Confidential

Review of Demand Forecasts for APT Allgas Queensland

For the Access Arrangement period commencing 1 July 2011

Prepared for the Australian Energy Regulator

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ACIL Tasman

Economics Policy Strategy

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1 Background

The Australian Energy Regulator (AER) engaged ACIL Tasman to review the adequacy and appropriateness of the methodology used by APT Allgas Energy Pty Limited, a wholly-owned subsidiary of the APA Group, ("Allgas") to develop forecasts of demand in its Queensland gas distribution networks for the access arrangement period commencing 1 July 2011, as set out in the proposed access arrangement information submitted by Allgas (APA Group, 2010a).

The *National Gas Rules* (NGR 72(1)(a)(iii)) require the access arrangement information provided by the service provider to include usage of the pipeline over the earlier access arrangement period showing:

- minimum, maximum and average demand
- customer numbers in total and by tariff class.

In making a decision whether to approve or not to approve an access arrangement proposal, the AER is required under rule 74 of the NGR to be satisfied that forecasts required in setting reference tariff(s) are arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances.

The process followed by the AER for assessing proposed access arrangements and access arrangement revisions is set out in the Final Access Arrangement Guideline published in March 2009 (AER, 2009).

2 This report

A key part of the information submitted by a service provider in support of a proposed access arrangement is a forecast of the level of demand for the reference services provided, over the course of the access arrangement period. This typically involves forecasting demand for services for a period of five years from the commencement date of the new access arrangement. It is important to ensure that the forecasts represent best estimates arrived at on a reasonable basis because:

- Demand forecasts may impact the forecast capital expenditure required to meet the new demand of prospective users or the increased demand of existing users and may therefore influence forecast revenue requirements.
- Demand forecasts influence the tariffs set to meet forecast revenue in each year of the access arrangement period, and how this revenue is to be allocated between tariff classes for different reference services.

2.1 Approach to the review

In undertaking this review, ACIL Tasman has considered the following issues:

1. the adequacy of the overall approach and methodology
2. the reasonableness of the assumptions
3. the currency and accuracy of the data used
4. the account taken of key drivers
5. whether the methodology has been properly applied.

The review has been undertaken as a desktop analysis into the methodology, data and parameters, and assumptions used to develop the demand forecasts. ACIL Tasman has used its own knowledge of Australian gas markets to test assumptions.

3 Scope of Allgas operations

The APA Group acquired the Allgas distribution network in 2006–07.

The Allgas network supplies natural gas to end users in Brisbane (south of the Brisbane River, South Coast (extending into northern New South Wales), Toowoomba and Oakey through over 2,900 km of distribution mains. The network supplies over 80,000 customers, with total gas usage currently around 10 PJ/a.

The high-pressure Roma – Brisbane Pipeline physically connects with the Allgas networks at Oakey, Toowoomba and Brisbane. The network is operated in conjunction with Envestra's gas distribution network, which is located generally on the north side of the Brisbane River.

A major network expansion currently underway in the Gold Coast area will extend the distribution network to service up to 9,000 new homes in the upper Coomera – Pimpama area.[1]

3.1 Historical gas demand

The historical customer numbers for the Allgas distribution network are shown in Table 1.

[1] APA Group website at http://www.apa.com.au/our-business/gas-transmission-and-distribution/queensland.aspx accessed 25 October 2010.

Table 1 **Allgas Queensland gas networks — historical customer numbers, by class**

Year ended 30 June	2006	2007	2008	2009	2010	2011 (F)
Residential	61,116	68,076	71,242	74,624	76,983	79,420
Small business	5,009	5,580	5,280	4,860	4,739	4,870
Volume Customer Total	**66,125**	**73,656**	**76,522**	**79,483**	**81,722**	**84,290**
Demand Customers	111	108	109	114	102	101
Total customers	**66,236**	**73,764**	**76,631**	**79,597**	**81,824**	**84,391**

Data source: Allgas 2010 Access Arrangement Information *(APA Group, 2010a)*

Historical gas demand, by customer class, is summarised in Table 2.

Table 2 **Allgas Queensland gas networks — historical customer demand (GJ), by class**

Year ended 30 June	2006	2007	2008	2009	2010	2011 (F)
Residential	730,138	801,155	766,404	804,525	785,010	780,651
Small business	1,908,708	2,094,358	2,153,500	2,107,047	2,014,749	2,063,454
Volume Customer Total	**2,638,846**	**2,895,513**	**2,919,904**	**2,911,572**	**2,799,759**	**2,844,104**
Demand Customers	7,154,477	7,207,520	7,678,777	7,565,349	7,666,093	6,954,840
Total demand	**9,793,323**	**10,103,033**	**10,598,681**	**10,476,921**	**10,465,852**	**9,798,944**

Data source: Allgas 2010 Access Arrangement Information *(APA Group, 2010a)*

4 Forecast methodology and assumptions

4.1 Definition of customer classes

The Allgas networks customer base is divided into two classes: Volume Class and Demand Class. Definitions for these customer classes are set out in the Load Forecast (APA Group, 2010b) as follows:

- **Volume Class** customers generally consume less than 10 TJ/a and include both Residential customers and Business customers. Residential customers have installed meter capacity of 10 cubic metres per hour or less, and include both houses and unit dwellings. All other Volume Class customers are classified as Business customers, and typically have an installed meter capacity of greater than 10 cubic metres per hour.
  - New customers for the Volume Class have further been split into Residential New Homes, Residential New Units, Residential Existing Homes and Business customers. This split has been used by Allgas to analyse individual market segment past performance, industry trends and forecasts. Conclusions from investigation into each market segment have been combined to give the total forecast of Allgas network demand for the coming access arrangement period.

  - Customers and consumption are also split by geographic regions. The 'Central Region' includes the Brisbane network, the 'Western Region' includes the Toowoomba and Oakey networks, and the 'Southern Region' includes the Gold Coast to Tweed Heads network (including neighbouring regions such as Yatala).
- **Demand Class** customers consume 10TJ pa or more and are typically large industrial customers.

4.2 Forecast methodology for the 2011–16 access arrangement period

Allgas has developed the forecasts based on historical trends, taking into account factors that may cause future growth rates to be either higher or lower than in the past.

4.2.1 Volume Class customers numbers

Residential customer numbers

The methodology for forecasting customer numbers in the Volume – Residential customer subclass is set out in section 2.2 of the load forecast (APA Group, 2010b). The approach can be summarised as follows:

$$RC_x = RC_{x-1} + NC_x - D_x$$

Where RC_x = the number of existing Residential customers in Year X,

RC_{x-1} = the number of existing Residential customers in Year X-1,

NC_x = the number of new Residential customers in Year X, and

D_x = the number of Residential customer disconnections in Year X.

The access arrangement information presents a comparison between new dwelling connection numbers on the Allgas network and the HIA historical data on Queensland housing starts, demonstrating a degree of correlation between the two measures.

In order to estimate the number of new customers each year, Allgas has used the FY10 actual new network connections as the foundation for the upcoming access arrangement period. Total customer connections have been split into customer segments (New Homes, New Units, Existing Homes, Business) to enable analysis of each individual customer market.

New dwellings have been split into new homes and new units using the Housing Institute of Australia (HIA) dwelling start forecasts for Queensland (HIA, 2010a). Allgas has assumed that new dwelling start trends in natural gas reticulated areas will follow new dwelling start trends for the Queensland market more generally.

The HIA also produces a Quarterly Outlook study which includes extensive historical analysis of housing construction trends at state and regional (Statistical Division) level, as well as whole-of-State forecasts (HIA, 2010b). The HIA uses macroeconomic analysis to forecast the impact of market factors on housing starts, including Government policy, employment rates, GDP, consumer confidence and inflation – both on a national and state level – as well as economic and industry indicators specifically relevant to the housing market, such as home lending, residential investment and building approval numbers. Factors and results from the Quarterly Outlook were extrapolated to give the long term forecast.

Use of the HIA forecasts for new residential housing developments in Queensland as a proxy for new residential gas connections is a reasonable approach based on reputable independent analysis of residential development trends. However, there were some questions regarding the way in which these forecasts have been employed in the Allgas demand model: The following issues were raised with Allgas:

- *There are inconsistencies between the data presented in the Load Forecast, Appendix A – HIA Long term Dwelling Forecast (APA Group, 2010b, p. 42), and the information provided in the supporting documentation (HIA Economics Group – long-term dwelling forecasts) with the latter document apparently more recent given that it includes a forecast for the year ended June 2012 and the data in Appendix A does not. The Allgas response was as follows[2]:*

  The tables in the Load Forecast (Attachment 3.1) included information from the September 2009 HIA Forecast document. As Acil Tasman has correctly pointed out, the document provided as Attachment 3.1.1 was the March 2010 forecast … As no change in the forecast results from this inclusion, APT Allgas does not propose any changes in its Load Forecast in response to this query.

ACIL Tasman considers this clarification to be satisfactory.

- *It is currently difficult to reconcile the growth rates (attributed to HIA[3]) used in the Allgas demand model with the HIA forecasts. In particular, the growth rates for year ended June 2011 appear to be low by a factor of ten when compared with the HIA forecasts, and the forecast growth rates in subsequent years are not consistent with the rates calculated by interpolation between the HIA forecast years ended June 2015 and 2020. The effect on the overall volume customer forecasts is relatively minor: substituting growth rates calculated by ACIL Tasman consistent with the more recent HIA forecasts set out in the supporting documentation results in a 0.41% increase in total Volume*

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2 APA Group Document file reference 20101117 Response to Acil Tasman load forecast queries.doc.

3 Refer file "20100923 - Demand Summary - CONFIDENTIAL (AERv2).xls", Sheet "Volume Class Connections", Rows 33,34.

> *Customer consumption over the access arrangement period. Nevertheless, ACIL Tasman considers that it would be reasonable to ask Allgas to explain how the forecast growth rates for new customer connections have been derived from the HIA forecasts, and to make any necessary adjustments. The Allgas response was as follows:*
>
> "To forecast the number of new residential connections per year, APT Allgas applied the HIA data to calculate a "rate of growth" in housing starts and unit starts. For example, 2011/12 saw a marked increase in dwelling starts over 2010/11, in the order of 17.28% for houses and 6.42% for units.
>
> APT Allgas has reviewed the calculation of growth rates for 2010-2011 and acknowledge that a decimal placement error was made (reference: Mid Range Forecast cells O5 and P5). The impact of this correction is to change the total number of customer connections over the forecast AA period from 18,040 to 18,586."

APT Allgas acknowledged that this should be corrected, and provided a corrected spreadsheet was provided with this response, the results of which are summarised below.

> To estimate the number of new connections in each year, APT Allgas applied the annual rate of change in housing and unit starts per the HIA Study (see table above) to the actual house and unit connections achieved in the 2009/10 year. For example, in 2009/10 APT Allgas connected 727 houses in the South region. The HIA Outlook shows a 7.2% increase in the rate of new house construction, resulting in a 2010/11 forecast of 779 houses. The HIA Outlook forecasts a 17.28% increase in the rate of house construction starts in 2011/12, resulting in a forecast of 914 new house connections in the South region in 2011/12. A similar process was applied to unit connections.
>
> As data was not available for the period from 2011 to 2014, the total dwelling starts figure was interpolated between these points. The HIA Outlook also published the proportion of houses relative to units, and this ratio was used to apportion the number of dwelling starts between houses and units. The HIA study showed a relative shift in building activity from houses to units, with houses falling from 72% to 69.5% of the total, and units correspondingly increasing. When this shift was applied to the extrapolated data, the result was a minor reduction in the rate of house construction of 1.66% in 2012/13 relative to 2011/12. In 2012/13, the interpolation process described above results in a slowing of house starts of -1.66%, resulting in a 2012/13 forecast of (914*(1-.0166)) 899 house starts.

The revised information is summarised in the tables below.

Table 3 **Revised housing starts, history and forecast, by type**

Housing Starts, by type							
(a) = actual	*thousand starts*			Rate of change (%):			*Houses*
Qld	Houses	Multi-units	Total	Houses	Multi-units	Total	*/ total*
2002/03 (a)	26.383	13.23	39.61				
2003/04 (a)	29.83	14.41	44.22	13	9	12	*0.675*
2004/05 (a)	25.25	14.11	39.31	-15	-2	-11	*0.642*
2005/06 (a)	24.71	13.03	37.72	-2	-8	-4	*0.655*
2006/07 (a)	28.21	12.96	41.20	14	-1	9	*0.685*
2007/08 (a)	29.95	14.81	44.84	6	14	9	*0.668*
2008/09 (a)	19.96	8.86	28.81	-33	-40	-36	*0.693*
2009/10	21.91	10.33	32.24	10	17	12	*0.680*
2010/11	23.48	10.06	33.55	7	-3	4	*0.700*
2011/12	27.54	10.71	38.25	17	6	14	*0.720*
2014/15	28.08	12.32	40.41				*0.695*
2019/20	31.44	14.46	45.90				*0.685*

Data source: APA Group Document file reference 20101117 Response to Acil Tasman load forecast queries.doc; analysis based on HIA 2010a

Table 4 **Revised customer connections forecast**

Customer Connections Forecast - APT Allgas Networks							
Mid Range	Actual	Budget	f'cast	f'cast	f'cast	f'cast	f'cast
Residential	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Central Region							
New Homes	828	887	1041	1024	1042	1061	1074
New Units	355	346	368	409	416	424	449
Existing Homes	420	441	463	486	511	536	563
Total	***1603***	***1674***	***1872***	***1918***	***1969***	***2021***	***2087***
Western Region							
New Homes	135	145	170	167	170	173	175
New Units	58	57	60	67	68	69	73
Existing Homes	45	47	49	52	54	57	60
Total	***238***	***248***	***279***	***285***	***292***	***299***	***309***
South Region							
New Homes	727	779	914	899	915	932	943
New Units	311	303	323	358	365	371	394
Existing Homes	138	145	152	160	168	176	185
Total	***1176***	***1227***	***1389***	***1416***	***1448***	***1479***	***1522***
Residential Total							
New Homes	1690	1811	2124	2089	2128	2166	2193
New Units	724	706	751	833	849	864	916
Existing Homes	603	633	665	698	733	769	808
Total Residential	***3017***	***3150***	***3540***	***3620***	***3709***	***3800***	***3917***

Data source: APA Group Document file reference 20101117 Response to Acil Tasman load forecast queries.doc; analysis based on HIA 2010a

The HIA forecasts were used as the basis for the upcoming access arrangement period forecast, with further development using analysis of the market context for Residential customer segments, including consideration of the following:

- the impact of the Queensland Sustainable Housing Code which has banned installation of electric resistance hot water systems in new dwellings and effectively removed a major competitor for gas in this market segment.
- appliance selection
- competition from electricity for cooking appliance selection
- competition from electricity (reverse cycle air conditioning) for space heating (relevant mainly to the Western region – Toowoomba/Oakey)
- government policies encouraging use of solar and heat pump hot water systems
- the impact of gas marketing initiatives undertaken by Allgas.

We believe that all of the above factors are relevant considerations influencing use of natural gas in new dwellings.

For existing dwellings, new sustainable housing laws on replacement of failed electric hot water systems have the potential to create a market opportunity for natural gas. However, analysis undertaken by Allgas leads to the conclusion that these laws are unlikely to result in any significant increase in the number of gas customers. This is principally because of the long lead times for a new gas service and meter installation—currently around 10 to 15 working days. Even with a strong focus on reducing this lead time, gas is at a severe disadvantage to alternative technologies in terms of how quickly a replacement service can be installed—a key consideration for consumers facing days without hot water. This problem is exacerbated by the fact that the majority of hot water system installers (Allgas estimates 72%) are not qualified gas fitters and therefore unlikely to recommend gas as a replacement option.

ACIL Tasman agrees that that there will be few if any new gas customers arising from the ban on replacement of electric resistance hot water heaters, and that the assumption made by Allgas of a 0% share of this market is not unreasonable.

Business customer numbers

The Volume – Business customer sub-class includes those customers consuming less than 10 TJ/a, but with an installed meter capacity of greater than 10 cubic metres per hour. These customers are generally commercial and small industrial users.

New connection numbers for Volume – Business customers have been forecast using the numbers for the year ended June 2010 as a base, with projections based on the increase in residential connections as previously described. Allgas has assumed that Business connections will be in line with residential activity, arguing that the HIA Long Term Forecast uses a range of broader economic indicators relevant to the business customer group. The access arrangement information also states that the forecasts derived in this manner are generally "in line with APA Group's Marketing Representative's forecasts of new Business connections based on previous experience and industry knowledge" (APA Group, 2010b, pp. 21-22).

ACIL Tasman did not consider the methodology for forecasting Volume Business customer numbers to be sound. Volume Business customer numbers fell 15% between 2007 and 2010 (from 5,580 to 4,739). Allgas had not provided any explanation for this marked decline. Over the same period, Volume Residential customer numbers rose 13% (from 68,076 to 76,983). Hence there was no evidence during the current access arrangement period to suggest that the number of new Volume Business customers would necessarily move in line with Residential customer trends as revealed in the HIA Housing Activity Forecasts. On the contrary, the historical trend in the Volume Business customer numbers has been steadily downwards, whereas the forecast based on the application of residential customer growth rates to the base number in financial year 2010 shows a steady upward trend from current levels. ACIL Tasman considered that, unless Allgas has a clear strategy to reverse the recent historical trend, the forecast customer numbers in the Volume Business sector for the next access arrangement period would be unlikely to be achieved and this would potentially lead to an overstatement of demand in this sector. These issues were raised with Allgas, who responded as follows:

> "Generally speaking, APT Allgas applied a rationale that the number of Volume business customers would increase in line with residential connections, following the premise that there would be a per capita increase in business customers relative to domestic customers. However, given the actual changes in Volume business customers identified by Acil Tasman, it is reasonable to revisit this presumption.
>
> While APT Allgas remains of the view that it is reasonable to forecast a per capita proportion of Volume business customers (for example, hairdressers, dry cleaners, food outlets, etc), it is possible that the proportion of Volume business customers may not be completely correlated to residential growth (for example, plastics fabricators, panel beaters, etc). Considering in conjunction with the observed reduction in Volume business customers, it would be reasonable to reduce the number of new business customers forecast to connect to the network over the forecast period.
>
> Consistent with the "per capita" argument, it would also be reasonable to expect that the average usage per forecast new Volume business customer would be lower than the average consumption of the current Volume business customers. This derives from two key factors:
>
> - The new connections forecast results primarily from reticulation of new subdivisions. To the extent that industrial estates have already been reticulated, we would expect the new connections to comprise fewer manufacturing applications and more service applications;

> - The current Volume business customer base includes the larger Volume business customers (the plastics fabricators and the like), and that there will be proportionately fewer of these large Volume business customers connecting to the network than comprises the current population.
>
> But because the Volume business customer is so diverse, APT Allgas struggled to develop a robust forecast for the average load of the new Volume business customer connections. Aside from reasonable certainty that the new Volume business customers will consume less than the current average, APT Allgas was not able to land on a particular supportable forecast that would meet the "best forecast or estimate possible in the circumstances" test under Rule 74(2)(b)."

For the most part the forecasts prepared by Allgas are based on only four years of historical data (from year ended June 2007) – reflecting the date of acquisition of the network by APA Group. However, Allgas has provided data showing that in the year ended June 2006 there were 5009 Volume business customer connections. This implies significant growth in business customer numbers over the year to June 2007, when the corresponding number was 5,580. If the 2006 value is incorporated into the historical trend analysis, then the forecast of Volume business connections proposed by Allgas is found to lie within the upper part of the 90% confidence interval (see section 5.2.1). On this basis the Allgas forecast may not be statistically unreasonable. However, given the downward trend over the past four years we consider that a better forecast in the circumstances may be based on an assumption that total Volume business customer numbers will stabilize over the next access arrangement period at a level equal to the average over the period 2006 to 2010 (5,094 customers).

Disconnections

Disconnections have been projected to continue at historical rates over the next Access Arrangement period with the proportion of business and residential disconnections based on the ratio of new connections for each year. The volume loss arising from disconnections has been assumed at the respective average for residential and business customers for each year, with the spread of disconnections assumed to occur evenly over the year.

ACIL Tasman considers that this is a reasonable approach to estimation number of customer disconnections and the associated loss of consumption volume.

4.2.2 Volume Customer gas consumption

Historical consumption

Allgas has presented data on gas consumption in the Volume Customer sector during the current access arrangement period (APA Group, 2010b, p. 23). The data show that, notwithstanding the fact that customer numbers significantly exceeded those in the Queensland Competition Authority (QCA) approval, gas consumption in the Volume Class has been below the QCA approved target in every year of the current access arrangement, and will be more than 10% below the QCA target of 16,100 TJ over the entire access arrangement period. The reason for this shortfall is that the average consumption per customer has been significantly lower than was anticipated in the QCA decision. In the Volume Residential sector, average consumption was 10.2 GJ/a compared to an assumed average of 13.6 GJ/a used by the QCA in developing the current access arrangement forecast.

Over the four-year period to end June 2010, average residential consumption in the Central region fell by 12.1 %. The corresponding reduction in the Southern region was 13.3% and in the Western region 15.3%. Factors identified by Allgas as contributing to the steep decline in average rates of consumption include:

- Introduction of water efficiency measures to combat drought conditions in 2007 and 2008. These water efficiency measures have resulted in a sustained reduction in average consumption, even after the recent breaking of the drought, as a result changes in consumer behaviour and attitudes to water conservation as well as physical measures taken to reduce consumption during the drought period.
- Ongoing improvements in appliance efficiency, including a shift from gas storage hot water systems to instantaneous systems; gas appliance energy efficiency labeling supported by the Sustainable Housing Code which sets a minimum requirement for natural gas hot water systems at a 5-star energy rating level; and manufacturer-driven improvements in appliance design.
- Increased penetration of gas-boosted solar hot water systems.
- In the Western region, loss of heating load due to the emergence of reverse cycle air conditioning has also been a factor and accounts for the higher rate of decline in this region.

Residential customers forecast methodology

For the Volume – Residential customer class, the following actual average consumption figures for financial year 2010 were adopted as a base:

- Central region – 9.49 GJ/a/customer
- Southern region – 9.64 GJ/a/customer
- Western Region – 13.07 GJ/a/customer

Across all regions, residential consumption has been forecast by Allgas to reduce by 5,128 GJ per year in aggregate as a result of appliance upgrades and improved appliance efficiency. This amounts to an annual reduction of approximately 0.65% based on 2010 residential consumption of 785,010 GJ, or

0.067 GJ per customer per year based on 76,983 residential connections in 2010.

Additionally, for the Western region only, average residential consumption is forecast to decline until June 2014 at the average rate displayed over the last four years, that is 0.763 GJ/a. For the last two years of the forthcoming access arrangement period the average residential consumption rate in the Western region is affected only by the assumed impact of appliance upgrades.

Based on historical experience in the Allgas network as well as experience in other distribution areas, an on-going reduction of 0.65% in average residential consumption as a result of improved appliance efficiency is considered reasonable. However, reducing the rate of consumption in the Western region at a rate equal to the average decline over the last four years, and then reducing the rate in that region by a further 0.65% to take account of improving average appliance efficiency in our opinion involves a double counting of the efficiency effect, since this effect is implicitly incorporated into the historical data.

This matter has been raised with Allgas, and Allgas has acknowledged that forecasting average demand by applying both the observed decline in average consumption and a factor for improved appliance efficiency effectively "double counts" the appliance efficiency effect.

Allgas noted that, during the forecast period, applying the observed rate of Western Region decline would reduces the Western Region load to be equivalent to the level observed in the Brisbane and Southern regions, where there is no space heating load. It therefore proposed that from this point forward, it would apply only the reduction attributable to the ongoing appliance efficiency improvements. On this basis, and taking into account the corrected forecast customer numbers, Allgas recalculated the Western Region domestic load forecast, with the following results:

Table 5 **Allgas revised domestic consumption forecasts**

Domestic Consumption			FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16
Original Forecast									
Average Consumption	West	(GJ/a)	13.07	12.25	11.42	10.60	9.77	9.72	9.66
Annual Consumption	West	(GJ/a)	192,246	181,252	171,361	161,312	150,986	152,333	153,745
Annual Consumption	All	(GJ/a)	785,010	780,651	789,260	799,124	809,133	831,254	853,978
Revised Forecast									
Average Consumption	West	(GJ/a)	13.07	12.31	11.55	10.78	10.02	9.34	9.29
Annual Consumption	West	(GJ/a)	192,246	182,252	173,401	164,388	155,082	146,786	148,201
Annual Consumption	All	(GJ/a)	785,010	782,062	792,598	804,439	816,396	829,809	853,472

Data source: APA Group Document file reference 20101117 Response to Acil Tasman load forecast queries.doc

The revised forecast would see average residential consumption levels in the Western (Toowoomba/Oakey) Region fall to equal those in the Central

(Brisbane) by 2014–15. This would, in effect, imply the complete loss of the Western region space heating load within that timeframe—an outcome that is intuitively unlikely.

One possible explanation is the fact that the data has not been weather normalised: while we agree that demand in the Central and Southern regions is typically not weather sensitive, the same is probably not true for the Western Region because of its significant space heating component. We therefore recommend that weather normalization of the Western Region residential demand data be investigated in order to better define the underlying decline trend attributable to penetration of reverse cycle air conditioning.

Business customers forecast methodology

For the Volume Business class customers, the average consumption rate for the next access arrangement period is assumed to be the same as the average rate over the past three years (FY2008 to FY2010):

- Central region – 382.39 GJ/a
- Southern region – 553.1 to GJ/a
- Western region – 322.76 GJ/a

ACIL Tasman considers that it is generally reasonable to assume that consumption rates in the Volume Business customer class will continue at historical average rates, assuming no significant change in the customer base. However, as noted on page 14, Allgas has advised that a number of customers previously included in the Demand Class have recently transferred into the Volume Business class because they do not currently meet the 10 TJ/a consumption threshold. Given that these are relatively large customers with annual gas demand close to 10 TJ, it might reasonably be expected that these transfers would result in some increase in the average rate of consumption for the Volume Business class. This is not reflected in the forecasts. However, given that the small number of customers involved, we consider it unlikely that the impact on the demand forecasts will be material.

Weather normalization

Because of the very low proportion of gas used for residential space heating in Queensland, gas demand in the Allgas network is generally not affected by weather. Accordingly, the process of weather normalisation of historical data that is routinely applied in the southern States has not been used by Allgas.

ACIL Tasman agrees that weather normalisation of historical data would be unlikely to affect the forecasts materially and is therefore not warranted in the Allgas demand assessment.

Carbon Pollution Reduction Scheme (CPRS)

The access arrangement information makes the following observation with regard to introduction of a Carbon Pollution Reduction Scheme or similar carbon pricing arrangement:

> "Given the uncertainty surrounding the format and timing of a Government CPRS initiative, the impacts of a potential CPRS are difficult to gauge and have therefore not been factored into APT Allgas forecast figures for the coming AA period." (APA Group, 2010b, p. 39)

ACIL Tasman considers that the effect of a CPRS scheme or similar carbon pricing arrangement, if introduced, will be to put upward pressure on the wholesale price of natural gas. To the extent that higher wholesale gas prices flow through to retail customers, CPRS could therefore be expected to result in some reduction in retail gas demand as a result of price elasticity effects. The fact that Allgas has not taken the potential impacts of CPRS into account is therefore not likely to lead to any understatement of demand, and may in fact mean that forecast demand is somewhat overstated during the second half of the new access arrangement period if carbon pricing results in increased gas prices and additional carbon cost imposts on industrial users.

4.2.3 Demand Class customer numbers

Demand Class customer numbers in the current access arrangement period

The access arrangement information sets out information regarding total customer numbers for the Demand Class during the current access arrangement period, compared with the customer numbers and volumes approved by QCA. Actual Demand Class customer numbers have ranged from a maximum of 114 (in 2009) down to 102 in 2010, consistently below the QCA forecasts which increased from 113 in 2007 to 117 in 2011.

Allgas attributes the recent reduction in number of Demand Class customers to known load losses, including one large end-user (Large Customer X) now serviced directly off the Roma – Brisbane pipeline, as well as transfer of a number of Demand Class customers into the Volume Class.

ACIL Tasman notes that transfer of Demand Class customers into the Volume Business class may result in an increase in gas consumption in the Volume Business class, given that the transferring customers have relatively large annual consumption (close to 10 TJ/a). However, given that the small number of customers involved, we consider it unlikely that the impact on the demand forecasts will be material.

Demand Class customer number forecast methodology

Allgas has assumed that Demand Class customer connection rates will continue in line with historical averages and that the existing customer base will remain unchanged. These assumptions are based on analysis of historical information as well as discussions with large end users and retailers. On this basis, the number of Demand Class customers is forecast by Allgas to increase from 101 in 2011 to 106 in 2016.

ACIL Tasman notes minor discrepancies between Table 3-1, Table 3-2 and the text on customer number forecasts methodology for Demand Class customers set out in section 3.2 of the access arrangement information (APA Group, 2010b, pp. 34, 36) with regard to the number of customers in 2011 and 2016. Allgas has advised that there is a typographical error in the text, and will correct the inconsistencies.

4.2.4 Demand Class customer gas consumption

Demand Class customer consumption in the current access arrangement period

Table 6 compares actual historical data for the total volume of gas consumed by Demand Class customers in each year of the current access arrangement period with the QCA-approved consumption for each year of the period.

Table 6 **Demand Class customers volume (TJ)**

Year	FY07	FY08	FY09	FY10	FY11 (f)	AA Total
QCA Approved	7,355	7,443	7,533	7,623	7,714	37,668
APT Allgas network Actual	7,154	7,679	7,565	7,666	6,955	37,020

Data source: (APA Group, 2010b) Table 3-3, p.37.

The significant drop in consumption forecast for 2011 relates primarily to the known loss of two large customers during 2010.

Demand Class customer consumption forecast methodology

Allgas has based its Demand Class consumption forecasts on:

- a review of historical demand
- discussions with large users in the group
- analysis of industry group trends.

Allgas notes that the introduction of interval metering to all Demand Class customers is now providing more detailed usage information and has led to changes in some assumptions previously made about Maximum Daily Quantity requirements at some basic metered sites. A review of end users in December

2008 saw some large Volume Class users upgrade to Demand Class, and some small Demand Class users downgrade to Volume Class.

A survey of the top 25 Demand Class customers was conducted in order to gauge future expectations regarding gas requirements. In general the indication of future loads was "business as usual" with some small increases forecast, and on this basis Allgas has based its future projections of demand, maximum daily quantity (MDQ) and maximum hourly quantity (MHQ) on recent historical trends.

The small incremental growth in customer numbers is assumed to be spread over demand zones 1 to 4, which have in the past been the largest growth zones for new Demand loads. In 2010, these four zones accounted for some 84% of total Demand Class customer consumption.

Allgas has assumed that each new connection has an annual demand requirement of 15,000 GJ/a, with MDQ of 100 GJ/d and MHQ of 10 GJ/hour. Allgas has not explained why it considers these to be the most appropriate assumptions for new Demand Class customer loads.

ACIL Tasman has reviewed data provided by Allgas for Demand Class customer consumption and capacity requirements. As shown in Table 7, median annual consumption in the Demand customer class was around 34,500 GJ/a in 2010, and is expected to fall to just under 34,000 GJ/a in 2011 following the loss of the Large Customer X and Y loads. Median MDQ in 2010 was 135 GJ/day, expected to fall to 128 GJ/day in 2011. Median MHQ was 22 GJ/hour in 2010, expected to fall to 20 GJ/hour in 2011. On this basis, the assumptions regarding annual demand, MDQ and MHQ for new Demand Class customers appear low.

Table 7 **Demand Customer consumption, MDQ and MHQ**

	2010 Actual GJ	2011 Forecast GJ	Forecast assumption GJ
Demand Customer avg annual consumption	71,725	57,737	
Demand Customer median annual consumption	34,537	33,973	15,000
Demand Customer Avg MDQ	256	219	
Demand Customer median MDQ	135	128	100
Demand Customer Avg MHQ	22	20	
Demand Customer median MHQ	14	14	10

Data source: ACIL Tasman analysis of confidential data provided by Allgas

Allgas was asked to explain the basis for the assumptions in relation to annual consumption, MDQ and MHQ for new Demand Customers. Its response was as follows:

> "The current average Demand customer load of 34,500 GJ/a stated in the question is a blended average of large and small Demand loads.
>
> Large gas loads require a significant amount of "lead time" to allow for site selection, development approvals, plant construction, etc. Early in that "lead time" period, enquiries would be made of the gas network provider to ascertain whether gas is available at a particular site, or at what cost it can be made available.
>
> APT Allgas has received no such enquiries for future large gas loads to come on line in the forecast AA period. APT Allgas therefore forecasts no large gas loads to be coming on line in the forecast AA period.
>
> This suggests that any new loads are likely to be smaller loads, which require minimal startup lead time. This is the primary reason for choosing an average load for new connections towards the lower end of the range."

Allgas subsequently amplified this response (in an email to AER dated 30 November 2010):

> "... the total Demand Class consumption for the last 7 years [excluding Large Customer X] ... indicates an average annual growth of approximately 13TJ/a which is in line with Allgas' forecasts going forward of 15 TJ/a. Load factors for all customers are site specific and as such Allgas has made assumptions around MHQ and MDQ for new connections based on current average load factors which for FY10 averaged 2.40 (MDQ/ADQ) which in turn equates to an MDQ of 98.63 for 15TJ/a customer (2.4 x 15000/365). The FY10 actual average ratio of MHQ/MDQ was 0.1 resulting in an assumed MHQ of 10 given an MDQ of 100."

We consider that this explanation satisfactorily addresses our concerns regarding the basis for the assumptions in relation to new Demand Customers.

5 The forecasts

In this chapter we review the revised forecasts themselves, to consider whether the application of the methodologies and assumptions used by Allgas has produced forecast results that are reasonable in light of historical patterns of demand as well as current and anticipated influences on retail gas demand in Queensland. We consider separately the forecasts for the Volume and Demand sectors of the market.

5.1 Use of trend extrapolation for forecast verification

Rather than using a comprehensive econometric modeling approach such as that employed by the National Institute of Economic and Industrial Research (NIEIR) for a number of other gas distribution businesses, Allgas has developed its demand forecasts based on historical trends, taking into account factors that may cause future growth rates to be either higher or lower than in the past.

In the following analysis we have undertaken our own assessment of the historical trends as a cross-check on the forecasts by Allgas. ACIL Tasman recognises that forecasting on the basis of extrapolation of historical trends involves a risk of overlooking changes in market drivers that could result in future trends differing from historical trends. The fact that a forecast diverges from the historical trend cannot in itself be taken as proof that the forecast is unreasonable. Rather, such divergence should prompt us to ask whether there are good reasons for the break in trend.

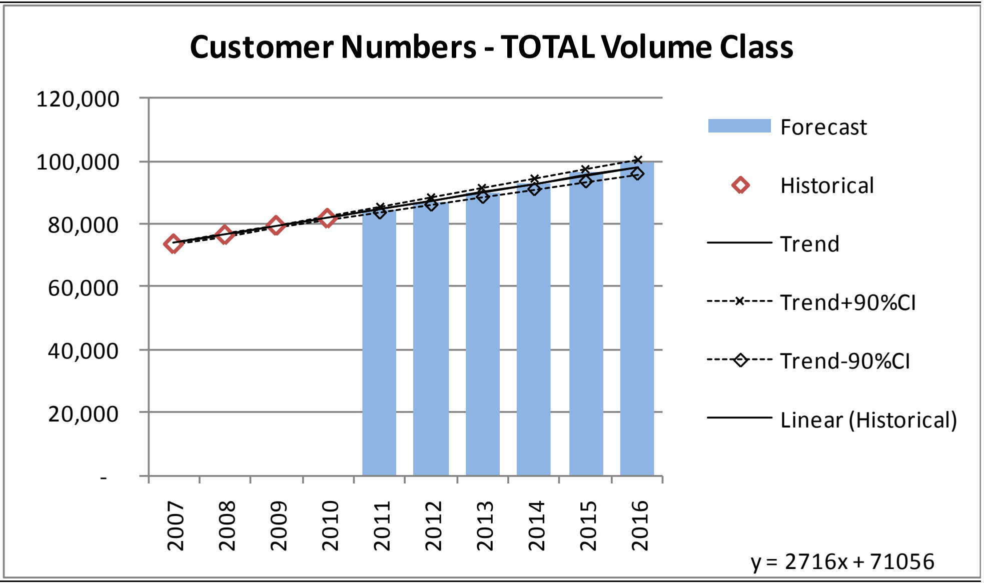
5.2 Volume Customer forecasts

5.2.1 Customer numbers

The forecast of total customer numbers for the Volume Class customer sector is summarised and compared with historical actual customer numbers in Figure 1. The historical data is tightly correlated. The forecast shows slightly stronger growth in customer numbers than in the past, with total customer numbers across the forecast period at or slightly above the historical trend line but within a 90 per cent confidence interval around the trend[4]

[4] See Appendix B for an explanation of the method of calculation of the 90 per cent confidence intervals.

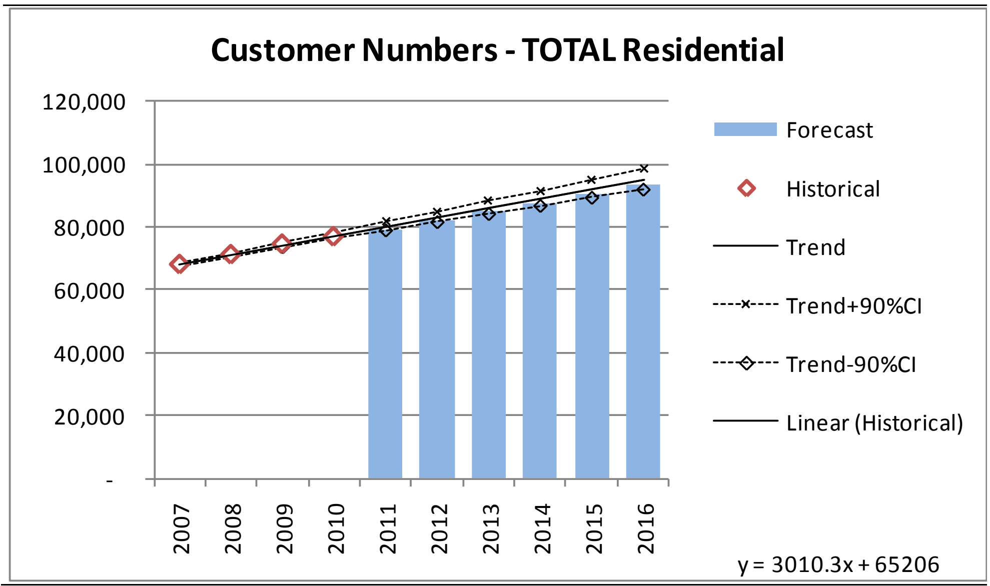
Figure 1 **Historical and forecast customer numbers—Volume Total**



Data source: (APA Group, 2010a); ACIL Tasman analysis

Figure 2 shows the corresponding data and forecast trends for Residential customer numbers as a subset of the Volume Class customer class. The forecast growth in new Residential customer numbers is somewhat below the historical growth trend, falling just within the lower bound of the 90% confidence interval around the trend.

Figure 2 **Historical and forecast customer numbers— Volume residential**



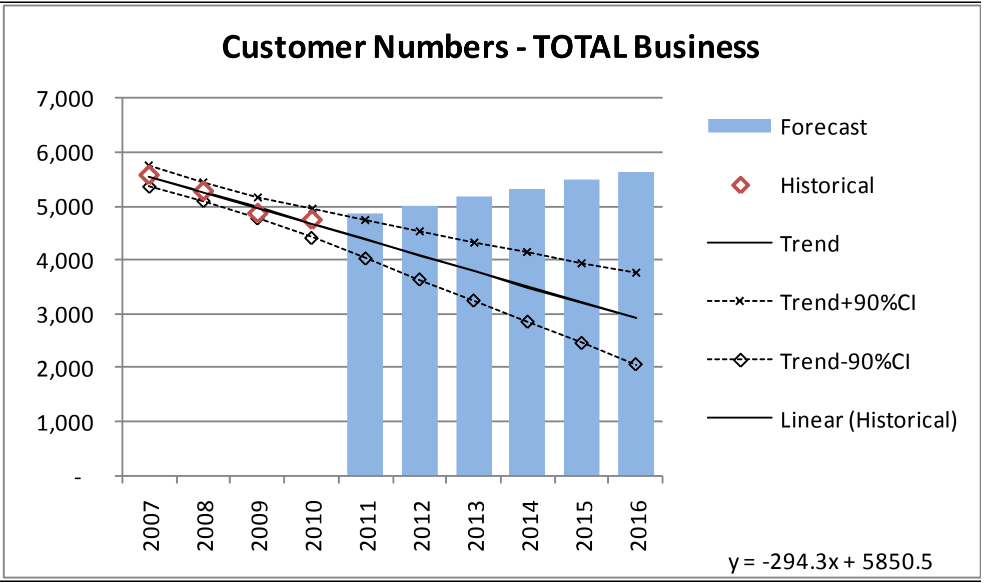
Data source: (APA Group, 2010a); ACIL Tasman analysis

Since the acquisition of the Allgas network by APA group in 2006–07, Residential customer numbers have grown strongly at an average rate of 4.2% per year, apparently reflecting active marketing efforts by the new owners targeting new residential estates close to existing mains. While the growth rate forecast for the next access arrangement period is somewhat lower at an average 3.35%, it remains strong and reflects the methodology described above which links growth in residential customer connections to independently forecast growth in new residential developments.

ACIL Tasman considers that the forecast rates of growth in residential customer numbers are statistically consistent with recent trends.

Figure 3 shows the corresponding results for the Volume Business customers.

Figure 3 **Historical and forecast customer numbers—Volume Business**

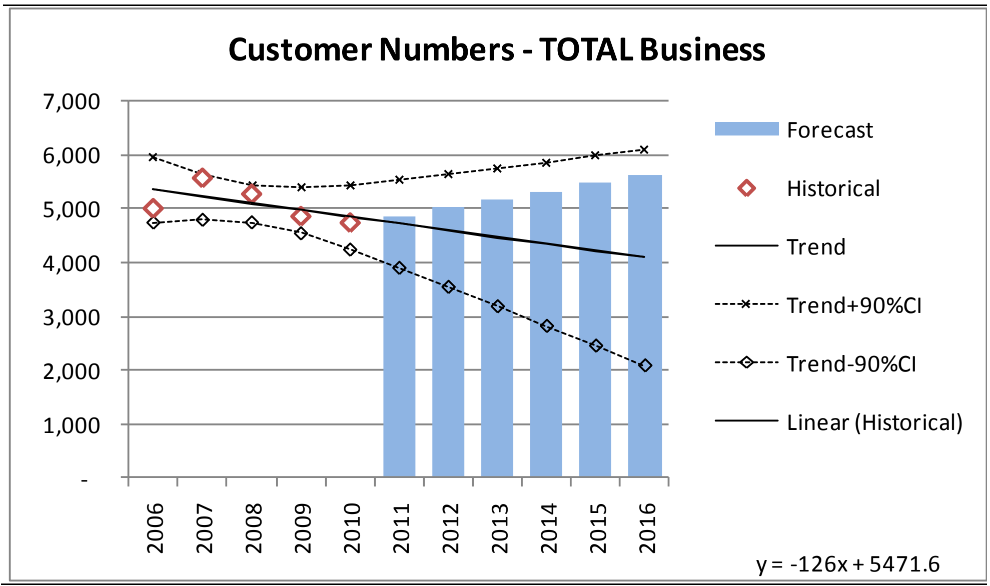


Data source: (APA Group, 2010a); ACIL Tasman analysis

As discussed in section 4.2.1, Volume Business customer numbers fell 15% between 2007 and 2010 (from 5,580 to 4,739). The forecast based on the application of residential customer growth rates to the base number in financial year 2010 represents a major reversal of the recent historical trend.

However, Allgas has provided data that shows that in the year ended June 2006 there were 5009 Volume business customer connections. If this value is incorporated into the historical trend analysis, then the forecast of Volume business connections proposed by Allgas is as shown in Figure 4. Because the 2006 Volume business customer numbers were significantly below those in 2007, the historical rate of decline is now seen to be less severe, and the Allgas forecast lies within the upper part of the 90% confidence interval. On this basis the Allgas forecast may not be statistically unreasonable.

Figure 4 **Alternative analysis of Volume Business customer numbers incorporating historical data for 2006**



Data source: (APA Group, 2010a); ACIL Tasman analysis

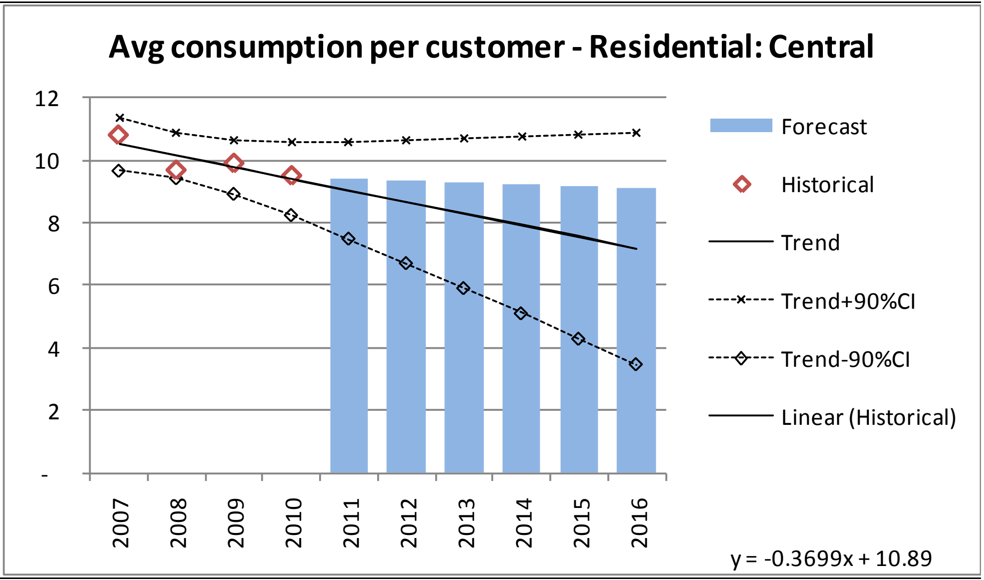
However, given the strong downward trend over the past four years we consider that a better forecast in the circumstances may be based on an assumption that total Volume business customer numbers will stabilize over the next access arrangement period at a level equal to the average over the period 2006 to 2010 (5,094 customers).

5.2.2 Volume average gas consumption

Volume residential customer class

The historical and forecast average gas consumption per customer in the Volume Residential sector for the Central region (Brisbane and surrounds) is shown in Figure 5. The forecast shows a continuing decrease in average gas consumption per customer, although at a rate somewhat lower than the historical trend line. Some easing in the rate of decline is to be expected given the recent drought breaking rains in Southeast Queensland, which may see consumer commitment to water conservation (and hence reduced hot water consumption) wane over time. However other factors affecting average consumption, such as improvements in appliance efficiency, are likely to be persistent.

Figure 5 **Actual vs forecast average gas consumption per Volume Residential Customer – Central Region**

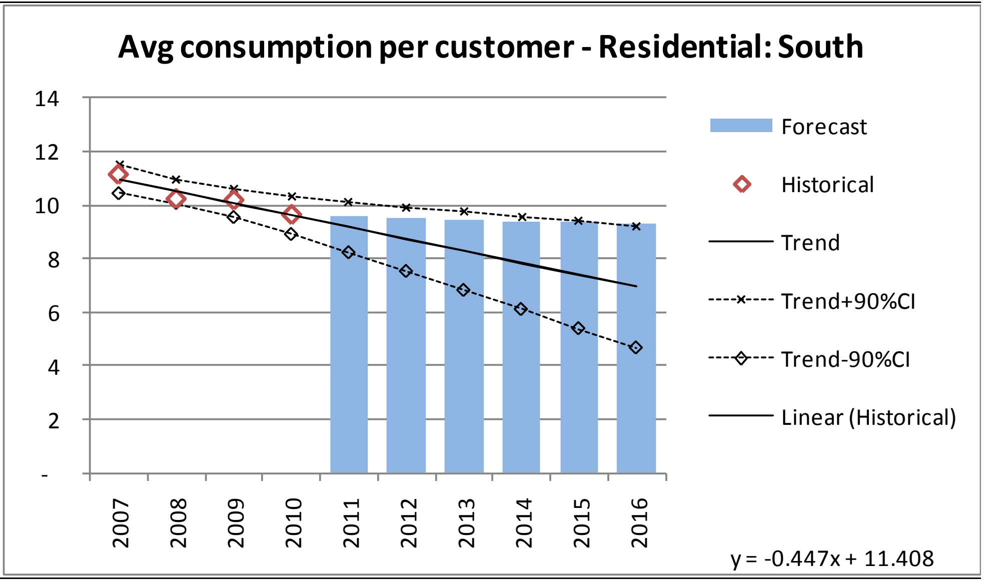


Data source: (APA Group, 2010a); ACIL Tasman analysis

The corresponding historical data and forecasts for average gas consumption in the residential sector for the Southern region (South Coast and northern New South Wales) and for the Western region (Toowoomba/Oakey) are shown in Figure 6 and Figure 7 respectively.

In the Southern region, the forecast rate of decline in average consumption per customer is less than seen in the historical data, with the result that the forecast trend rises toward the upper bound of the 90% confidence interval.

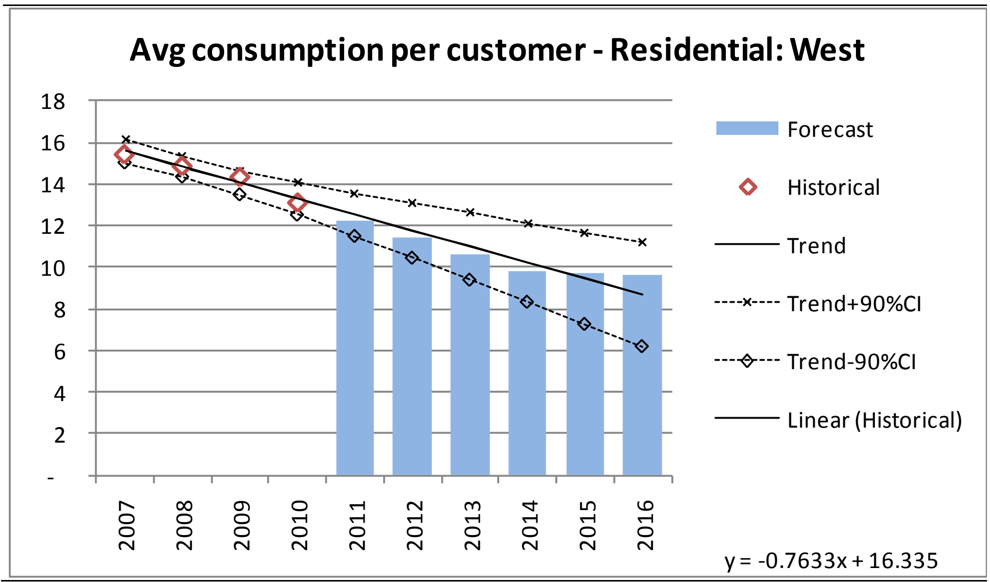
Figure 6 **Actual vs forecast average gas consumption per Volume Residential Customer – Southern Region**



Data source: (APA Group, 2010a); ACIL Tasman analysis

The historical data on average consumption per residential customer in the Western region demonstrates the higher gas usage resulting from cooler climatic conditions. The forecast average residential gas consumption in the Western region is generally in line with historical trends, and well within the 90% confidence interval around the historical trend line, notwithstanding the minor "double counting" methodological issues identified in section 4.2.2.

Figure 7 **Actual vs forecast average gas consumption per Volume Residential Customer – Western Region**



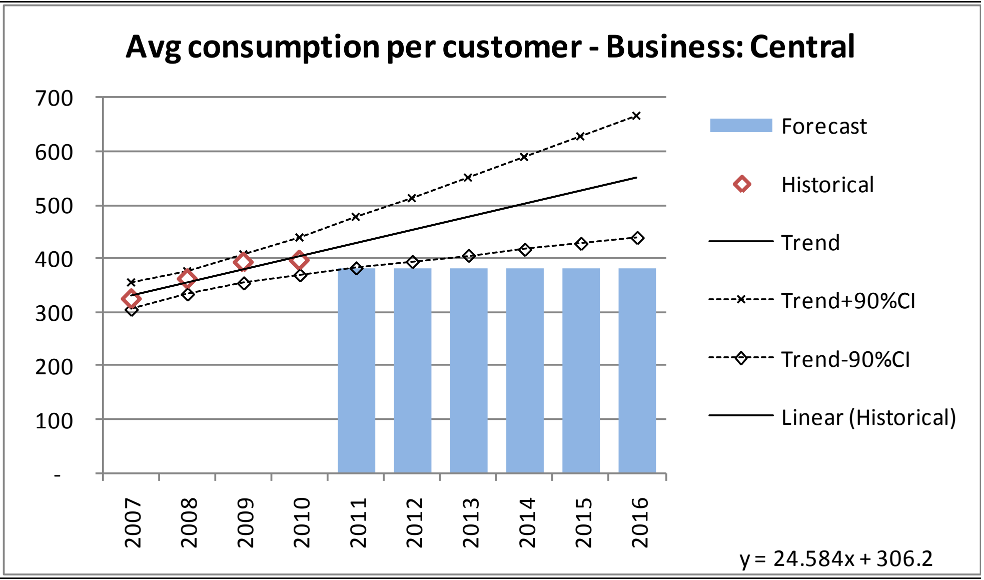
Data source: (APA Group, 2010a); ACIL Tasman analysis

Overall, the forecasts of average consumption per residential customer are not statistically different from the historical trend based on the past four years of data, and this basis we consider that the forecast is not unreasonable.

Volume Business customer class

The historical and forecast average gas consumption per customer in the Volume Business sector for the Central region is shown in Figure 5. As discussed in section 4.2.2, the forecast adopts the average rate of consumption per customer over the past four years. The historical data shows a clear rising trend, and as a result the forecast lies significantly below the lower bound of the 90% confidence interval around the historical trend line.

Figure 8 **Actual vs forecast average gas consumption per Volume Business Customer – Central Region**

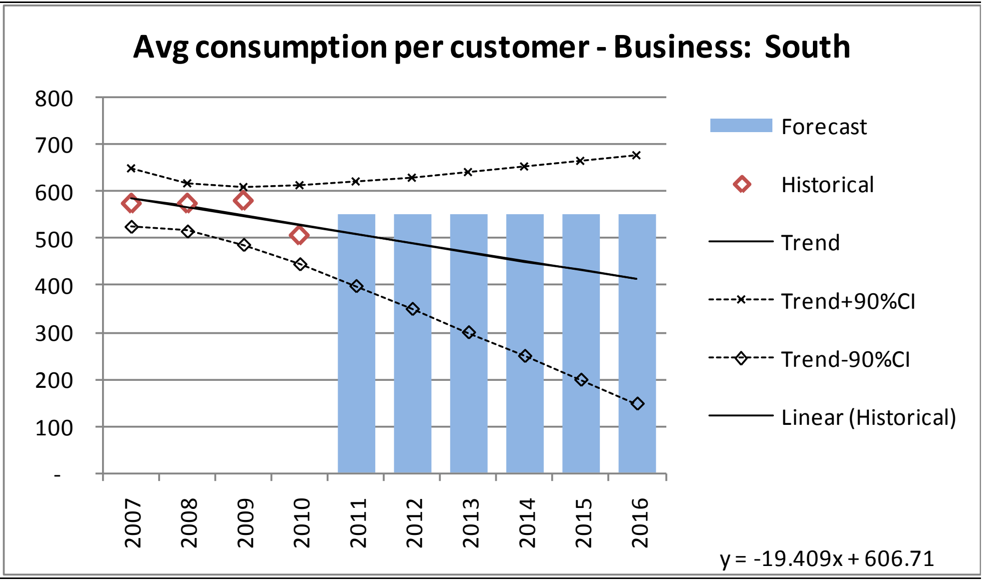


Data source: (APA Group, 2010a); ACIL Tasman analysis

The corresponding historical data and forecasts for average gas consumption in the Volume Business sector for the Southern region and the Western region are shown in Figure 6 and Figure 7 respectively.

In the Southern region, the adoption of the average rate of consumption per customer over the last four years produces a forecast that is somewhat above the historical downward trend, but within the 90% confidence interval around the trend line.

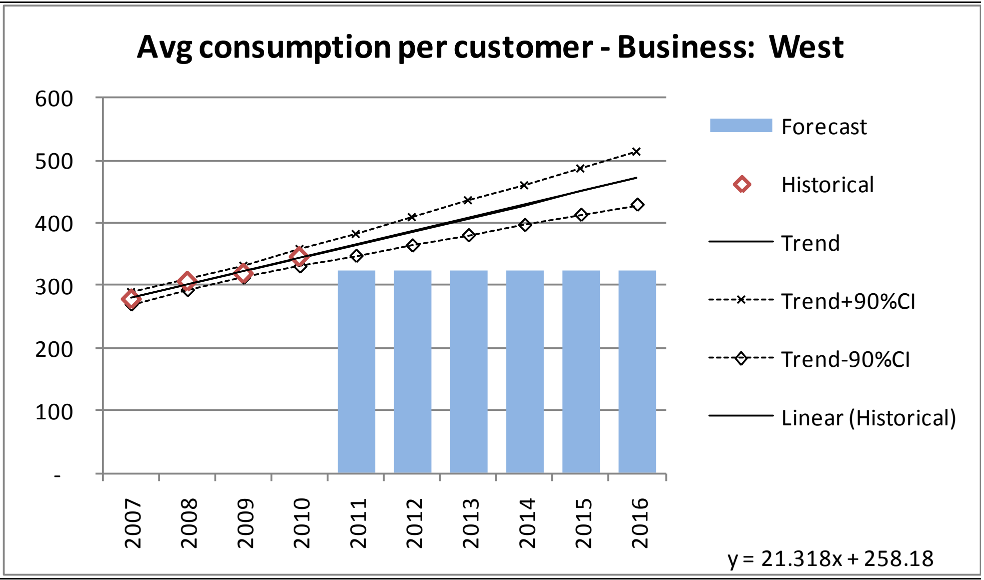
Figure 9 **Actual vs forecast average gas consumption per Volume Business Customer – Southern Region**



Data source: (APA Group, 2010a); ACIL Tasman analysis

In the Western region the average rate of consumption per customer over the past four years shows a clear upward trend, and the adoption of the four-year historical average results in a forecast that lies well below the lower bound of the 90% confidence interval around the historical trend line.

Figure 10 **Actual vs forecast average gas consumption per Volume Business Customer – Western Region**



Data source: (APA Group, 2010a); ACIL Tasman analysis

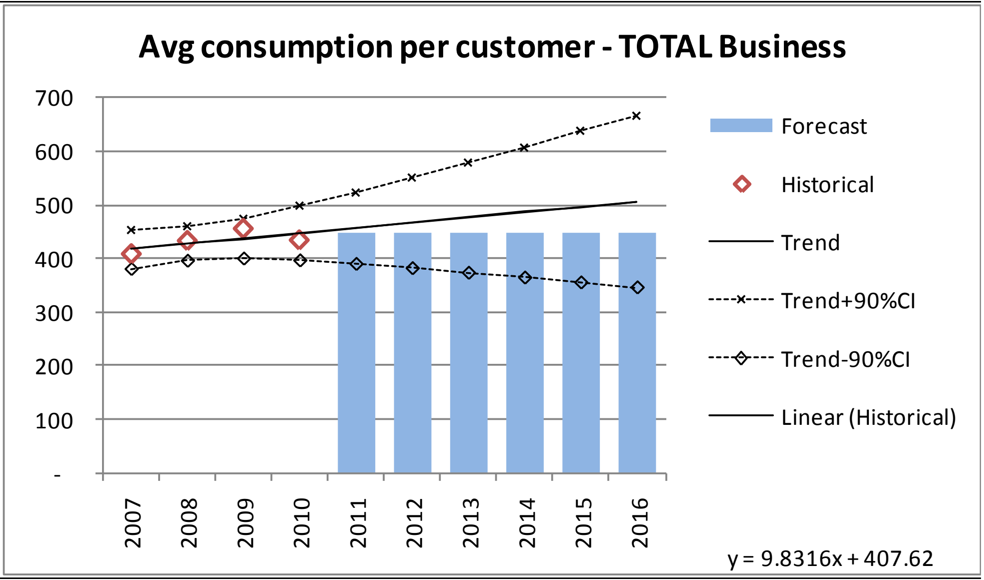
Figure 11 shows the volume weighted average of the actual and forecast average gas consumption per Volume Business customer for all regions combined.

Taken together, the overall average consumption per customer forecast lies somewhat below the historical trend but within the 90% confidence interval around the trend line. On this basis the forecast is not statistically inconsistent with the historical trend. However, this result comes about because the forecast average for the Southern region lies above the historical trend, offsetting the forecasts for the Central and Western regions which lie well below the historical trends and which, taken separately, appear to be significantly understated.

Asked for an explanation of the low assumptions regarding average consumption per Volume Business Customer in the Central and Western regions, Allgas responded as follows:

> "APT Allgas forecasts an increased level of economic activity in the southern (Gold Coast) region relative to the other regions of the network, and accordingly forecasts increased connection and consumption activity in the southern region.
>
> It should be noted that the Volume tariff operates as a postage stamp tariff across the service territory; so long as total growth in the Volume Business sector is acceptable, the location of that growth will have no impact on the tariff outcome."

Figure 11 **Actual vs forecast average gas consumption per Volume Business Customer – All Regions Combined**



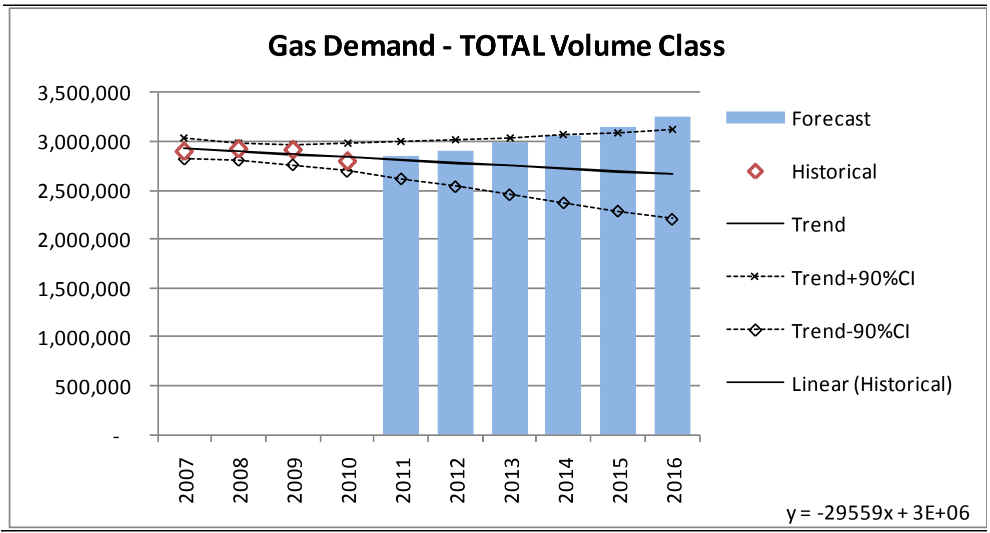
Data source: (APA Group, 2010a); ACIL Tasman analysis

5.2.3 Volume Customer gas demand

Allgas has derived the volume customer demand forecasts from the forecasts of customer numbers and average demand per customer. In the analysis that follows, forecast demand is compared to raw historical trends (that is, without weather normalisation) based on linear extrapolation. Because of Queensland's warm climate, there is virtually no space heating load and demand does not vary significantly with seasonal temperatures. Accordingly, the demand forecasts are not weather normalised.

The historical and forecast gas demand for the Volume Customer sector for the Allgas network as a whole is summarised in Figure 12. As shown, the forecast for the Volume Class as a whole shows a reversal of the mild downward trend of the past four years, and by the end of the next access arrangement period lies slightly above the upper bound of the 90% confidence interval around the trend line. This result is driven largely by the forecast increase in customer numbers in both the residential and business sectors, which serves to more than offset the anticipated reduction in average gas consumption per customer.

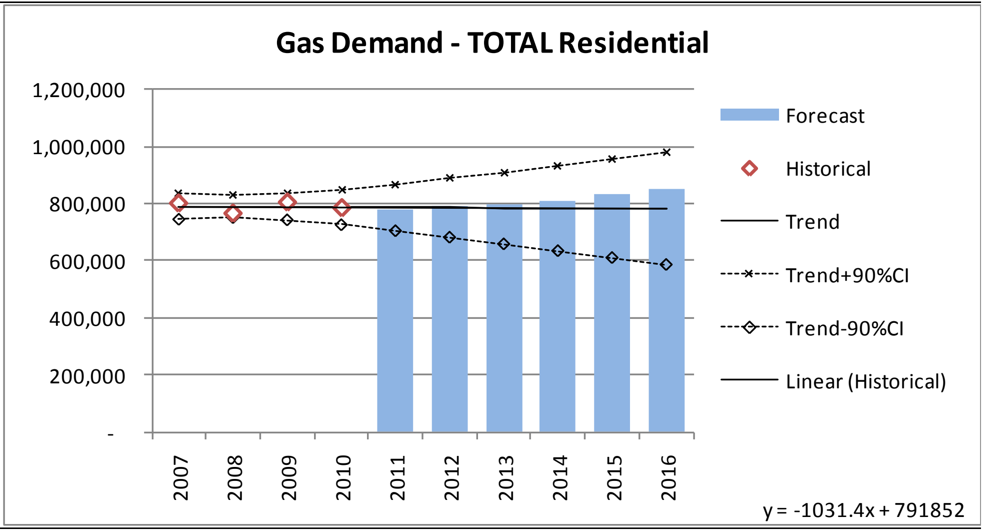
Figure 12 **Historical and forecast demand—Volume Class customers**



Data source: (APA Group, 2010a); ACIL Tasman analysis

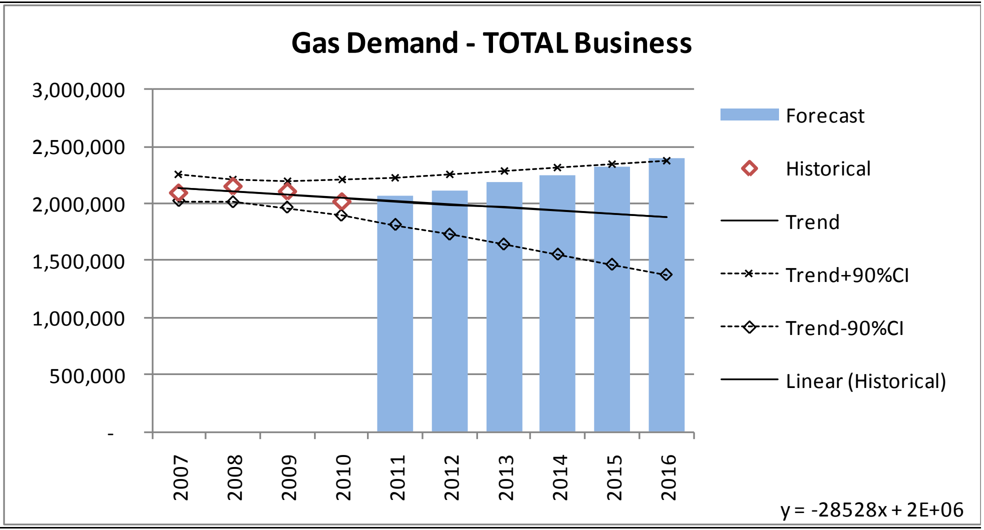
Figure 13 and Figure 14 show, respectively, the corresponding forecasts of gas demand for the Volume Residential and Volume Business sectors for the Allgas network as a whole.

Figure 13 **Historical and forecast demand—Volume Residential, All Regions**



Data source: (APA Group, 2010a); ACIL Tasman analysis analysis

Figure 14 **Historical and forecast demand— Volume Business, All Regions**



Data source: (APA Group, 2010a); ACIL Tasman analysis analysis

The forecasts for Volume Residential sector gas demand across the Allgas business as a whole lies close to the historical trend. However for the Volume Business sector the forecast lies well above the historical trend, reflecting the fact that the forecast growth in customer numbers (which, as commented on earlier, may be unrealistically optimistic) more than offsets the low forecast of average demand per business customer in the Central and Western regions. We have also reviewed the corresponding gas demand forecasts for Volume Residential and Volume Business customer classes in each of the three separate regions (Central, Southern and Western) and found that in all cases the forecast demand lies within or slightly above the 90% confidence interval around the historical trends. In the Volume Business class, this appears to be a result of "compensating errors" with high customer number forecasts offsetting low average consumption forecasts. However, the result is a set of demand forecasts for the volume sector that are either statistically consistent with historical trends, or lie somewhat above those trends. On this basis we consider the forecasts to be not unreasonable.

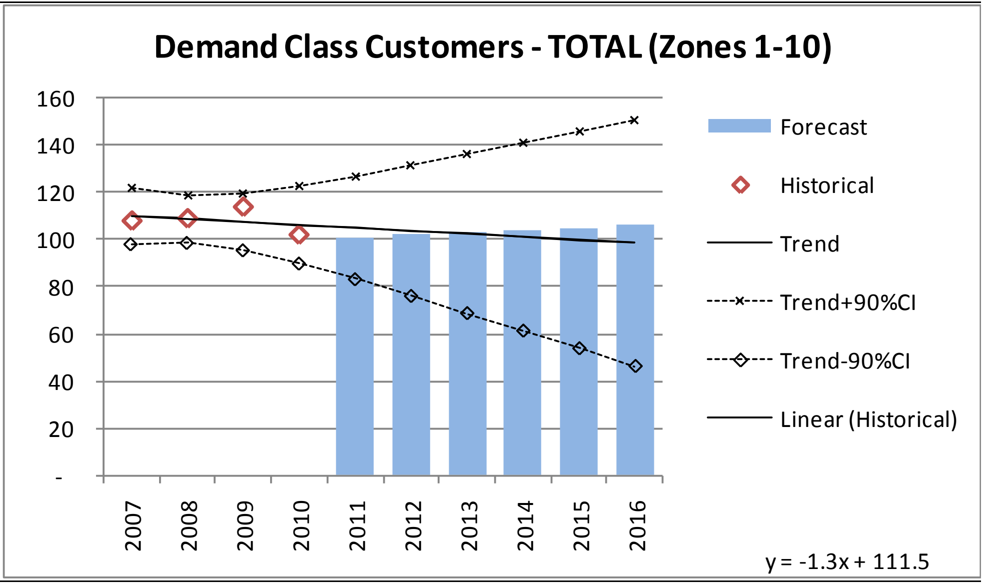
5.3 Demand Class customer forecasts

5.3.1 Demand Class customer numbers

The Demand Class customer class represents large gas users (>10TJ/year), and includes both commercial and industrial gas users. For the purpose of setting tariffs, the Demand Class customer class is divided into ten geographic zones with zones 1 to 3 comprising the Central region (Brisbane and surrounds), zones 4 to 6 comprising the Southern region (South Coast/Northern NSW), and zones 7 to 10 the Toowoomba and Oakey regions.

Figure 15 shows the historical and forecast customer numbers for the Demand Commercial customer class across the Allgas network as a whole. Historically, customer numbers in the Demand Class have shown some volatility both as a result of start-up and shutdown of individual sites in response to economic cycles, and also through reclassification of customers around the 10 TJ/a threshold level between Demand and Volume Classes. Over the past four years, customer numbers have ranged from a high of 114 in 2009 to a low of 102 in the current year.

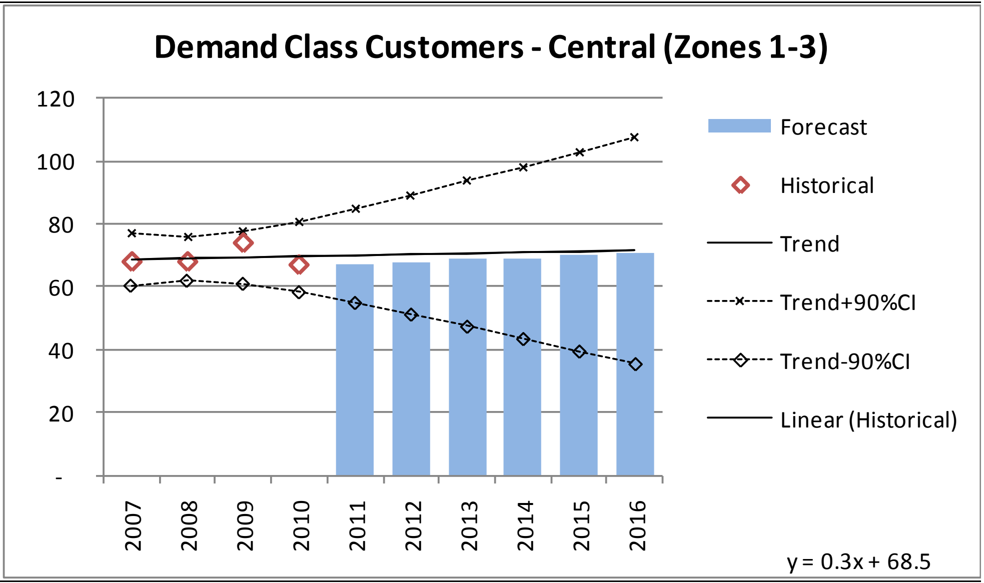
Figure 15 **Historical and forecast Demand Class customer numbers**



Data source: (APA Group, 2010a); ACIL Tasman analysis

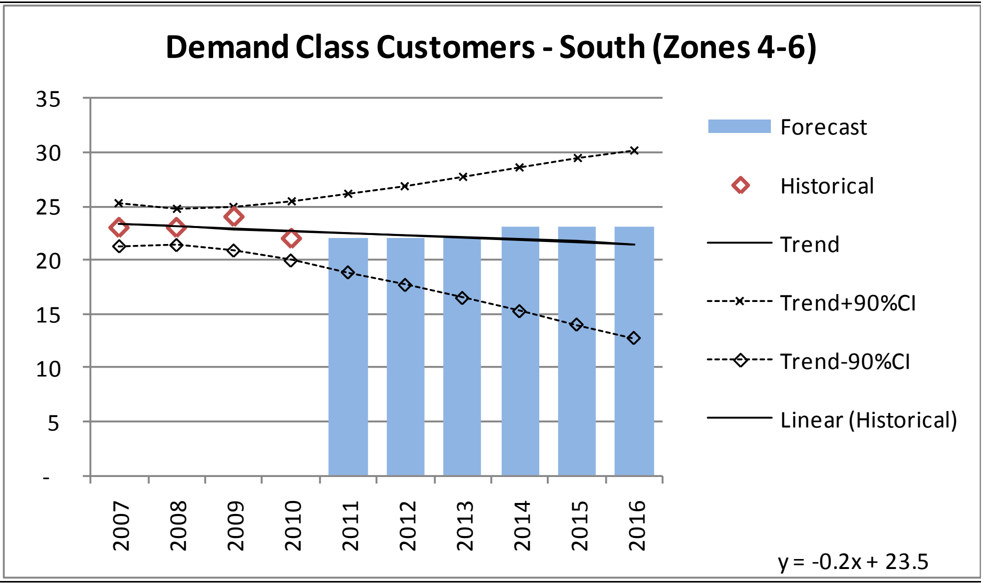
The forecast is close to the historical trend and well within the 90% confidence interval. The corresponding actual and forecast Demand Class customer numbers for the Central, Southern and Western regions are shown in Figure 16, Figure 17 and Figure 18 respectively. Again, the forecasts lie close to historical trends, and in all cases are well within the 90% confidence intervals.

Figure 16 **Historical and forecast Demand Class customer numbers – Central Region**



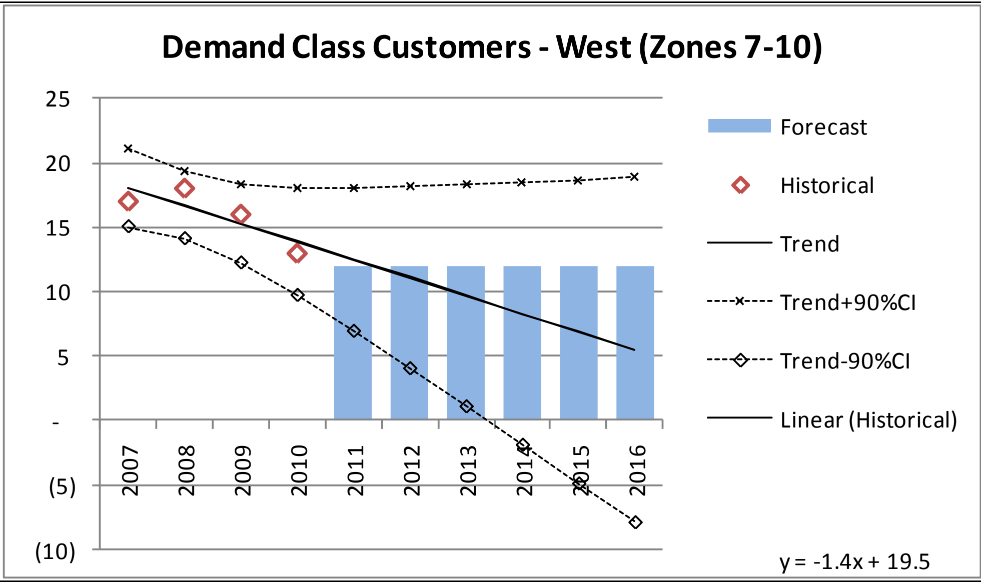
Data source: (APA Group, 2010a); ACIL Tasman analysis

Figure 17 **Historical and forecast Demand Class customer numbers – Southern Region**



Data source: (APA Group, 2010a); ACIL Tasman analysis

Figure 18 **Historical and forecast Demand Class customer numbers – Western Region**

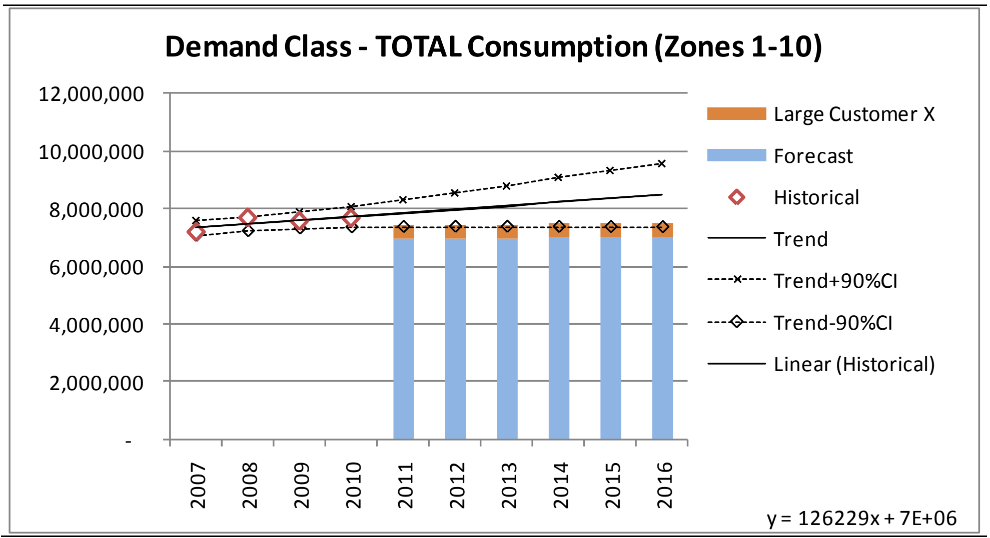


Data source: (APA Group, 2010a); ACIL Tasman analysis

5.3.2 Demand gas consumption

The consumption forecasts for the Demand Class customer group in aggregate are shown in Figure 19. The forecast anticipates a significant fall from around 7,670 TJ in 2010 to a steady 7,000 TJ/a over the next access arrangement period. The decrease is attributable to loss of the Large Customer X load from July 2010, and reclassification of some smaller Demand loads into the Volume sector.

Figure 19 **Historical and forecast consumption— Demand Class customers, ALL regions**



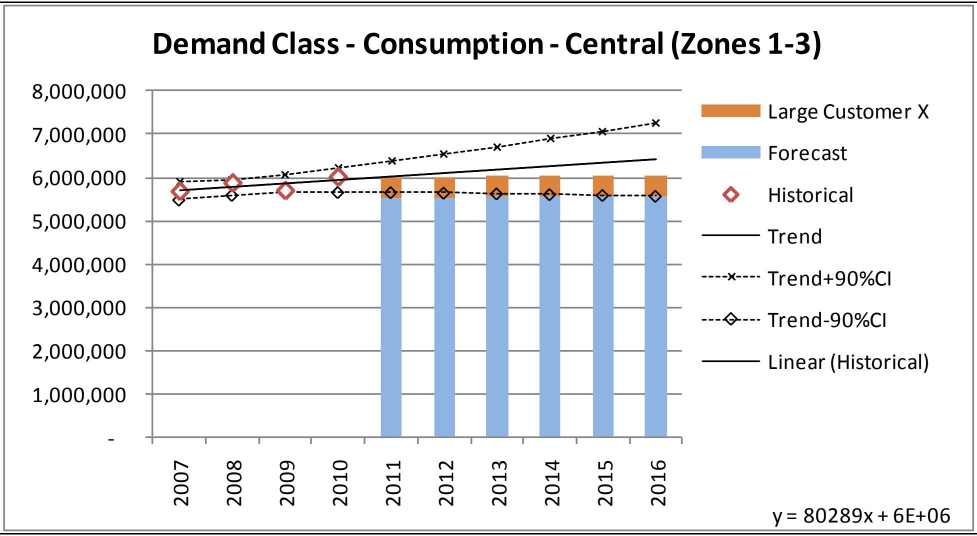
Data source: (APA Group, 2010a); ACIL Tasman analysis

In light of these considerations we conclude that the Allgas forecast of total consumption in the Demand sector is not unreasonable.

Demand Customer gas consumption by region

Figure 13 shows the forecast of gas consumption in the Demand Class customer sector for the Central region. The forecast anticipates steady demand at current levels, adjusted for loss of Large Customer X load.

Figure 20 **Historical and forecast consumption— Demand Class customers, Central region**



Data source: (APA Group, 2010a); ACIL Tasman analysis

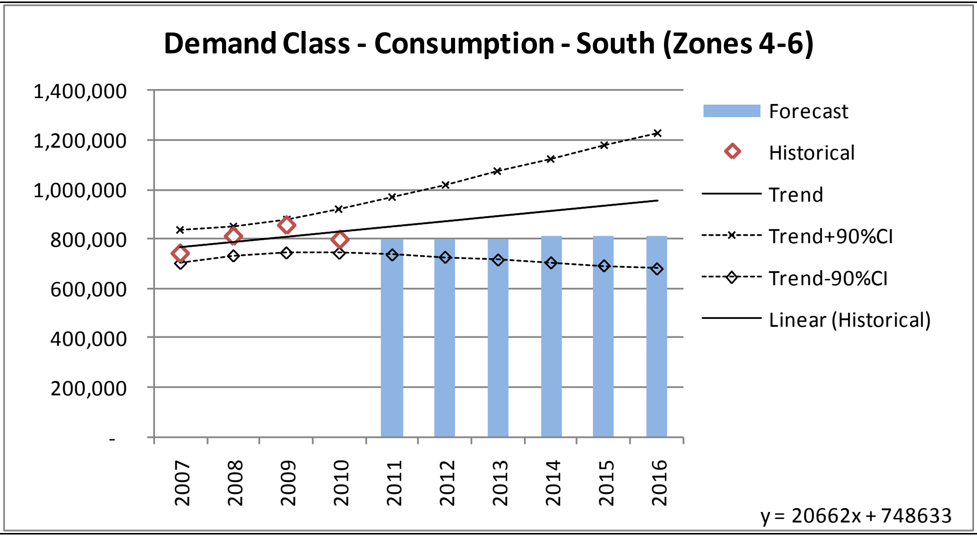
The corresponding consumption forecasts for Demand Class customers in the Southern and Western regions are shown in Figure 21 and Figure 22 respectively.

Consumption in the Southern region is expected to remain at around current levels, with the forecast lying within the 90% confidence interval around the historical trend.

In the Western region, the forecast is significantly below historical levels (by around 350 TJ/a) as a result of closure of the Large Customer Y facility during the 2010 financial year.

To the extent that the regional consumption forecasts differ significantly from past trends, the changes are attributable to the loss of significant individual customer loads, and on this basis we consider that the forecast is not unreasonable.

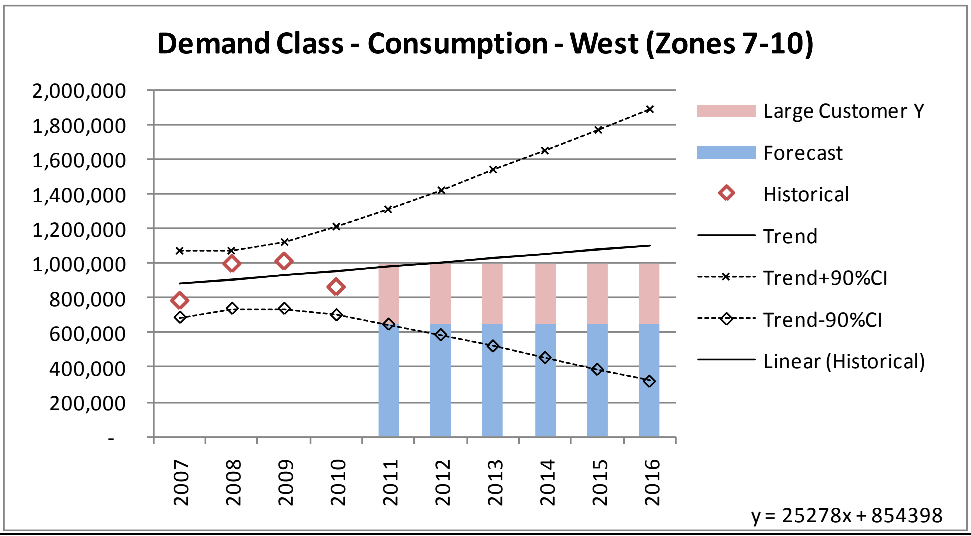
Figure 21 **Historical and forecast consumption— Demand Class customers, Southern region**



Data source: (APA Group, 2010a); ACIL Tasman analysis

Figure 22 **Historical and forecast consumption— Demand Class customers, Western region**

a



Data source: (APA Group, 2010a); ACIL Tasman analysis

5.3.3 MDQ and MHQ forecasts for Demand Class customers

Relationship between MDQ, MHQ and gas demand

While it is important to consider the volume forecasts for Demand Class customers, it is the forecasts of Maximum Daily Quantity (MDQ) and Maximum Hourly Quantity (MHQ) requirements that are critical for calculation of revenue and tariff setting. This is because the charges for

Demand Customers are calculated on the basis of the system capacity used (MDQ and MHQ), rather than the physical quantity of gas delivered.

The relationship between gas demand and system capacity is complex. The ratio of average daily throughput to peak daily throughput (that is, the "load factor") varies widely from customer to customer. MDQ is directly related to peak daily requirements, rather than average daily requirements. MHQ requirements reflect load variations on an intra-daily basis.

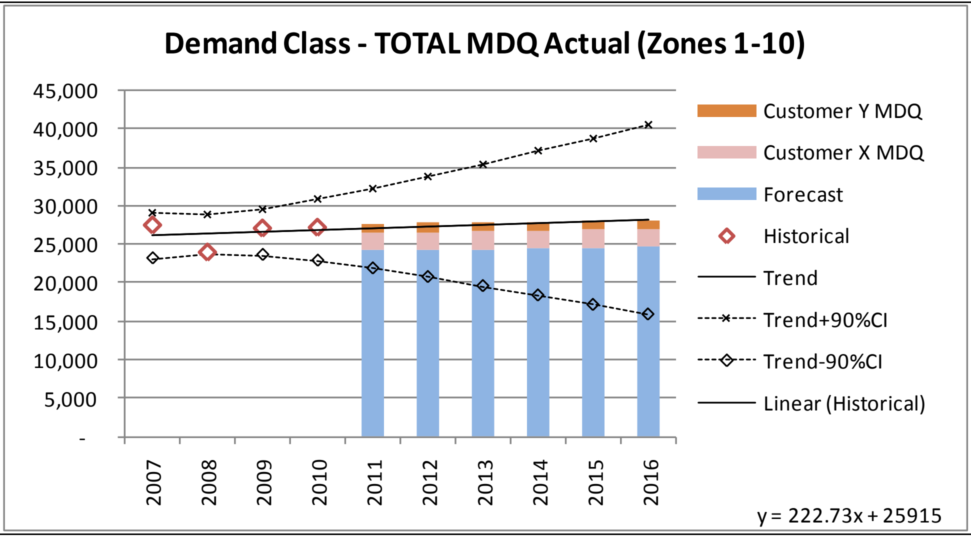
The loss or gain of a demand customer therefore has an impact on aggregate system MDQ and MHQ requirements that is not necessarily proportional to the corresponding impact on total gas demand. A very low load factor customer such as a peaking electricity generator may have large MDQ and MHQ requirements, but may consume only a small quantity of gas over the course of a year.

The impacts of changes in MDQ and MHQ are further complicated by the fact that capacity is not uniform throughout the pipeline network. Hence the cost impact of adding or subtracting a customer with a given MDQ/MHQ requirement may vary depending on where that requirement is located within the pipeline network.

MDQ/MHQ history and forecast

Historical and forecast MDQ for the Demand Class customer group, for the entire Allgas network, is shown in Figure 23. The forecast MDQ lies somewhat below the historical trend, reflecting the recent loss of the Large Customer X and Large Customer Y loads.

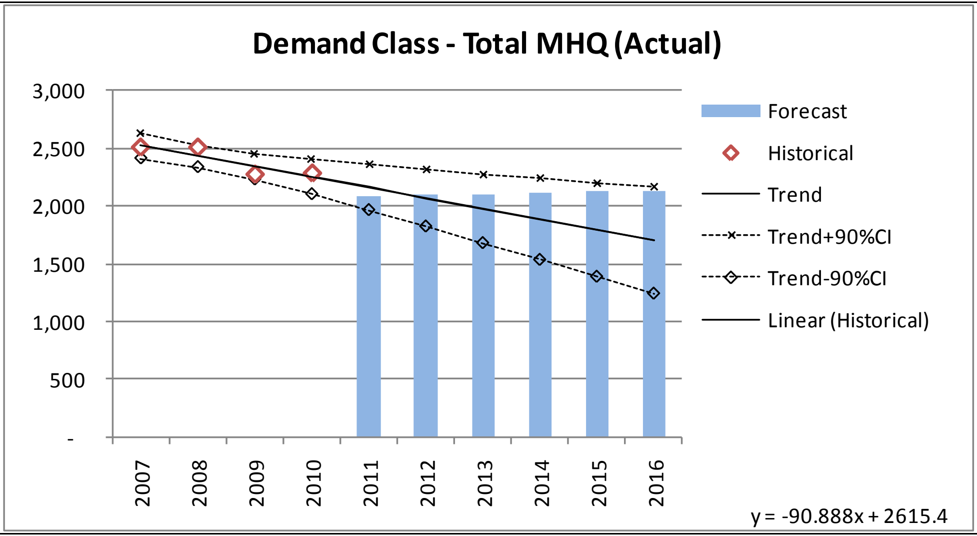
Figure 23 **Demand Customer Maximum Daily Quantity (MDQ)—TOTAL**



Data source: (APA Group, 2010a); ACIL Tasman analysis

The corresponding historical and forecast MHQ for the Demand Class customer group is shown in Figure 24. Because no reliable data on MHQ was available for the 2007 financial year, for purposes of trend analysis we have assumed that 2007 was the same as 2008. *On this basis, and taking into account recent significant load losses, the forecast Demand Class MHQ does not appear unreasonable.*

Figure 24 **Demand Maximum Hourly Quantity (MDH)—TOTAL**



Data source. (APA Group, 2010a); ACIL Tasman analysis

6 Conclusions

Overall, the approach to forecasting the various elements of gas demand in the distribution area serviced by Allgas is systematic and supported by data of generally good quality. We consider that the resultant forecasts are for the most part reasonable. A number of areas have been identified in which we consider the methodology could be improved. For the most part, the suggested changes are unlikely to lead to any material change in the forecasts but would result in a more robust methodology. In response to a number of questions and requests for clarification, Allgas has:

- explained how the forecast growth rates for new customer connections have been derived from the HIA forecasts, and made necessary adjustments to the customer number forecasts.
- reconsidered the basis for forecasting new Volume Business customer numbers, which we consider likely to result in overstatement of consumption in this sector. We have suggested that a better forecast in the circumstances may be based on an assumption that total Volume business customer numbers will stabilize over the next access arrangement period at a level equal to the average over the period 2006 to 2010.

- reviewed and where appropriate adjusted the methodology in relation to forecasting average residential consumption in the Western area. We consider that further consideration of this issue is required, including an assessment of the potential impact of weather on observed reductions in residential demand in the Western Region.
- satisfactorily explained the basis for the assumptions in relation to annual consumption, MDQ and MHQ for new Demand Customers.

Subject to satisfactory resolution of the outstanding issues, we consider that the proposals by Allgas in relation to load forecasts could be regarded as being reasonable.

7 Bibliography

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HIA. (2010b). *State Outlook Queensland, March Quarter2010.* Housing Institute of Australia Economics Group.

A Curriculums Vitae

Following are brief curriculums vitae for the consulting team involved in the preparation of this report

Paul Balfe

Paul Balfe is an Executive Director of ACIL Tasman and has overall responsibility for ACIL Tasman's gas business. Paul has more than 30 years experience in the energy and resources sectors. Previously he held a number of senior executive positions in the Queensland Department of Minerals and Energy. He has a Masters in Business Administration and a degree in Science.

Paul is responsible for the development and commercialisation of ACIL Tasman's *GasMark* model and its application to strategic and policy analysis throughout Australia, New Zealand and in South East Asia. He provides a range of analytical and advisory services to companies, government agencies and industry associations, particularly in the gas, electricity and resources sector. He has expertise in gas, electricity, resources, mining, economic impact analysis and in the analysis of core risk management, safety and health.

He has advised government and corporate sector clients on matters relating to the coal, oil and gas industries, coal seam gas, oil shale, mining safety and health, environmental management and alternative and renewable energies. With qualifications in geology and business administration, his experience ranges across both technical and commercial aspects of project evaluation and development.

Paul has worked extensively on gas industry matters, particularly gas policy reform issues; gas market analysis; gas pipeline developments, acquisitions and disposals; and gas project commercial analysis. He has worked extensively in the Queensland coal seam gas industry as an adviser to both government and corporate sector clients on regulatory, technical, economic and commercial aspects of CSG development.

Owen Kelp

Owen Kelp is a Consultant with ACIL Tasman specialising in electricity and gas markets. Owen has worked extensively on energy industry matters and across a broad range of assignments including upstream conventional and coal seam methane economics; market demand, supply and price forecasting studies; strategic reviews; transmission and distribution networks (project evaluation, throughput forecasts, asset sales and due diligence work); project evaluation (financial modelling, market studies and economic benefits);

regulatory and policy change impact studies. Over the last eight years Owen has managed more than 50 energy industry assignments.

He has extensive modelling capability using various software packages and programming languages as well as practical experience with operations research methods including linear programming and optimisation. He also has a good theoretical knowledge of financial markets and instruments. Owen has been principally responsible for the development and maintenance of a number of ACIL Tasman energy market models, in particular:

GasMark Global – ACIL Tasman's global model for gas trade for both LNG and pipeline gas

GasMark – ACIL Tasman's regional model of the interconnected Australian gas market

GasMark New Zealand – supply demand model for the New Zealand system

PowerMark – detailed model of the National Electricity Market used for price forecasting and asset due diligence

PowerMark WA – detailed model of the Western Australian electricity market.

Owen holds a Bachelor of Business (Economics and Finance) from Queensland University of Technology and a Graduate Diploma of Applied Finance and Investment from the Financial Services Institute of Australasia (FINSIA).

B Establishment of Confidence Intervals around historical trend lines

The following explanation of the construction of confidence intervals is based on information provided in the manual for the Statistica software package.

> The confidence intervals for specific statistics (for example, means or regression lines) provide a range of values around the statistic where the "true" (population) statistic can be expected to be located (with a given level of certainty).
>
> The confidence intervals for the mean give us a range of values around the mean where we expect the "true" (population) mean is located (with a given level of certainty). Confidence intervals can be calculated for any p-level; for example, if the mean in a sample is 23, and the lower and upper limits of the p=.05 confidence interval are 19 and 27 respectively, then we can conclude that there is a 95 per cent probability that the population mean is greater than 19 and lower than 27. If the p-level is reduced to a smaller value, then the interval would become wider thereby increasing the "certainty" of the estimate, and vice versa. The width of the confidence interval depends on the sample size and on the variation of data values. The calculation of confidence intervals is based on the assumption that the variable is normally distributed in the population. This estimate may not be valid if this assumption is not met, unless the sample size is large, say n = 100 or more.

Confidence Intervals (CI's) have the form:

$$Est \pm t_{1-\frac{\alpha}{2},(n-2)} SE_{est}$$

For the CI around the y-estimate in the linear regression equation, the CI is given by:

$$CI = Est_y \pm t_{1-\frac{\alpha}{2},(n-2)} SE_{est}$$

Where $t_{1-\frac{\alpha}{2},(n-2)}$ is the inverse of the Student's t-distribution for confidence level α given that n is the number of data points (so that n-2 is the number of degrees of freedom in the distribution)

and

$$SE_{est} = SE_y \times \sqrt{\frac{1}{n} + \frac{(x_i - \bar{x})^2}{\sum(x_i - \bar{x})^2}}$$