

Jemena Gas Networks (NSW) – Access Arrangement Information - Appendix 5.2

**NIEIR: Natural gas projections NSW
Jemena Gas Networks to 2019**

26 August 2009



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Natural gas projections NSW Jemena Gas Networks to 2019

**A report for
Jemena Gas Networks (NSW)**

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1. Introduction

Jemena Gas Networks (NSW) commissioned the National Institute of Economic and Industry Research (NIEIR) to develop forecasts of natural gas sales and customer numbers.

These forecasts were to be prepared on a financial year basis and to cover each major tariff group.

This report summarises the economic outlook for Australia and New South Wales, outlines the methodologies employed and then summarises the forecasts of volumes by tariff group.

The background and scope for the study is reproduced below.

1.1 Background

Jemena Gas Network (JGN) is currently preparing its revised access arrangement proposal with supporting information for the Australian Energy Regulator's (AER's) consideration. The revised access arrangement will cover the period 2010-11 to 2014-15 (July to June financial years). Two major elements of this process are the formulation of both network augmentation capital expenditure requirements and forecast gas demand across New South Wales. Both these elements are heavily dependent on expectations of gas usage per customer and total customer numbers. Key drivers of gas usage are current market trends, Government energy policies and general economic conditions.

When considering approval of JGN's revised access arrangement, the AER must have regard to the National Gas Objective, which is:

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

The AER May also take into account the pricing principles in Section 24(2) of the National Gas Law, and must do so when considering whether to approve a reference tariff.

"A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in:

- (a) providing reference services; and*
- (b) complying with a regulatory obligation or requirement or making a regulatory payment."*

And Section 74 of the National Gas Rules:

- "(1) Information in the nature of a forecast or estimate must be supported by a statement of the basis of the forecast or estimate.*
- (2) A forecast or estimate:*
 - (a) must be arrived at on a reasonable basis; and*
 - (b) must represent the best forecast or estimate possible in the circumstances."*

Accordingly, JGN sought the opinion of a recognised independent expert to develop the forecast JGN will use in preparing the volumes of gas to be transported for the period relating to revised access arrangement submission.

1.2 Scope of work – forecasts of demand for the services provided by JGN

The objectives of the project, as outlined in the study brief are that, a recognised independent expert is to develop the forecast JGN will use in preparing the volumes of gas to be transported for the period relating to revised access arrangement submission.

JGN required an opinion report detailing the quantitative incremental impacts (both positive and negative) of each of the following contributing factors during the period 2008-09 to 2015-16 upon:

1. annual gas consumption of JGN's existing residential, business and large industrial consumers;
2. annual gas consumption of JGN's new residential, business and large industrial consumers; and
3. hourly and daily demand for business and large industrial consumers using more than 10 terajoules per annum.

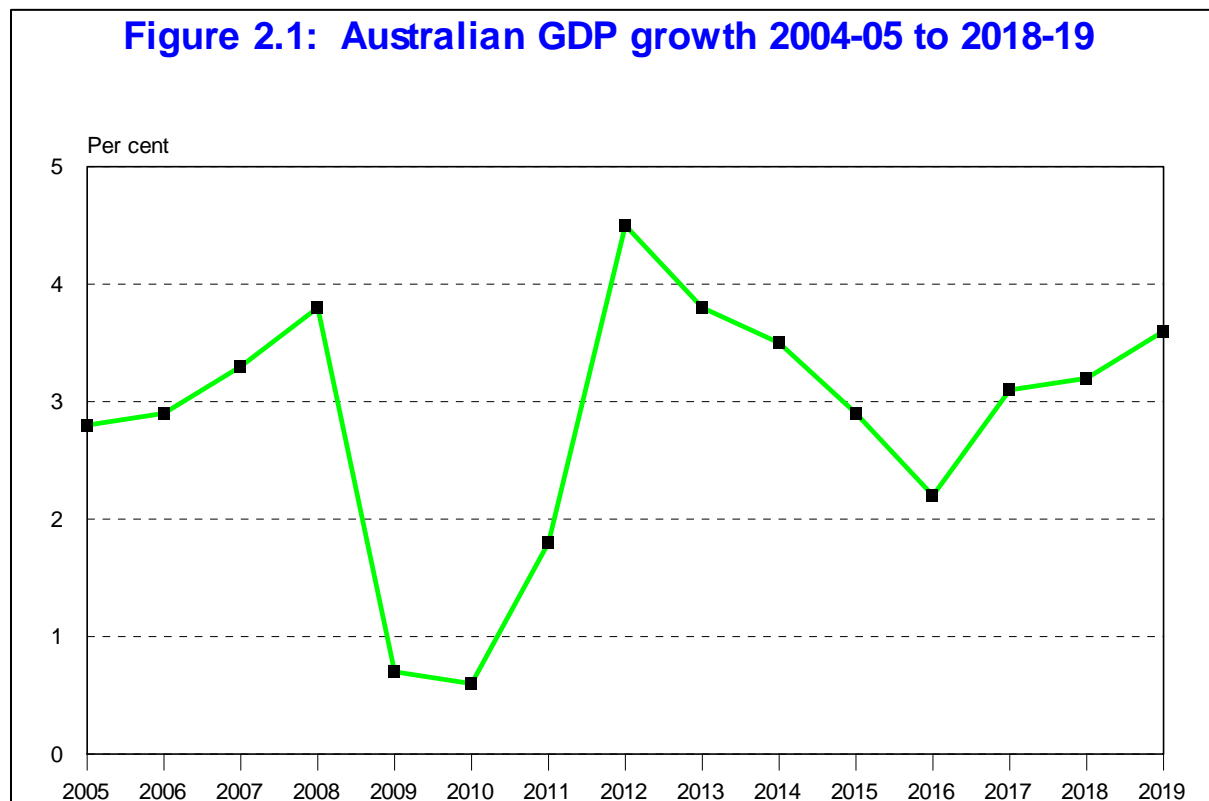
The contributing factors to be considered are:

- (a) market trends affecting the installation of existing gas appliances, including but not limited to, the impacts of installing alternative appliances such as reverse cycle air conditioning in lieu of gas heating, continuous flow gas systems in lieu of storage gas systems, solar or electrical systems, and the impacts of water conservation measures on the consumption of hot water;
- (b) government energy efficiency policies including but not limited to, minimum efficiency performance standards for gas hot water systems, energy efficiency home rating schemes, business energy efficiency reporting schemes and hot water rebate schemes for solar and heat pump hot water system replacements; and
- (c) implementation of the Government's Carbon Pollution Reduction Scheme including the impacts on fuel substitution, reduction in demand of increased cost of gas especially in the large industrial market, economics of small and large scale cogeneration and electricity production.

2. The economic outlook for Australia to 2018-19

2.1 Introduction

This section provides an outline of the economic outlook for Australia to 2018-19. Figure 2.1 shows the outlook for Australian gross domestic product to 2018-19. Table 2.1 shows the projected annual Australian GDP growth rates to 2018-19. Part 2.2 of this section provides a more detailed outlook for the Australian economy to 2013-14. This economic outlook was prepared in December 2008.



Note: Financial years ending June.

Table 2.1 Australian GDP growth 2004-05 to 2018-19

Per cent change	
2005	2.8
2006	2.9
2007	3.3
2008	3.8
2009	0.7
2010	0.6
2011	1.8
2012	4.5
2013	3.8
2014	3.5
2015	2.9
2016	2.2
2017	3.1
2018	3.2
2019	3.6
Compound growth rate (per cent)	
2008-2010	0.6
2010-2019	3.2
2009-2019	2.9

Note: All growth rates refer to financial years ending June.

2.2 An overview of the medium-term outlook for the world and Australian economies

2.2.1 The world economy

It is now obvious that the world economy faces its most difficult period since the Great Depression. It will not be as severe as the Great Depression (although the scale of wealth destruction will be of the same order of magnitude), because governments now are willing to use whatever tools are available to place a floor under activity. Before recovery can occur, necessary further measures will probably include:

- (i) direct (via central banks) financing of credit markets (wholesale, commercial); and
- (ii) turning fully or partly nationalised banks into utilities directed in the first instance and the maintenance of trade credit and project financing, along with cutting interest rates to low levels and injecting fiscal stimulus packages of between 2 to 4 per cent of GDP.

However, the shock to confidence and the scale of wealth destruction so great, self funded retirees and those nearing retirement can now expect only a half to one third of the standard of living they expected three months ago.

But in North America and Europe deferred benefit schemes are the norm. The reforms here will be painful and politically diverse. The role of companies in providing pensions and health care costs in the United States will send many firms into liquidation, and will force the "socialisation" of the provisions of these services onto the United States Government, which will involve large increases in the revenue accruing to the Government which could only be done in a crisis that is now prevailing.

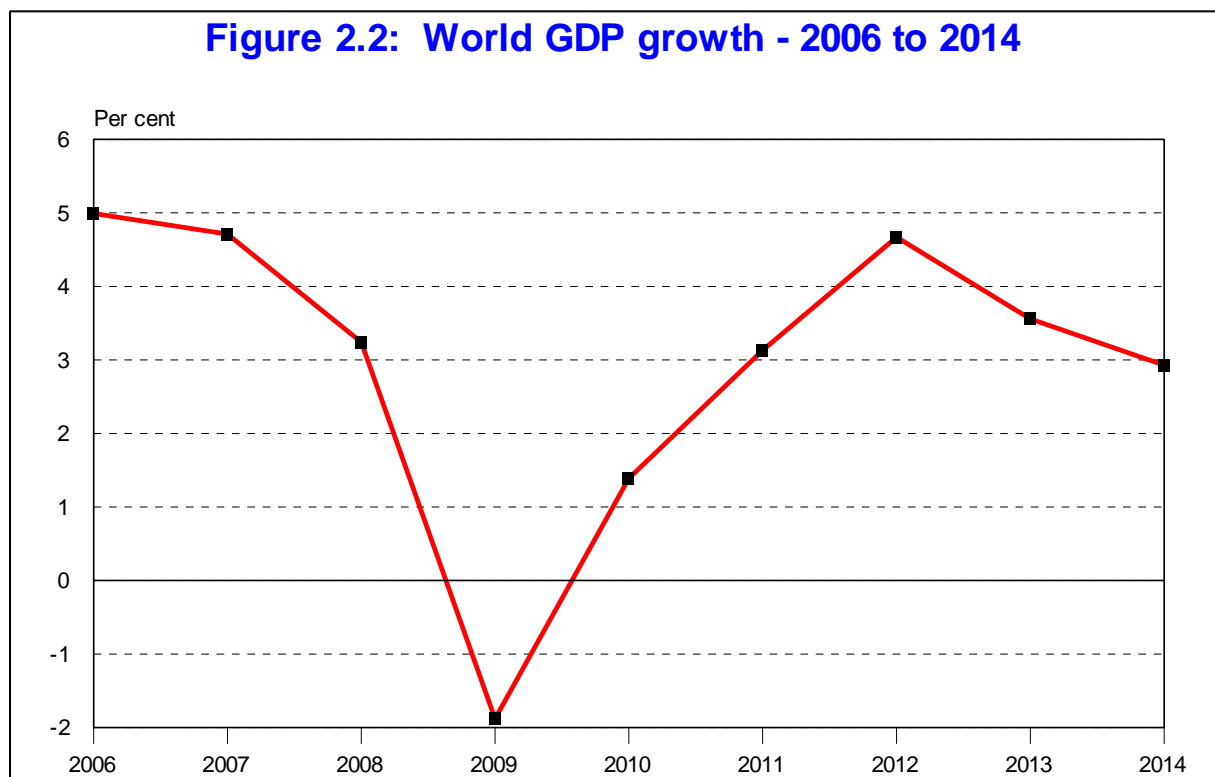
Massive stimulatory packages will be applied. However, in the short term, that is over the next two years at least, these measures will not be enough to stop negative growth outcomes. The reason is that the negative factors unleashed by the financial crisis of September-October 2008 will be powerful and ongoing. These include:

- (i) households rapidly increasing their savings ratios from a combination of motives, including:
 - loss of long run expected post retirement incomes;
 - aversion to any further increases in debt;
 - to build-up cash balances as a precautionary motive against an uncertain future;
- (ii) unavailability of trade and roll-over finance as financial institutions also build cash balances. This will probably require direct public sector donations to unblock. It is now clear that lack of trade credit and loss of confidence in payment will have a significant short term impact on Australia's export performance, especially in mining;
- (iii) non-finance firms also building their cash balances to qualify for future financing and allow resources for the low cost take-over opportunities that will be in abundance. This will be a negative for economic activity because it will involve:
 - cuts to employment;
 - rapid reductions in inventories; and
 - postponement or cancellation of investment projects.

Rapid destocking by customers will also impact on Australia's export performance and lead to significant declines in mining production.

As a partial offset the rapid declines in commodity prices, in general, and oil, in particular, will also act as powerful built-in stabilisers to support real incomes. It will, of course, have the negative effect of transferring economic growth from commodity producing to commodity consuming countries.

In this environment what world growth will be in 2009 and 2010 is largely guesswork. A reasonable assessment would seem to be that United States growth will be in the range of -4 to -1 per cent, while Europe will be in the range of -2 to 0 per cent. The rest of the world will be in the range of 0 to 2 per cent, with Asia in the range of 1.5 to 3 per cent, excluding China. The question then becomes, what happens to China? The problem here is that China simply lies about its growth rate.



China

The world places much hope in China maintaining relatively high economic growth rates over the next two to three years by offsetting the fall off in export demand by accelerated growth in domestic demand. For 2009 and into 2010 this expectation is unlikely to be realised.

It was always expected that China would experience a post Olympic Games slowdown in growth, as has been the experience of most countries in recent times. This is because the Games have the effect of "pulling forward" expenditures, both for consumers and investment, which leads to a natural downturn in growth after the event.

The world economic crisis has reinforced this effect. As a result, economic growth in China is slowing rapidly, as evidenced by:

- (i) large falls in imports in October;
- (ii) month on month a year earlier Chinese industrial production was running at an increase of 8 to 12 per cent during the first half of 2008. In October the fall was 17 per cent, with production of white goods and cars falling and cement production being the same as a year earlier;
- (iii) earlier in the year electricity production was running at 17 per cent above the levels of a year earlier. In October the increase had fallen to 4 per cent;
- (iv) millions of workers are now being laid off in the construction sector;
- (v) forward export orders show no growth; and
- (vi) falls in Chinese equity prices have, like elsewhere, created large scale wealth destruction.

The Chinese Government has just announced a major stimulatory package. However, the assessment is that at least two thirds, and perhaps 80 per cent, were projects that would have gone ahead in any case.

The forward indicators suggest that in 2009 the Chinese growth rate will be around 3 to 5 per cent, although the Government statistics will show a growth of 7 to 8 per cent.

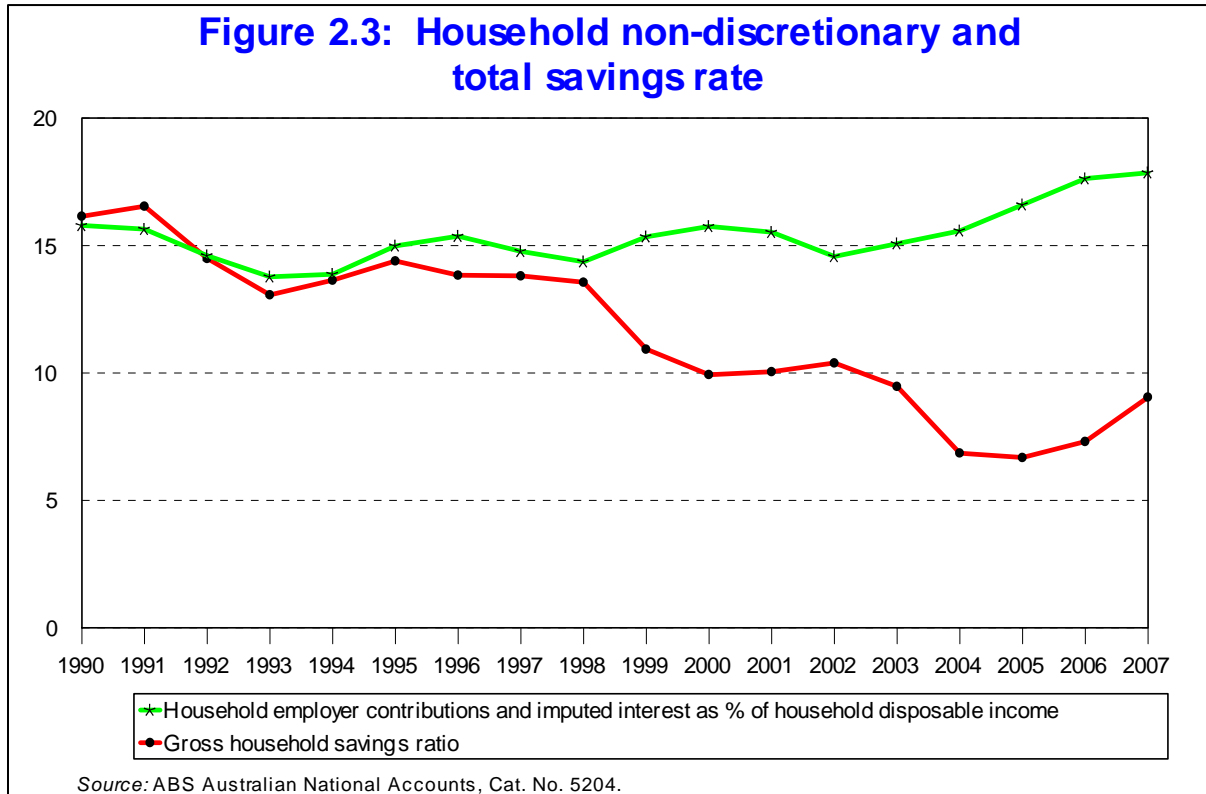
China is a state capitalist economy with latent or formal controls over almost all aspects of economic life. Like the German fascist economy of the 1930s, it has powerful instruments to “command” growth. There will be massive uplift in infrastructure expenditures which will start to have an effect from 2010. Therefore, this projection does have Chinese growth averaging 7 per cent over the next five years. However, growth is 2 per cent for 2009, 4 per cent for 2010, 8 per cent for 2011, 10 per cent for 2012 and 12 per cent for 2013.

The projection therefore allows for the likelihood, over the next two years, that policy to stimulate the economy will be largely, though not completely, offset by the cyclical down-saving now operating on the economy.

2.2.2 The financial whirlwind facing Australia over the next three years

The causal mechanisms and the cumulative outcome over the past 15 years that have led to Australia’s current financial vulnerability can be demonstrated by reference to a small number of statistical series.

One series in the following figure is the ratio of employer social security contributions plus household imputed interest on superannuation assets to household gross disposable income net of cash transfers. Driven in part by compulsory superannuation, this ratio has increased from 14 per cent in 1994 to 18 per cent in 2007.



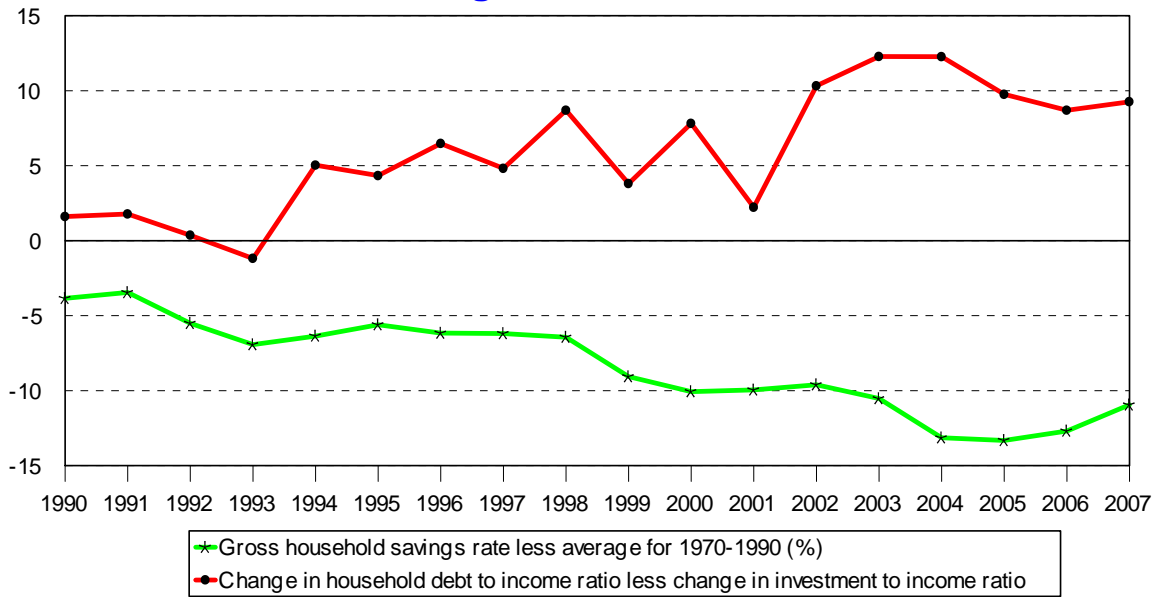
Over the same time period the gross household savings ratio has fallen by more than 4 percentage points. This is perverse since both employer contributions and imputed interest are treated as part of household income in the Australian National Accounts, with no disbursement entered on the outlay side of the household accounts. That is, premiums and imputed interest are included in gross savings. The expectation, therefore, would have been that gross savings should increase in parallel with the premiums/imputed interest series. This after all was one of the objectives of the policy.

The conclusion is that the household sector simply used the deregulation of the financial system to offset the increased savings pressure of compulsory superannuation by borrowing to finance consumption.

This conclusion is consistent with the evidence provided in Figure 2.4. This figure shows the ratio of gross saving to household disposable income less the average for the gross household savings to income ratio from 1970 to 1990, during which period the household debt to income ratio exhibited a relatively slow upward trend, at least compared to post mid 1990s experience as indicated by the figure on the next page.

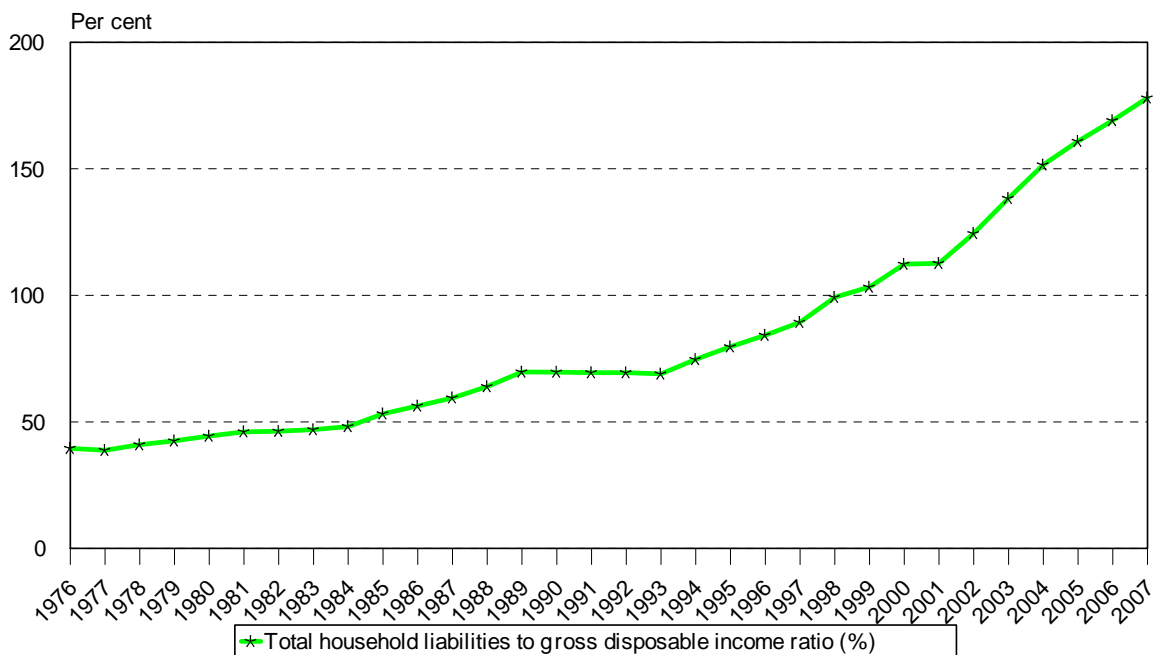
Also plotted in Figure 2.4 is the change in the household debt income ratio less 75 per cent of the change in the household gross investment (dwellings plus unincorporated enterprises) to income ratio. This series attempts to estimate the increase in debt to income ratio that was, in whole or part, used to finance consumption. The close correlation between the two series in the figure suggests that the build-up in household debt has largely been used to finance consumption. This in turn implies that, to stabilise the debt to income ratio, the household savings ratio will have to increase by at 8 to 10 percentage points, that is, almost double.

Figure 2.4: Ratio of gross savings to household disposable income less average gross household savings to income ratio



Source: ABS Australian National Accounts: Financial Accounts, Cat No. 5232 and Australian National Accounts, Cat No. 5204

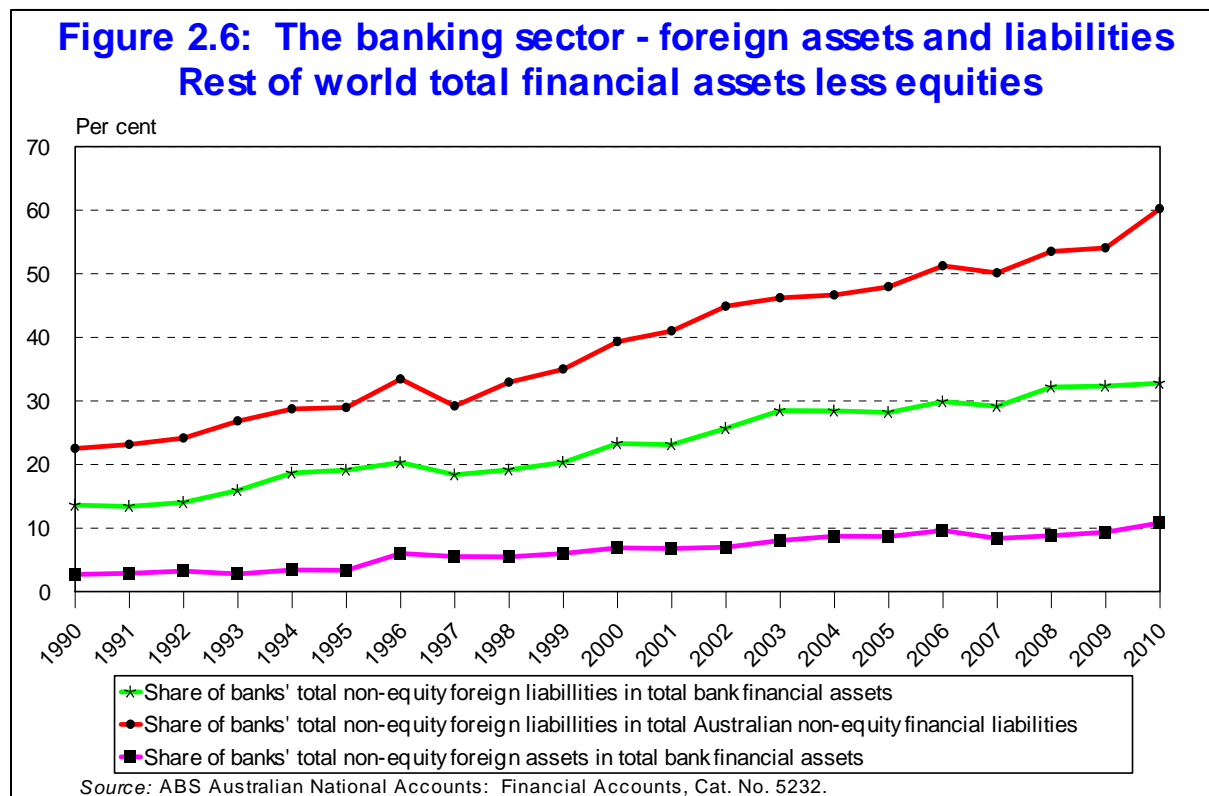
Figure 2.5: Household debt to income ratio



Source: ABS Australian National Accounts: Financial Accounts, Cat No. 5232 and Australian National Accounts, Cat. No. 5204.

The analysis suggests that if household borrowing for consumption were to cease suddenly, then consumption would fall directly by between 5 and 10 per cent from what otherwise would have been the case, or an absolute fall of between 1 and 6 per cent. With multipliers this would plunge the economy into a recession. The severity of the recession would depend on the drawdown in financial assets.

In addition any economy-wide response to a cessation of household borrowing for consumption will be aggravated by the vulnerability of the banking system. The following figure indicates that the banks' holdings of Australia's total gross non-equity foreign financial liabilities have doubled from the 30 per cent to 60 per cent since the mid 1990s, with the result that the banks' share of total foreign non-equity liabilities as a percentage of total bank financial assets has increased by 83 per cent over the same period to a third. The increase in Banks' net foreign liabilities as a percentage of their assets has been 70 per cent. To what extent the foreign banks' gross foreign assets are a hedge against their gross foreign liabilities is unknown.



Any household cessation of lending for consumption is expected to reduce the banks' demand for new foreign liabilities, which in turn will result in a depreciation of the currency. Once hedging positions are unwound, this will increase bank costs, force the banks to increase domestic and lending margins, so reinforcing the contraction in economic activity. Furthermore, uncertain times would force up bank hedging costs as debt is rolled over, as well as force the acceptance of a greater proportion of foreign liabilities denominated in foreign currency.

In any case, the level of bank holdings of Australia's international debt is so high that any loss of confidence in the Australian economy and its banking system will result in a sharp plunge in the exchange rate, as per Iceland over the past 18 months, which, by itself, could result in the banks being unable to roll over international debt, forcing them at best into a

partial nationalisation arrangement with government as per the recent experience of the United States and United Kingdom banks. By itself, the banks' balance sheet structure could trigger a sequence of actions, by which the unavailability of bank finance for consumption expenditure is a consequence of, not a trigger for, the descent of the Australian economy into recession or at worst depression.

Finally, as noted above, the issue of climate change itself could be a catalyst for financial and economic crisis. If the projections of the damage from climate change increase and the acceptance of low common per capita emissions cap is forced on the world, then the recognition by investors of just how far Australia has to go to achieve required outcomes in terms of CO₂ reduction in the context of unsustainable bank and household balance sheets could trigger exchange-rate-lending-economic crisis. If Australia was unprepared, or did not understand the reasons, or responded poorly, then the crisis could easily be translated into a depression, as in Iceland.

If there is a loss of confidence, problems could arise with refinancing of bank overseas liabilities. A particular worry is what might happen to the banks' balance sheets if overseas borrowings have to be re-financed at a reduced exchange rate and in the face of overseas pessimism about Australian economic prospects – in particular, pessimism about Australia's capacity to repay promptly in creditor currencies. Worse, what would happen if Australia's creditors apply the principles of sound finance, and demand prompt repayment? Suppose that they refuse to refinance the net liability. Official overseas reserves of foreign currency amount to only about 20 per cent of this. This demand, should it arise, is accordingly serious: it would take virtually the whole of one year's export earnings to satisfy it. The adjustment required would be at least as serious as that which faced the Asian economies in the financial crisis a decade ago.

At this point the best that could be expected from a sound-finance approach would be a major effort to increase export earnings and devote them to debt repayment. However, the scope for this is limited: there is little that the Australian government can do to increase exports rapidly, and accordingly the main way to release foreign exchange to repay debts is by cutting imports drastically. The market mechanism to do this would be a drastic fall in the exchange rate, making imported goods much more expensive and making exporting much more attractive. The fall in the exchange rate would affect not only the price of consumers' goods (thus reducing the standard of living) but also the price of equipment – for example, computers would become much more expensive. Even worse, from a domestic point of view, the Australian dollar value of debt which is fixed on overseas currency terms would rise, meaning that the Australian dollar earnings required for debt service will rise. A major reorganisation of the economy is required, and in the process a high rate of unemployment would be inevitable. There would also be a financial meltdown, with a high threat of bank closures and the bankruptcy of other businesses with overseas borrowings to repay.

A slightly more palatable alternative, on the precedent of several of the countries involved in the 1998 Asian crisis and various of the Latin American countries which suffered financial crises in the 1980s is to take a loan from the International Monetary Fund. The Fund represents the major international creditors, and its loans are intended to provide bridging finance to over-indebted countries while they make the necessary domestic adjustments to allow them to repay their debts. Loans from the IMF are thus conditional on economic reforms which, in the judgement of the Fund's generally neo-liberal economists, will help repay the borrowing country's creditors as fast as possible. The IMF was able to play a major role in the Latin American and Asian financial crises, but has not previously had to face up to a financial crisis originating in the United States. We have yet to see how its policies will develop, but there is no guarantee that, as a representative of international creditors, it will be at all sympathetic to a rich country like Australia which has got itself into trouble by adopting foolish policies – and in this court foolishness will be judged in retrospect, not by the economic fashions of the 1990s.

A third alternative was pioneered by the Malaysian response to the Asian financial crisis, and is associated with Dr Mahatir, the then Malaysian prime minister. This was essentially a domestically-managed variant of the IMF loan response, with the following main elements.

- Suspension of currency convertibility on capital account, with a promise that this would be temporary. The effect was that central bank permission was required for domestic investors to shift funds overseas, and likewise for overseas investors to repatriate funds. The effect was to reduce downward pressure on the exchange rate while measures were put in place to deal with the over-indebtedness which was the root cause of the problem.
- Implementation of a plan to repay overseas debt so that it falls to sustainable levels. Essential elements in such a plan include reduced reliance on overseas borrowing and an emphasis on increasing the capacity to service the stock of overseas debt already incurred. Reliance on overseas borrowing can only be reduced if domestic saving is increased, while the capacity to service debt requires expanding export revenues relative to import costs.

The major difference from the IMF loan alternative was the imposition of exchange controls (which were anathema to the neo-liberal establishment running the IMF). The immediate benefit of this was the avoidance of further indebtedness to the IMF, but the major benefit was that the adjustment program was kept under local control, rather than ceded to the IMF. It was thus possible to take advantage of local knowledge to draft a more efficient adjustment program. However, an important point was that the program had to be drastic enough to rid the country of excess debt within a matter of a few years – and to convince international creditors that this would happen.

Interest rates

Currently there is a general expectation that interest rate reductions to very low levels will come to the rescue and keep the economy moving along at a reasonable growth rate.

This is not likely. This is because of the inflation problem. The decline of the exchange rate to current levels will aggravate inflationary pressures although somewhat offset by falls in commodity prices. Further falls in the exchange rate almost certainly will lead to substantially higher inflation. The RBA, therefore, will have constraints on lowering interest rates, which will be compounded by increases in the current account deficit. Hence, the base scenario puts a floor under the interest rate declines.

The exchange rate

The Australian exchange rate could collapse at any point. That is, fall to the 30 to 40 cents range. The reason is straight forward. Over the next year Australia, and the banks in particular, will have to roll-over between \$300 billion to \$400 billion in foreign debt, as well as raise \$40 billion or \$60 billion in new liabilities to fund a widening current account deficit resulting from the rapid destruction in the terms of trade. In the context of the continuation of new foreign credit markets it will be difficult.

Further, if Australian households significantly reduce their lending for consumption, then there will be little incentive for the banks to borrow overseas. This will leave a very large deficit in the foreign account and, give the limited foreign reserves of the RBA, the exchange rate will fall to low levels, that is, below 40 cents to the US dollar. If this happens then the Banking Meltdown scenario will in all probability be triggered.

In any case, the exchange rate will go to relatively low levels. That is, to the 50 to 60 cents range. In part this will be due to the sharp decline that is expected in the terms of trade over the next one to two years due to slow world growth, and the likelihood that China will follow the world down in the short term.

Climate change

In the context of the gloom concerning the world economic growth outlook, the pressure for aggressive action on climate change will increase. The scientific consensus is that the world will have to target a return to 350 ppm (now 387 ppm) to have any chance of surviving in an environment near its current form to 2100. This will require targets similar to 80 per cent below 2000 levels by 2005, which are now being adopted in Europe at least, and no doubt in the United States over the next few years.

Australia will not have the option of “opting out”. If it does it will simply be subjected to trade and financial embargoes. However, as is now being pointed out regularly overseas, the necessary war on climate change offers a platform for the developed world to reflate their economies, similarly to how World War II gave the impetus for restoring full employment from the Great Depression.

Table 2.2 Major Australian economic aggregates: calendar year averages (annual per cent rate of change)									
	2006	2007	2008	2009	2010	2011	2012	2013	2014
International									
World GDP (fiscal year)	5.0	4.7	4.1	1.7	0.8	2.0	3.0	3.8	4.3
Demand									
Private consumption	2.6	4.1	3.7	1.1	1.6	2.0	3.6	3.9	3.5
Business investment	15.2	6.6	13.1	-0.9	-13.3	-10.6	3.8	6.9	11.5
Housing	-3.9	2.0	1.3	-3.3	5.4	3.2	6.9	5.0	-1.4
Public expenditure	3.7	4.1	4.0	4.7	4.2	4.4	4.6	3.8	4.5
Total expenditure	4.3	4.4	5.2	1.3	-0.2	0.7	4.0	4.3	4.5
GDP	2.9	3.3	3.8	0.7	0.6	1.8	4.5	3.8	3.5
External sector									
Current account deficit (\$B)	-52.8	-59.0	-70.2	-49.0	-76.7	-95.0	-111.6	-112.6	-123.2
CAD as per cent of GDP	5.5	5.7	6.2	3.9	5.5	6.3	7.0	6.5	6.8
Labour market									
Employment	2.4	2.7	2.6	1.3	-0.7	1.2	1.8	2.3	2.5
Unemployment rate (%)	5.0	4.5	4.2	4.6	6.6	6.7	6.3	5.9	5.5
Finance									
90 day bank bill (%)	5.7	6.3	7.3	5.4	4.5	4.7	5.6	6.6	6.9
10 year bond rate (%)	5.4	5.8	6.2	5.2	4.8	5.1	6.0	6.8	6.7
\$US/\$A	0.7	0.8	0.9	0.7	0.6	0.6	0.6	0.7	0.7
Trade weighted index	63.3	64.8	69.7	55.6	46.8	45.0	45.0	46.3	47.8
Wages and prices									
Average weekly ordinary time earnings	4.7	3.7	5.0	4.7	4.0	3.7	3.7	3.7	4.1
CPI	3.2	2.9	3.4	4.1	3.2	2.1	1.8	2.1	2.7

Figures 2.7 to 2.13 show graphically selected indicators for the base scenarios for the Australian economy over the medium term.

Figure 2.7: Consumer spending and GDP



Figure 2.8: GDP and employment



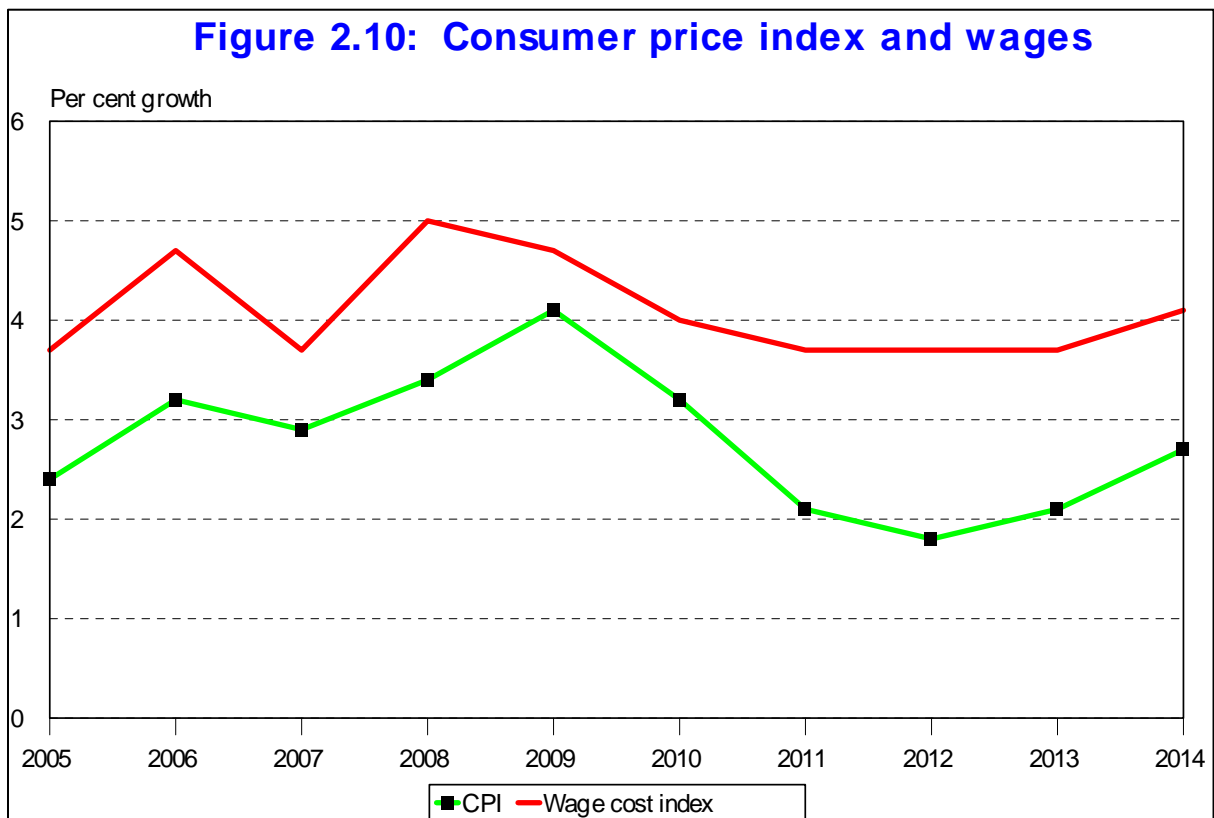
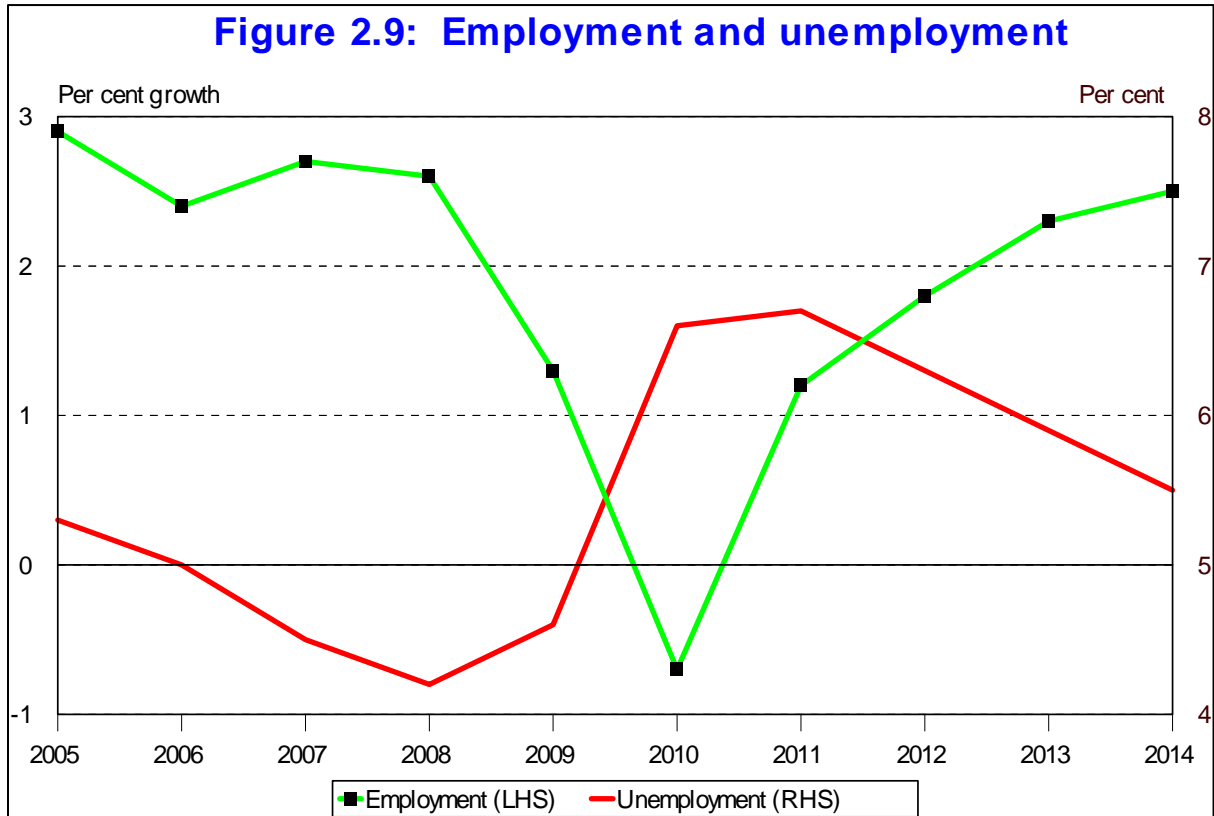


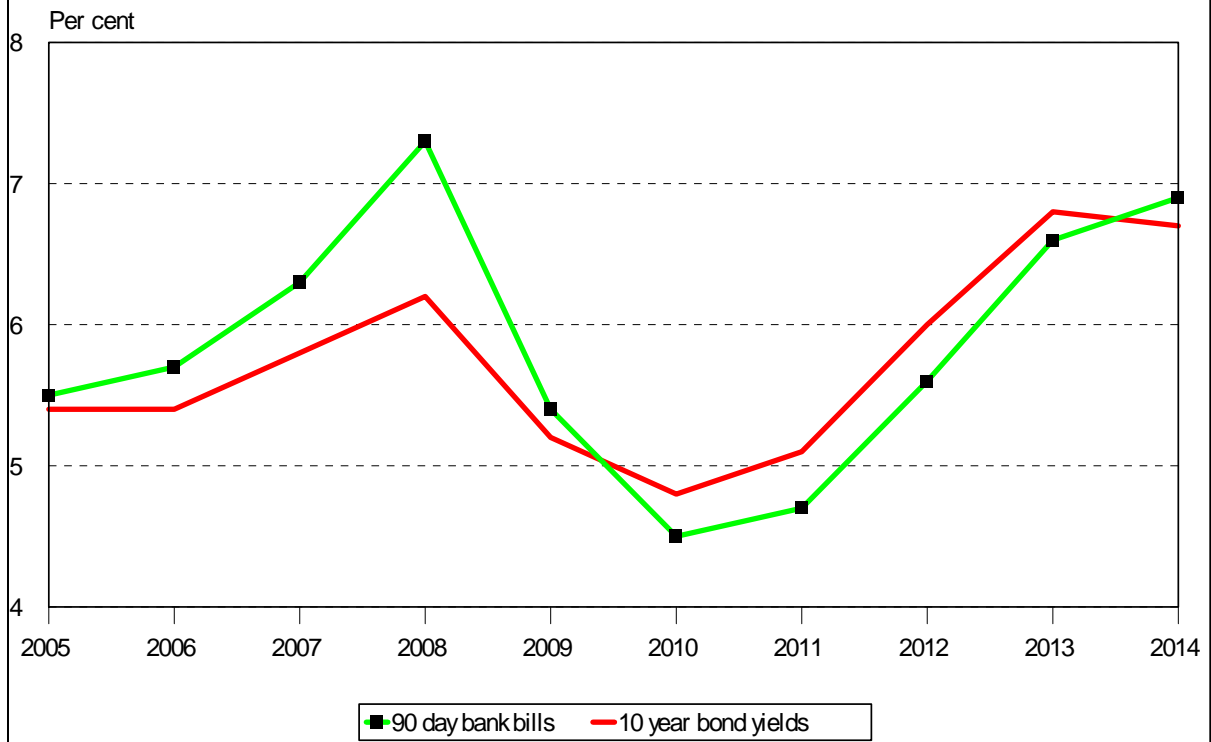
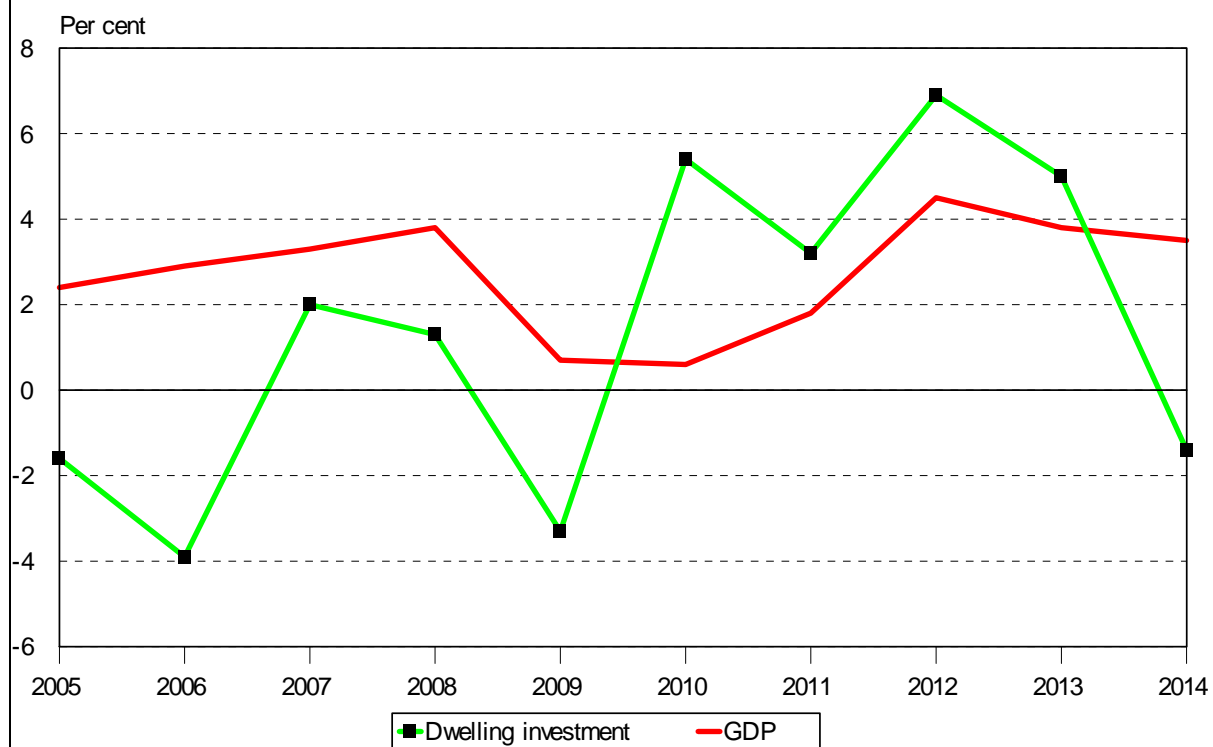
Figure 2.11: Domestic interest rates**Figure 2.12: Exchange rate**

Figure 2.13: Housing sector

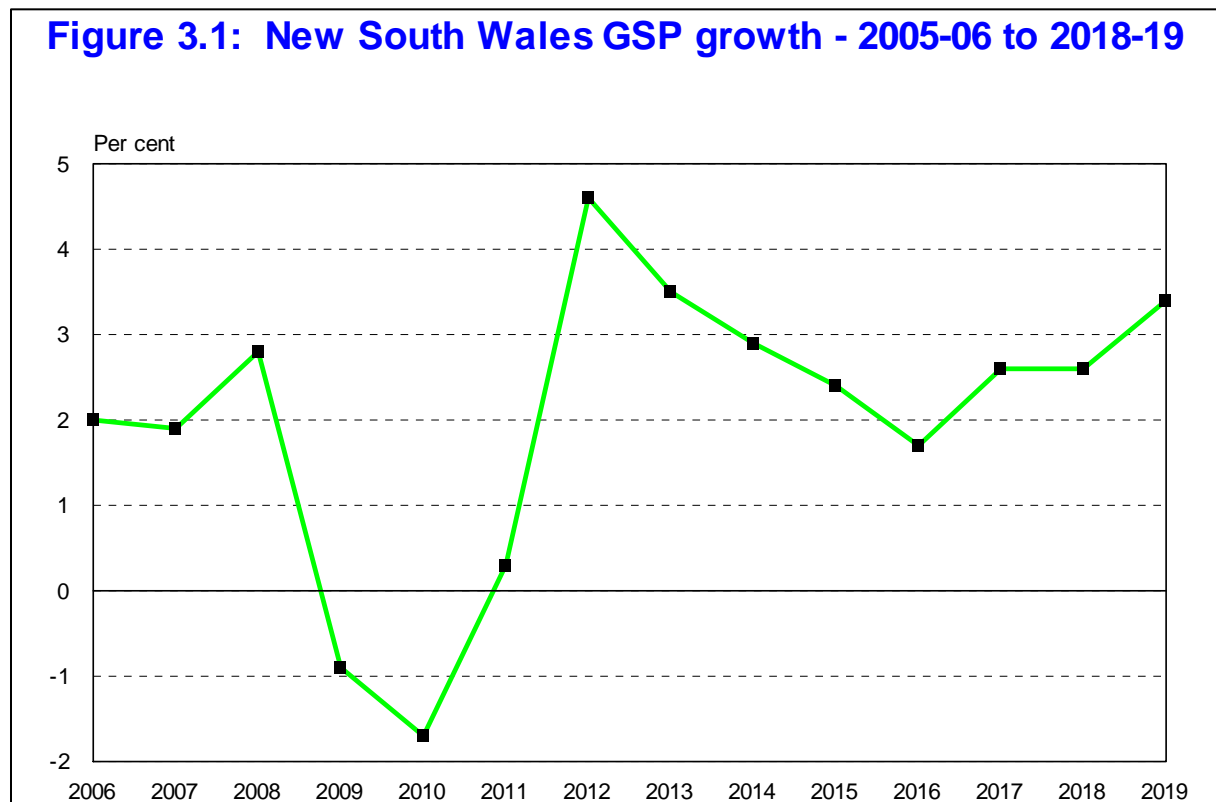
3. The outlook for New South Wales to 2018-19

3.1 Introduction

This section outlines the base economic outlook for New South Wales to 2018-19.

3.2 Summary

Figure 3.1 shows the outlook for New South Wales GSP growth over the period to 2018-19. New South Wales GSP growth averages 2.4 per cent per annum between 2008-09 and 2018-19. Table 3.1 shows the projected annual growth rates in GSP in New South Wales for the period 2004-05 to 2018-19. These economic projections were prepared in December 2008.



Note: Financial years ending June.

Table 3.1 Projected Australian and New South Wales GDP growth rate – 2004-05 to 2018-19		
	Australia	New South Wales
Per cent change		
2005	2.8	1.7
2006	2.9	2.0
2007	3.3	1.9
2008	3.8	2.8
2009	0.7	-0.9
2010	0.6	-1.7
2011	1.8	0.3
2012	4.5	4.6
2013	3.8	3.5
2014	3.5	2.9
2015	2.9	2.4
2016	2.2	1.7
2017	3.1	2.6
2018	3.2	2.6
2019	3.6	3.4
Compound growth rate (per cent)		
2008-2010	0.6	-1.3
2010-2019	3.2	2.7
2009-2019	2.9	2.2

3.3 The outlook for New South Wales to 2013-14

Table 3.2 presents selected economic aggregates for the New South Wales economy to 2013-14. A commentary on the main indicators is provided below.

Table 3.2 Macroeconomic aggregates and selected indicators – New South Wales (per cent change)									
	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Compound growth rate 2008-09 to 2013-14
Private consumption	3.9	3.1	-1.1	0.2	0.9	2.9	3.5	3.0	2.1
Private business investment ¹	-1.2	15.6	-2.2	-19.5	1.4	28.4	0.8	5.3	1.9
Private dwelling investment	-7.2	-2.6	-7.2	10.0	9.6	14.4	10.8	-1.0	8.7
Government consumption	1.5	3.6	2.2	2.5	3.0	2.9	2.0	2.3	2.6
Government investment	4.4	-1.7	12.1	0.1	18.5	29.8	2.9	7.4	10.8
State final demand	2.2	4.4	-0.5	-1.9	2.5	7.9	3.2	3.1	2.9
Gross state product	1.9	2.8	-0.9	-1.7	0.3	4.6	3.5	2.8	1.9
Population	1.0	1.1	0.9	0.8	0.7	0.8	0.9	0.9	0.8
Employment	1.8	2.4	0.0	-2.3	-1.4	0.9	2.5	2.2	0.4

Source: NIEIR and ABS.

Gross state product

New South Wales GSP growth was 2.8 per cent in 2007-08, following growth of 1.9 per cent in 2006-07. On average over the last five years, growth in the New South Wales economy has been over 1.0 per cent below the recorded national GDP growth rate.

The meltdown in the financial sector and its flow-on effects are forecast to lead to a decline in New South Wales GSP in 2008-09 and 2009-10. This largely reflects projected falls in consumption and business investment.

Weak growth continues into 2010-11 before the New South Wales economy rebounds strongly in 2011-12. New South Wales GSP growth in 2011-12 is 4.6 per cent. A recovery in consumption expenditure and housing construction fuels this growth in New South Wales. On average, New South Wales GSP growth averages 1.9 per cent over the 2008-09 to 2013-14 period.

Population

New South Wales population growth was 1.1 per cent in 2007-08, following on from growth of 1.0 per cent in 2006-07.

Whilst population growth rates have increased over recent years, they remain at only two thirds of the national population growth rate. Weaker economic growth and high house prices in Sydney have contributed to the slower population growth in New South Wales.

A large increase in net overseas migration gains by New South Wales has contributed to stronger population growth. The natural increase in population (births less deaths) has also contributed to the increase, although this fell sharply in 2007-08.

New South Wales continues to record net interstate migration losses, which have been between 22,000 and 27,000 persons over the last four years.

New South Wales population growth is expected to slow over 2009-10 to around 0.8 per cent growth. On average, New South Wales population growth averages 0.8 per cent growth over the 2008-09 to 2013-14 period.

Private consumption expenditure

Private consumption expenditure in New South Wales is forecast to slow significantly over the next three years. This reflects a number of factors, including lower levels of consumer confidence, falling employment and real incomes, and falling levels of private housing expenditure.

Private consumption expenditure is forecast to fall by 1.1 per cent in 2008-09, remain flat in 2009-10 and rise by only 0.9 per cent in 2010-11. This compares to growth of 3.9 per cent in 2006-07 and 3.1 per cent in 2007-08.

Stronger growth in private consumption expenditure in New South Wales is expected by 2011-12, with growth of around 3.0 to 3.5 per cent expected over the last three years of the period to 2013-14.

Private business investment

Private business investment in New South Wales has risen very rapidly over the last five years. As a share of New South Wales GSP, its share has risen by 5.0 per cent.

The growth in business investment in New South Wales has been underpinned by significant increases in building, engineering and equipment expenditures. Both mining and tertiary sector investment levels have risen, while new manufacturing investment levels have remained flat.

With the collapse in domestic demand and trade induced by the 2008 financial sector meltdown, business investment is expected to fall significantly in New South Wales. Business investment in New South Wales falls by around 23 per cent over the 2008-09 to 2010-11 period.

Dwellings investment

Private dwellings investment has fallen sharply in New South Wales over recent years. Since 2004, private dwelling expenditure has fallen by around 28 per cent. This represents a fall of some \$5 billion over four years.

The decline in the new dwelling construction sector has been even more pronounced. Total new dwelling approvals were some 31,000 units in 2007-08, compared to 50,000 in 2002-03.

Private new dwelling expenditure is expected to fall further in 2008-09 in New South Wales. Low nominal interest rates and slowly improving levels of consumer confidence are expected to generate a strong recovery in new dwelling construction in New South Wales. Expenditure levels rise from 2009-10 through to 2012-13.

Government expenditure

New South Wales Government consumption expenditure rose by 3.6 per cent in 2007-08, following growth of 1.5 per cent in 2006-07.

The fiscal strategy of the New South Wales Government has been to strengthen the State's balance sheet by reducing general government net debt and other financial liabilities to sustainable levels. This has been done over the last 10 years. Net general government debt, however, is expected to increase by around \$4 billion over the next four years to finance higher levels of capital investment. The New South Wales budgets for 2008-09 through to 2010-11 are likely to be adversely affected by the economic slowdown, including much weaker revenue growth.

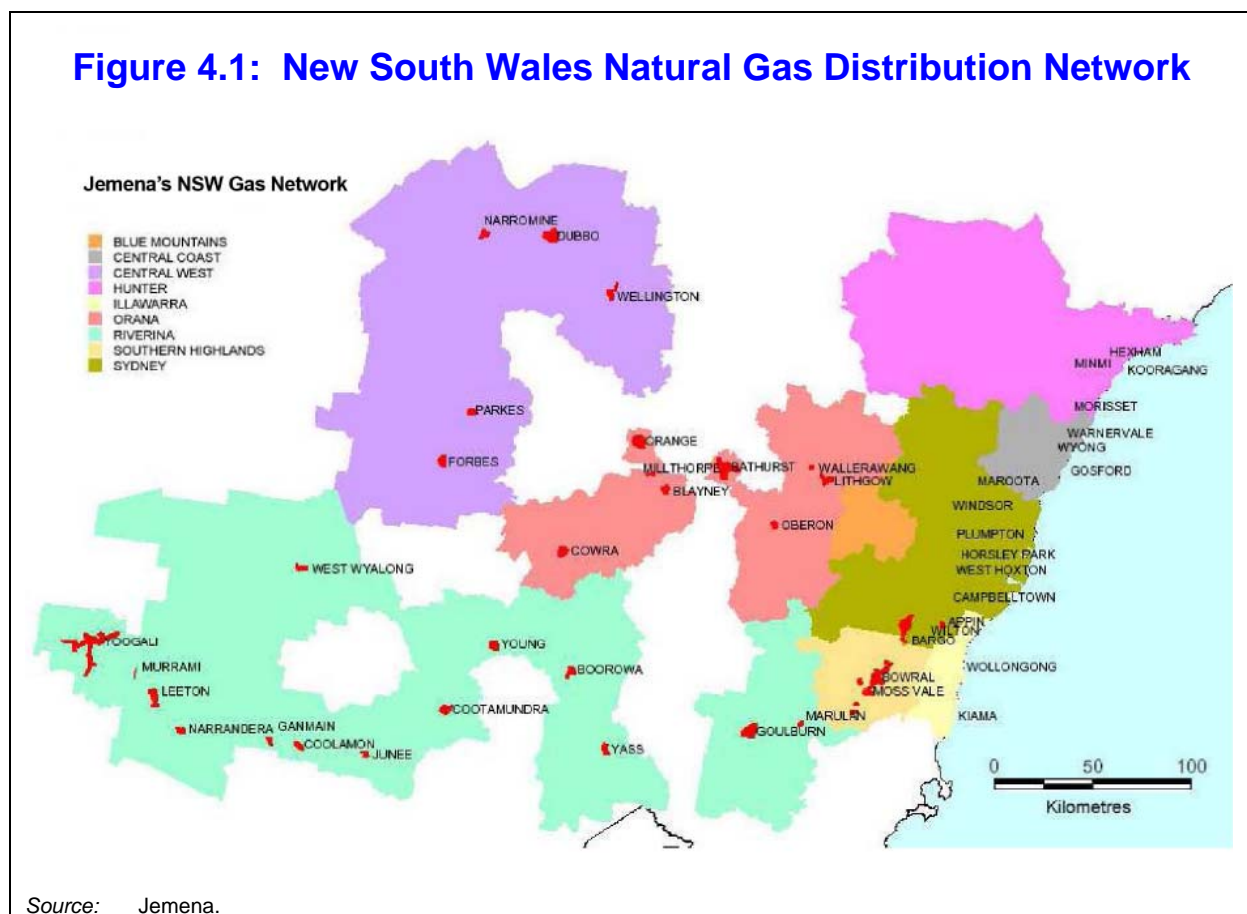
New South Wales Government investment expenditure remained flat in 2007-08. Over the 2008-09 to 2013-14 period, total government investment expenditure growth averages 10.8 per cent per annum.

4. Methodological approach

4.1 Introduction

This section outlines the key methodologies employed in developing the forecasts for NSW Jemena networks. Jemena Gas Networks (JGN) is the major gas distribution service provider in New South Wales (NSW). JGN owns 24,000 kilometres of natural gas distribution system, delivering approximately 100 petajoules of natural gas to over one million homes, businesses and large industrial consumers across NSW. Jemena Asset Management (JAM) undertakes the majority of JGN's operating, maintenance, and capital works activity.

Figure 4.1: New South Wales Natural Gas Distribution Network



4.2 Information supplied by Jemena Gas Networks

Jemena Gas Networks (JGN) provided NIEIR with the following data:

- gas consumption data for the various markets (tariff and contract), and for various customer types including new residential customers, electricity to gas customers (E to G) and business customers; and
- contract customers by individual customer including annual consumption and MDQ.

These data allowed NIEIR to develop a history of actual data for sales and customer growth for the Jemena distribution area, extending back around 10 years, previously supplied to NIEIR.

The issue of weather and normalisation of the sales data is described later in this section and boundary data on a daily basis for the Jemena gas network in New South Wales.

4.3 Overall modelling approach

Forecasts of the NSW JGN area natural gas sales were developed within a regional economic model of the New South Wales (NSW) economy. This model takes NIEIR's State forecast of gross State product (by industry) and disaggregates it into statistical sub-divisions across NSW. Figure 4.2 illustrates the link between NIEIR's national economic models and regional natural gas sales.

Forecasts of economic outlook

NIEIR's national and State economic models were used to generate economic forecasts to 2018-19. The regional economic model of NSW will separately imply how the economic scenario maps down to the Jemena NSW distribution area.

Key indicators at the regional level will be population, dwelling stock and gross regional product (by industry).

Projections of JGN annual gas usage were prepared for:

- tariff volumes (annual loads of less than 10 TJs); and
- contract volumes on an industry basis.

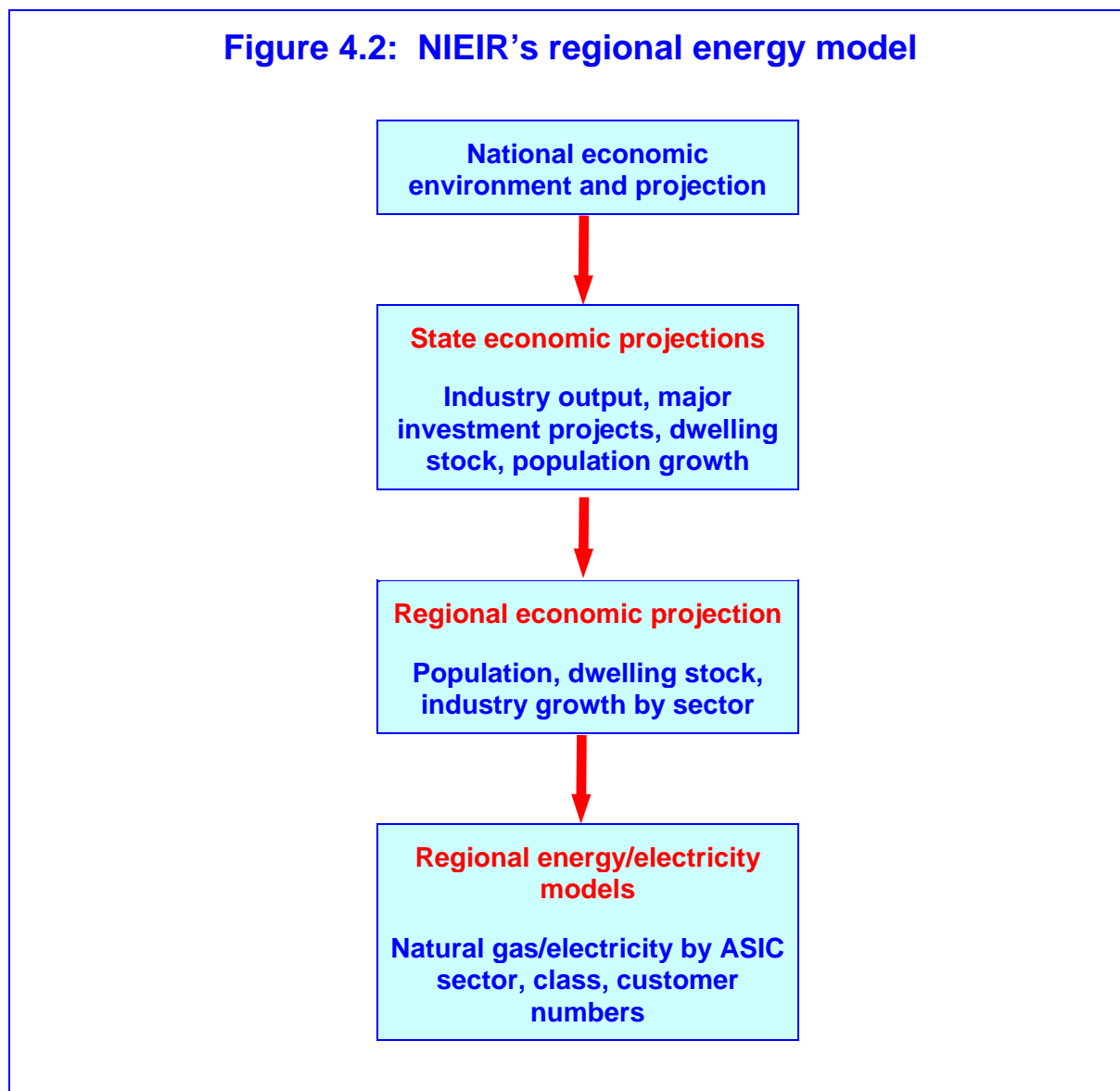
Tariff volumes were separated into residential and business. Residential were further disaggregated into existing, E to G and new estates and high rise.

The annual gas demand projections include the impact of Federal and State Government greenhouse and other energy policies.

Tariff customers and volumes

Residential gas usage dominates Tariff consumption. Residential gas usage is modelled using an end-use type model that disaggregates residential usage into new and established dwellings usage. Residential new usage was separated further to net new customers and E to G customers, the latter referring to new customers on the existing gas network. Actual data in the customer number and average usage by market segment were provided by JGN.

Figure 4.2: NIEIR's regional energy model



The residential forecasts are prepared on a weather normalised basis and incorporate the impact of real household disposable income and real gas prices.

Residential customer number forecasts are linked to NIEIR's projections of the dwelling stock.

The residential gas consumption forecast model also took account of Federal and State Energy and greenhouse policies included:

- BASIX for new NSW homes implemented in July 2006;
- the program to review and standardise energy labelling of gas appliances followed with the development of MEPS for new gas appliances;
- the increased penetration of energy efficient showerheads;
- the effective banning of electric resistance hot water appliances from 2012;
- the ongoing negative impact of high sales of reverse cycle air conditioning equipment;

- Commonwealth stimulus package with subsidies towards insulation; and
- Other new policies or developments, such as the new NEET policy of the NSW Government and the RET scheme.

Tariff business projections are derived using a regression model which takes account of commercial output growth and movements in real gas prices.

In summary, the residential sales forecast were developed by first determining an econometric forecast (where the key drivers are household incomes and prices) and then adjusting the forecast for the impact of new energy policies. In developing these impacts includes models for hot water were developed for the JGN by market segment (new, E to G and existing). These models are outlined later in this section.

Contract customers and volumes

Projections of gas volumes for contract customers were developed on an industry basis. JGN supplied NIEIR with around 8 years of contract customer gas usage and MDQ's by customers. NIEIR industry coded these data on a customer by customer basis.

Gas demand models have been parameterised using NIEIR's existing State gas forecasting model. Regional gas demand models were parameterised using NIEIR's existing State gas forecasting model. The structure of this model in terms of industry coverage is shown in Table 4.1.

The industry regression models specifically relate gas consumption to:

- the change in output for that industry within the gas distribution area; and
- the change in real gas prices for that industry (incorporating lags in real prices to proxy the long run response or price elasticity).

The output and price elasticities at the regional level were adjusted to reflect differences in the gas intensity between industries and regions. Forecasts of MDQ were also developed on an industry basis. The MDQ forecasts were determined from the energy growth by industry and an industry specific load factor.

Table 4.1 Reconciliation of major customer class categories with ASIC industries

Customer class category	ASIC
Residential	
Commercial	Water and sewerage Construction Wholesale and retail trade Transport and storage Communication Finance, property, business services Public administration and defence Community services Recreation, personal and other services
Industrial	Mining Food, beverages, tobacco manufacturing Textiles, clothing and footwear manufacturing Wood, wood products manufacturing Chemicals, petroleum, coal manufacturing Paper, paper products manufacturing Non-metallic minerals manufacturing Basic metal products manufacturing Fabricated metal products manufacturing Transport equipment manufacturing Other machinery and equipment manufacturing Miscellaneous manufacturing
Farm¹	Agriculture, forestry, fishing, hunting

Notes: ASIC refers to Australian Standard Industrial Classification.

1. The farm class which excludes residential farm is included in the industrial sector.

4.4 Weather normalisation of JGN gas data

Weather data was obtained from the Bureau of Meteorology for the Sydney weather station.

It is widely accepted that gas demand is a function of temperature expressed as heating degree days (HDD) where the number of HDD for a day is defined as the difference between the average temperature for the day and 18 degrees Celsius except that HDD for a day is zero if the average temperature is greater than 18 degrees Celsius.

In order to make meaningful comparisons of consumption from year to year and to establish a datum from which to forecast future consumption, it is necessary to normalise observed consumption for the differences in HDD between years. The normalising adjustment is obtained by taking the difference between the observed number of HDD for the year and the standard number of HDD for a year and multiplying that difference – referred to here as “abnormal HDD” – by a temperature sensitivity coefficient for the relevant market (TJ/HDD). The coefficient is estimated by analysing historical market performance. In our analysis we have determined separate coefficients for the tariff and contract markets.

NIEIR estimates the standard number of HDD for a year to be 489 HDD which is the average number of HDD for the years 2003 to 2008.

Table 4.2 shows billed volumes, temperature sensitivity coefficients, observed HDDs, standard HDDs and normalised billed volumes for the tariff and contract markets for the years 2004 to 2009.

There is a long term trend of declining annual HDD and this trend has been factored into the forecast.

Table 4.2 Macroeconomic aggregates and selected indicators – New South Wales (per cent change)								
Tariff market	Unit	Source	2004	2005	2006	2007	2008	2009
Residential	TJ	JEMENA, NIEIR			20,009	20,649	21,327	22,875
Business	TJ	JEMENA, NIEIR			11,790	11,844	12,210	12,227
Total Billed Volumes	TJ	JEMENA, NIEIR	31,789	31,665	31,799	32,493	33,537	35,102
Temperature Sensitivity	TJ/HDD	NIEIR	16.2	16.4	16.5	16.7	16.9	17.1
Actual HDD	HDD	Bureau of Meteorology, NIEIR	527	464	533	486	477	602
Standard HDD	HDD	NIEIR	489	489	489	489	489	489
Abnormal HDD	HDD	NIEIR	38	-25	44	-4	-12	113
Weather Normalised Billed	TJ	NIEIR	31,175	32,076	32,809	32,554	32,003	33,173
Abnormal Weather Volumes	TJ	NIEIR	614	-411	728	-62	-205	1,929
Contract market	Unit	Source	2004	2005	2006	2007	2008	2009
Billed Volumes	TJ	JEMENA, NIEIR	64,230	64,050	62,988	64,857	65,452	65,487
Temperature Sensitivity	TJ	NIEIR		4.51	4.51	4.51	4.51	4.51
Actual HDD	HDD	Bureau of Meteorology, NIEIR	527	464	533	486	477	602
Standard HDD	HDD	NIEIR	489	489	489	489	489	489
Abnormal HDD	HDD	NIEIR	38	-25	44	-4	-12	113
Weather Normalised Billed	TJ	NIEIR		64,163	62,789	64,874	65,506	64,979
Abnormal Weather Volumes	TJ	NIEIR		-113	199	-17	-54	508

4.5 Old/new residential customer usage – JGN Gas Networks NSW

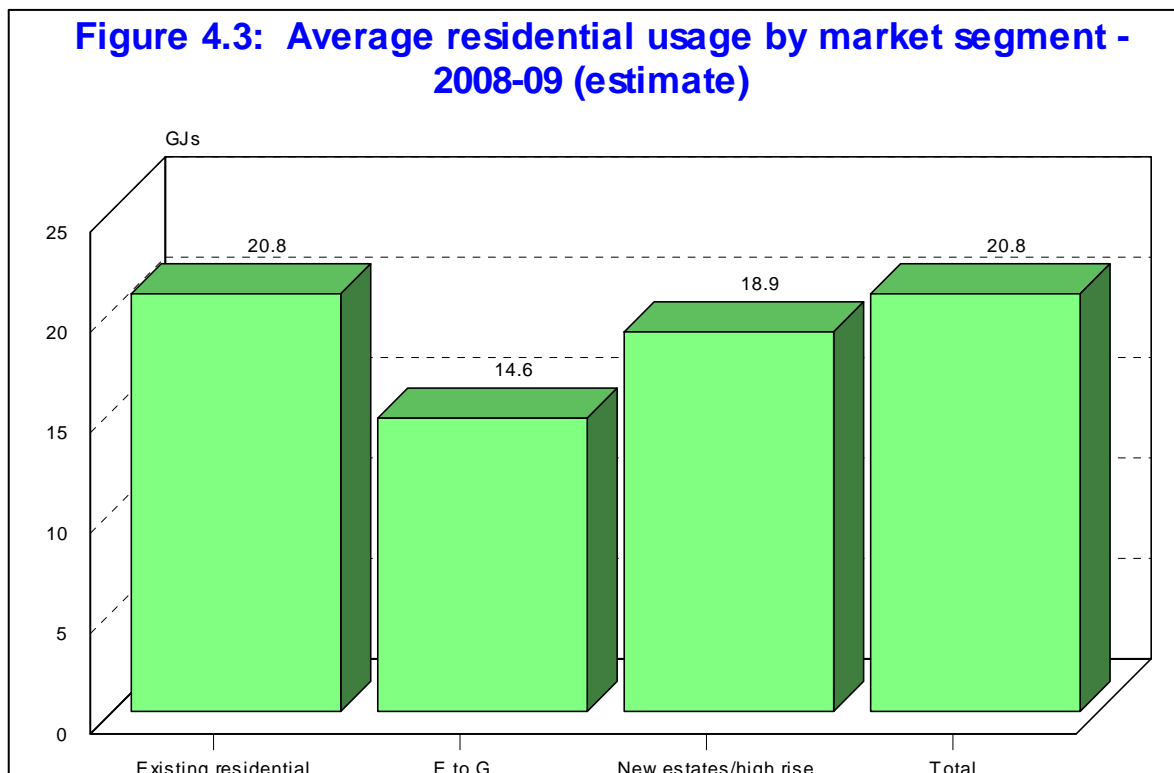
The rationale for looking at ‘old’ or existing customers and new customers was to assess how changes in government energy policies and building standards were affecting average consumption of natural gas by residential Tariff customers on JGN.

Table 4.3 Average residential customer usage – existing and new customers – JGN Gas Network NSW^(a) (GJs)	
	2008-09
Existing residential	20.8
Electricity to gas	14.6
New estates and high rise	18.9
Total	20.8

Note: (a) Weather normalised.

As indicated in Table 4.3, new residential customers consume on average around 2 GJ's less than existing customers. The result is not surprising and reflects a number of interacting factors, including:

- the efficiency of new versus existing water and space heating appliances;
- the fact that minimum energy performance standards for gas hot water appliances have not increased for a number of years; and
- The continued use of electric, solar-electric and heat pumps for hot water and the increased usage of reverse cycle air conditioners in New South Wales and the rest of Australia.



4.6 Gas usage in New South Wales

The Australian Bureau of Statistics (ABS) has, every three years since 1994, produced information relating to domestic energy use through the use of the monthly Labour Force Survey (LFS) and supplemented by the Energy Use and Conservation Survey (latest, March 2008).

The latter covers a range of issues including energy sources, appliances and energy saving measures used in households. As the ABS notes, the statistics are subject to normal sampling errors and may be biased by changes in the methodologies in collecting the data. Despite this, they provide a useful overall picture of gas usage by households in New South Wales.

Table 4.4 below shows the main energy source used in the four main end-uses for New South Wales in 2008. The four end-uses are:

- ovens;
- cook tops;
- space heating; and
- water heating

Natural gas is used in 15.8 per cent of ovens, 27.9 per cent of cook tops, 17.2 per cent of space heating appliances and 23.9 per cent of water heaters. Nearly all gas heaters in New South Wales are non-ducted. Also, 23.9 per cent of households do not use a heater.

Table 4.4 Appliance penetration in gas end-uses – New South Wales – 2008 (per cent)							
	Electricity	Mains gas	Electricity and gas combined	LP bottle gas	Solar	Wood	Other*
Main source of energy used							
Ovens	80.3	15.8	n.a.	3.6	n.p.	0.3	-
Cook tops	65.2	27.9	0.3	6.2	n.p.	n.p.	n.a.
Space heating	43.1	17.2	n.a.	4.0	n.a.	10.3	1.6
Water heating	58.1	23.9	n.a.	1.6	5.0	0.3	12.1

Notes: * Includes didn't know and oil.
n.a. Not applicable.
n.p. Not available for publications but included in the totals.
Source: ABS, Tables 3.6, 3.7, 3.8, 3.10, Catalogue 4602.0.55.001.

Water heating

A small percentage of hot water heating is solar in New South Wales, but of those that are solar, the majority is solar-electric. The 2008 values in Table 4.5 could reflect some sampling errors in the latest survey.

Table 4.5 Solar hot water – type of booster – New South Wales (per cent)					
	Electric	Mains gas	LPG gas	Total gas	Other*
1999	90.2	n.a.	n.a.	1.0	8.8
2002	95.1	n.a.	n.a.	3.7	1.2
2005	93.9	n.a.	n.a.	n.a.	6.1
2008	77.0	6.7	n.p.	6.7	13.5

Note: * Other includes not boosted, did not know and wood.

Space heating

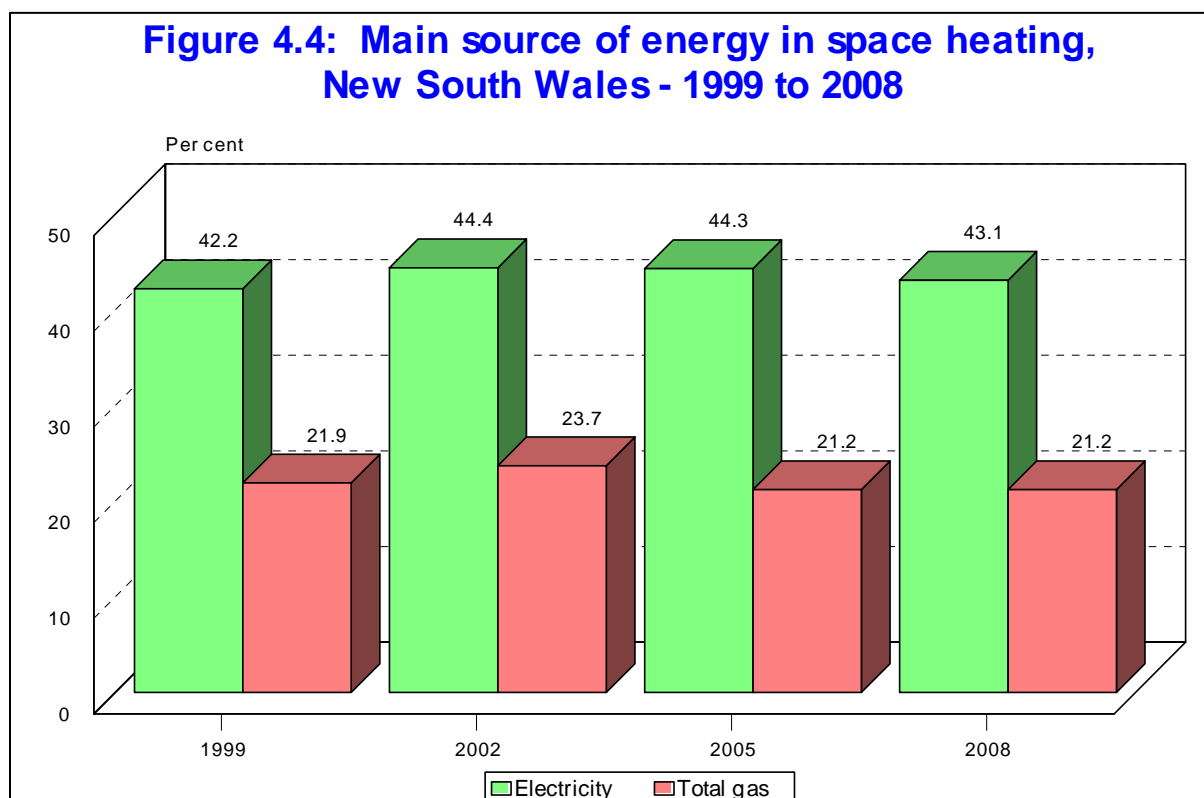
Table 4.6 below, shows the main energy source in space heating in New South Wales for 1999 to 2008 for selected years. The table highlights that:

- natural gas' share of the main energy source used in space heating decreased slightly from 21.9 per cent in 1999 to 21.2 per cent in 2008. The highest share was in 2002, with 23.7 per cent of heaters using gas. Wood heating is also on the decline, having lost more than 4 percentage points of its share at 10.3 per cent in 2008;
- electricity's share in space heating has been fairly steady since 1999, having risen by 0.9 per cent to a share of 43.1 per cent over the last nine years; and
- a notable trend is the increasing proportion of households with no heater. From 17.8 per cent in 1999 to 23.9 per cent in 2008. This trend could potentially reflect the increased use of air conditioners for room heating.

Table 4.6 Main source of energy used in space heating – New South Wales (per cent)							
	Electricity	Mains gas	LPG	Total gas	Wood	Oil	No heater
1999	42.2	n.a	n.a	21.9	14.7	2.7	17.8
2002	44.4	n.a	n.a	23.7	11.8	1.6	18.2
2005	44.3	16.1	5.1	21.2	10.9	0.8	22.5
2008	43.1	17.2	4.0	21.2	10.3	0.3	23.9

Note: n.a. = Not applicable.

Source: ABS, Table 3.9, Catalogue 4602.0.55.001.



	Dwellings with insulation (000's)*	Dwellings with no insulation (000's)*	% of households with no insulation
New South Wales	1,728.4	978.5	36
Victoria	1,700.1	356.5	17
Queensland	943.9	671.3	42
South Australia	543.8	103.7	16
Western Australia	633.2	193.6	23
Tasmania	165.1	36.6	18
Northern Territory	38.8	22.2	36
Australian Capital Territory	110.9	17.6	14
Australia	5,863.9	2,379.8	29

Note: * Pro-rata distribution of 'did not know'.
Source: ABS, Table 2.12, Catalogue 4602.0.55.001.

Table 4.7 shows that 36 per cent of dwellings in New South Wales have no insulation, this is greater than the Australian average of 29 per cent of dwellings with no insulation. With the Commonwealth stimulus package announced in March 2009, Government aims to install insulation into 2.7 million Australian homes. According to the ABS publication approximately 2.4 million dwellings currently have no insulation.

Water heating

Table 4.8 shows the main energy source used in water heating in New South Wales for 1999 to 2008 for selected years. The table highlights that:

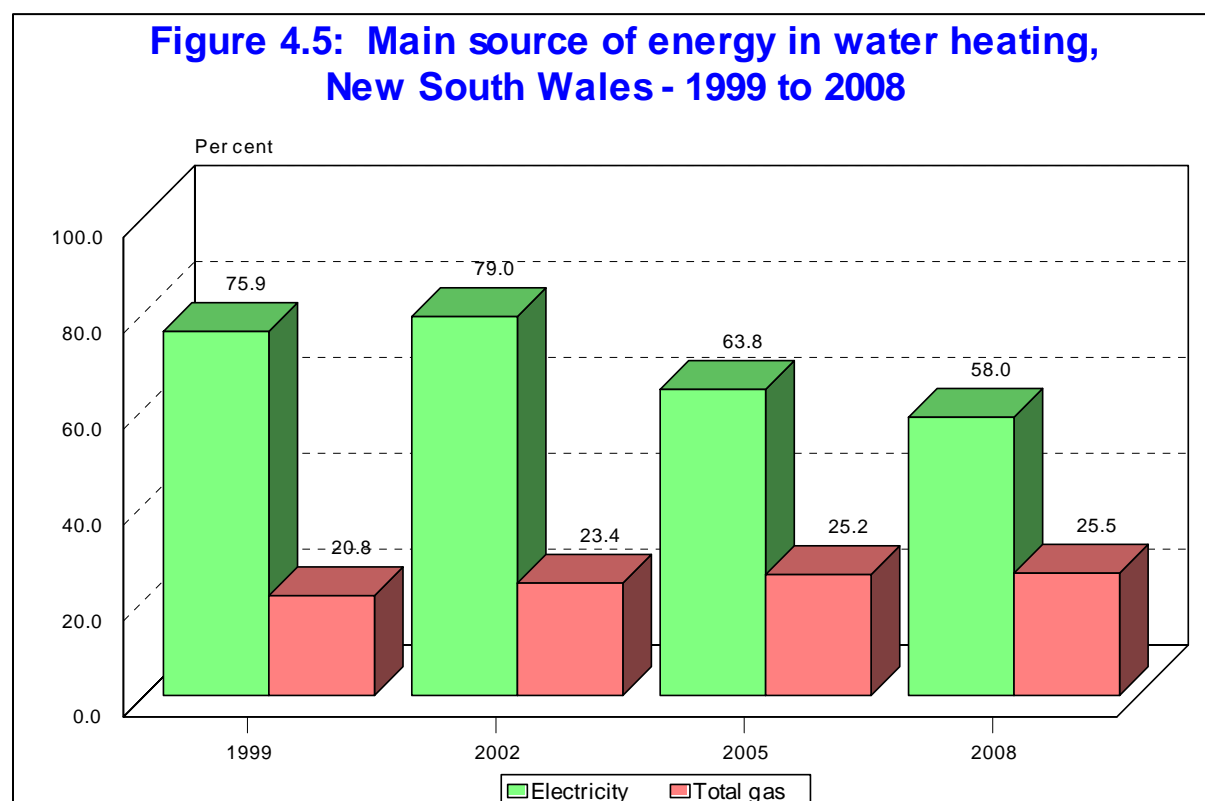
- natural gas's share of the main energy source used water heating increased from 20.8 per cent in 1999 to 25.5 per cent in 2008;
- electricity's share has been steadily declining having lost at least 17 per cent of its share as a main source of energy as households shift towards solar and gas;
- solar energy as a source for heating water has been increasing slowly, but is still only 5 per cent of the share of energy used in water heating; and
- the significant increase in other could reflect heat pump installations (which are really electric).

Table 4.8 Main source of energy used in water heating – New South Wales (per cent)							
	Electricity	Mains gas	LPG	Total gas	Wood	Solar	Other*
1999	75.9	n.a.	n.a.	20.8	0.7	2.7	1.0
2002	79.0	n.a.	n.a.	23.4	0.5	2.4	2.4
2005	63.8	23.9	1.3	25.2	0.6	2.5	8.6
2008	58.0	23.9	1.6	25.5	0.3	5.0	12.1

Notes: n.a. = Not applicable.

* Includes didn't know and oil.

Source: ABS, Table 3.11, Catalogue 4602.0.55.001.

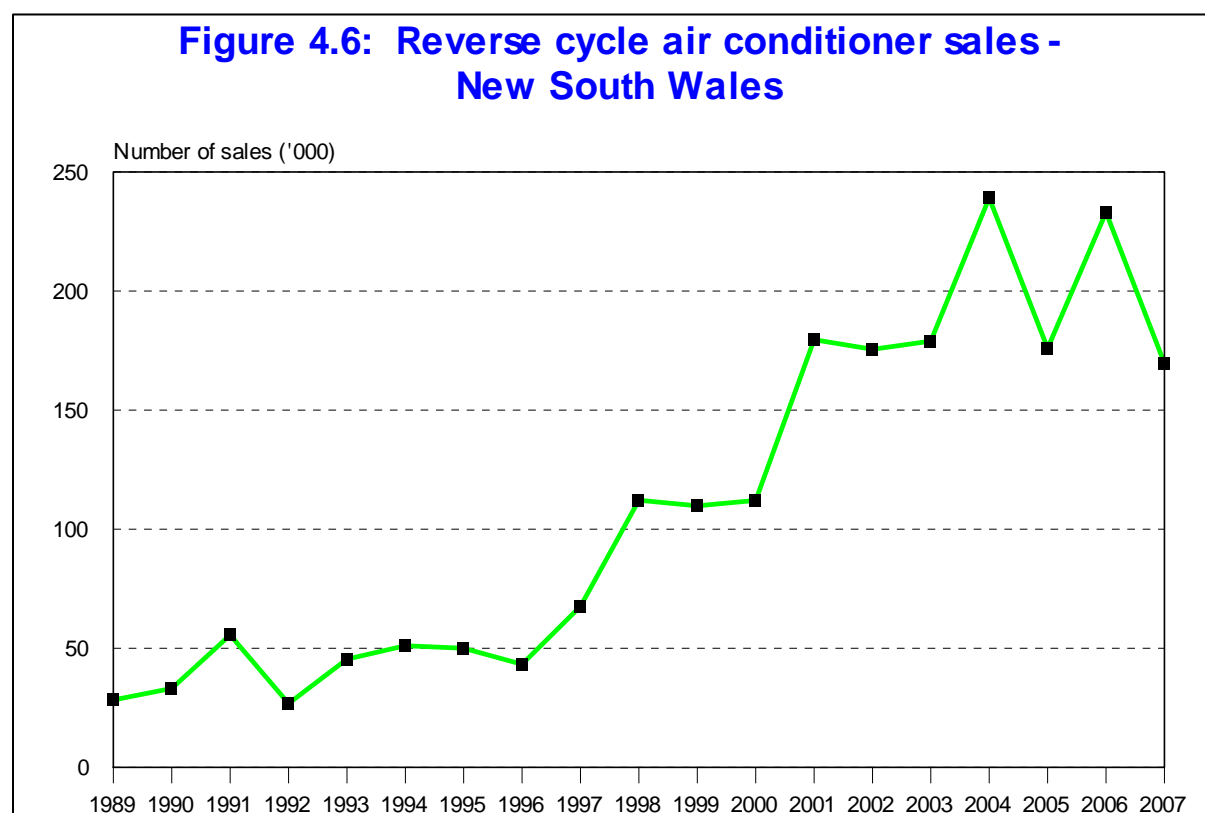


The number of dwelling with a cooler has been on an increasing trend in New South Wales, from 30.8 per cent of households in 1994, to 58.3 per cent of households in 2008, according to the ABS survey¹. The types of coolers being purchased are presented in Table 4.9 below.

Table 4.9 Main cooler in dwelling – New South Wales (per cent)				
	Reverse cycle/ heat pump	Refrigerated	Evaporative	Don't know
1994	67.5	14.2	16.1	2.2
1999	59.4	16.6	20.8	3.1
2002	71.4	12.5	12.6	3.5
2005	78.0	7.6	12.7	1.7
2008	77.7	8.5	11.6	2.2

Source: ABS, Table 4.12, Catalogue 4602.0.55.001.

This data can be further supported by the New South Wales reverse cycle sales date, which shows that air conditioner sales have been on a steady increase since 1994 at an average growth of 14 per cent annually. There was an increase in sales in 1998 and again in 2004, as can be seen in Figure 4.6.



¹ Source: ABS, Table 4.11 Catalogue 4602.0.55.001.

4.7 Gas prices and the CPRS

Greenhouse policy

At the time these projections were prepared, a number of Federal and State Government policies were impacting on gas prices.

On the 15 December 2008, the Australian government released the White Paper on the Carbon Pollution Reduction Scheme. This paper confirmed an emission trading scheme is to be introduced by 2010-11. The White Paper outlines the final design of the Carbon Pollution Reduction Scheme, and a target range for reducing carbon pollution. NIEIR's assessment of the White Paper and the implications for permit and gas prices is provided below.

Permit (CO₂e) prices and electricity prices (\$/MWh), 2010-2030

Over this period the CPRS will apply and lead to increases in gas prices. The quantitative impact will be determined by a range of factors: the CPRS caps set, the costs of reducing GHG emissions domestically (which will depend on the prices of black coal and natural gas, and GHGA technologies such as CCS and renewable), the price and availability of international permits (no restrictions on their use to meet domestic caps, but price in A\$ of supply is an issue) and other specific design features of the CPRs.

In our base (most likely) scenario out to 2030, we have assumed the Treasury CPRS-5 scenario applies out to 2015 (the caps to 2015 will be announced in early 2010), gradual change to the CPRS-15 scenario by 2025 (will largely depend on the global Copenhagen, December 2009 results), similar gas coal and renewable and CCS prices to Treasury and similar impacts (pass through) of permit prices on gas prices given in the White Paper.

We are reasonably confident that the magnitudes are reasonable out to 2015, but uncertainty increases past that point in the absence at this time of better information and data.

Caps – domestic permits and international permits

The interaction of these two (unrestricted) sources of eligible CPRS permits could have a significant impact on GHGA under the CPRS in Australia.

International permit prices in A\$ will determine their contribution to attainment of CPRS caps. Some Treasury scenarios have international permits contributing over 50 per cent of cap attainment.

The CPRS cap determines the number of carbon pollution permits that will be issued by the Government. Allowable emissions across the sources covered by the Scheme will be able to exceed the cap only if the excess is matched by the surrender of eligible international units, additional domestic permits issued as a result of forestry activities, additional permits issued under the price cap mechanism or, if allowed, Scheme offsets (see Chapter 6 of the White Paper).

In a system with little or no international linkage, the interaction between the cap and the demand for permits is the primary determinant of the carbon price: the more stringent the Scheme cap, the higher the price, all other things being equal. However, the Government has decided to allow unlimited imports of eligible international units from Scheme commencement and to review the scope for exporting permits over time (see Chapter 11 of the White Paper). This means, depending on the level of international prices and the longer term Scheme linking policy, the domestic Scheme cap may be a less significant determinant of domestic carbon prices. Over time, the domestic carbon price is expected to converge on the international price, which in turn will be determined by global abatement demand and supply conditions.

The Scheme cap-setting arrangements remain important, however, because the Scheme cap will reflect national emissions targets and Australia's international obligations. As the number of eligible international units that may need to be purchased will be determined by the ambition of national targets, targets will be the key to the overall cost to the Australian economy.

The projections for real New South Wales gas prices to 2018-19 is summarised in Table 4.10 below by major customer class.

Table 4.10 New South Wales gas prices – 2005-06 (\$ per GJ)			
	Residential	Business	Total
2005-06	21.8	8.5	10.9
2006-07	21.9	8.5	10.8
2007-08	22.1	8.5	10.9
2008-09	22.0	8.5	10.9
2009-10	21.7	8.5	10.8
2010-11	23.1	9.9	12.3
2011-12	23.2	10.0	12.3
2012-13	23.3	10.0	12.4
2013-14	23.3	10.1	12.5
2014-15	23.4	10.2	12.6
2015-16	23.6	10.3	12.7
2016-17	23.7	10.5	12.9
2017-18	23.9	10.7	13.0
2018-19	24.1	10.9	13.2

4.8 Policies relating to gas (and electricity) consumption in New South Wales

There are a number of policies and initiatives through federal and state government which consider the future gas emissions and climate change related to energy use and gas consumption. These policies cover construction of homes, alterations and extensions, and purchasing/replacement of household appliances. All of these have an impact on the future gas consumption in New South Wales.

The following sections look at the impacts from BASIX, introduction of MEPS for gas hot water heaters, the increased penetration of energy efficient shower heads as well as the newly announced Commonwealth stimulus package, which has a focus on mass scale dwelling insulation across Australia, plus some other initiatives related to energy and water use which may also influence consumer behaviors towards end uses of gas.

4.8.1 Building Sustainability Index (BASIX)

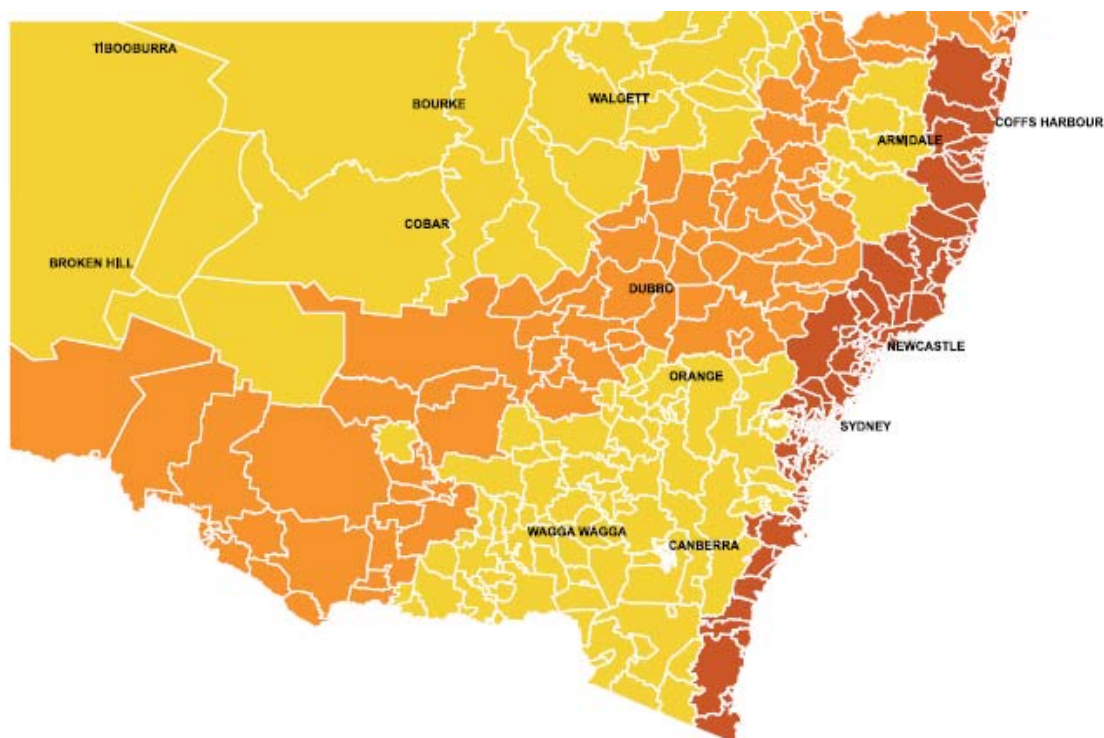
BASIX requires all new homes in New South Wales to use up to 40 per cent less potable water and produce up to 40 per cent fewer greenhouse gas emissions than the average home. BASIX will also apply to alterations and additions to existing homes worth \$50,000 or more.

The BASIX Energy target varies according to building type and location and the BASIX Water target incorporates regional variations such as soil type, climate, rainfall and evaporation rates.

Homes with some or all of the following features score well with BASIX:

- good solar orientation;
- cross ventilation;
- insulation;
- external shading;
- performance glazing for large glazed areas and/or poorly oriented areas;
- rainwater tanks, plumbed to toilet, garden and/or laundry*;
- efficient (3A-5A) showerheads, toilets, tap fittings;
- indigenous garden species;
- grey water system where appropriate;
- solar, heat pump or high efficiency gas hot water systems;
- ceiling fans, evaporative coolers, fixed flue gas heating or high efficiency air conditioning;
- energy efficient lighting;
- efficient pool heating and pumps; and
- alternative energy systems such as photovoltaics.

* BASIX for regional New South Wales recognises rainwater use for drinking or all household uses.

Figure 4.7: BASIX targets across New South Wales zones

Building type	Zone		
	1	2	3
Detached + semi-detached	40	35	25
3 storey units	35	30	20
4 and 5 storey units	30	25	15
6 storey units and higher	20	15	5

Table 18

Distribution of certificates by energy target zone				
energy target zone	2005-06*	2006-07	2007-08	Average
Zone 1	n/a	70.9%	72.0%	46.6%
Zone 2	n/a	10.5%	10.5%	7.0%
Zone 3	100.0%	18.6%	17.5%	46.4%

Note: * Zone 1 target of 25 per cent applied to all certificates in 2005-06.

Source: BASIX, 05-08.

Average gas consumption as a result of BASIX in new homes is expected to drop with the new standards in place. Programs such as GGAS and the Commonwealth stimulus package look at improving existing dwellings energy efficiency, whilst BASIX aims to regulate the development of new dwellings to reduce greenhouse gases, which at the same time reduces the average energy use of new dwellings. Average gas usage in new dwellings for heating is around 6.6 GJ, some 9 per cent less than for existing dwellings.

4.8.2 Mandatory Energy Performance Standards (MEPS)

Requirements for gas space heaters, gas water heaters and gas cookers

Energy labels can be found on gas space heaters and gas water heaters (both storage and instantaneous). The gas labelling program is currently an industry voluntary scheme. A review of the scheme is under way by the Gas Industry and Governments. In the meantime a 10 year strategy is in place called 'Switch on Gas'.

Strategy and work program for gas appliances

'Switch on Gas' is a ten year strategic plan intended to implement a nationally consistent regulation scheme for energy efficiency of gas appliances and equipment. This strategy is an important part of the package of measures being implemented by the MCE under the National Framework for Energy Efficiency (NFEI).

Switch on Gas will make a contribution to national efforts to reduce greenhouse gas emissions. Natural gas currently supplies about 30 per cent of total household energy in Australia. Within 20 years it is projected that Switch on Gas has the potential to reduce:

- the expenditure on natural gas of Australian consumers by up to \$115 million per annum; and
- consumption by over 5 per cent below business as usual.

Changes to the gas labelling and MEPS scheme for appliances

In November 2002, a joint government-industry working group comprising SEAV, OGS, AGO, AGA and the GAMAA formed a group to work on enhancing the effectiveness of the gas appliance efficiency scheme.

The proposed initiative of the MEPS for gas water heating requires the phasing out of all appliances below a 4.5 star rating. This will have a great impact on the overall consumption in New South Wales, as the consumption level from a 3 star hot water heater to a 5 star is a reduction of at least 15 per cent (see table below).

	Storage water heaters (MJ/year)	Instantaneous water heaters (MJ/year)
6 star	n.a.	17,837
5 Star	20,559	20,076
4 Star	22,466	23,325
3 Star	24,221	24,988
2 Star	25,601	n.a.
1 Star	27,599	n.a.

Note: The above average actual consumption figures are derived from test conditions and overstate average actual gas use by these appliances.

Source: AGA and NIEIR.

A hot water model was developed to estimate this saving, and looks at changing trends in replacing failed or scrapped units in existing dwellings and household preferences for purchasing HWS in new dwellings.

The hot water model

A representative hot water model was developed in order to assist in projecting hot water gas usage from new and existing customers. JGN assisted NIEIR in parameterising parts of the hot water model developed.

The hot water model covered the key three residential market segments:

- (i) existing customers (irrespective of whether they have gas hot water);
- (ii) new connections from new dwelling; and
- (iii) new connections from existing dwellings (known as E to G).

The hot water model segmented hot water systems into mains gas, solar gas, solar electric, heat pumps and electric storage.

The model in each market segment recognised that conventional electric resistance waters will be banned in all new and existing homes in gas reticulated areas from 2010. This policy extends to new flats and apartments in reticulated areas and established houses in non-gas reticulated areas from 2012.

New dwellings

For new dwellings, hot water is dominated by mains storage and instantaneous gas systems, although the banning of storage hot water leads to solar electric and heat pumps significantly increase their market share. By 2015, the share of has for new hot water systems in new dwellings falls to 67 per cent, the residual is solar electric and heat pumps.

Average gas usage for hot water in new dwellings is assumed to be 10.5 GJ per annum, and to improve by a further 1 per cent per annum out to 2018-19.

Existing dwellings

For existing dwellings, a failure or scrappage rate was assumed for each type of hot water system (i.e. mains gas, storage, electric, etc.). A fuel switching matrix was developed for each type of system. This matrix took into account the phasing out of storage electric systems between 2010 and 2012. For example for storage electric, it was assumed that by 2012, 43 per cent of replacements of resistance heaters were mains gas and 49.5 per cent were solar electric or heat pumps.

For existing customers, the increase in gas usage in hot water represented:

- the net decrease from pre-existing storage and instantaneous gas hot water heater customers replacing it with a more efficient has hot water unit; and
- the increase from previously electric hot water systems switching to storage gas and instantaneous gas hot water.

E to G dwellings

For E to G (or new gas connections from dwellings using electricity or other fuels) it was assumed 60 per cent switched to storage or instantaneous gas hot water in year 1. For the remainder of E to G customers (mainly still with resistance electric or hot water systems) a failure or scrappage rate was assumed similar to existing dwellings.

4.8.3 Energy efficient showerheads

There are various companies accredited under the NSW Greenhouse Gas Reduction Scheme (GGAS) who offer or install water efficient showerheads.

The Australian Government, in collaboration with state and territory governments, has introduced a Water Efficiency Labelling and Standards (WELS) Scheme.

The WELS scheme requires certain types of household water-using products to carry rating labels to reflect their relative water-use efficiency

The WELS Scheme applies to showers intended solely for personal bathing as specified in *AS/NZS 3662:2005 – Performance of showers for bathing*. Showers generate about 25 per cent of water savings under the WELS Scheme because:

- a standard showerhead uses about 15 to 25 litres of water per minute-a four star rated water efficient showerhead uses as little as 6 or 7 litres per minute.
- a standard showerhead uses at least 120 litres of water per eight-minute shower whereas a water efficient model uses less than 72 litres or 40 per cent less water
- installing a water-efficient showerhead saves about 14,500 litres per household each year *and*
- gas hot water costs for a standard showerhead are around \$1,500 over ten years whereas gas hot water costs for a water-efficient shower head are only \$790 over ten years or a 47 per cent reduction.

Under the WELS Scheme a rating is given to a showerhead and any additional component supplied with the head such as pivoting arm, flexible hose or flow controller. However, additional components cannot be rated separately from the head.

GGAS and WELS have an indirect impact on gas consumption in New South Wales. With a reduction in water consumption, those dwellings with gas hot water heaters will see a reduction in their gas consumption, depending on the energy efficiency of the water heater, gas savings will vary between dwellings, but a saving due to energy efficient shower heads is expected.

The penetration of low flow showerheads is assumed to rise by around 3 per cent per annum, consistent with historic trends. This leads to a very small reduction in gas usage by existing dwellings for hot water. On an annual basis it is 0.1 GJ per annum.

4.8.4 Insulation and heating

The Department of Environment and Climate Change NSW, is providing up to three hundred dollars in rebates for home owners in New South Wales, plus the federal government is giving up to \$1,600 rebates for home owners across the country to insulate their homes.

From 1 July 2009, the Rudd Government, as a part of Energy Efficient Homes, will install free ceiling insulation in around 2.7 million Australian homes. The Energy Efficient Homes investment will:

- install ceiling insulation in around 2.7 million Australian homes;
- cut around \$200 per year off the energy bills for households benefiting from these ceiling insulation programs;
- reduce greenhouse gas emissions by around 49.4 million tonnes by 2020, the equivalent of taking more than 1 million cars off the road.

The Rudd Government will also double the rebate available under the Low Emissions Plan for Renters for landlords to install insulation in their rental properties – from \$500 to up to \$1,000 – from now until 30 June 2011. The Government estimates 500,000 rented homes will benefit from this program.

The New South Wales Government also provides a residential rebate. The rebate covers half the cost of installing ceiling insulation, up to a maximum of \$300.

It is available for any type of thermal insulation materials for ceilings, installed in residential properties in New South Wales. The ceiling insulation must:

- cover the entire ceiling area;
- comply with the Australian Standard for insulation – AS/NZS 4859.1:2002;
- be purchased in full, and installed between 1 October 2007 and 30 June 2009; and
- meet a minimum R-value in the local government area (approximately three across New South Wales).

Insulation installed to comply with BASIX (the Building Sustainability Index) for new homes or major renovations is not eligible for a rebate.

For existing dwellings, this scheme will provide a saving to those dwellings which use gas space heaters, so although most houses without insulation are expected to partake in this scheme (about 90 per cent of households without insulation), only those with gas space heaters will benefit in reduced gas consumption for the household.

Around 36 per cent of NSW homes are uninsulated assuming 50 per cent take up the Energy Efficient Homes initiative, and apportioning the 25 per cent savings from insulation, average heating gas usage for existing dwellings falls by around 0.4 GJ per annum over the life of the policy initiative, 2010, 2011 and 2012.

Substitution to electricity

The projections also allow for the substitution towards electricity for existing customers. The projections assume that as gas space heaters break down, 25 per cent of existing customers substitute to reverse cycle air conditioning. This leads to a small reduction in total usage for heating in existing dwellings of 0.1 GJ per annum.

4.8.5 RET – Renewable Energy Target

The Australian Government is committed to ensuring 20 per cent of Australia's electricity supply comes from renewable energy by 2020.

To deliver on this commitment, the Government is establishing an expanded national Renewable Energy Target (RET) scheme.

The national Renewable Energy Target scheme will:

- increase the existing Mandatory Renewable Energy Target (MRET) by more than four times to 45,000 gigawatt-hours in 2020;
- contribute to meeting Australia's targets for the reduction of greenhouse gas emissions;
- provide a market incentive to accelerate uptake of Australia's abundant renewable energy sources, which include solar, wind and geothermal energy; and
- reduce red tape by bringing existing state-based targets into a single, national scheme.

It is important to note that certificates under RET apply both to new and existing dwelling replacements of hot water systems.

4.8.6 NEET – New South Wales Energy Efficiency Target

The Government is setting a new target to increase energy efficiency activity under the NSW Greenhouse Gas Reduction Scheme (GGAS). Retailers will be required to pursue additional energy efficiency measures in households and businesses from July 2009.

A new class of tradeable certificate will be established to support the enhanced energy efficiency target, which will be designed to achieve an optimal level of energy efficiency in New South Wales. The remainder of GGAS will continue as it has in the past until it is replaced by the national emissions trading scheme. The existing targets in GGAS will also continue.

The revitalised energy efficiency scheme will substantially utilise the existing GGAS architecture and continue to be regulated and administered by the Independent Pricing and Regulatory Tribunal.

NEET is designed to bridge the potential gap in the incentive for energy efficiency projects which the introduction of a national emissions trading scheme (ETS) in 2010 will not address. It is proposed that the NEET Scheme would continue until a national energy efficiency trading scheme is established, or in the absence of this, until 2020.

It is currently proposed that, initially, the NEET will only cover electricity use. However, scheme coverage could be expanded later to include other sources of stationary energy including natural gas. From 1 July 2009 substitution of electric hot water systems with gas will no longer receive any credits under the NEET scheme.

4.8.7 Other rebates and incentives

- Sydney Water offers a \$150 to \$500 rebate for installing and connecting rainwater tanks. There's \$500 for connecting the tank to your toilet, another \$500 for a laundry hook-up, and \$150 for installing a water efficient washing machine.
- From January 2008, the NSW Government offers a \$1200 rebate for switching from electric to solar hot water, and \$300 for switching to gas hot water heaters with a 5 star or higher energy rating.
- By trading greenhouse gas savings via the NSW Greenhouse Gas Abatement Scheme (GGAS), some companies can offer free or cut-rate installation of compact fluorescent light bulbs, water efficient showerheads and home energy audits.
- NSW Rainwater Tank Rebate – The NSW Government is offering a rebate to help households who install a rainwater tank with a capacity larger than 2,000 litres. There is an additional rebate for connecting the tank to the toilet or washing machine. The offer is only for existing homes.
- NSW Washing Machine Rebate – If you install a 4.5 star WELS rated washing machine between 1 August 2008 and 30 June 2010 in New South Wales, you may be eligible for a \$150 rebate from the Department of Environment and Climate Change.

5. Natural gas sales and customer number forecasts to 2019 – New South Wales Natural Gas Distribution Network

5.1 Introduction

This section presents natural gas demand forecasts by class and tariff to 2019 for the New South Wales Natural Gas Distribution Network. Forecast numbers were prepared on a financial year basis to 2019.

Forecasts of natural gas sales, customer numbers and MDQ are presented for the following:

- tariff by class; and
- contract by class and industry.

5.2 Natural gas sales forecasts to 2019

Table 5.1 shows forecasts of natural gas sales by tariff and class on a financial year basis to 2019 for the New South Wales Natural Gas Distribution Network. The tariff forecasts are shown on a class basis, residential and business.

The data in Table 5.1 is presented on a weather normalised basis. This table shows volumes by class for tariff and contract by class and industry volumes. These volume forecasts are weather normalised to a standard of 489 HDDs.

Tariff

- Tariff volumes for the New South Wales Natural Gas Distribution Network represent around 34 per cent of total volumes. Total tariff volume growth is forecast to be 0.9 per cent per annum over the 2009 to 2019 period. The slow volume growth in the New South Wales Natural Gas Distribution Network price effects associated with the CPRS and the impact of the Federal and State energy policies on residential volume growth. These policies were outlined in Section 4.8.

Residential volume growth on a weather normalised basis is 0.6 per cent per annum over the 2009 to 2019 period. Residential volumes for the New South Wales Natural Gas Distribution Network represent around 22 per cent of total gas sales.

Table 5.2 shows the formation of the forecasts for residential tariff gas volumes. This table separates out existing and new residential customers. Existing customer gas usage is expected to remain relatively stable, but decline slightly in average usage terms. New customers are separated into E to G and new estates and high rise.

Average usage by new customers, however, reflects the impact of Commonwealth and State policy measures identified in Chapter 4 of this report (e.g. BASIX, resistance hot water phase-out). Average usage by new customers (excluding E to G) falls to around 18.9 GJs in 2009 (excluding losses) and 16.9 GJ by 2015.

Figure 5.1 shows the percentage growth in volumes by class and tariff over the 2009 to 2019 period for the New South Wales Natural Gas Distribution Network. Figure 5.2 shows total volume growth by class and tariff over the same period.

- Business tariff gas consumption represents around 12 per cent of total New South Wales Natural Gas Distribution Network sales volumes. Forecast growth over the 2009 to 2019 period is around 1,783 TJs, or 1.4 per cent per annum.

Contract

- Industrial contract natural gas consumption from the New South Wales Natural Gas Distribution Network falls by 0.4 per cent per year. Increasing downside risks to New South Wales manufacturing may suggest the forecasts for contract are too optimistic. There have been a number of major customer losses over recent years in New South Wales. Many manufacturers have either closed their New South Wales' production facilities altogether, or shifted their operations overseas, to countries like China.

Projections of contract volumes, customer numbers and maximum daily quantities are presented in Tables 5.1, 5.3 and 5.4.

The projections for contract to 2019 reflect a number of alternative sources of information:

- the impact of price increases associated with the proposed Emissions Trading Scheme; and
- the economic prospects for each sector, in terms of overall real output growth projections to 2019. These are produced as part of NIEIR's economic forecast.

On the balance of probabilities, the NIEIR volume forecast for contract may prove far too optimistic. This is particularly the case for the region which includes a large share of older manufacturing establishments.

Figure 5.1: Natural gas sales by tariff and class - 2009 to 2019
(Average annual percentage growth)

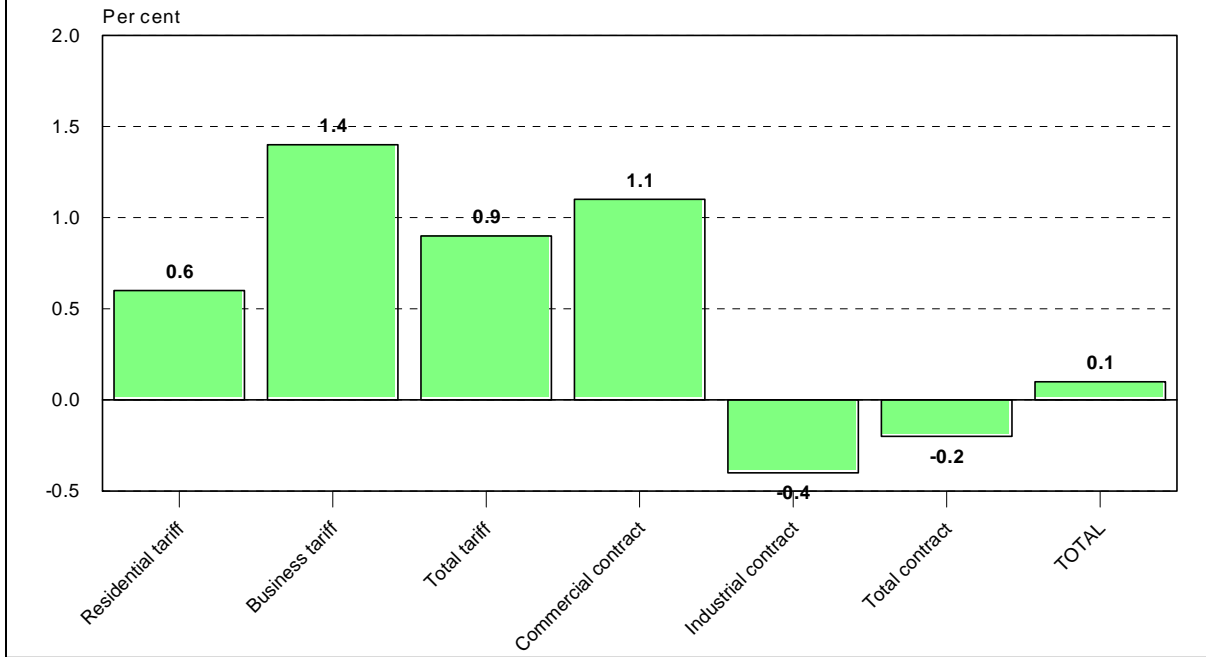


Figure 5.2: Natural gas sales by tariff and class - Volume growth - 2009 to 2019 (TJs)

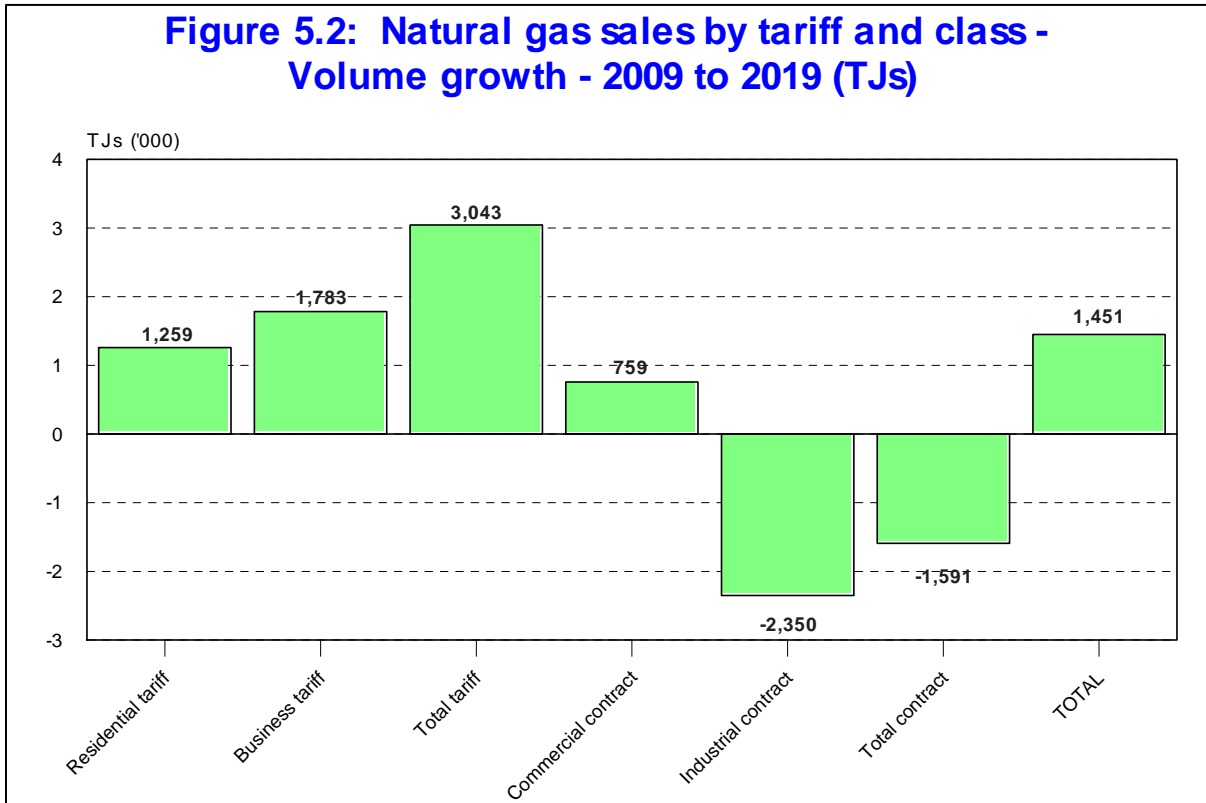


Table 5.1 Natural gas sales projections to 2018-19 by class and industry – New South Wales Gas Distribution Network (TJs)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
System Total	99,248	98,152	92,830	95,505	95,959	94,937	95,868	96,582	96,302	97,337	98,263	99,309
Tariff	33,742	33,173	32,360	32,135	32,030	32,587	33,260	33,869	34,412	35,037	35,684	36,216
Residential Tariff	21,511	21,139	20,288	20,175	20,063	20,459	20,808	21,092	21,361	21,725	22,117	22,398
Existing customers	21,511	21,139	19,818	19,124	18,348	18,057	17,823	17,598	17,376	17,166	16,964	16,730
New customers	n.a.	n.a.	470	1,051	1,715	2,402	2,985	3,494	3,985	4,559	5,153	5,668
Business Tariff	12,230	12,034	12,072	11,961	11,966	12,128	12,451	12,777	13,051	13,312	13,567	13,818
Contract	65,506	64,979	60,470	63,370	63,929	62,350	62,609	62,713	61,890	62,300	62,580	63,094
Commercial Contract	4,795	4,235	4,291	4,342	4,377	4,372	4,432	4,524	4,622	4,716	4,809	4,902
Electricity, gas and water (ex GPG)	616	513	510	505	503	506	512	518	523	528	532	536
Wholesale trade and retail trade	11	10	10	10	10	11	11	11	11	11	12	12
Transport and storage and communication services	820	769	759	769	799	807	824	854	875	896	917	938
Finance insurance property and business services plus distributed cogeneration assumption	38	5	5	5	5	5	5	5	5	5	5	5
Government administration, defence, education, health and community services	2,096	1,790	1,830	1,854	1,846	1,802	1,804	1,814	1,845	1,874	1,902	1,930
Accommodation, cafes, restaurants, cultural and recreational services, personal and other services	1,216	1,148	1,177	1,199	1,215	1,242	1,276	1,322	1,362	1,402	1,442	1,482
Industrial Contract	60,711	60,744	56,179	59,028	59,552	57,978	58,176	58,189	57,269	57,584	57,770	58,191
Agriculture	388	388	369	411	415	415	421	428	435	442	449	455
Mining	110	110	108	110	112	116	120	118	119	119	119	120
Food, beverages, tobacco manufacturing	6,178	6,181	5,956	6,290	6,446	6,324	6,375	6,453	6,431	6,484	6,534	6,610
Textiles, clothing and footwear manufacturing	384	384	351	340	320	295	277	262	244	230	216	204
Wood and paper, wood products and paper product manufacturing	3,423	3,425	3,423	3,445	3,399	3,358	3,364	3,383	3,392	3,405	3,415	3,426
Chemicals, petroleum, coal manufacturing	25,504	25,517	23,409	24,579	23,708	22,820	22,832	22,950	22,671	22,689	22,694	22,793
Non-metallic minerals manufacturing	10,861	10,867	9,885	10,797	11,413	11,102	11,169	11,285	11,157	11,218	11,275	11,394
Basic and fabricated metal products manufacturing	13,404	13,411	12,252	12,631	13,330	13,167	13,253	12,959	12,482	12,672	12,753	12,880
Transport and other machinery equipment manufacturing	404	404	372	367	350	326	310	294	281	268	259	252
Miscellaneous manufacturing	56	56	55	57	57	56	56	56	56	56	56	57

Table 5.2 Residential gas sales by customer type to 2018-19 – New South Wales Gas Distribution Network

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Customer numbers												
Tariff meter	995,074	1,017,157	1,043,653	1,076,880	1,115,666	1,156,343	1,191,645	1,222,988	1,253,688	1,289,904	1,327,853	1,361,408
Residential tariff meters												
Existing customer meters	995,074	995,074	995,074	995,074	995,074	995,074	995,074	995,074	995,074	995,074	995,074	995,074
New customer meters												
Electricity to gas(E to G)	6,067	4,988	5,215	6,273	7,220	7,022	6,807	6,575	6,337	6,106	5,872	5,623
New estates and high rise	17,142	17,095	21,280	26,954	31,565	33,655	28,495	24,768	24,363	30,110	32,078	27,933
Total new	23209	22083	26495	33227	38786	40678	35302	31342	30700	36216	37950	33555
Business tariff meters	30,869	30,721	30,869	30,876	31,083	31,492	32,110	32,677	33,125	33,555	33,974	34,387
Average usage (GJ per year) – on weather normalised basis												
Tariff												
Residential tariff												
Existing customers	21.6	20.8	19.9	19.2	18.4	18.1	17.9	17.7	17.5	17.3	17.0	16.8
Electricity to gas(E to G)	14.6	14.6	14.3	14.2	14.0	13.9	13.8	13.8	13.7	13.6	13.6	13.5
New Estates and High rise		18.9	18.6	18.3	17.9	17.5	17.2	16.9	16.6	16.3	16.0	15.7
Total volumes by market segment (TJs)												
Existing customers	21,511	21,139	19,818	19,124	18,348	18,057	17,823	17,598	17,376	17,166	16,964	16,730
Electricity to gas(E to G)			75	164	265	362	457	547	634	717	797	873
New estates and high rise			395	887	1,451	2,039	2,529	2,947	3,351	3,842	4,356	4,795
Total	21,511	21,139	20,288	20,175	20,063	20,459	20,808	21,092	21,361	21,725	22,117	22,398
Average usage – overall residential	21.6	20.8	19.4	18.7	18.0	17.7	17.5	17.2	17.0	16.8	16.7	16.5

Table 5.3 MDQ projections to 2018-19 by class and industry – New South Wales Gas Distribution Network (continued)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mining	926	926	926	926	926	926	926	926	926	926	926	926
Food, beverages, tobacco manufacturing	29510	29522	28659	29940	30533	30067	30262	30559	30473	30675	30866	31152
Textiles, clothing and footwear manufacturing	2108	2108	1979	1937	1857	1753	1679	1613	1534	1473	1411	1355
Wood and paper, wood products and paper product manufacturing	13844	13851	13843	13920	13762	13620	13641	13708	13739	13782	13817	13855
Chemicals, petroleum, coal manufacturing	94711	94756	87754	91648	88752	85786	85826	86222	85290	85349	85364	85698
Non-metallic minerals manufacturing	42468	42489	38943	42238	44447	43331	43574	43990	43530	43748	43952	44379
Basic and fabricated metal products manufacturing	76971	77002	71825	73532	76646	75922	76303	74997	72863	73714	74075	74645
Transport and other machinery equipment manufacturing	2898	2899	2726	2700	2607	2472	2379	2289	2214	2140	2084	2042
Miscellaneous manufacturing	2746	2747	2694	2758	2774	2735	2738	2749	2739	2744	2747	2756

5.3 Customer number and MDQ forecasts to 2019

Table 5.4 presents customer number forecasts by tariff and class to 2019, as well as contract maximum daily quantity projections.

Figure 5.3 shows customer growth by tariff and class over the 2009 to 2019 period for the New South Wales Natural Gas Distribution Network region. Figure 5.4 shows the average annual percentage change for contract between 2009 and 2019 in total volumes, total customers and total MDQs.

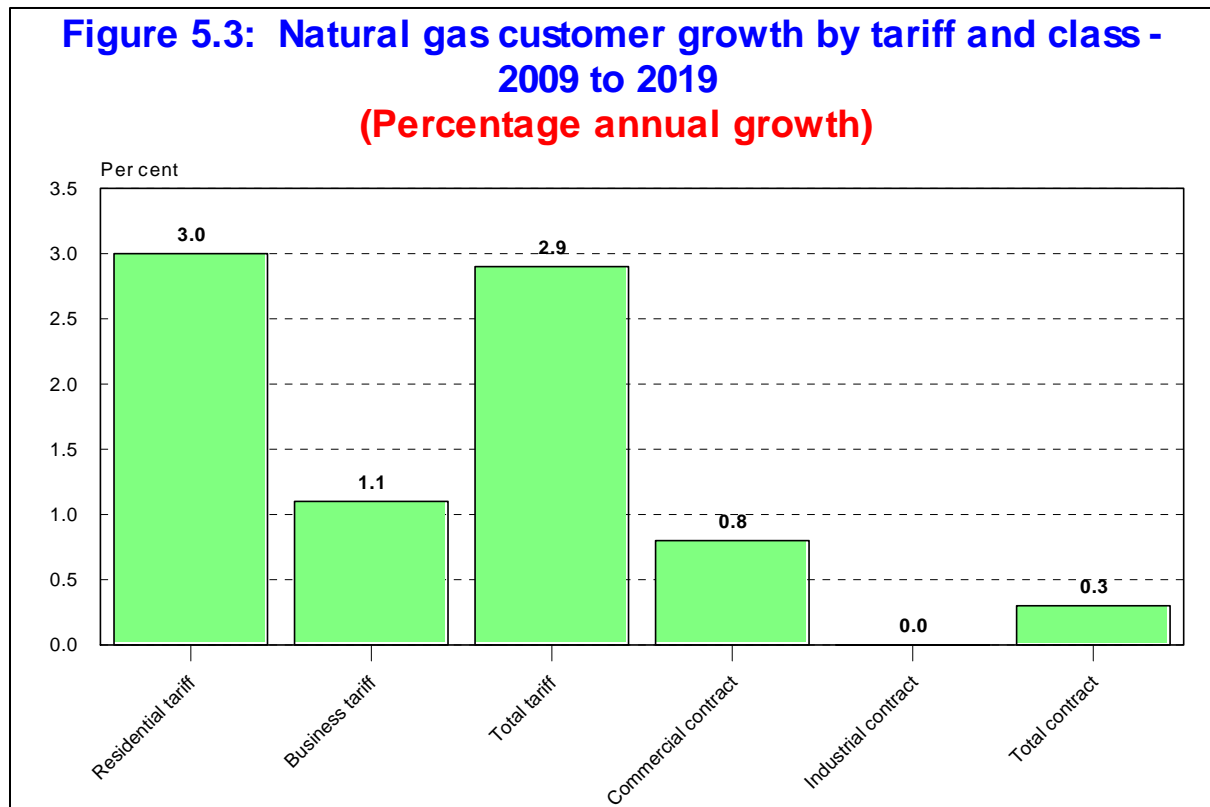


Figure 5.4: Contract volume, customer and MDQ growth - 2009 to 2019
(Average percentage change)

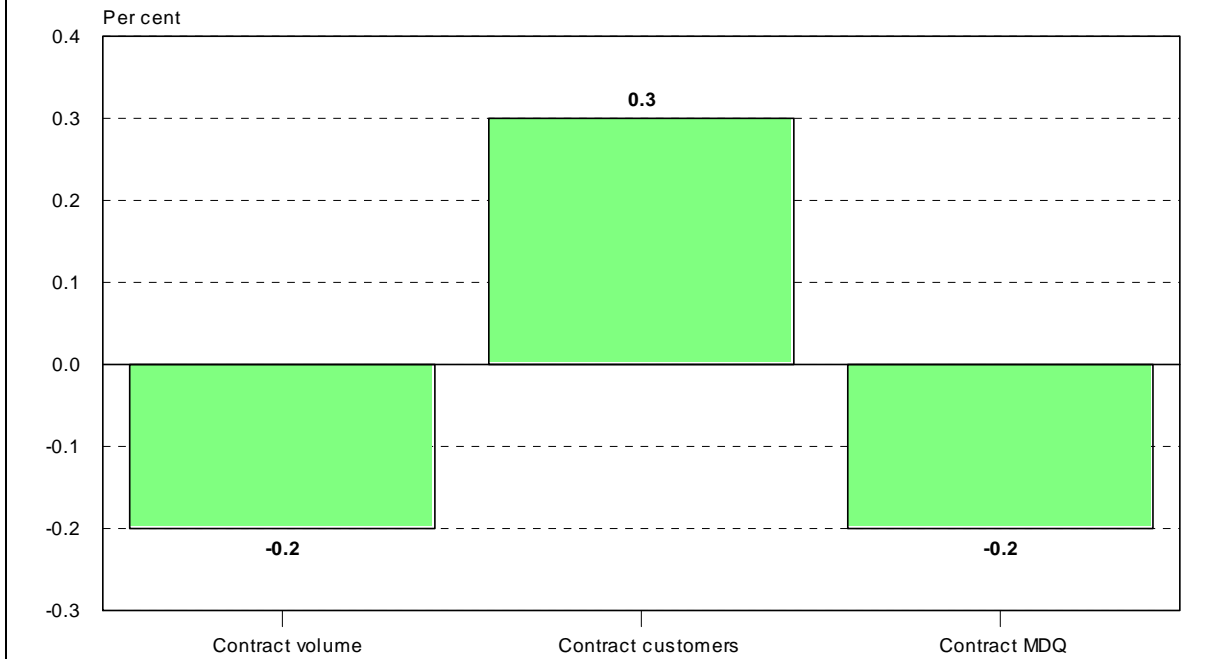
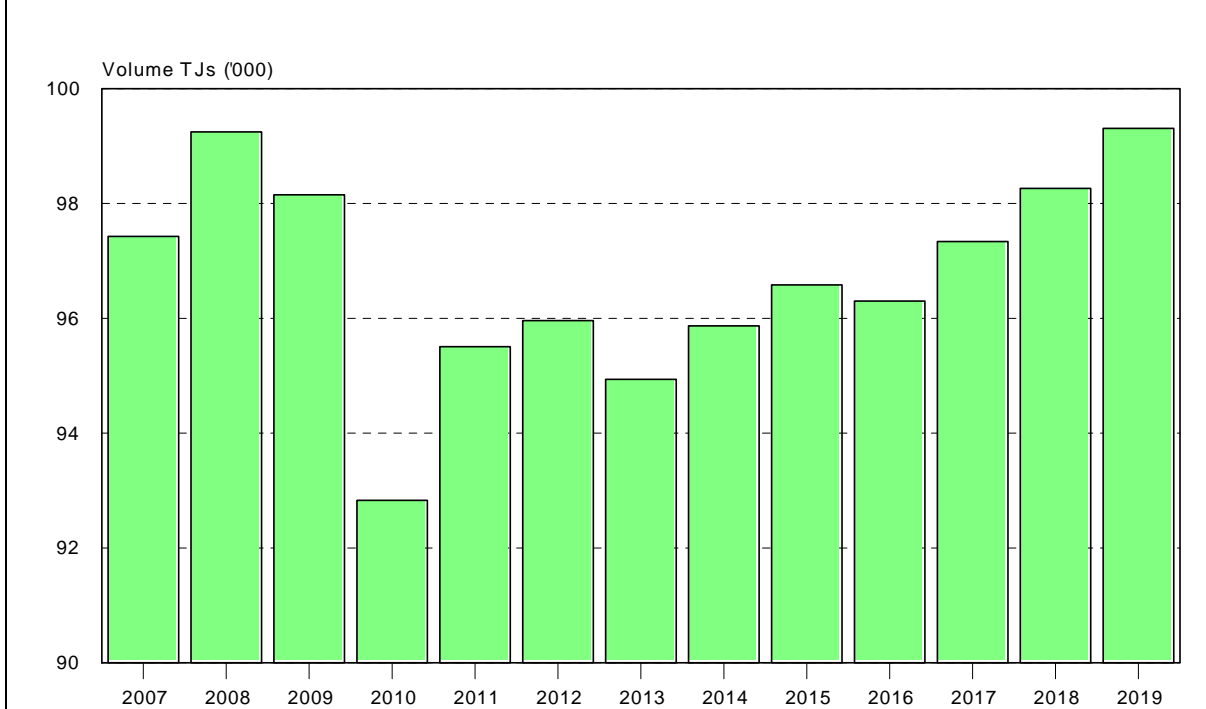
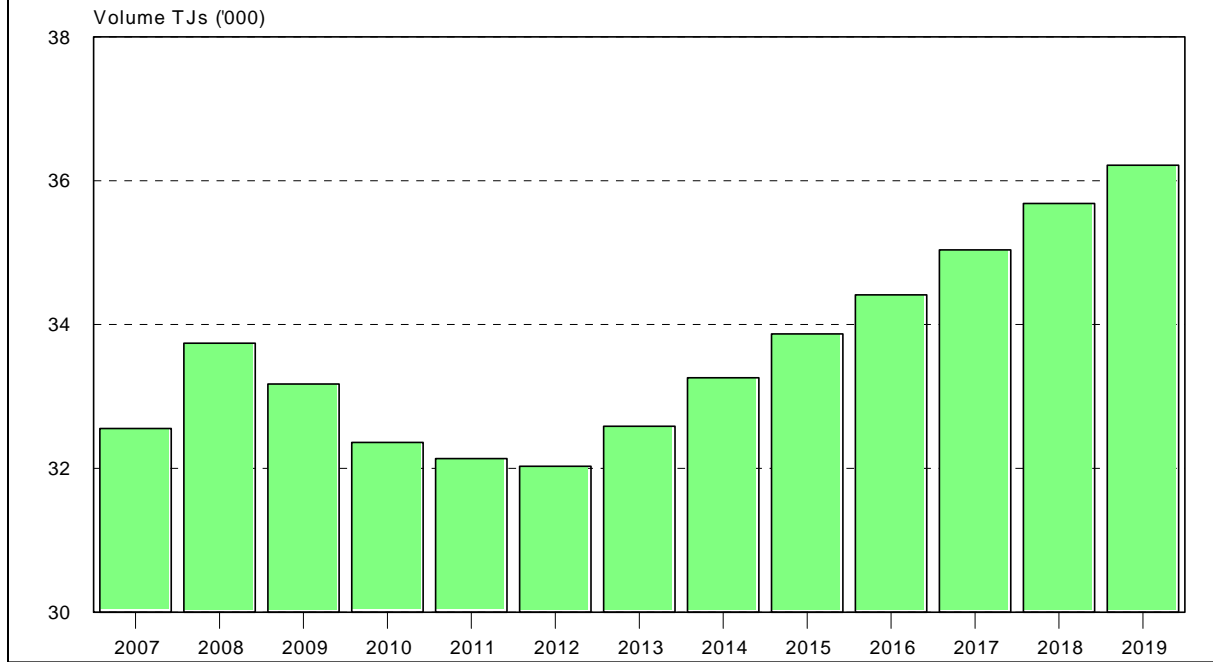


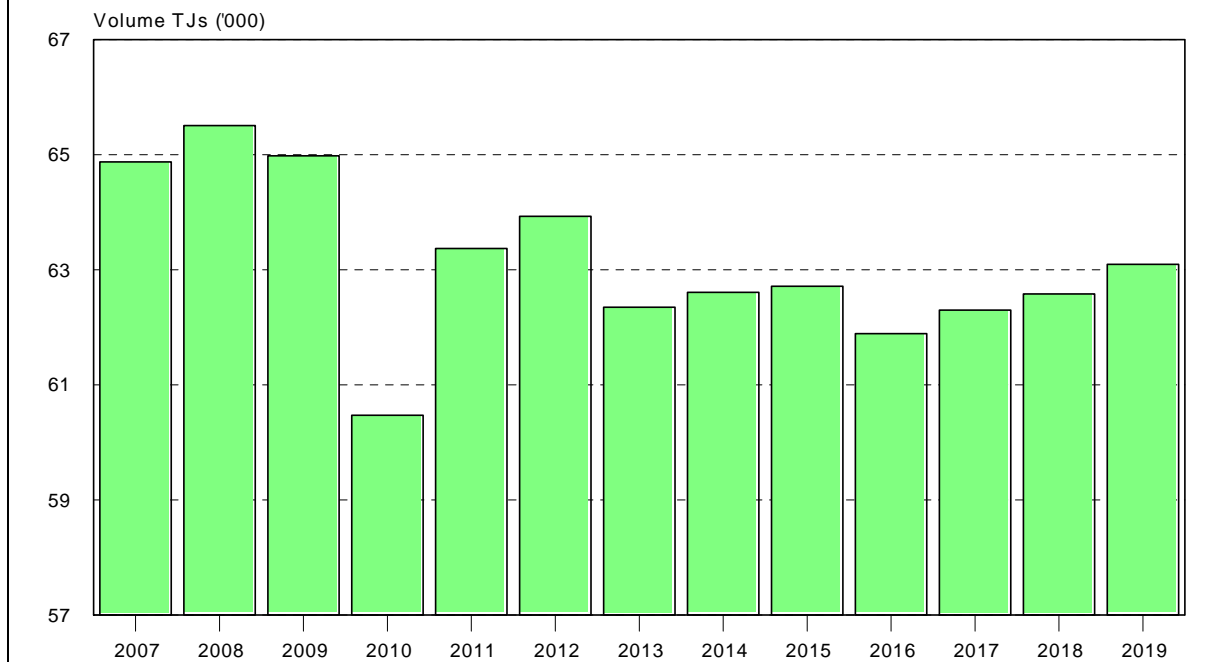
Figure 5.5: Natural gas sales - System total - 2007 to 2019



**Figure 5.6: Natural gas sales - Tariff -
2007 to 2019**

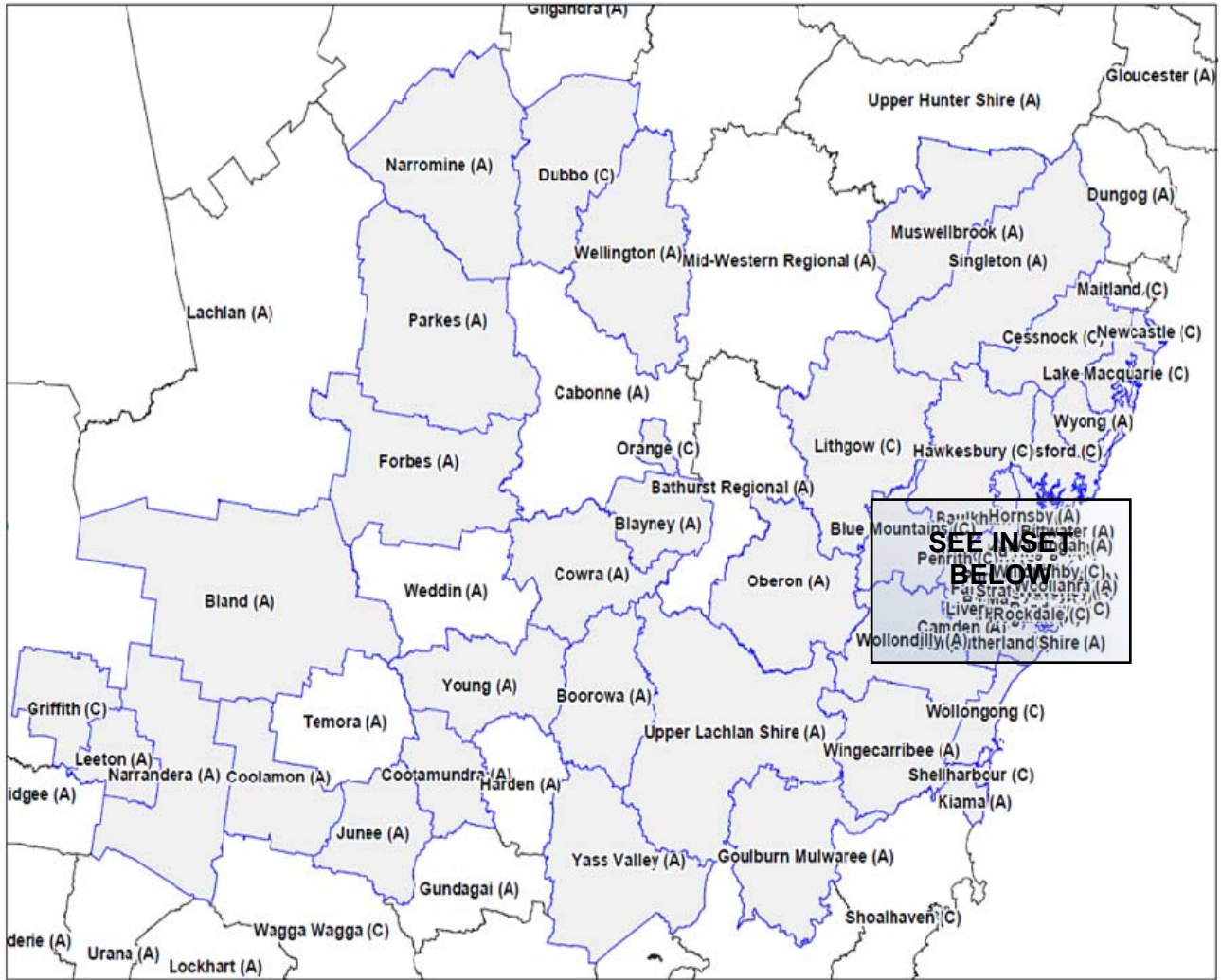


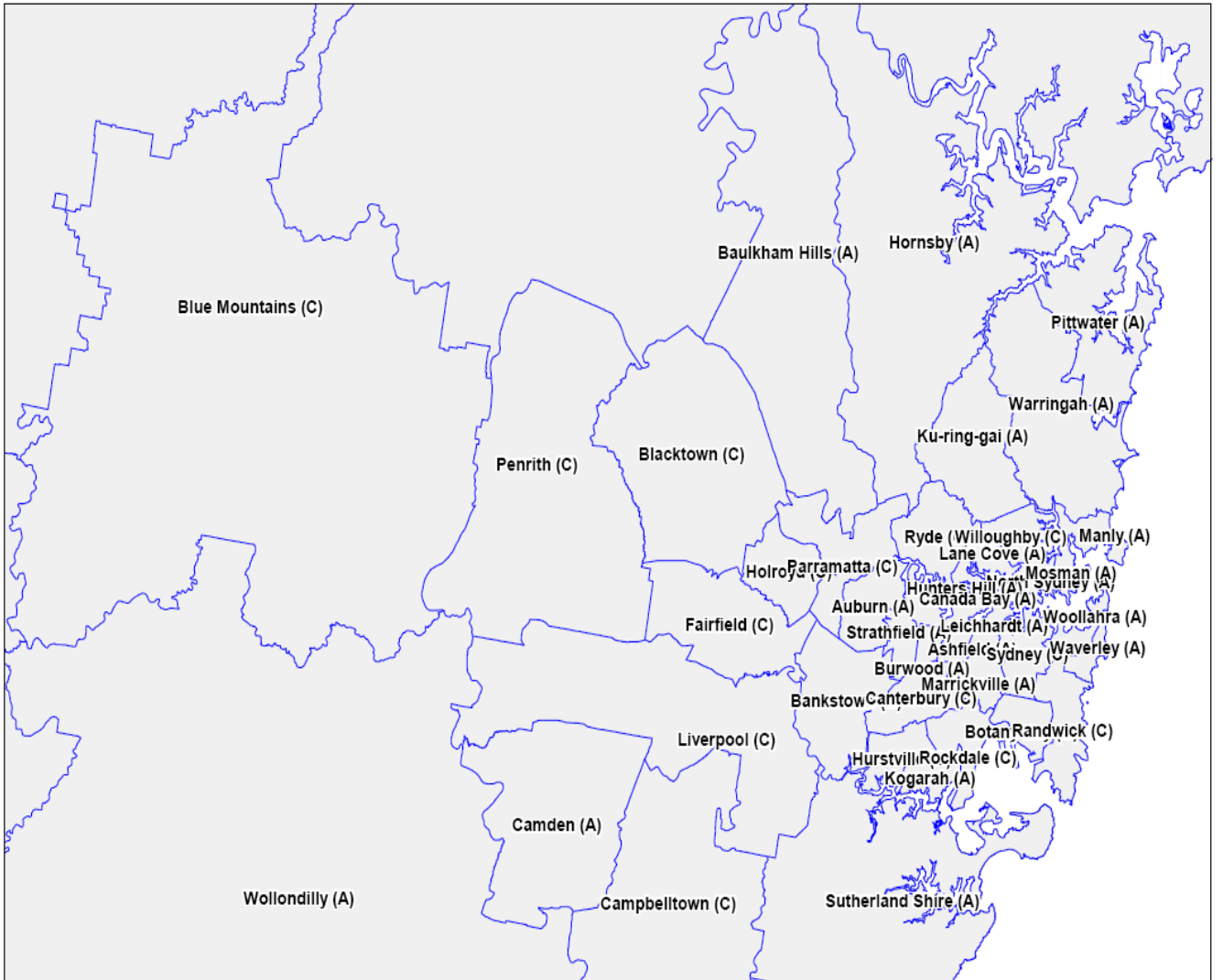
**Figure 5.7: Natural gas sales - Contract -
2007 to 2019**



Appendix A: Jemena Gas Network defined by ABS LGAs

The maps below are a concordance of ABS Local Government Areas with the Jemena Gas Network (JGN) map.





LGA No. Comment	LGA Name	Population 1996	Population 2001	Population 2006	Dwellings 1996	Dwellings 2001	Dwellings 2006
10150	Ashfield (A)	40077	39494	40115	14801	14439	14920
10200	Auburn (A)	50959	56379	65604	15698	16380	19054
10350	Bankstown (C)	157735	165604	170617	51412	53395	54864
10500	Baulkham Hills (A)	119545	139404	158734	36255	43009	49818
10750	Blacktown (C)	232219	256364	272328	72584	79769	85605
10900	Blue Mountains (C)	72506	74317	73711	25445	26834	27251
11100	Botany Bay (C)	34702	35897	36457	12269	12463	13146
11300	Burwood (A)	28579	29960	31438	9591	9934	10218
11450	Camden (A)	32109	43945	49350	10214	13984	15724
11500	Campbelltown (C)	143773	145860	142841	43486	45199	45746
11520	Canada Bay (A)	53908	59845	65931	20135	22195	24414
11550	Canterbury (C)	132360	130947	130426	44479	43455	44258
11720	Cessnock (C)	44362	45204	46141	15601	15947	16664
12850	Fairfield (C)	181785	181936	179928	52262	53337	53909
13100	Gosford (C)	144840	154654	155957	53825	57922	58593
13800	Hawkesbury (C)	57381	61073	60924	18616	19885	19998
13950	Holroyd (C)	80470	85760	89874	27603	29346	30784
14000	Hornsby (A)	136746	145968	150376	45217	48312	50838
14100	Hunters Hill (A)	11969	12692	13228	3933	4105	4294
14150	Hurstville (C)	65392	70642	73750	23495	25052	26102
14450	Kogarah (A)	47618	50340	53197	16834	17441	18350
14500	Ku-ring-gai (A)	99032	101346	100460	32371	32830	32993
14650	Lake Macquarie (C)	170495	177619	180126	61164	65727	67442
14700	Lane Cove (A)	30107	30756	30530	11434	11445	11441
10150	Ashfield (A)	40077	39494	40115	14801	14439	14920
10200	Auburn (A)	50959	56379	65604	15698	16380	19054
10350	Bankstown (C)	157735	165604	170617	51412	53395	54864
10500	Baulkham Hills (A)	119545	139404	158734	36255	43009	49818
10750	Blacktown (C)	232219	256364	272328	72584	79769	85605
10800	Bland (A)	6681	6439	6273	2380	2319	2310
10850	Blayney (A)	6025	6141	6364	2174	2218	2402
10900	Blue Mountains (C)	72506	74317	73711	25445	26834	27251
11050	Boorowa (A)	2376	2333	2253	901	899	921
11100	Botany Bay (C)	34702	35897	36457	12269	12463	13146
11300	Burwood (A)	28579	29960	31438	9591	9934	10218
11450	Camden (A)	32109	43945	49350	10214	13984	15724
11500	Campbelltown (C)	143773	145860	142841	43486	45199	45746
11520	Canada Bay (A)	53908	59845	65931	20135	22195	24414
11550	Canterbury (C)	132360	130947	130426	44479	43455	44258
11720	Cessnock (C)	44362	45204	46141	15601	15947	16664
12000	Coolamon (A)	3849	3911	3916	1396	1418	1471
12200	Cootamundra (A)	7457	7132	7140	2823	2813	2887
12350	Cowra (A)	12146	12462	12357	4475	4646	4766
12600	Dubbo (C)	36701	37659	37950	12174	12960	13076
12850	Fairfield (C)	181785	181936	179928	52262	53337	53909
12900	Forbes (A)	10138	9707	9329	3598	3581	3548
13100	Gosford (C)	144840	154654	155957	53825	57922	58593
13310	Goulburn Mulwaree (A)	25779	26558	26962	8941	9280	9720

LGA No.	Comment	LGA Name	Population	Population	Population	Dwellings	Dwellings	Dwellings
			1996	2001	2006	1996	2001	2006
13450		Griffith (C)	21594	23805	23798	7400	8055	8098
13800		Hawkesbury (C)	57381	61073	60924	18616	19885	19998
13950		Holroyd (C)	80470	85760	89874	27603	29346	30784
14000		Hornsby (A)	136746	145968	150376	45217	48312	50838
14100		Hunters Hill (A)	11969	12692	13228	3933	4105	4294
14150		Hurstville (C)	65392	70642	73750	23495	25052	26102
14300		Junee (A)	5755	5585	5766	1804	1794	1821
14400		Kiama (A)	17706	18827	18596	6225	6707	6818
14450		Kogarah (A)	47618	50340	53197	16834	17441	18350
14500		Ku-ring-gai (A)	99032	101346	100460	32371	32830	32993
14650		Lake Macquarie (C)	170495	177619	180126	61164	65727	67442
14700		Lane Cove (A)	30107	30756	30530	11434	11445	11441
14750		Leeton (A)	11031	11469	11213	3743	3925	3852
14800		Leichhardt (A)	44395	48705	48698	18724	20279	20156
14870	small part not included	Lithgow (C)	19558	19550	19399	6981	7226	7440
14900		Liverpool (C)	120197	154287	164964	37702	46808	49249
15150		Manly (A)	36265	37587	37378	14471	14154	14029
15200		Marrickville (A)	76017	73431	71966	28391	27941	28086
15350		Mosman (A)	25468	25889	26082	10601	10627	10436
15650		Muswellbrook (A)	15562	14796	15419	5125	5089	5302
15800		Narrandera (A)	7141	6486	6039	2444	2320	2307
15850		Narromine (A)	6523	6621	6406	2362	2443	2400
15900		Newcastle (C)	133686	137307	141868	53232	54901	55991
15950		North Sydney (A)	53790	56547	59673	24739	25761	26606
16100		Oberon (A)	4937	5132	5077	1619	1679	1806
16150		Orange (C)	33964	35521	34969	11873	12663	12886
16200		Parkes (A)	15098	14455	14272	5370	5308	5381
16250		Parramatta (C)	139157	144490	151300	47914	48599	51206
16350		Penrith (C)	163122	172397	172102	51658	55363	56931
16370		Pittwater (A)	51450	52804	53098	18349	18596	18664
16550		Randwick (C)	118905	121497	122176	44351	44501	44848
16650		Rockdale (C)	84847	88523	92621	30912	31304	32873
16700		Ryde (C)	92675	95744	98519	34204	35310	35666
16900		Shellharbour (C)	52080	57071	59634	17462	19507	20832
17000		Singleton (A)	20133	20384	22071	6421	6642	7287
17100		Strathfield (A)	26044	28206	32360	8480	9033	10364
17150		Sutherland Shire (A)	194105	203089	203124	66969	71472	72883
17200		Sydney (C)	121752	153200	180474	44386	52548	59671
17640	only about half included	Upper Lachlan Shire (A)	6653	6749	6840	2464	2532	2636
18000		Warragah (A)	124299	128839	133494	45111	46707	48437
18050		Waverley (A)	62357	61332	61690	25533	24010	22809
18150		Wellington (A)	8648	8239	8173	3140	3084	3045
18250		Willoughby (C)	53735	59354	64856	19925	21614	23540
18350		Wingecarribee (A)	36777	40840	41868	12812	14545	15566
18400		Wollondilly (A)	33413	37123	40039	10564	11791	12887
18450		Wollongong (C)	177009	181612	183634	63976	66530	68332
18500		Woollahra (A)	49486	50240	50420	20545	19878	19560
18550		Wyong (A)	115999	130854	137755	43919	49314	52313
18710		Yass Valley (A)	10708	11380	13166	3809	4099	4657
18750		Young (A)	11046	11300	11774	4118	4191	4455
Total Jemena Gas Network			6851577	7265621	7509401	2346138	2483794	2586079