factors. After significant quantities of gas were discovered in Victoria's Gippsland and Otway basins in the 1960s, the actions of the Victorian Government and Gas and Fuel Corporation (including strong reticence toward interstate exports) led to high levels of penetration.[10]

While significant quantities of gas were also discovered in Queensland, South Australia, and Western Australia around the same time, their different governmental policy approaches, locations of gas relative to population centres, and warmer climates meant gas usage is far less prevalent than in Victoria. Tasmania, while it has a similarly cold climate to Victoria, has almost no gas reserves, and needs to import its gas from Victoria.[11] Thus, while gas is the main source of heating for close to 70% of Victorians, the figure is less than 3% in Tasmania, where electricity (66%) and wood (28%) dominate.[12]

Table 1 shows how these different conditions are reflected in the levels of gas penetration and usage for selected states, and Table 2 calculates the average bills for different capital cities.

Table 1: Residential gas penetration and usage for selected states, 2010-11

	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania
Gas penetration rate (capital city) [a]	47.7%	91.0%	18.6%	75.2%	83.9%	6.2%
Gas penetration rate (non-capital) [a]	25.3%	57.5%	5.0%	13.7%	24.5%	3.1%
Gas penetration rate (state) [a]	38.9%	81.6%	10.9%	58.4%	68.3%	4.4%
Annual usage (state) [b]	24.3 PJ [d]	100.2 PJ	2.9 PJ	10.7 PJ	10.0 PJ	0.1 PJ
Average annual household usage [c]	21 GJ [d]	57 GJ	15 GJ	28 GJ	16 GJ	11 GJ

[a] (ABS, 2011a) [b] (BREE, 2013a) [c] Total state usage (BREE, 2013a) ÷ number of households with mains gas (ABS, 2011a) [d] Includes ACT

[8] (L/NP, 2013)
[9] (AER, 2012)
[10] (Kimber, 2009). "Gas penetration" refers to percentage of households with a gas connection.
[11] (Lowe, 2013)
[12] (ABS, 2011a) Table 12

Note that the usage figures for NSW in Table 1 include the ACT. This probably raises average NSW usage, as the ACT has a high territory-wide penetration rate of 74.6% (ABS, 2011a) and reasonably high consumption – see Table 2. The Northern Territory has a mains gas penetration rate of around 3%, though the ABS cautions that this estimate is unreliable.

Table 2: Average residential capital city expenditure on mains gas, 2009-10

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra
Weekly	$5.40	$14.43	$1.75	$8.92	$8.42	$0.99	-	$15.69
Yearly	$281.57	$752.42	$91.25	$465.11	$439.04	$51.62	-	$818.12

Source: Table 23A (ABS, 2011b), own calculation

According to the NSW Independent Pricing and Regulatory Tribunal (IPART), household use of gas for cooking is around 500 MJ per quarter. Reflecting differences in heating usage, "residents of freestanding houses tend to use more gas than residents of semi-detached dwellings and flats, and households in cold climates tend to use more gas than those in warmer areas."[13]

Table 3 shows the differences in levels of gas consumption between high-usage, medium-usage, and low-usage households (based on tertiles, i.e. one-third of customers). It is notable that the bottom third of Victorian households use almost as much gas as the top third in Queensland, and more than the middle third in New South Wales or South Australia, demonstrating the different importance of gas in different states.

Table 3: Average annual gas usage for AGL customers by state and tertile, 2012 (GJ/a)

	New South Wales	Victoria	Queensland	South Australia
Bottom tertile	8.7 GJ	22.1 GJ	5.7 GJ	7.5 GJ
Middle tertile	18.9 GJ	52.7 GJ	10.9 GJ	16.3 GJ
Top tertile	42.6 GJ	99.2 GJ	23.5 GJ	39.2 GJ
Average	23 GJ	58 GJ	13 GJ	21 GJ

Source: (Nelson, Securing Gas Supplies for Domestic Consumption in the Long Term, 2012, p. 109), own calculation. Excludes AGL customers not using gas.

[13] http://www.ipart.nsw.gov.au/Home/For_Consumers/Compare_Energy_Offers/Typical_household_energy_use, retrieved 19.08.2013

4. REGULATION

This section briefly describes the regulatory environment for natural gas, drawing chiefly on DRET (2012, p. 138). For a fuller discussion of regulatory arrangements, see Chapter 7 of AEMC (2013).

Offshore gas resources are owned and regulated by the Commonwealth, while onshore resources and owned and regulated by the states and territories.

The Council of Australian Governments (COAG) entered into the Australian Energy Market Agreement (AEMA) in 2004, which establishes a national legislative framework for electricity and gas consisting of the National Electricity Law, National Electricity Rules, National Gas Law, and National Gas Rules.[14]

COAG also established the Ministerial Council on Energy (MCE) to drive energy reform, which operated alongside the Ministerial Council on Mineral and Petroleum Resources until both were replaced by the Standing Council on Energy and Resources (SCER). SCER's brief is "to ensure the safe, prudent and competitive development of the nation's mineral and energy resources and markets to optimise long-term economic, social and environmental benefits to the community." (COAG, 2011, p. 1)

The National Gas Law applies in all states and territories except Western Australia, which has adopted a modified version under the National Gas Access (WA) Act 2009. Under the national framework, responsibilities are broadly vested in three bodies:

- The Australian Energy Market Commission (AEMC) is responsible for making rules that govern the gas market (such as the economic regulation of gas transmission and distribution services, or access to natural gas pipeline services), developing gas markets, reviewing the energy market framework, and providing advice to SCER.
- The Australian Energy Market Operator (AEMO) is responsible for the day-to-day operation and administration of the gas wholesale and retail markets in all jurisdictions except Western Australia and the Northern Territory. Retail market operation and settlement in Western Australia is the responsibility of the Retail Energy Market Company (REMCo).
- The Australian Energy Regulator (AER) is responsible for the economic regulation of pipelines subject to regulatory arrangements under the National Gas Law, for gas transmission and distribution networks, and for enforcing the National Gas Law and National Gas Rules in all jurisdictions except Western Australia. The western market (including gas pipelines) are regulated by the Western Australian Economic Regulation Authority (ERA)

The AEMA is complemented by the National Energy Customer Framework (NECF), which provides customer protections for retail sales of electricity and gas to residential and small business customers. The NECF has currently been implemented by New South Wales, South Australia, Tasmania, and the ACT. Victoria and Queensland plan to implement the NECF, while Western Australia and the Northern Territory are not covered.[15] Retail gas prices are regulated in only New South Wales, by IPART.[16]

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[14] http://www.aer.gov.au/node/460, retrieved 21.08.2013
[15] http://www.scer.gov.au/workstreams/energy-market-reform/national-energy-customer-framework/, retrieved 14.10.2013
[16] http://www.aer.gov.au/retail-markets, retrieved 21.08.2013

5. WHOLESALE MARKETS

This section describes the structure of the main gas wholesale markets in Australia.[17]

The Australian domestic gas market consists of three economically and geographically separate markets in the east, west, and north (see also Figure 2). While the trends for each may appear similar, the markets differ in their resource base, current and future production, demand profile, and maturity of their infrastructure, and should be assessed separately.[18]

The eastern seaboard is covered by the National Gas Market (NGM), the most mature, competitive, interconnected, and largest of the three Australian markets.[19] The NGM has four spot markets: the Declared Wholesale Gas Market (DWGM) in Victoria and a Short Term Trading Market (STTM) with a separate market or trading "hub" in Sydney, Brisbane, and Adelaide. The hubs operate separately, but under the same rules. The DWGM and STTM are explained in more detail in Appendix I: East coast spot markets.

The majority of wholesale gas traded is via bilateral, confidential, long term contracts between a small number of parties, with a small but growing proportion of trade occurring through the spot markets.[20] The NGM and its spot markets are operated by the Australian Energy Market Operator (AEMO), but bilateral contracts for gas and contracts for pipeline capacity are not covered by AEMO nor regulated by the AER.

The relatively low share of total trade (5%-20%) leads Lowe (2013, p. 53) to describe the spot markets as "more of a market-based balancing mechanism that overlay the bilateral contracting arrangements … than a commodity market."

The Western Australian market is operated by the Retail Energy Market Company (REMCo).[21]

[17] This section draws heavily on (AEMO, 2011), (AEMO, 2012b), and (Hughson & Johnston, 2012)
[18] (DRET, 2012, pp. 135, 139)
[19] (DRET, 2012)
[20] In the year to June 2012, the proportion of gas through spot markets was 5% in Brisbane, 8% in Sydney, 12% in Adelaide, and 20% in Victoria. (Deloitte, 2013, p. 44)
[21] http://www.remco.net.au/

6. COST COMPONENTS

This section looks at the different cost components of producing, transporting, and selling gas.

The cost base of supplying gas to end (retail) users consists of four components:

- Wholesale (exploration and production);
- Transmission (high pressure pipelines);
- Distribution (lower pressure pipelines); and
- Retailing.

The size of the components is difficult to calculate, as little information is publicly available. Compared to electricity markets there are fewer producers and retailers, bilateral contracts make up a greater proportion of trade (as opposed to spot markets), and those contracts are often longer and confidential. The AER estimates the cost components of residential gas bills for New South Wales and South Australia yearly (see Table 4) but lacks the data to do so for other jurisdictions.

Table 4: Estimated cost components of a residential gas price, 2012

	Wholesale	Network	Carbon	Retail
New South Wales	32%	45%	5%	18%
South Australia	15%	60%	5%	20%

Notes: "Network" costs include both transmission and distribution.
Source: (AER, 2012, p. 127)

In previous years when more data was available, ACIL Tasman estimated the cost components of residential gas prices for selected capital cities for the AER – see Figure 4.

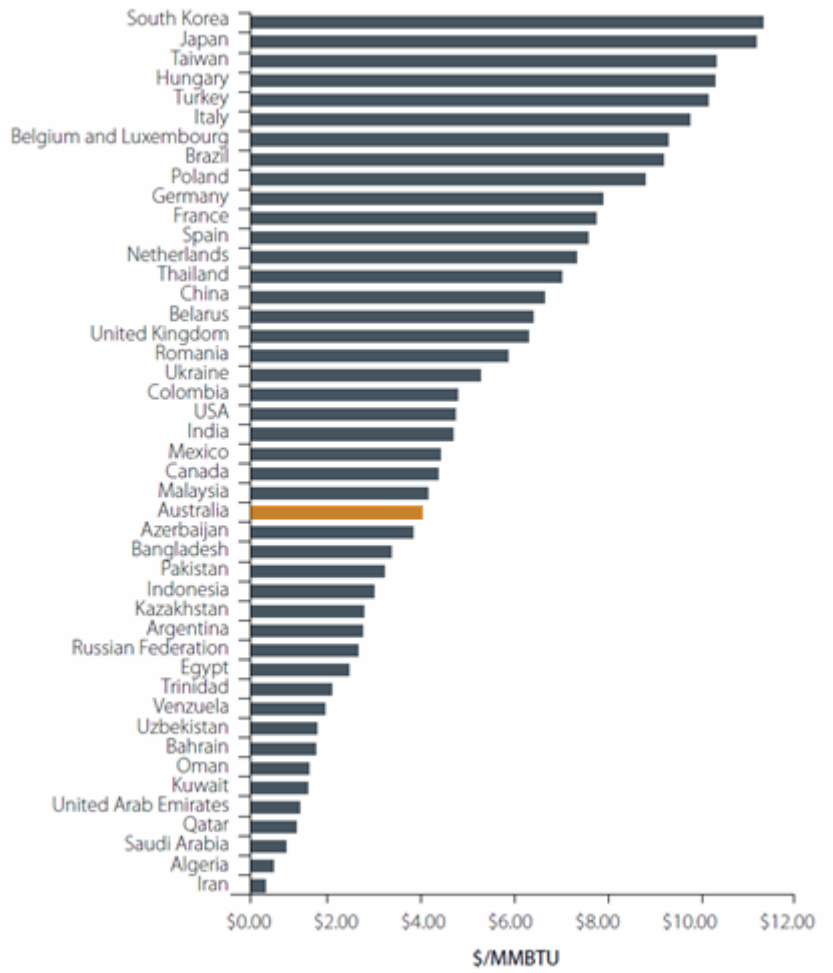
Figure 4: Estimated cost components of residential gas price, 2008

Source: (AER, 2008)

Differences in the absolute and relative size of cost components, particularly network costs, can be significantly influenced by geography (see below). Other differences are more idiosyncratic and not easily explained.

Australian wholesale gas prices have historically been low compared to other countries (see Figure 5) due to lack of exposure to international markets. This is expected to change as LNG export capacity increases on the east coast.

Figure 5: Average wholesale gas price by country, 2010



Notes: MMBTU = British Thermal Unit (millions) ≈ GJ
Source: (BREE, 2012b, p. 49). Highlights added by author.

Transmission and distribution cost structures are broadly similar, with the principal component being the gradual recovery of past capital expenditure (capex), and the remainder operating costs (opex). For transmission (transportation of gas through large pipelines at high pressure) the capex/opex split is roughly 70/30; for distribution (transportation of gas through smaller pipelines at lower pressure) the capex component is lower. [22]

Similar to electricity networks, the main cost drivers of network costs are therefore the:

- Cost of capital;
- Volume of demand compared with the capacity of the pipes; and
- Load factor of demand, i.e. how 'flat' it is (degree of variation between maximum and minimum demand).

[22] (Berry, 2009)

Distribution charges can also vary depending on the proximity of customers and the difficulty of laying pipes in particular terrain.[23] When buildings are close together the average length of pipe required to connect each one is less (and therefore cheaper) than when they are far apart, and digging trenches can be more expensive in areas with rocks, trees, clay, very loose soil, or that are difficult to gain access to.

Industrial loads tend to be flat – consistent throughout the day – while residential and small commercial loads are more volatile or 'peaky'. Transmissions pipelines, writes Berry (2009), tend to cater for this by requiring retailers to reserve pipeline capacity across the whole of the day, whether that capacity is continually used or not. This capacity charge typically exceeds the volumetric charges for transporting gas.

There is little public information about the cost components of gas retailers' operations.

[23] (Berry, 2009)

7. PRICE PRESSURES AND CURRENT ISSUES

This section provides an overview of several current issues in natural gas, with references to selected material for further reading. Issues discussed include the development of LNG export capacity on the eastern seaboard, possible supply shortages, development of unconventional gas (including CSG), market efficiency, and environmental effects. Each of these is addressed in a sub-section; readers interested in further discussion are advised to examine the publications listed in Box 1.

A large concern arising out of these issues for stakeholders including consumer organisations is possible price spikes, which carry particular risk for end users whose gas costs are a large component of expenditure and/or who have little ability to alter their usage. Possible price developments are covered in Section 8, Future price rises and household bills.

Industries likely to be most vulnerable to high gas prices are feedstock industries such as fertiliser and basic chemical manufacture, large-scale mineral processing facilities, combined-cycle gas turbine (CCGT) electricity generating plants.[24]

Smaller gas users, such as residential and commercial gas consumers and smaller industrial facilities, are generally less sensitive to wholesale gas price rises than large industrial users or electricity generators. However, low income and vulnerable households can be disproportionately and inequitably disadvantaged by higher gas and electricity costs if (when) gas prices rise.[25] Low income consumers are particularly at risk of detriment from rising prices as they often lack the access to the resources required to upgrade their energy efficiency (e.g. through better appliances or insulation), and utility bills form a larger proportion of their expenditure than for other household types.

Further issues identified by consumer organisations,[26] though not yet the subject of wider discussion nor addressed in this report, include:

- The effects of rising gas prices on renters or other groups that face constrained choices about forms of energy use;
- The possibility of stranded gas assets (both for consumers and networks);
- Whether new residences should continue to be connected to gas;
- The implications for government promotion of and investment in gas appliances in government-owned buildings, in particular social housing;
- Appropriate concessions for gas appliances versus energy-efficient non-gas appliances (e.g. the Victorian "Warmer Winter Discount" for high efficiency gas space heating); [27] and
- The need to revisit government policy to examine the implications of gas price increase on consumers, particularly in Victoria and states where gas usage is high.

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[24] (ACIL Allen Consulting, 2013a)
[25] (ACIL Allen Consulting, 2013a)
[26] Consumer Action Law Centre (CALC) and Alternative Technology Association (ATA), personal communication
[27] http://www.sustainability.vic.gov.au/www/html/3439-victorian-government-warmer-winter-discount.asp retrieved 22.08.2013

Box 1: Further reading on gas issues

Leading regular reports covering issues in gas include:

- the AER's *State of the Energy Market* series (national, since 2007);
- AEMO's *Gas Statement of Opportunities* (GSOO) series (eastern and south eastern Australia, since 2009);
- the Queensland Government's *Annual Gas Market Review* (Queensland, since 2010); and
- the Independent Market Operator's (IMO) GSOO series (Western Australia, since 2013).

Systemic issues have also been analysed by a number of irregular reports and publications,[28] notably including:

- the *Energy White Paper 2012* (DRET, 2012);
- the *Gas Market Scoping Study* report for the AEMC (Lowe, 2013);
- *Assessment of the East Coast gas market and opportunities for long-term strategic reform*, for the Energy Supply Association of Australia (Deloitte, 2013)
- *Australia's Natural Gas Supply: an assessment of current policy issues and options,* for the Australian Pipeline Industry Association (ACIL Allen Consulting, 2013a);
- *Getting gas right: Australia's energy challenge* (Wood, Carter, & Mullerworth, 2013);
- Gas Wholesale Markets, and Retail Competition in NSW and Victoria (Hughson & Johnston, 2012);
- Gas Pricing – Cost Drivers and Scenarios for Future Price Directions (Berry, 2009).

7.1 Exports

The Asia-Pacific region accounts for nearly 60% of global LNG demand,[29] and Australia is expected to become the world's second largest exporter of LNG in the coming decades.[30]

Australian domestic gas prices have been generally low by international standards – until recently, typically $3-4 per gigajoule; see also Figure 5. They have also been relatively stable, reflecting long term supply contracts and gas' historical role as a substitute for coal and coal fired electricity generation; Australia's low cost coal sources have effectively capped gas prices.[31] LNG export prices, on the other hand, have almost tripled in last decade as global demand has increased, reaching $11.47/GJ in 2011-12.[32]

To export natural gas, it has to be liquefied by cooling it to -161°C before being loaded onto ships. At present, commercial liquefaction and shipping facilities – known as "trains" – exist only in Western Australia and the Northern Territory. However, in 2014 and 2015 several LNG trains will begin operation in Queensland (see Table 5), exposing the eastern gas market to a degree of international price competition. Further trains will also open in WA and the NT.

[28] See e.g.
[29] (AEMO, 2012a)
[30] (DRET, 2012)
[31] (AER, 2012)
[32] (BREE, 2013b)

Table 5: LNG export projects committed to/under construction, Australia, March 2013

Project name	Owner	State	Start up	Capacity (Mt/a)	Capacity (PJ/a)^
Queensland Curtis LNG	QGC (BG Group)	QLD	2014	8.5	462
Australia Pacific LNG	Origin Energy Ltd (operator); ConocoPhillips; Sinopec	QLD	2015	9	490
Gladstone LNG	Santos (operator); Petronas; Total; Kogas	QLD	2015	7.8	424
Gorgon LNG	Chevron (operator); Shell; ExxonMobil; Osaka Gas; Tokyo Gas; Chubu Electric	WA	2015	15.6	849
Prelude (floating LNG)	Shell	WA	2016	3.6	196
Wheatstone LNG	Chevron (operator); Apache; KUFPEK; Shell	WA	2016	8.9	484
Ichthys LNG	INPEX (operator); Total	NT	2017	8.4	457

Note: Current LNG export capacity is 20.6 Mt/a in WA and 3.7 Mt/a in the NT.

^ Conversions based on 1 Mt = 54.4 GJ/t (BREE, 2013a, p. x).

Source: Adapted from (BREE, 2013b, p. 77)

To place the new export capacity into perspective: in the year to June 2012, eastern Australia produced 700 PJ of gas,[33] and in the year to June 2011, households in the eastern states consumed 138 PJ (see Table 1). Queensland's three LNG trains will together be capable of exporting around 1376 PJ per year. While this export capacity is expected to be largely met by increases in gas production, it is still almost ten times as large as the combined eastern state residential gas demand, and twice as large as the total east coast demand. This represents a fundamental shift in the dynamics of Australian gas markets.

Domestic reserve

A domestic reserve (or 'set-aside') of gas involves requiring producers to sell a certain amount of gas on the domestic (Australian, not just residential) market rather than export it. It has been suggested by parties including the non-government members of the Prime Minister's Taskforce on Manufacturing, some large energy users, a recent NSW Parliamentary Committee, Manufacturing Australia, and The Australia Institute.[34]

A form of trade restriction – also known as protectionism – the aim of a domestic reserve is to delink domestic and international markets, with the domestic price then being set by the interplay of demand and (mandated) supply. With a high enough reserve, domestic prices could be cheaper than foreign prices.

There is considerable opposition to a domestic reservation policy, primarily based on classical economic arguments against protectionism.

The typical argument against a reservation policy[35] is that it will place downward pressure on domestic gas prices in the short term, but that these lower-than-normal prices will lead to higher-than-normal consumption of gas and investment in associated products or industries. This higher consumption and

[33] (AER, 2012, p. 87)

[34] (Prime Minister's Manufacturing Taskforce, 2012) ; (BREE, 2012b) ; (Manufacturing Australia, 2013); (Grudnoff, 2013)

[35] See e.g. (BREE, 2012b, p. 60)

investment is only viable due to the implicit subsidy of gas consumers by gas producers, as the latter have to sell their gas more cheaply than they otherwise would. This comes with a welfare loss: the benefits to consumers are less than the cost to producers.

In the long term, resources flow to or remain in industries that use gas inefficiently (i.e. only because it is abnormally cheap) when those resources could be reallocated to more efficient uses. At the same time, producers who would normally have invested in the gas industry stay away or leave due to the lower returns, putting their resources into worse investments. Most current gas developments, for example, are only occurring because of the expectation the gas can be sold overseas.

Taken too far, an industry that should have gradually declined or evolved with changing prices can find itself dependent on protectionist policies for survival and face sudden, painful restructuring when conditions change beyond governments' willingness to subsidise it. (A current example is the Australian automotive sector.)

Even before this point, the existence of a reserve can lead to resources being wasted on lobbying by affected parties, and the overall redistribution of welfare (from producers to consumers) comes at a net cost to the Australian community.[36]

Opposition along these lines has been expressed by the Commonwealth, think tanks, academic economists, the ACCC, gas producers, and retailers.[37] As the issue has only recently emerged in the media and through some policy processes, many community and consumer organisations are still grappling with the information, options, and implications and have yet to formalise their responses.

While Western Australia reserves 15% of gas production for the local market, the Energy White Paper suggests "there is no compelling evidence [the WA reserve] has constrained domestic prices." (DRET, 2012, p. 145) Prices for gas in WA and the Northern Territory are close to double those in the east (see Table 7).

Further, the WA reservations were agreed upon before the gas projects were committed to. The Australian Industry Group (2013) notes the legal and investment risks carried by imposing reservation policies on existing projects, and, while opposing a domestic reserve, instead calls for a 'national interest test' to apply to new or significantly expanded LNG export capacity. A national interest test is also supported by Manufacturing Australia.

While different in operation, the intention of a national interest test is the same as that of a domestic reservation policy: to increase the amount of gas available for domestic consumption at the expense of exports. As such, similar economic arguments apply.

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[36] (BREE, 2012b, p. 60)

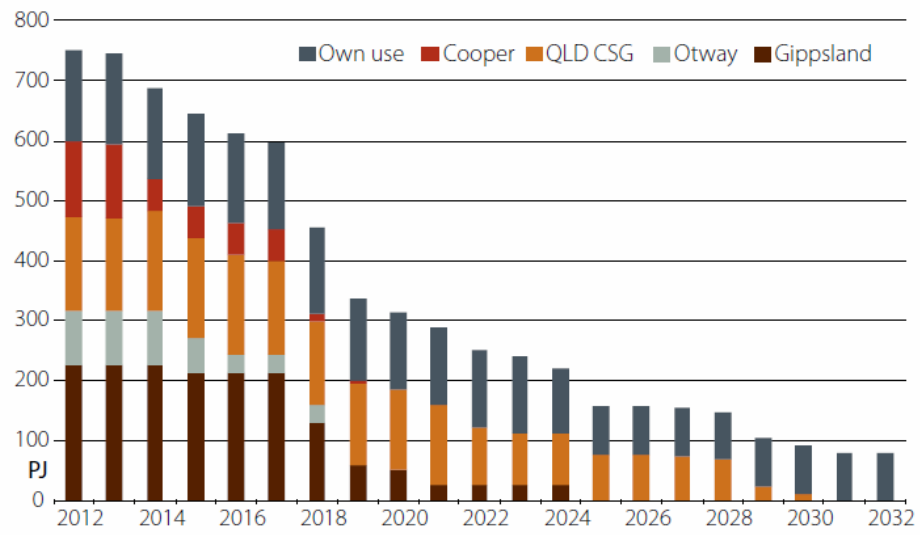
[37] (DRET, 2012) ; (Wood, Carter, & Mullerworth, 2013) ; "A gas reservation scheme is protectionism in disguise" http://theconversation.com/a-gas-reservation-scheme-is-protectionism-in-disguise-11810 retrieved 13/08/2013 ; "Gas producers shun manufacturers' calls for domestic reserves" http://www.afr.com/p/business/sunday/gas_producers_shun_manufacturers_2N7X71N6xH8bCafeMC8HpJ retrieved 13/08/2013 ; (Nelson, Ensuring Domestic Supplies of Natural Gas for Australian Businesses and Households, 2013)

7.2 Supply constraints

Industrial gas users are concerned about gas supply on the eastern market. When surveyed by the Australian Industry Group in April/May 2013 (Energy shock: the gas crunch is here, 2013), 10% of respondents[38] stated they could not get offers for new gas contracts, 32% stated they could not get "serious offers", and 26% were able to get offers from only one supplier (i.e. were not facing a competitive market).

The AER notes that historical long term low priced domestic contracts will progressively expire over the next five years, with contract replacement activity peaking in Queensland in 2015-16, and NSW/Victoria in 2018.[39] This view is supported by the Bureau of Resources and Energy Economics (BREE) – see Figure 6.

Figure 6: East coast domestic gas contract volumes, by year and source



Source: (BREE, 2012b, p. 50)

Much of the market tightness can be explained by future domestic demand having to compete with expected international demand. The Queensland Department of Energy and Water Supply (DEWS, 2012) notes than LNG developers are stockpiling reserves and striking contracts with each other, reducing market availability for gas.

So much gas is committed that AEMO estimates that a 15% reduction in reserve development could cause supply shortfalls from 2016. [40] Based on their current progress, Lowe (2013) considers it likely that, even if all current projects are developed on time, other new sources will be required or domestic demand will have to fall.

In a conflict between domestic and foreign demand it is likely that foreign demand would prevail, due to existing contracts and higher foreign willingness to pay. Gas for export from Queensland would chiefly be redirected from New South Wales' supply (NSW imports over 90% of its gas). Without

[38] 61 business gas users in the eastern gas market, of whom 30 were seeking new contracts.
[39] (AER, 2012, p. 95)
[40] (AER, 2012)

expansion of internal gas reserves or pipeline capacity, there are concerns NSW may not be able to meet its demand on peak gas days.[41]

Even when enough physical gas may be available, supply may be constrained by limited pipeline capacity. As pipeline operators often make retailers reserve capacity whether they use it or not and retailers have limited ability to trade capacity with each other, available capacity is often used inefficiently (see Section 7.5, Market efficiency).

Phrased another way: in some situations, gas may become more expensive than many consumers are willing to pay. According to Origin Energy, the first consumers to reduce gas consumption will be power generators, with their supply gap being filled by non-gas generators.[42]

7.3 Unconventional gas

Unconventional gas (which includes CSG, shale gas, and tight gas – see Section 1, Types of gas) is a possible source of gas that could reduce price pressures, but it faces opposition from agricultural and environmental groups. The development timeframe for unconventional gas resources – four to five years for the NSW Gunnedah CSG basin – means parties in favour of development, such as the Federal Government, see the present as a critical window of opportunity to expand production capacity.[43]

CSG

Australia's coal seam gas resources lie primarily in Queensland and NSW – see Section 2, Resources. The industry is still immature, though it has developed rapidly in Queensland. In NSW, though 95% of gas is sourced from interstate[44] and the bulk of internal reserves are CSG, opposition from agricultural and environmental groups has prevented significant development. The opposition is centred around concerns that gas production (particularly involving fracking) with insufficient or inappropriate regulation might damage or contaminate aquifers and water supplies, cause earthquakes or sinkholes, or conflict with existing land use (e.g. farming).[45] A poll in September 2013 found 46 percent of people opposed coal seam gas mining.[46]

Producers, industry groups, and the Federal Government are in favour of developing CSG nationally, while the NSW Government has forbidden gas exploration or production within two kilometres of any current or future residential zone, as well as near 'critical industry clusters'. Victoria currently has a moratorium on fracking and on issuing new exploration licenses for coal seam gas.[47]

In May 2013, SCER endorsed the National Harmonised Regulatory Framework on Natural Gas from Coal Seams.[48] While the Framework is not a legislative document, it is expected that states will adopt its guidance in their legislative responses. In particular, the Victorian Government had planned to revisit its moratorium once the Framework has been finalised and released, though it is expected to wait for the results of an inquiry into CSG being led by Peter Reith.

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[41] See e.g. (Wood, Carter, & Mullerworth, 2013)
[42] www.businessspectator.com.au/article/2013/9/11/policy-politics/manufacturing-gas-crisis, retrieved 11.09.2013
[43] (DRET, 2012)
[44] (Moraza, 2013); (Lowe, 2013)
[45] See e.g. http://lockthegategippsland.com/information/coal-seam-gas-fact-sheet/
[46] http://www.businessspectator.com.au/news/2013/9/25/policy-politics/coal-seam-gas-opposition-remains-strong
[47] (Loelinger & Thompson, 2013)
[48] http://www.scer.gov.au/workstreams/land-access/coal-seam-gas/

The new Industry Minister (whose portfolio includes energy), the Hon. Ian Macfarlane MP, is strongly in favour of CSG development, stating, "We've got to make sure that every molecule of gas that can come out of the ground does so. Provided we've got the environmental approvals right, we should develop everything we can."[49]

A good source of scientific information on this topic is the Coal Seam Gas Review by the NSW Chief Scientist.[50] The review is ongoing, but an initial report was released in July 2013 and the NSW Chief Scientist has commissioned background papers on specific topics from independent experts.

Non-CSG

Non-CSG unconventional gas development is still maturing: commercial drilling of shale gas wells has only recently begun, and further development is not likely to be viable at current prices. A recent report by the Australian Council of Learned Academies found Australia's large shale gas reserves would not become economical to develop until gas prices rise to around $9/GJ, due to their remoteness and lack of existing infrastructure connections.[51] Major gas producer Santos puts the minimum economic range at $6-9/GJ.[52]

7.4 Electricity generation

A signification proportion of gas usage is for power generation (see Section 3, Usage), and the level of usage was expected to grow as power demand increased and the carbon price made gas generation more competitive against coal power plants.

However, in its latest planning document, AEMO projects under its central (or medium) scenario that no new generation capacity will be required to meet supply constraints in the National Electricity Market (NEM) during its 10-year forecast period. An exception is Queensland, which may require new generation after 2019-20.[53] This accords with the 2012 Queensland gas market review (DEWS, 2012), which projected little to no significant change to Queensland gas power generation levels to 2020.

AEMO also notes that while 37% of *proposed* new generation capacity in the NEM is from gas plants, all *committed* new generation capacity in the last year has been from wind or solar projects. These trends are being driven by governmental climate change and renewable energy policies, which may be subject to change under the new Coalition Government,[54] as well as the availability of long-term gas contracts. Whether gas demand from electricity generation increases or not is therefore uncertain at this time.

Changing patterns of gas power generation may also affect gas markets: increased levels of variable renewable power generation (chiefly from wind) in South Australia and Victoria may lead to increased

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[49] http://www.theaustralian.com.au/national-affairs/use-it-or-lose-it-miners-warned-by-coalition/story-fn59niix-1226721368923, retrieved 18.09.2013
[50] http://www.chiefscientist.nsw.gov.au/coal-seam-gas-review/
[51] http://www.acolasecretariat.org.au/ACOLA/index.php/news/31-acola-report-finds-success-of-an-australian-shale-gas-industry-depends-on-effective-regulation-and-the-right-rocks retrieved 05.06.2013
[52] http://www.theage.com.au/business/carbon-economy/us-shale-gas-exports-no-threat-20130827-2socb.html, retrieved 28.08.2013
[53] (AEMO, 2013)
[54] (AEMO, 2013)

reliance on gas turbines as back-up generation, which in turn could result in a greater degree of gas demand volatility in those states.[55]

7.5 Market efficiency

Gas markets are opaque and difficult to analyse,[56] use pipeline capacity inefficiently, and are not as competitive as electricity markets.

The majority of wholesale gas traded is via bilateral, confidential contracts between a small number of buyers and sellers. The lack of information and general market complexity causes problems for gas consumers looking to sign new contracts and potential new entrants (both producers and retailers).[57]

Hughson & Johnston (2012) point to limited financial hedging opportunities for gas as making entry by retailers particularly risky. This is the case even in Victoria, the most mature of the wholesale markets, and has led to non-incumbent retailers selling gas only in combination with electricity (primarily to attract dual-fuel customers).

Recent market transparency and information reforms in Western Australia include the Independent Market Operator (IMO) publishing a Gas Statement of Opportunities (GSOO), a 10 year forecasting document to assist industry planning, and establishing a Gas Market Bulletin Board, a website providing up-to-date information on supply, demand, and system constraints. This follows similar activities in the eastern market by AEMO, which also publishes a GSOO and runs the National Gas Market Bulletin Board. Wholesale spot markets were also established in recent years in Melbourne, Sydney, Adelaide, and Brisbane (see Section 5, Wholesale markets).

A complementary industry proposal to develop a representative index of gas prices is currently on hold due to concerns over industry-led price indices following a scandal in the UK in which a number of banks were found to have fraudulently manipulated the LIBOR price index.[58] A private LNG index is expected launch soon.[59]

In response to gas industry growth in Queensland, SCER has tasked AEMO with developing a Gas Supply Hub (spot exchange/brokerage hub) in Wallumbilla. Wallumbilla is an interconnection point for major upstream (supply fields) and downstream (end user) pipelines in Queensland.[60]

Related to this, SCER (via AEMO) is also exploring pipeline capacity trading at the Wallumbilla hub, to improve inefficient use of pipelines when users purchase more capacity than they require but are unable to trade the unused component. The Hub could "support bilateral trading of unused pipeline capacity via a bulletin board style, web-based information screen that will allow market participants to advertise a willingness to buy or sell gas transportation services." (SCER, 2013, p. ii)[61]

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[55] (Lowe, 2013)
[56] See e.g. (NERA, 2013)
[57] (Hughson & Johnston, 2012), (DEWS, 2012)
[58] (Wood, Carter, & Mullerworth, 2013). LIBOR is the London Interbank Offered Rate, an index of the short term interest rates banks charge each other.
[59] www.businessspectator.com.au/news/2013/10/9/energy-markets/gas-index-illuminate-market, retrieved 17.10.13
[60] (AEMO, 2012c)
[61] For a discussion of secondary trading of pipeline capacity trading, see also (Lowe, 2013, pp. 46-48)

An issue primarily of significance for the western gas market is joint marketing. Joint marketing is an arrangement wherein owners of a gas field jointly market and sell gas, lowering the risk for each participant (as each may not individually have the skills to sell gas). However, joint marketing also reduces the number of sellers in the market, decreasing competition, and therefore needs approval from the ACCC.[62] The Australian Government believes that joint marketing will naturally become more curtailed as markets mature.[63]

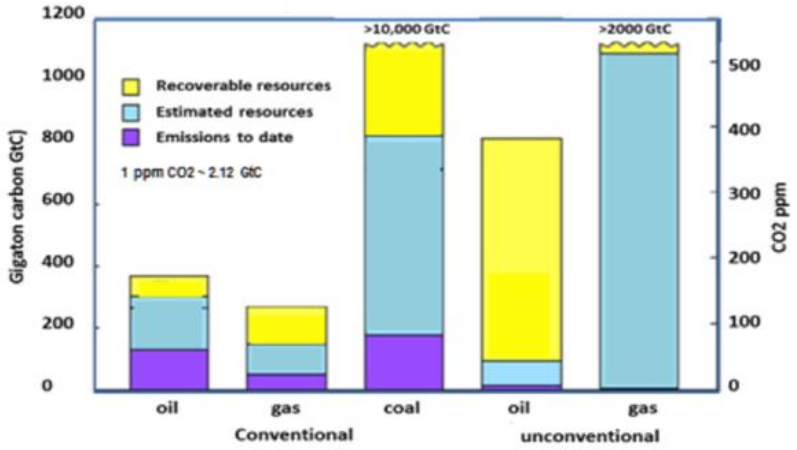
7.6 Environmental effects

In addition to the possible environmental damage caused by extracting unconventional gas (see Section 7.3, Unconventional gas), burning gas also releases greenhouse gases (GHGs), which contribute to climate change.

At the 2010 United Nations Climate Change Conference in Cancun, Mexico, the United Nations (including Australia) agreed to keep the global average temperature rise below two degrees Celsius.[64] In scenarios from the Intergovernmental Panel on Climate Change (IPCC), the atmospheric concentration levels of GHGs that led to an expected 2°C rise were around 450ppm CO_2-e.[65] (Levels of gas in the atmosphere are commonly measured in parts-per-million (ppm). Different GHGs are converted to units of carbon dioxide equivalent (CO_2-e).) 450ppm CO_2-e is widely regarded as the upper bound to limiting the chance of intolerably dangerous climate change to acceptable levels.

Though gas emits fewer GHGs per unit of energy than other fossil fuels such as coal, there is a lot of it. Consumption of present gas resources would alone make virtually impossible the goal of limiting atmospheric levels of CO_2-e to 450ppm (see Figure 7). In this context, much gas falls under the category of an 'unburnable fuel'.

Figure 7: Estimates of fossil fuel resources and equivalent atmospheric CO_2 levels



Source: Adapted from (Hansen, 2012, p. 5). Recoverable and estimated resources are analogous (though not necessarily equivalent) to 2P and 3P resources (see Section 1).

[62] (Wood, Carter, & Mullerworth, 2013)
[63] (DRET, 2012)
[64] http://unfccc.int/key_steps/cancun_agreements/items/6132.php
[65] (IPCC, 2007)

Nevertheless, gas is seen by many as a useful fuel to transition between higher-emission coal power and zero emission renewable energy. Depending on the environmental policy of governments – including the level of any carbon price – and the evolution of the electricity market, gas may fill this role. However, in the absence of commercially viable carbon capture and storage technology, the scientific evidence suggests long term usage of gas at a large scale could greatly threaten the global climate.

8. FUTURE PRICE RISES AND HOUSEHOLD BILLS

As domestic gas prices become linked to international prices, factors that affect international prices will play a greater role in the domestic market. According to the AEMC (2013, p. 26), key factors affecting international prices will be the extent to which the USA exports its newly developed shale gas resources and the evolution of energy demand in China and Japan, in particular around the question of gas vs. nuclear. These factors, together with the topics discussed in Section 7, Price pressures and current issues, are key drivers of future Australian gas prices.

This section compiles analysts' forecasts of future gas prices in different regions and the associated increase in household gas bills.

Average wholesale gas prices in recent years have fluctuated between $2-$5/GJ in Victoria and $3-$6/GJ in Sydney, Brisbane, and Adelaide. Prices in these markets have begun to trend upward recently.[66]

Table 6 presents a range of forecasts from different analysts for the eastern and western seaboards. The common trend is for domestic prices to approach the 'netback' price, which is the international price less the costs of marketing, liquefaction, and transportation. The netback price is, essentially, the opportunity cost of (best alternative to) a domestic sale of gas.

Table 6: Gas price forecasts for the east and west coasts of Australia (real $2012-13/GJ)

Source	Forecast year	Eastern Market		Western Market	
		2020	2030	2020	2030
ACIL Tasman	2010	$6.60	$7.90	$8.00	$8.40
ACIL Tasman	2011	$7.90	$10.60	-	-
ACIL Tasman	2012	$8.60	$11.70	$13.40	$11.80
AEMO/IES	2011	$7.00	$8.30	-	-
Australian Treasury (ROAM)	2011	-	$10.10	-	$10.10
Australian Treasury (SKM-MMA)	2011	$6.20	$9.30	$6.20	$9.30
Average		**$7.30**	**$9.60**	**$9.20**	**$9.90**

Source: (Wood, Carter, & Mullerworth, 2013, p. 9)

Table 7 extends the forecast out to 2050 and breaks it down into regions. The general trend for prices to rise toward netback prices is the same, but with some states experiencing lesser/slower rises due to their distance from export terminals, own supply of gas, or low usage of gas.

[66] http://www.aer.gov.au/Industry-information/industry-statistics, retrieved 21.08.2013

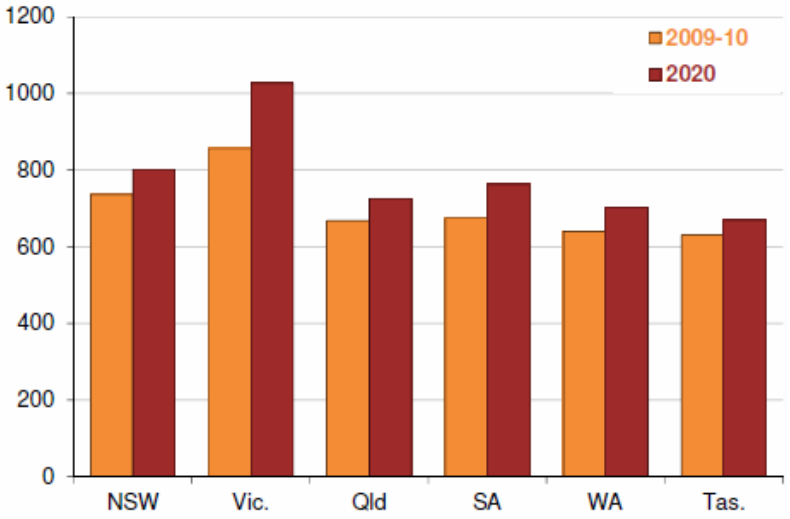
Table 7: ACIL Tasman estimates for gas prices, 2012 to 2050, $/GJ

Region	2020	2030	2040	2050
North Queensland (NQ, NTNDP Zone)	$9.33	$12.01	$12.01	$12.01
South Queensland (CQ, WQ, SEQ, NTNDP Zones)	$9.37	$11.94	$11.94	$11.94
NSW (including ACT)	$8.57	$11.71	$11.71	$11.71
Victoria	$7.69	$10.99	$10.99	$10.99
Tasmania	$8.15	$11.48	$11.48	$11.48
South Australia	$8.70	$11.78	$11.78	$11.78
Northern Territory	$11.00	$11.00	$11.00	$11.00
SWIS (WA)	$13.87	$12.30	$12.30	$12.30
Pilbara (WA)	$12.88	$11.29	$11.29	$11.29

Source: ACIL Tasman Consulting for (BREE, 2012a, p. 18)

Based on the forecasts above, and assuming residential gas volumes remain at similar levels to today, the Grattan Institute projects annual bills will increase by between $40 and $170 – see Figure 8. Households with greatest usage of gas, such as those in Victoria, would suffer the greatest increase in bills.

Figure 8: Annual household gas bills, 2009-10 vs. 2020 (projected)



Note: Assumes volumes remain at 2009-10 levels in 2020. NSW includes ACT.
Source: (Wood, Carter, & Mullerworth, 2013, p. 10)

The assumption of a completely price inelastic demand response is unrealistic – as prices rise, demand will tend to fall – but the figures are a useful starting point for analysis.

The AEMC's Gas Scoping Study suggests most retailers' existing gas supply contracts run until 2015-2018 (see also Figure 6), so the effects of higher wholesale gas prices are unlikely to flow into retail prices before then. However, the study also raises the possibility that retailers could try to prise prices prior to their contracts expiring if they orient themselves by the opportunity cost of gas (i.e. the value of foregone sales) rather than the cost of supply.[67]

[67] (Lowe, 2013)

9. OPPORTUNITIES FOR ENGAGEMENT

This section provides a brief, non-exhaustive summary of possibilities for consumer organisations to engage with regulators, governments, industry, and consumers on gas issues.

AER

For retail gas markets, Hughson & Johnston (2012) identify the AER as probably the most important decision maker and regulator, through its administration of the National Gas Law and National Gas Rules. However, the AER is also active in wholesale markets and networks. It regulates network prices, monitors wholesale and retail gas markets to ensure and enforce compliance, regulates retail markets in jurisdictions that have signed up to the National Energy Retail Law,[68] and publishes detailed reports on markets and compliance.[69]

The AER has several engagement processes, including:

- the Customer Consultative Group,[70] whose purpose includes soliciting feedback for the AER on issues affecting gas consumers;
- the Consumer Challenge Panel,[71] which advises the AER of consumer issues relevant to network regulation; and
- the Consumer Reference Group,[72] which allows consumer organisations to have input into the AER's Better Regulation Program to develop its guidelines.

Part of the Better Regulation project is developing a guideline for consumer engagement for network service providers, which could assist for consumers' engagement with gas transmission and distribution businesses.

While the Customer Reference Group is only expected to last for the course of the Better Regulation Program, the AER are considering mechanisms to replace it, such as meetings at the jurisdictional level (state-based).[73]

The AER is also currently developing its Stakeholder Engagement Framework,[74] which will influence how it engages with stakeholders – including consumers, advocates, and representative bodies – and incorporates their concerns and interests into the AER's processes and activities. Currently used engagement processes include workshops, webinars, face-to-face meetings, and capacity building through training.

The AER's current reviews of access arrangements for gas pipelines are set out in its Strategic Priorities and Work Program 2013-14 document (AER, 2013).

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[68] As of 1 July 2013: NSW, SA, ACT, Tasmania (electricity only)
[69] http://www.aer.gov.au/about-us, retrieved 03.09.2013
[70] http://www.aer.gov.au/retail-markets/customer-consultative-group
[71] http://www.aer.gov.au/about-us/consumer-challenge-panel
[72] http://www.aer.gov.au/node/19166
[73] AER, personal communication
[74] http://www.aer.gov.au/node/21247

AEMC

For wholesale market regulation, the most important decision makers are the AEMC and AEMO (see Section 4, Regulation).

The AEMC develops its strategic priorities through consultation and workshops, including with consumers, and its current strategic priorities include both gas markets and consumer participation.[75] The Commission is open to engaging with consumers through either formally (e.g. through its official consultations) or more informally; it holds regular meetings with consumer organisations – both of its own accord and in response to invitations – and attends consumer roundtables and conferences.

A notable current AEMC project on gas markets is the Gas Market Scoping Study, which arose out of feedback received during the strategic priorities review.[76] The formal submission period for this project has passed, but the AEMC plans to use its results as the basis for further engagement with SCER, industry, and consumers.

The AEMC also gives consumer organisations the opportunity to alter market arrangements by submitting to it a Rule Change Proposal, though this is an involved and lengthy process that, to date, few consumer organisations have initiated.[77] Exceptions are a proposal submitted by Major Energy Users Inc., a proposal currently being prepared by CUAC and the Consumer Action Law Centre (CALC) around fixed term contracts, and another being prepared by the Total Environment Centre around changes to demand management incentives.[78]

AEMO

In AEMO's Stakeholder Engagement Strategy,[79] consumers are included as stakeholders with which it engages. AEMO also operates a number of working groups related to gas that are open to stakeholders.[80] However, the working groups contain few (if any) consumer representatives, nor have there been many consumer submissions to past reviews, and many industry representatives involved feel consumers would have little to no value in the process as the issues are too technical and complex.[81] As AEMO's work *is* often highly technical and complex, effective engagement may therefore involve first changing AEMO's processes to better accommodate (non-technical) consumer involvement.

Government

Opportunities to engage with governments on gas differ between jurisdictions, but typically include State and Federal Ministers responsible for energy, resources, or consumer issues, their advisers, and the responsible departments. While the inter-connected nature of the gas sector means decisions in one jurisdiction can have ramifications beyond its borders (e.g. rulings on CSG development in NSW affect prices on the entire eastern seaboard), there may be opportunities to engage on a purely local scale on concessions for vulnerable groups or transitional assistance to move consumers away from gas to cheaper (in the long term) alternatives.

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[75] (AEMC, 2013)
[76] http://www.aemc.gov.au/market-reviews/open/gas-market-scoping-study.html, retrieved 23.08.2013
[77] http://www.aemc.gov.au/gas/rule-changes/completed.html, retrieved 22.08.2013.
[78] Total Environment Centre, personal communication
[79] http://www.aemo.com.au/About-AEMO/Services/Stakeholder-Engagement
[80] http://www.aemo.com.au/Gas/Resources/Working-Groups/STTM-Consultative-Forum
[81] (Hughson & Johnston, 2012, p. 23)

On a cross-jurisdictional level, the Council of Australian Governments (COAG) is the most powerful body. Most of COAG's energy reform work occurs through its Standing Council on Energy and Resources (SCER). SCER's current work streams include:

- Gas Supply Hubs (Trading Exchanges);
- Gas Transmission Pipeline Capacity Trading;
- Natural Gas from Coal Seam
- Gas Safety Strategy; and a
- National Gas Emergency response.[82]

SCER is currently also in the process of establishing an Australian Energy Consumers Organisation (AECO), scheduled to begin operation on 1 July 2014.[83] Though its role and scope is not yet fully formalised, AECO should provide a further avenue for consumer engagement on gas issues.

A number of governmental gas market reviews are currently underway that may provide opportunity for engagement:[84]

- DRET and BREE are reviewing the supply-demand situation in eastern Australia;
- A Gas Task Force, heading by Peter Reith, is examining supply and pricing issues for the Victorian Government;
- The NSW Legislative Assembly is holding an inquiry into downstream gas supply and availability in NSW; and
- The Hon Ian Macfarlane MP, Federal Minister for Industry, will convene a gas stakeholders group to discuss gas supply in NSW.

Industry

Retail gas businesses are typically also involved in electricity retailing, and consumer organisations can leverage existing relationships to engage on gas issues. This is also true to a lesser extent for gas distribution businesses, but the non-retail gas industries in general and network/wholesale suppliers, in particular, have been less accessible to engage with. Their "customers" are retailers and large consumers, not households. Peak bodies and industry groups may currently be the best avenues of approach. These include the:

- Energy Users Association of Australia (EUAA), representing business users of energy;
- Energy Retailers Association of Australia (ERAA), representing energy retailers;
- Energy Supply Association of Australia (ESAA), representing supply businesses from the downstream natural gas and electricity industries;
- Energy Networks Association (ENA), representing gas and electricity network businesses;
- Australian Pipeline Industry Association (APIA), representing Australia's pipeline infrastructure businesses (with a focus on gas transmission);
- Australian Petroleum Production and Exploration Association (APPEA), representing Australia's oil and gas exploration and production businesses; and

[82] www.scer.gov.au
[83] http://www.scer.gov.au/workstreams/energy-market-reform/national-energy-consumer-advocacy-body/
[84] (Lowe, 2013)

- Major Energy Users (MEU) Inc, comprising over 20 major energy users operating across the NEM, Western Australia, and Northern Territory.

Less relevant to the natural gas sector, but worth being aware of, is Gas Energy Australia, the peak body for the downstream alternative gaseous fuels industry (Liquefied Petroleum Gas (LPG), Liquefied Natural Gas (LNG) and Compressed Natural Gas (CNG)).

Consumers and other consumer organisations

Organisations that interact with customers directly have the opportunity to use these relationships to engage with gas consumers, informing them of potential price developments and providing advice on activities to limit their exposure while maintaining adequate living standards. Information dissemination is important, particularly for consumers looking to purchase long-lived assets (such as central heating or hot water systems) whose lifespan will extend into the period of high expected prices. Increasingly, electric services may prove a cheaper option than their gas counterparts.[85]

Several consumer organisations also currently do or have done work on gas. To find out who is currently engaged in activities around gas, make contact with the Consumers' Federation Australia[86] or the administrator of the National Consumer Roundtable on Energy.[87] The Consumer Advocacy Panel also funds consumer research into gas markets, and publishes a list of current and past projects on its website.[88]

[85] See e.g. http://www.businessspectator.com.au/article/2012/10/4/smart-energy/gas-industry-admits-electricity-cheaper, retrieved 08.08.2013
[86] http://consumersfederation.org.au/
[87] Until recently, the administrator of the Roundtable was the Queensland Council of Social Service (QCOSS). At the time of writing, the new administrator is unclear, but will probably be the South Australia Council of Social Service (SACOSS).
[88] http://www.advocacypanel.com.au/

10. CONCLUSION

Australia has large natural gas resources, both conventional and unconventional, and a limited ability to export gas has meant consumers have enjoyed prices lower than overseas, particularly in the eastern states. However, export capacity will expand on the east and west coasts in the next few years, linking Australian gas markets more closely to international markets. Australia is expected to become the world's second largest exporter of LNG in the coming decades, with the eastern seaboard exporting up to twice as much as it consumes.

As the international price of gas is much higher than the domestic price, domestic prices will rise and Australian consumers will pay more. Wholesale costs make up only around 1/3rd of the retail price of gas, but those costs are expected to double or triple.

While households make up only a small proportion of total direct gas use in Australia (i.e. burning it at home for cooking, space heating, or hot water), many more households are exposed to gas prices through their use of electricity generated from gas. Additionally, the spread and intensity of household gas usage differs widely between states, depending on local factors. The biggest residential users are Victorians, who use one-third of gas consumed in that state, with even lower-use households consuming more than middle- or higher-use households in other states. The effects of price changes on consumer bills will thus differ depending on where they live.

Rising prices are of particular concern for low-income households, as their ability to reduce use (e.g. through improving the energy efficiency of their appliances or homes) is lower and utility bills form a larger proportion of their expenditure than for other households.

As well as the challenges increased exports will bring, Australian gas markets must deal with possible supply constraints, the question of to what extent and how to develop unconventional gas, market efficiency reforms, and the environmental damage gas causes, amongst other issues. The problem is not about the quantity of gas in reserves, but of whether, how, and when to extract and sell it, and how to deal with the associated price rises.

Consumer organisations can and should engage on these issues with the different entities active in gas markets. However, gas markets are complex, and not as harmonised as the electricity markets with which some consumer organisations will already have experience. Consumers may need to build their capacity, using some of the resources given in this primer, to effectively engage.

The relative immaturity of gas markets and wholesale arrangements (compared to electricity) and the dramatic, fundamental shifts facing the industry mean there is significant opportunity for consumer organisation to engage and help shape the sector's development.

CUAC will be conducting further research into gas markets to improve consumer understanding of the situation and inform our own advocacy, including investigating the role of gas in Victorian households and levels of competition in the Victorian gas market. We welcome suggestions, feedback, questions, and offers of collaboration from interested parties. The gas sector is developing rapidly, and we encourage consumers to engage with what will become an increasingly important topic.

BIBLIOGRAPHY

ABS. (2011a). *4602.0.55.001 Environmental Issues: Energy Use and Conservation, Mar 2011.* Canberra: Australian Bureau of Statistics, Commonwealth of Australia.

ABS. (2011b). *6530.0 Household Expenditure Survey, 2009-10.* Canberra: Australian Bureau of Statistics, Commonwealth of Australia.

ACIL Allen Consulting. (2013a). *Australia's Natural Gas Supply: an assessment of current policy issues and options.* Australian Pipeline Industry Association.

ACIL Allen Consulting. (2013b). *NSW Coal Seam Gas.* Australian Petroleum Production and Exploration Agency.

AEMC. (2013). *Strategic Priorities for Energy Market Development; Discussion Paper.* Australian Energy Market Commission.

AEMO. (2011). *Overview of the Short Term Trading Market for Natural Gas.* Australian Energy Market Operator.

AEMO. (2012a). *Gas Statement of Opportunites 2012.* Australian Energy Market Operator.

AEMO. (2012b). *Guide to Victoria's Declared Wholesale Gas Market.* Australian Energy Market Operator.

AEMO. (2012c). *Detailed Design for a Gas Supply Hub at Wallumbilla.* Australian Energy Market Operator.

AEMO. (2013). *Electricity Statement of Opportunities 2013.* Australian Energy Market Operator.

AER. (2008). *State of the Energy Market 2008.* Melbourne: Australian Energy Regulator.

AER. (2012). *State of the Energy Market 2012.* Melbourne: Australian Energy Regulator.

AER. (2013). *AER Strategic Priorities and Work Program 2013-14.* Australian Energy Regulator.

AIG. (2013). *Energy shock: the gas crunch is here.* Australian Industry Group.

APA GasNet Australia. (2012). *Access Arrangement Submission for 2013-17.*

Berry, L. (2009). *Gas Pricing – Cost Drivers and Scenarios for Future Price Directions.* Engineroom Consulting.

BREE. (2012a). *Australian Energy Technology Assessment 2012.* Bureau of Resources and Energy Economics, Commonwealth of Australia.

BREE. (2012b). *Gas Market Report.* Canberra: Bureau of Resources and Energy Economics, Commonwealth of Australia.

BREE. (2013a). *Australian energy statistics 2013.* Canberra: Bureau of Resources and Energy Economics, Commonwealth of Australia.

BREE. (2013b). *Energy in Australia, May 2013.* Canberra: Bureau of Resources and Energy Economics, Commonwealth of Australia.

BREE. (2013c). *Resources and Energy Quarterly, June 2013.* Canberra: Bureau of Resources and Energy Economics, Commonwealth of Australia.

COAG. (2011). *COAG Standing Council on Energy and Resources Terms of Reference.* Council of Australian Governments.

Deloitte. (2013). *Assessment of the East Coast gas market and opportunities for long-term strategic reform.* Energy Supply Association of Australia.

DEWS. (2012). *Queensland Gas Market Review 2012.* Department of Energy and Water Supply, State of Queensland.

DRET. (2012). *Energy White Paper 2012*. Canberra: Department of Resources, Energy, and Tourism, Commonwealth of Australia.

Geoscience Australia and BREE. (2012). *Australian Gas Resource Assessment 2012.* Canberra: Commonwealth of Australia.

Grudnoff, M. (2013). *Cooking up a price rise.* Canberra: The Australia Institute.

Hansen, J. (2012, January 27). *Cowards in our Democracies - Part 1.* Retrieved July 31, 2013, from Columbia University: http://www.columbia.edu/~jeh1/mailings/2012/20120127_CowardsPart1.pdf

Hughson, B., & Johnston, M. M. (2012). *Gas Wholesale Markets and Retail Competition in NSW and Victoria.* Alviss Consulting and Darach Energy Consulting.

IPCC. (2007). *Climate Change 2007: Synthesis Report* . Geneva, Switzerland: Intergovernmental Panel on Climate Change.

Kimber, M. (2009). *Development of Australia's Natural Gas Resources.* Garran, ACT: Department of Resources, Energy, and Tourism, Commonwealth of Australia.

L/NP. (2013). *The Coalition's Policy for Resources and Energy.* Liberal Party of Australia, National Party of Australia.

Loelinger, J., & Thompson, S. (2013, Spring). A fractured framework – new rules for fraccing. *Gas Today*, pp. 26-28.

Lowe, K. (2013). *Gas Market Scoping Study.* Australian Energy Market Commission.

Manufacturing Australia. (2013). *Australia's Energy Advantage.* Retrieved August 14, 2013, from Manufacturing Australia: http://www.manufacturingaustralia.com.au/assets/Uploads/130312-Australias-Energy-Advantage-Final.pdf

Moraza, M. (2013). Balancing gas needs and community concerns. *NSW Mineral and Investment Conference.* Sydney: AGL.

Nelson, T. (2012). Securing Gas Supplies for Domestic Consumption in the Long Term. *APPEA Journal*, pp. 105-114.

Nelson, T. (2013). Ensuring Domestic Supplies of Natural Gas for Australian Businesses and Households. *APPEA Journal*, pp. 177-184.

NERA. (2013). *Prices and Profit Margin Analysis for the NSW Competition Review.* Sydney: NERA Economic Consulting.

Prime Minister's Manufacturing Taskforce. (2012). *Report of the non-Government members.* Commonwealth of Australia.

SCER. (2013). *RIS: Gas Transmission Pipeline Capacity Trading (Consultation Statement).* Standing Council on Energy and Resources.

Wood, T., Carter, L., & Mullerworth, D. (2013). *Getting gas right: Australia's energy challenge.* Melbourne: Grattan Institute.

APPENDIX I:
EAST COAST SPOT MARKETS

This Appendix describes the operation of the wholesale gas spot markets on the eastern seaboard of Australia, which consist of the Short Term Trading Market (STTM) with hubs in Sydney, Brisbane, and Adelaide, and the Declared Wholesale Gas Market (DWGM) in Victoria. These spot markets cover between 5%-20% of total supplied volume.[89]

Short Term Trading Market (STTM)

The Short Term Trading Market (STTM) is a market for trading gas wholesale, generally between suppliers and retailers or large users. Trading occurs at a "hub", which is the intersection of gas transmission and distribution pipelines. Gas transmission occurs in larger pipelines at higher pressure, and distribution in smaller pipelines at lower pressure. There are three hubs in the STTM, one each in the demand centres of Sydney, Brisbane, and Adelaide.[90] Each operates separately, but under the same rules. The STTM is operated by AEMO.

Gas systems have a range of technical requirements, such as maintaining pressure within safe ranges and ensuring there is sufficient pipeline capacity to transport gas from a seller to a buyer. To make fulfilling these requirements easier, gas is traded a day ahead: trades occur on e.g. Monday for delivery on Tuesday, leaving time for the delivery to be planned.

During trading, buyers and sellers bid into an open, transparent market; all parties can see each others' bids. Sellers are known as "shippers", and buyers are "users". The bids can be to buy (withdraw) or sell (inject) a quantity of gas at a specified price (or a combination of quantities at different prices), or they can be to buy a particular quantity at any price. These unpriced bids are usually for uncontrollable demand, such as the demand retailers face from households. Retailers might thus place bids over the range of quantities they expect households to consume over the next day, with an unpriced bid as a fallback should their prediction be wrong. Bids are also placed for two and three days ahead, to help the market plan, though the bids are not binding until the AEMO closes the day-ahead market. The same entity, or different parts of the same entity, can place both withdrawals and injection bids (i.e. be both a shipper and a user).

To constrain the risk of excessive price spikes, there is minimum price of $0/GJ and a maximum price of $400/GJ.[91] Typical recent STTM prices have been between $4-7/GJ.[92]

While quantities of gas are traded through the STTM, pipeline capacity is traded separately between the STTM shippers and transmission pipeline owners. Sellers must have enough contracted

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[89] (Lowe, 2013)
[90] The STTM began in Sydney and Adelaide on 1 September 2010, and in Brisbane on 1 December 2011.
[91] http://www.aemo.com.au/Gas/Market-Data/Short-Term-Trading-Market-Data/Set-Gas-Market-Prices, retrieved 08.08.2013
[92] http://www.aer.gov.au/node/11727, retrieved 21.08.2013

transmission capacity to inject their supply, and buyers must have enough distribution capacity to withdraw their purchases. These pipeline contracts must be registered with AEMO, so that it knows who has what capacity, but they are not AEMO's responsibility. This type of market is called a contract carriage system.

Once the market closes, AEMO takes all bids and "stacks" them, from lowest to highest, then determines the price that "clears" the market, i.e. balances demand and supply. This is the "ex-ante" market-clearing price. On the basis of the bids, registered capacity rights, and technical requirements, AEMO generates a schedule of gas flows.

After the schedule is released, sellers approach transmission pipeline operators and buyers approach distribution pipeline operators to organise their flows. The physical flows of gas on the delivery day (the "gas day") are managed by the market participants and pipeline operators. The flows don't have to match the schedule, but variations (planned) or deviations (unplanned) from the schedule incur extra costs for participants, so there are incentives to provide accurate information to AEMO and follow the schedule. If there are delivery day differences between scheduled supply and withdrawals, AEMO balances these using standing contracts with pipelines operators and/or shippers for gas and capacity. This function is described as a Market Operator Service (MOS), and AEMO charges market participants for it.

Delivery occurs via the gas transmission lines from producers via shippers to the hub where it is taken by retailers and distributed to their customers. On the day after the delivery day, AEMO calculates the effect of the deviations on the market and publishes an "ex-post imbalance price". Invoices are issued and payments made between market participants (for wholesale gas, not pipeline capacity) on a monthly basis for the preceding month.

Declared Wholesale Gas Market (DWGM)

The Victorian Declared Wholesale Gas Market (DWGM) is a market for trading gas wholesale, generally between suppliers and retailers or large users. It began in 2009 and revolves around the Declared Transmission System (DTS), which covers most of the Victorian transmission system. The DTS is also known as the Victorian Transmission System (VTS). Gas transmission occurs in larger pipelines at higher pressure, and distribution in smaller pipelines at lower pressure.

Gas systems have a range of technical requirements, such as maintaining pressure within safe ranges and ensuring there is sufficient pipeline capacity to transport gas from a seller to a buyer. To make fulfilling these requirements easier, gas is traded a day ahead: trades occur on e.g. Monday for delivery on Tuesday, leaving time for the delivery to be planned.

Sellers in the DWGM are known as "shippers", and buyers are "users". Their bids into the market can be to buy (withdraw) or sell (inject) a quantity of gas at a specified price (or a combination of quantities at different prices), or they can be to buy a particular quantity at any price. These unpriced bids are usually for uncontrollable demand, such as the demand retailers face from households. Retailers might thus place bids over the range of quantities they expect households to consume over the next day, with an unpriced bid as a fallback should their prediction be wrong. Bids are also placed for two days ahead, to help the market plan, though the bids are not binding until the AEMO closes the trading for that period. The same entity, or different parts of the same entity, can place both withdrawals and injection bids (i.e. be both a shipper and a user).

To constrain the risk of excessive price spikes, there is minimum price of $0/GJ and a maximum price of $800/GJ. Typical recent DWGM prices have been between $3-5/GJ.[93]

Once the market closes, AEMO takes all bids and "stacks" them, from lowest to highest, then determines the price that "clears" the market, i.e. balances demand and supply. This is the "ex-ante market-clearing price". It applies only to net flows: a trader who injects 50 TJ into the market and withdraws 51 TJ will only need to pay the purchase price for 1 TJ. On the basis of the bids and technical requirements, AEMO generates a schedule of gas flows.

In the STTM, shippers need to purchase pipeline capacity (to transport their gas to their market hub) directly from transmission pipeline owners, and the pipeline owners manage the flow of gas to buyers. This is not necessary in the DWGM. Instead, the owner of the DTS, APA GasNet, provides use of its pipelines exclusively to AEMO. AEMO then uses market bids by sellers (also known as "shippers") to determine a merit order of flows and recovers transportation tariffs from market participants on a "pay as you go" basis. This is called the market carriage model. [94]

Market participants can purchase the right to prioritise their deliveries in case of network congestion. These are called Authorised Maximum Interval Quantity (AMIQ) or Authorised Maximum Daily Quantity (AMDQ) rights. If congestion occurs in the DTS, holders of AMIQ/AMDQ rights have priority, and users without rights or who exceed their authorised quantity can face "uplift" charges.

This use of priority rights only (rather than capacity rights) encourages a more efficient use of pipeline capacity and has lower barriers to entry for new producers and retailers than the contract carriage model. However, this comes at the expense of efficient investment in pipeline capacity, as shippers may be unwilling to fund expansions they are not guaranteed to have access to. Instead, investment must occur through a regulatory process.[95]

Victoria's use of a market carriage model arose as the pipeline infrastructure was government-owned when the DWGM was developed.[96] This allowed the state government to design a market that had lower barriers to entry and trade (i.e. no need to secure capacity) than a contract carriage model would have. In contrast, other states' pipeline infrastructure was (to various extents) privately owned when the STTM was developed.

As well as setting the schedule of gas flows, AEMO manages all physical flows of gas, including system security and "linepack" (the storage of gas in pipelines). AEMO updates the gas schedule regularly throughout the day to account for changes in demand and supply, but where participants deviate from their forecast demand or supply they can be subject to deviation charges. These encourage participants to forecast accurately and stick to the schedule.

On the day after the delivery day, AEMO calculates the effect of the deviations on the market and publishes an "ex-post imbalance price". Invoices are issued and payments made between market participants on a daily basis for the preceding day.

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[93] http://www.aer.gov.au/node/11722, retrieved 21.08.2013
[94] (APA GasNet Australia, 2012)
[95] (Lowe, 2013, pp. 12-13)
[96] (APA GasNet Australia, 2012)