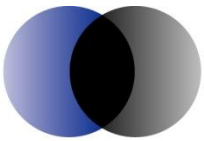
Confidential

Victorian Electricity Distribution Price review

An assessment of selected zone substation maximum demand forecasts

Prepared for the Australian Energy Regulator

September 2010



ACIL Tasman

Economics Policy Strategy

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1 Introduction

The AER has identified a number of zone sub-stations whose demand forecasts it believes need to be scrutinised more closely in this phase of the review process. The primary reason for this is that there are considerable augmentation projects proposed by the DNSPs whose business cases hinge greatly on the individual zone substation demand forecasts presented by the DNSPs in the revised RIN.

The main augmentation projects proposed include the establishment of new zone substations in areas surrounding the zone substations under assessment as well as the addition of new transformers and feeder works at the selected zone substations.

This report assesses the reasonableness of the demand forecasts for the next regulatory period for each of the selected zone sub-stations.

1.1 Zone substations under consideration

The AER has selected a number of zone substations for closer analysis. These are shown below:

1.1.1 Citipower

- Bouverie/Queen Street (BSBQ)
- Docks Area (DA)
- Flinders/Ramsden (FR)
- Little Bourke Street (JA)
- McIlwraith Place (MP)
- Victoria Market (VM)
- Celestial Avenue (WA)

1.1.2 Powercor

- Cobram East (CBE)
- Eaglehawk (EHK)
- Geelong East (GLE)
- Woodend (WND)
- Waurn Ponds (WPD)

1.1.3 United Energy

- Doncaster (D)
- Dandenong South (DSH)

- Mentone (M)
- Noble Park (NP)

1.1.4 Jemena

- Airport West (AW)
- Broadmeadows (BD)
- Coburg South (CS)
- Flemington (FT)
- Pascoe Vale (PV)

1.1.5 SP Ausnet

- Clyde ZSS
- Croydon ZSS
- Epping ZSS
- Ferntree Gully ZSS
- Kilmore South ZSS
- Lilydale ZSS
- Moe ZSS
- Ringwood North ZSS
- Woori Yallock ZSS

1.2 Approach to assessment of demand forecasts

The approach ACIL Tasman has adopted in assessing the reasonableness of the demand forecasts is to place a significant weight on the recent history (ie the last 5 years) of the behaviour of demand at each zone substation and then seek to identify valid reasons for any divergence in the forecast growth rates at specific zone substations relative to past growth.

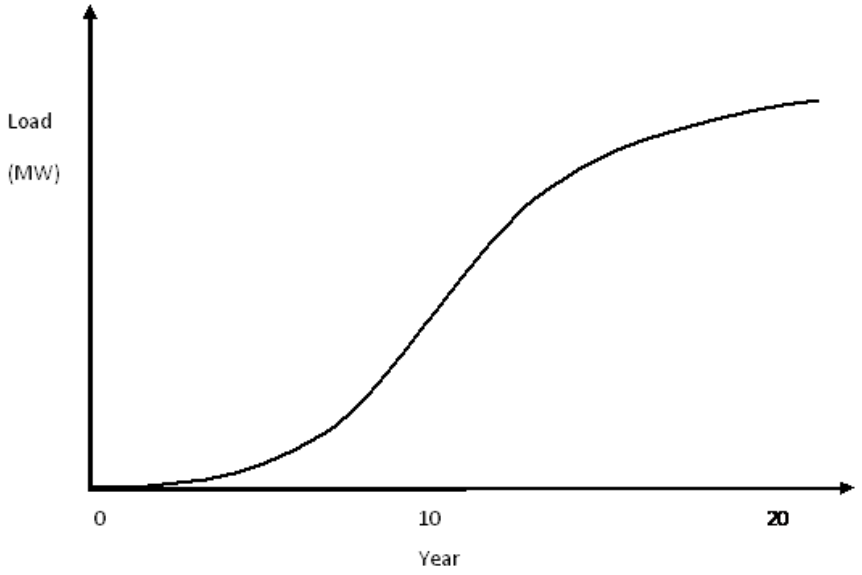
There are a number of possible reasons for this:

- Significant acceleration in growth due to the ramp-up of new residential, commercial or industrial developments at greenfield sites
- Moderate acceleration of growth due to infill development in mature areas
- Slower growth arising from areas surrounding a zone substation reaching maturity with fewer or no large residential developments relative to the past
- Change in the rate of growth over time as a result of changes in prevailing macroeconomic conditions

Conceptually, ACIL Tasman is seeking to identify a shift along the maturity profile of the life of a zone substation shown in Figure 1 below. Figure 1shows that growth tends to commence slowly and then ramps-up as new

residential and commercial developments arise. As areas reach maturity growth then decelerates to more moderate levels compared to those observed in the past.

Figure 1 **Typical life cycle behaviour of zone substation**



The zone substations selected by the AER broadly cover the entire life cycle of zone substations with some being located in predominantly greenfield areas and others in mature suburban areas with relatively little or no opportunity for greenfield development.

Zone substations are assessed as follows:

1. Compare historical and forecast growth rates at each zone substation. ACIL Tasman believes that over short time horizons up to 5 years the best indicator of forecast growth at an individual zone substation is likely to be recent historical growth.
2. Assess the demographic and physical characteristics of the area surrounding a zone substation to identify it as a likely high/medium or low demand growth area, depending on past levels of development and the potential for further development in the future
3. Identify and account for major new or block loads that are projected to occur in the next regulatory period
4. Correct for any permanent transfers that have occurred and that are expected to occur in the next regulatory period (load transfers across zone substations will create discontinuities in the demand time series which may bias any calculated growth rates)

5. Re-calculate and compare the historical and forecast growth rates after accounting for significant new loads and permanent transfers between zone substations
6. Determine whether the forecast rate of growth is reasonable given past behaviour, system-level behaviour and future prospects for growth.

Ideally comparison of historical and forecast demand series will be made on temperature corrected demands. ACIL Tasman in this exercise has opted to work with the data provided to the AER in the revised RIN. In the case of Citipower and SP Ausnet temperature corrected demands have been provided for both historical values and forecasts. In the case of Powercor and Jemena, a temperature corrected 2010 value has been provided as well as temperature corrected forecasts.

United Energy has only applied temperature correction to forecasts. All United Energy historical values correspond to actual peaks. The analysis for United Energy's zone substations are further complicated by the fact that the forecasts presented are 10% POE. This means that a significant step change is observed in each time series between the historical and forecast values. At face value this can present the impression of a large increase in the rate of growth in forecast demand compared to the historical period.

ACIL Tasman considers that apart from the unseasonally hot 2008 and 2009 weather conditions, any bias that arises from not temperature correcting the historical time series is likely to be reasonably small. We minimise the effect of the extreme weather conditions of these two years by calculating historical annualised growth rates between 2005 and 2010, which use only those two values as the basis for the calculation.

1.3 Data collected from the DNSPs for the analysis

As part of this exercise the AER requested that for each of the selected zone substations, the DNSP's provide details of the following:

- Basic details for each zone substation such as location and a breakdown of energy use by customer class
- Details of the major new loads expected to occur at each zone substation
- Details of any permanent transfers both historical and expected
- Qualitative assessment of the underlying growth prospects of each zone substation
- Daily time series data for each zone substation.

2 SP Ausnet

The names and locations of the zone substations within the SP Ausnet network to be assessed are shown in Table 1.

Table 1 **Location of zone substations under review in SP Ausnet network**

Station	Code	Suburb
Clyde North ZS	CLN	Clyde North
Croydon Zone Substation	CYN	Croydon
Epping Zone Substation	EPG	Epping
Ferntree Gully Zone Substation	FGY	Ferntree Gully
Kilmore South Zone Substation	KMS	Kilmore
Lilydale Zone Substation	LDL	Lilydale
Moe Zone Substation	MOE	Moe
Ringwood North Zone Substation	RWN	Ringwood North
Woori Yallock Zone Substation	WYK	Woori Yallock

Data source: SP Ausnet

2.1 Customer breakdown

Table 2 presents a breakdown of customer numbers at the selected zone substations by category.

Table 2 **Breakdown by customer type (%)**

Station	Commercial	Industrial	Residential	Rural
	%	%	%	%
Clyde North ZS	4.7	1.3	91.8	2.2
Croydon Zone Substation	8.3	2.6	88.9	0.3
Epping Zone Substation	4.9	1.2	93.4	0.5
Ferntree Gully Zone Substation	6.4	2.2	91.1	0.3
Kilmore South Zone Substation	8.7	1.5	82.1	7.8
Lilydale Zone Substation	6.8	1.8	86.2	5.2
Moe Zone Substation	7.1	1.5	78.6	12.8
Ringwood North Zone Substation	5.4	1.7	92.1	0.8
Woori Yallock Zone Substation	4.6	1.4	86.6	7.4

Data source: SP Ausnet

Table 2 suggests that all zone substations have a strong residential/commercial mix indicating that loads should show a fair degree of temperature sensitivity. The large residential segment should also be sensitive to increasing air conditioner penetration over time.

Woori Yalloock, Moe and Kilmore South have a greater rural presence which is less temperature sensitive and perhaps adds irrigation (associated with rainfall patterns) as a possible driver of peak loads.

2.2 Population growth within SP Ausnet network

Table 3 **Historical population growth rates of LGAs in SP Ausnet network**

Council	Contribution	1996	2001	2006	96-01 growth rate	01-06 growth rate	96-06 growth rate
Cardinia (S)	All	40599	45404	56264	2.26%	4.38%	3.32%
Casey (C)	All	143531	176075	213556	4.17%	3.94%	4.05%
Knox (C)	All	130794	141912	145300	1.65%	0.47%	1.06%
Maroondah (C)	All	91323	96461	97811	1.10%	0.28%	0.69%
Nillumbik (S)	All	54417	58161	58597	1.34%	0.15%	0.74%
Whittlesea (C)	All	101894	114082	124331	2.29%	1.74%	2.01%
Yarra Ranges (S)	All	130805	137539	138039	1.01%	0.07%	0.54%
Ovens-Murray	All	92181	94383	97460	0.47%	0.64%	0.56%
East Gippsland	All	77710	77316	78402	-0.10%	0.28%	0.09%
Gippsland	All	145599	151084	155883	0.74%	0.63%	0.68%
Banyule (C)	Part	112594	114222	114194	0.29%	0.00%	0.14%
Goulburn	Part	178606	186950	194662	0.92%	0.81%	0.86%
Frankston (C)	Part	103971	110179	116596	1.17%	1.14%	1.15%
Weighted Total		1206439	1298093	1378369	1.48%	1.21%	1.34%

Data source: ABS Census of Population and Housing

According to the Census of Population and Housing the three fastest growth areas within the SP Ausnet network are the City of Casey, Shire of Cardinia and City of Whittlesea.

Clyde North ZSS and Epping ZSS are located within the Casey and Whittlesea LGAs respectively.

2.3 Block loads and permanent transfers in SP Ausnet network

SP Ausnet states that it avoids adding block loads to its forecasts except where it deems them to be significant. This is to avoid the possibility of double counting.

Table 4 **SP Ausnet Historical and forecast block loads, MW**

Substation	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Historical						Forecast				
Clyde North ZS	0	0	0	0	0	0	0	0	0	0	0
Croydon ZS	0	0	0	0	0	0	0	0	0	0	0
Epping ZS	0	0	0	0	9	0	0	5	0	0	0
Ferntree Gully ZS	0	0	0	0	0	0	0	0	0	0	0
Kilmore South ZS	0	0	0	0	0	0	0	0	0	0	0
Lilydale ZS	0	0	0	0	0	0	0	0	0	0	0
Moe ZS	0	0	0	0	0	0	0	0	0	0	0
Ringwood North ZS	0	0	0	0	0	0	0	0	0	0	0
Woori Yallock ZS	0	0	0	0	0	0	0	0	0	0	0

Data source: SP Ausnet

The only additional block is 5 MW at Epping in 2013 for the relocation of the Footscray fruit and vegetable market to Epping.

Permanent load transfers, both historical and planned, within the SP Ausnet network are generally small. The major exception is Epping where there are significant transfers away from the zone substation in 2007 and every year from 2009 to 2012. These transfers need to be removed from the demand time series to allow an unbiased assessment of historical versus forecast growth.

Table 5 **SP Ausnet historical and planned major transfers, MW**

Substation	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Historical						Forecast				
Clyde North ZS	25	0	0	0	0	0	0	0	0	0	0
Croydon ZS	0	0	-4	0	0	0	0	0	0	0	0
Epping ZS	0	0	-8	0	-8	-14	-6	-10	0	0	0
Ferntree Gully ZS	0	0	0	0	0	0	0	0	0	0	0
Kilmore South ZS	0	0	0	0	0	0	0	0	0	0	0
Lilydale ZS	0	2	3	0	0	0	0	0	0	0	0
Moe ZS	0	0	0	0	0	0	0	0	0	0	0
Ringwood North ZS	0	2	0	0	0	0	0	0	0	0	0
Woori Yallock ZS	0	0	0	-3	0	0	0	0	0	0	0

Data source: SP Ausnet

Table 6 shows the calculated historical and forecast growth rates for both the original demand time series and the series adjusted for permanent transfers and significant block loads.

Table 6 **Historical and forecast growth rates at selected zone substations in SP Ausnet network, percent p.a.**

Zone substation	Original		Adjusted	
	historical, 2005 to 2010	forecast, 2010 to 2015	historical, 2005 to 2010	forecast, 2010 to 2015
Clyde North ZS	21.7%	7.7%	21.7%	7.7%
Croydon ZS	2.2%	3.0%	3.1%	2.8%
Epping ZS	3.3%	3.4%	8.2%	4.6%
Ferntree Gully ZS	9.0%	3.7%	9.0%	3.7%
Kilmore South ZS	7.0%	3.6%	7.0%	3.6%
Lilydale ZS	9.7%	7.2%	8.2%	7.7%
Moe ZS	5.5%	6.5%	5.5%	6.5%
Ringwood North ZS	8.0%	4.4%	7.2%	4.6%
Woori Yallock ZS	2.0%	1.2%	4.0%	1.1%
Sum of all zone substation demands	4.1%	5.1%	4.1%	5.1%

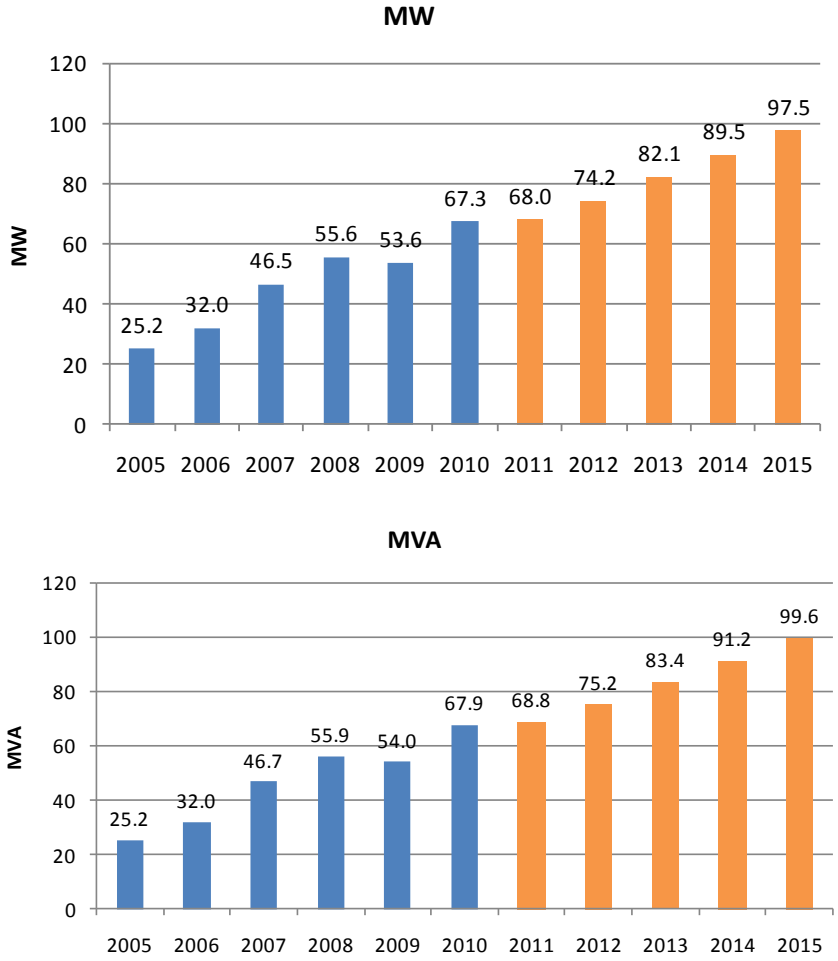
Data source: SP Ausnet

2.4 Zone station by zone station assessment

2.4.1 Clyde North

Demand at Clyde North zone substation is forecast by SP Ausnet to reach 97.5 MW by the end of the next regulatory period (see Figure 2). Although Figure 2 shows only the unadjusted demands over the historical and forecast period, there are no major new loads or permanent transfers to cause any discontinuities in the time series.

Figure 2 **Historical and 50% POE demand forecasts, Clyde North ZSS, MW and MVA**



Data source: SP Ausnet

Annualised growth in demand at the zone substation was 21.7% per annum between 2005 and 2010. This is not surprising given that the Clyde North zone substation is located in the middle of Melbourne's South East growth corridor in the City of Casey. Growth in the area has been driven by significant greenfield residential development. The forecast rate of growth for the zone substation is 7.7% per annum, reaching 97.5 MW by 2015. This represents a continuation of the strong growth observed historically although historical growth rates have been faster as they were calculated off a very low base.

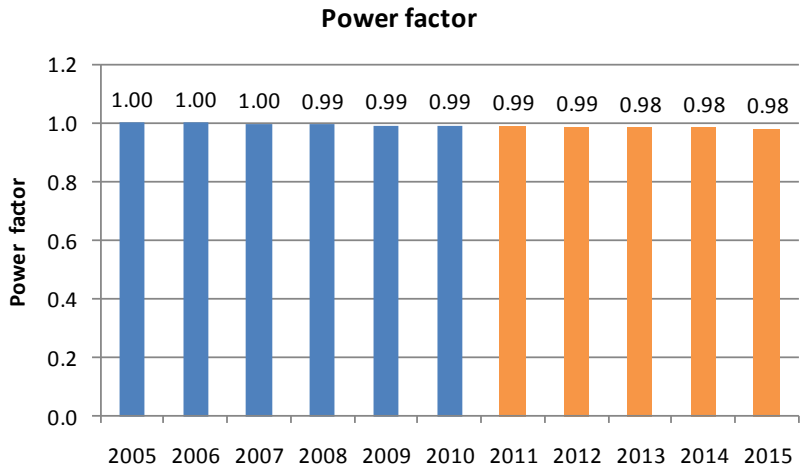
Population growth in the City of Casey has averaged over 4% in the 10 years between 1996 and 2006 (see Table 3) and is expected to continue to grow strongly though at a slower rate. According to data obtained from the City of Casey website, the number of dwellings in the suburb of Clyde North is

expected to increase from 489 in 2010 to 17,208 in 2031[1]. This shows that the zone substation is still in its growth phase.

The zone substation is also still quite young having only come online in 2005 with a 25MW transfer from the Hampton Park and Berwick North zone substations.

Figure 3 presents the historical and forecast power factor at the Clyde North zone substation. The figure shows that the MW and MVA forecasts are consistent and growing at approximately the same rate.

Figure 3 **Historical and forecast power factor, Clyde North ZSS**



Data source: SP Ausnet

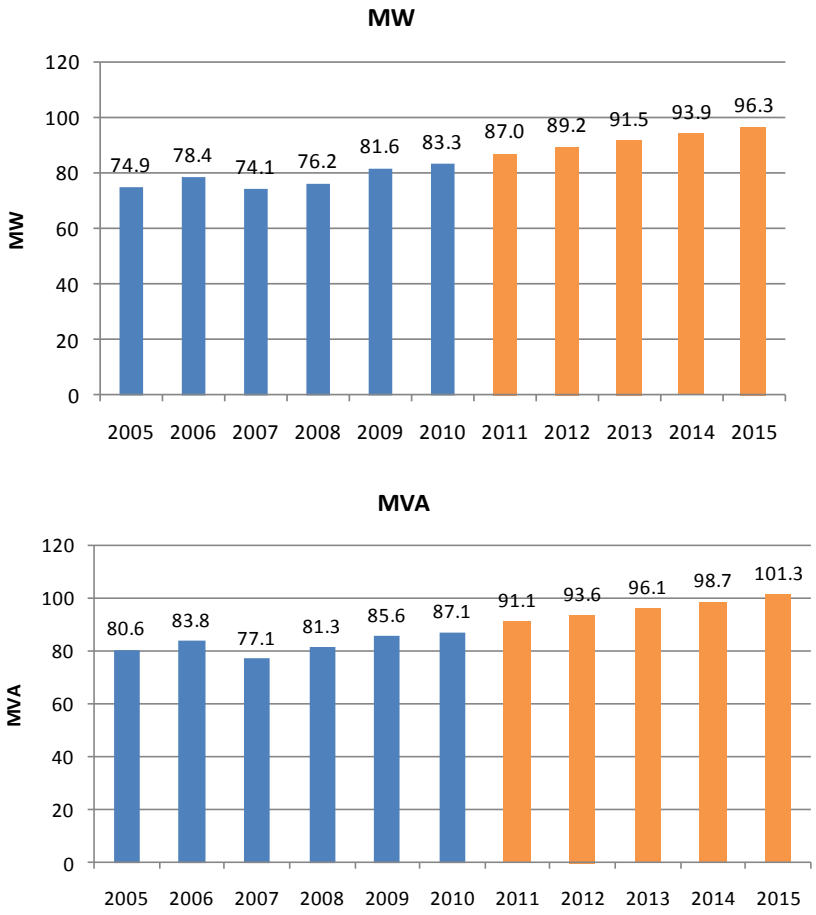
On the basis of observed historical demands and qualitative demographic knowledge of the area surrounding the zone substation ACIL Tasman believes that SP Ausnet's forecasts for the Clyde North zone substation are reasonable.

2.4.2 Croydon

SP Ausnet forecasts demand at the Croydon Zone substation to reach 96.3 MW by 2015, from 83.3 MW in 2010 (see Figure 4). This is equivalent to an annualised rate of growth of 3.0% per annum over the period. In the 5 year period from 2005 to 2010 demand grew at an annualised rate of growth of 2.2% p.a. The acceleration in the rate of growth is evident in the figure below.

[1] http://forecast2.id.com.au/Default.aspx?id=109&pg=5330

Figure 4 **Historical and 50% POE demand forecasts, Croydon ZSS, MW and MVA**

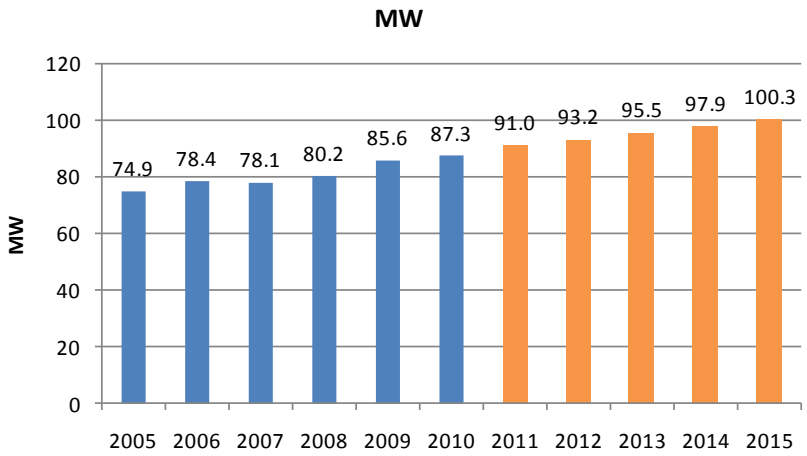


Data source: SP Ausnet

While there are no additional block loads that are added onto the forecast separately by SP Ausnet, ACIL Tasman notes that there was a permanent transfer of 4 MW out of the zone substation in 2007. In order to properly assess the historical and forecast growth rate of the zone substation this transfer needs to be added back onto the forecasts from 2007 onwards.

The adjusted historical and forecast series are shown in Figure 5 below. Based on the adjusted data, the 5 year average historical rate of growth at the zone substation is 3.1% p.a versus a forecast rate of growth of 2.8% per annum between 2010 and 2015.

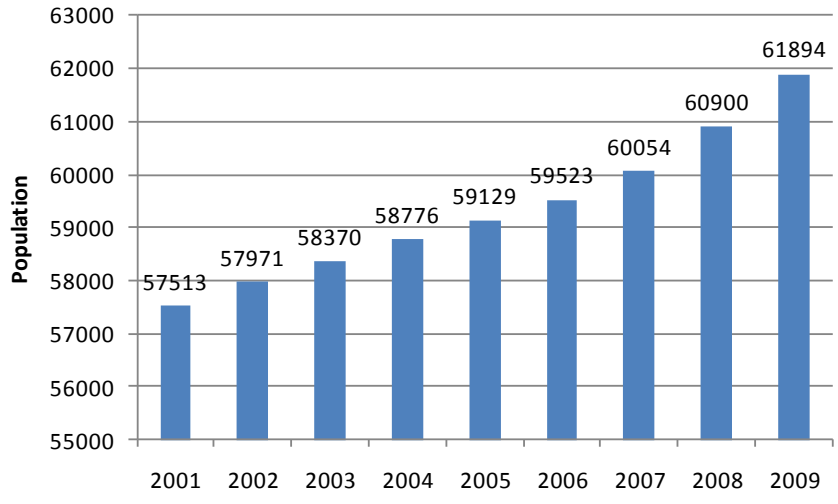
Figure 5 **Adjusted historical and 50% POE demand forecasts, Croydon ZSS, MW**



Data source: SP Ausnet and ACIL Tasman calculations

This low rate of growth is consistent with what we know about the area surrounding the zone substation. According to SP Ausnet Croydon is 'an established area in the outer Eastern suburbs of Melbourne with low load growth rates driven mainly by urban consolidation'. This statement is supported by population data obtained from the ABS for the Croydon statistical local area (SLA) shown in Figure 6. In the 5 years between 2004 and 2009, the annualised rate of population growth in Croydon was 1% p.a.

Figure 6 **Population of Croydon Statistical Local Area, 2001 to 2009**



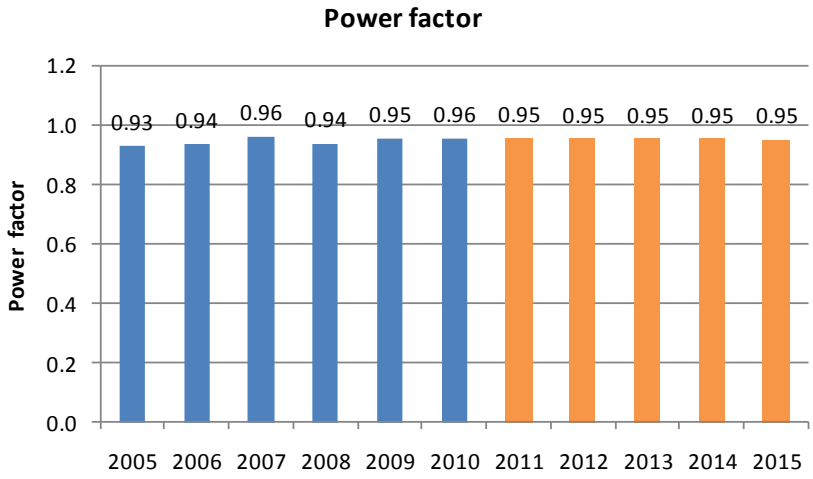
Data source: ABS, 3218.0 Regional Population Growth, Australia

Based on our analysis, ACIL Tasman expects load growth to continue to be relatively slow at the Croydon zone substation, driven by a small number of new customer connections and additional electricity use by existing customers.

ACIL Tasman therefore considers SP Ausnet's forecasts of demand at the Croydon zone substation to be reasonable.

An additional check of the power factor over time shows that the forecasts denoted in MWs are consistent with those denoted in MVA (see Figure 7).

Figure 7 **Historical and forecast power factor, Croydon ZSS**



Data source: SP Ausnet

2.4.3 Epping

The Epping zone substation is located in the north of Melbourne within the City of Whittlesea. The zone substation is located in the northern growth corridor of Melbourne and is expected by SP Ausnet to have strong demand growth in line with strong population growth in the area.

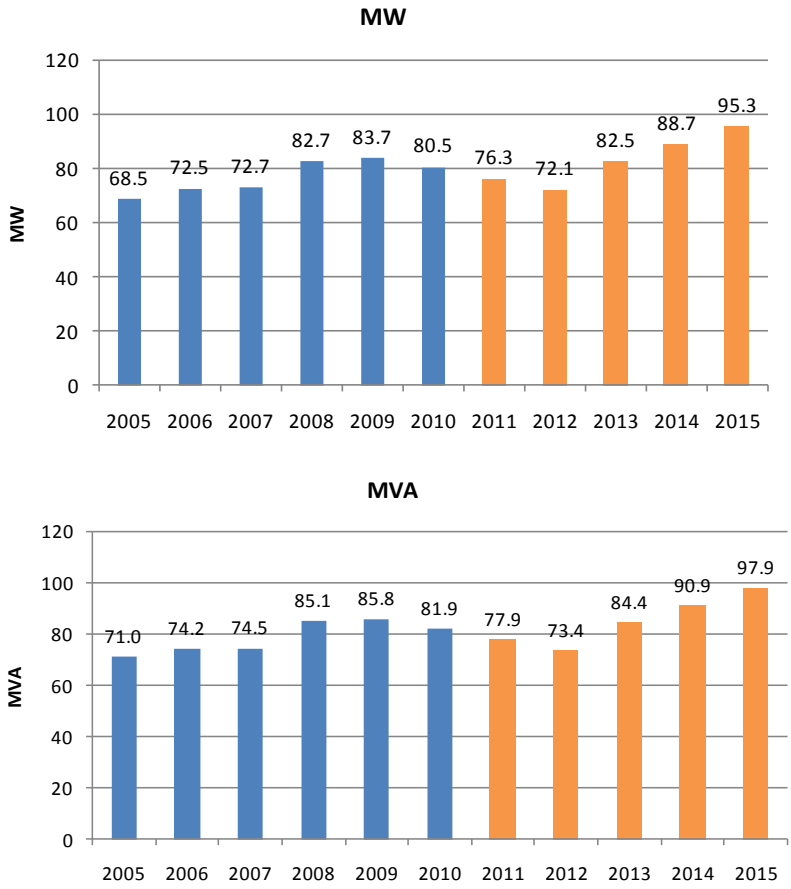
The City of Whittlesea projects population to grow from 152,342 in 2011 to 175,774[2] in 2016 which is equivalent to a growth rate of 2.9% per annum. SP Ausnet also expects significant additional load onto the zone substation arising from industrial developments. This compares to a historical population rate of growth for the LGA of 2.0% per annum in the 10 years between 1996 and 2006 (see Table 3).

The high growth profile of the zone substation is not evident in the historical and forecast demands provided by SP Ausnet in the revised RIN and this is the result of significant permanent transfers and a large block load which are creating distortions in the series.

[2] Located at http://www.whittlesea.vic.gov.au/files/1812_DEV%20BULL%2006.indd.pdf

Major block loads which are added to the demand series are a 9 MW load arising in 2009 after the completion of the Westfield Plenty Valley Town shopping centre and a forecast for 5 MW added in 2013 accounting for the proposed relocation of the fruit and vegetable market from Footscray to Epping. SP Ausnet believes that it's treatment of this major new load has been conservative with a contribution of up to 15 MW in 2013 being more realistic.

Figure 8 **Historical and 50% POE demand forecasts, Epping ZSS, MW and MVA**



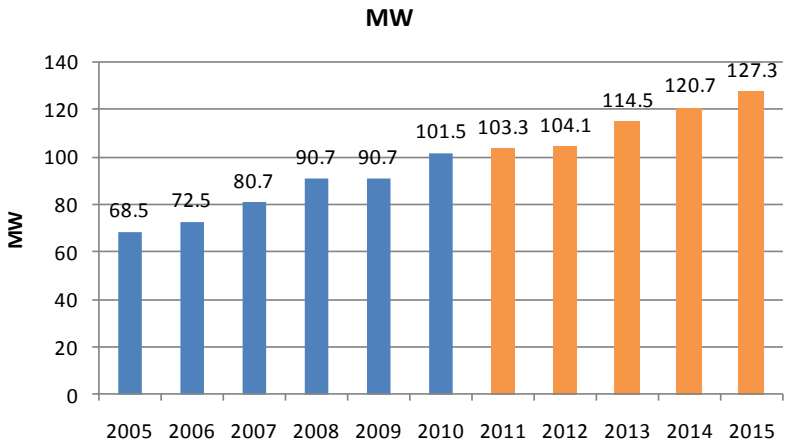
Data source: SP Ausnet

The original series are also distorted by significant permanent transfers away from the zone substation. These are shown in Table 5 of this report. Historically there were transfers out of 8 MW in 2007 and 8 MW in 2009. An additional 14 MW, 6 MW and 10 MW transfers were expected in 2010, 2011 and 2012 respectively.

The adjusted time series is shown in Figure 10. After removing the impact of permanent transfers and significant block loads a smoother underlying trend in the series is more evident. Between 2005 and 2010 the adjusted annual rate of growth at the Epping zone substation was 8.2%. Between 2010 and 2015

strong growth is expected to continue although at a slower rate of 4.6% per annum. ACIL Tasman believes that these forecasts are reasonable given our understanding of the demographic characteristic of the region around Epping.

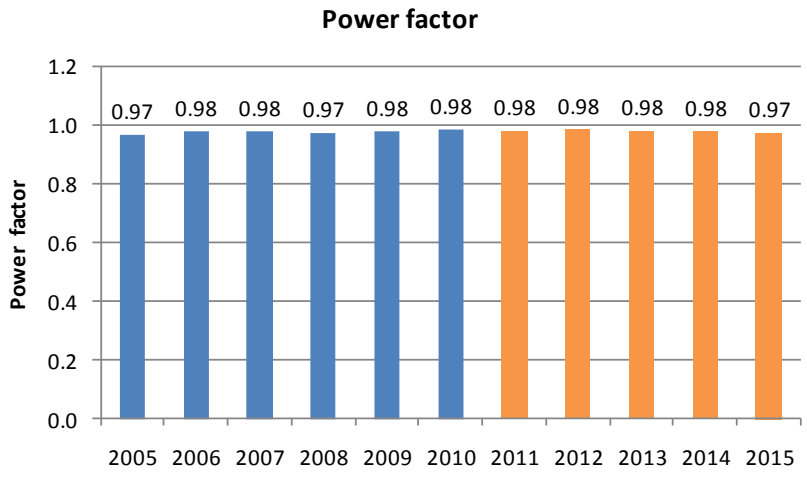
Figure 9 **Adjusted historical and 50% POE demand forecasts, Epping ZSS, MW**



Data source: SP Ausnet

An examination of the historical and forecast power factor at the zone substation shows that the MW and MVA forecasts of demand at the zone substation are aligned.

Figure 10 **Historical and forecast power factor, Epping ZSS**



Data source: SP Ausnet

2.4.4 Ferntree Gully

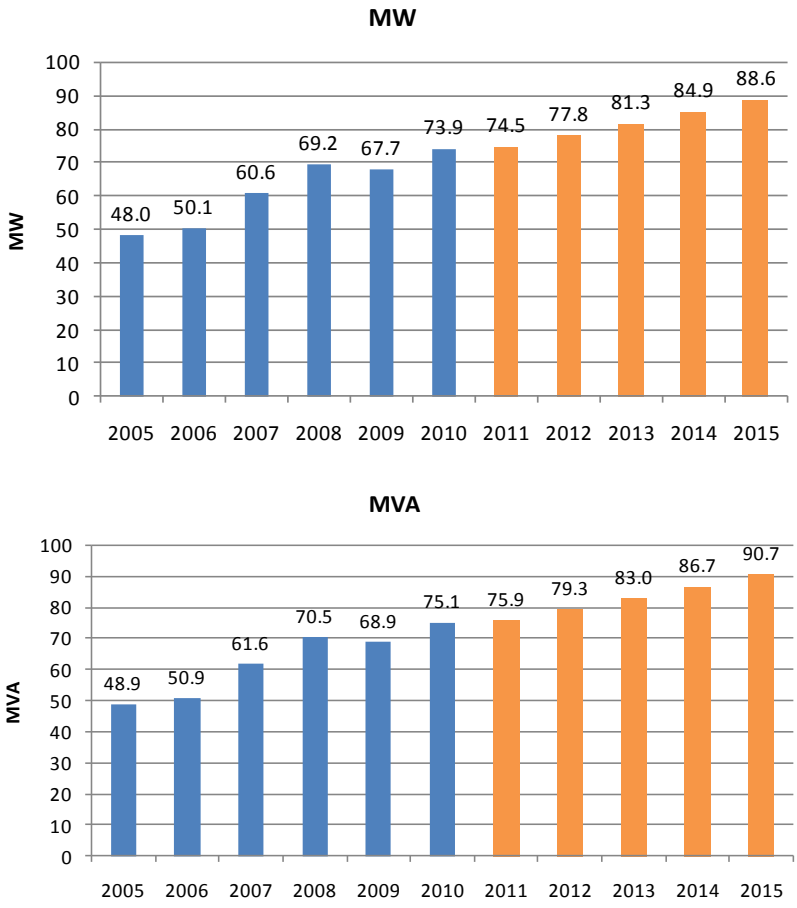
The Ferntree Gully zone substation is located in Melbourne's outer east. The area is generally established but has some pockets where growth in residential

and industrial load is expected. SP Ausnet considers the zone substation to have medium growth prospects.

The historical and forecast demands at the Ferntree Gully zone substation are shown in Figure 11 below. There are no permanent transfers or major block loads affecting the time series. Demand at the zone substation is forecast to grow from 73.9 MW in 2010 to 88.6 MW in 2015.

Annualised growth in the historical period was 9% per annum. The forecast rate of growth in the next regulatory period is expected to be 3.7% p.a. This slower rate of growth reflects the fact that the area has started to approach maturity with fewer large new loads coming online.

Figure 11 **Historical and 50% POE demand forecasts, Ferntree Gully ZSS, MW and MVA**

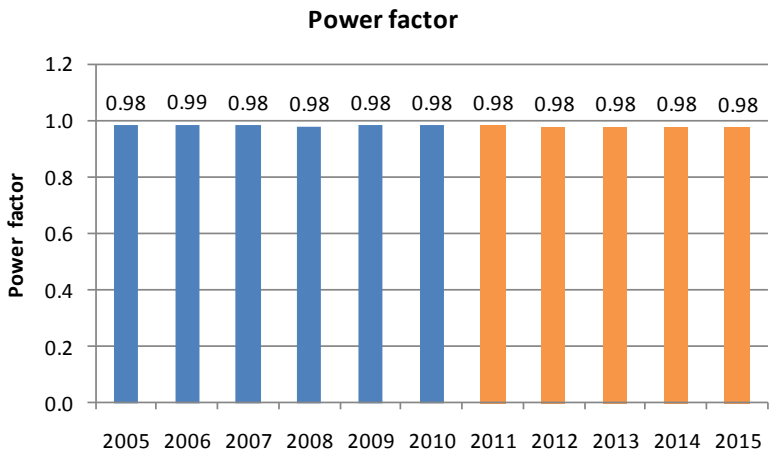


Data source: SP Ausnet

ACIL Tasman believes these forecasts are reasonable given the historical behaviour of demand at the zone substation and the fact that Ferntree Gully lies in an established area where large new developments are becoming fewer in number.

A comparison of the MW and MVA denoted forecasts in Figure 12 shows that the power factor has remained constant over the forecast period and the MW and MVA forecasts are moving in a consistent fashion.

Figure 12 **Historical and forecast power factor, Ferntree Gully ZSS**



Data source: SP Ausnet

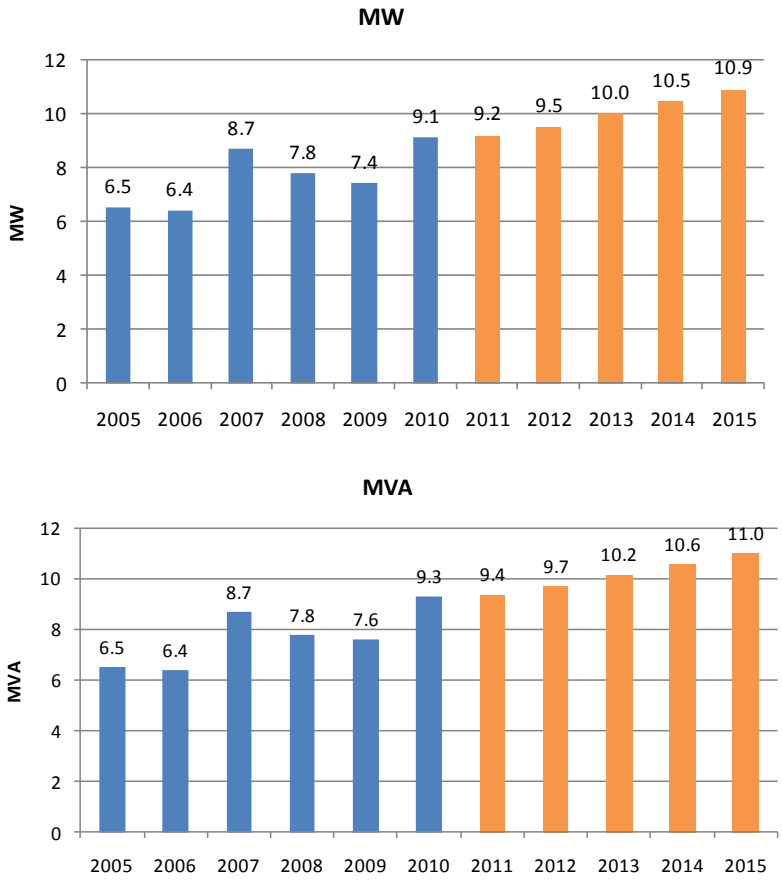
2.4.5 Kilmore South

Demand at the zone substation at Kilmore South is forecast to grow from 9.1 MW in 2010 to 10.9 MW in 2015, equivalent to an annualised growth rate of 3.6% per annum. This rate of growth is broadly consistent with SP Ausnet's assessment of the zone substation as having medium growth prospects.

Growth at the zone substation between 2005 and 2010 has averaged 7% per annum. As a zone substation located on the northern fringe of metropolitan Melbourne, ACIL Tasman accepts that reasonably strong historical growth is likely to be driven by new dwellings built on the outskirts of Melbourne. SP Ausnet however, believes that future growth is not going to be as robust as that observed previously. ACIL Tasman accepts this view.

There are no major block loads or permanent transfers embedded in the demand time series.

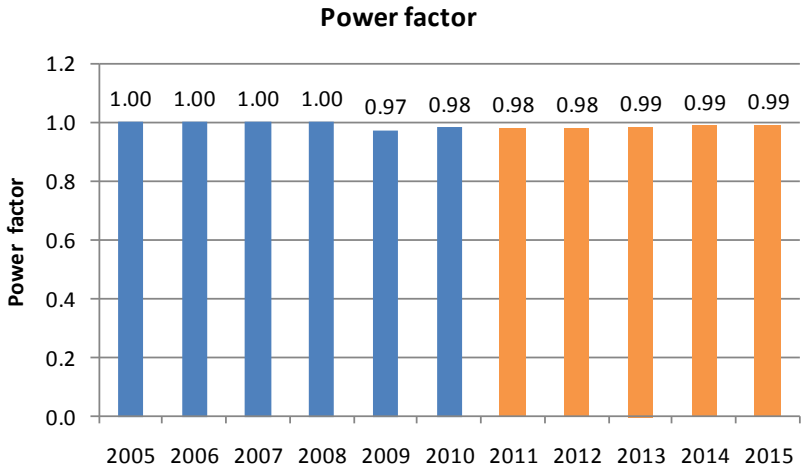
Figure 13 **Historical and 50% POE demand forecasts, Kilmore South ZSS, MW and MVA**



Data source: SP Ausnet

An examination of the power factor over time at the Kilmore South zone substation in Figure 14 shows that the SP Ausnet's two sets of forecasts for the zone substation are consistent.

Figure 14 **Historical and forecast power factor, Kilmore South ZSS**



Data source: SP Ausnet

ACIL Tasman considers the forecasts of demand from the Kilmore South zone substation to be reasonable.

2.4.6 Lilydale

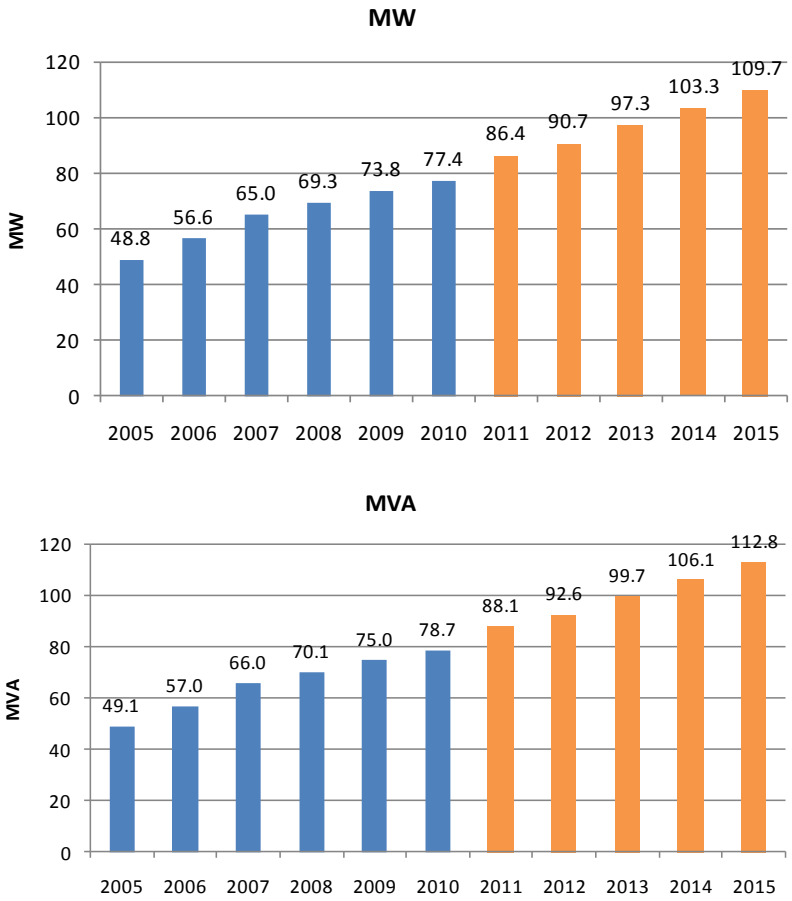
The historical and forecast demand for the Lilydale zone substation is shown in Figure 15. Between 2005 and 2010 load grew from 49 MW to 77 MW. SP Ausnet forecasts demand to reach 110 MW by 2015 at the zone substation.

As a zone substation located on the eastern fringes of Melbourne, the Lilydale zone substation has experienced strong load growth.

After adjusting for a permanent load transfer of 2 MW in 2006 and 3 MW in 2007, the rate of historical growth between 2005 and 2010 averaged 8.2% per annum (see Figure 16). In the next regulatory period demand is forecast to grow at an annualised rate of 7.7% per annum.

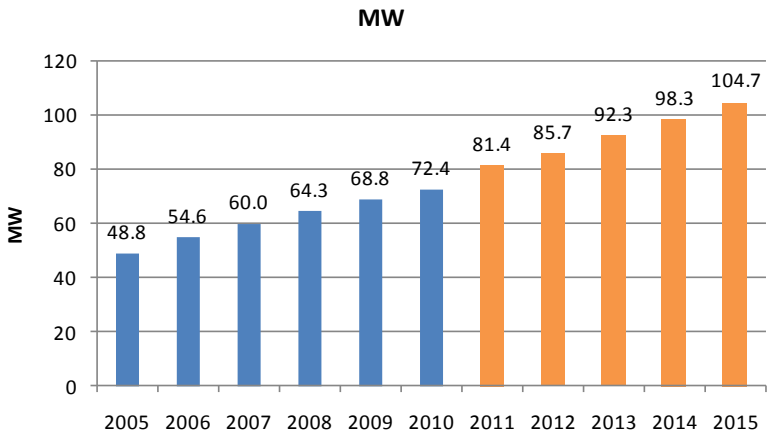
On the basis that the forecast growth rates are in line with historical behaviour, and Lilydale is located on the outskirts of Melbourne with further growth potential, ACIL Tasman considers that the demand forecasts for the Lilydale zone substation are reasonable.

Figure 15 **Historical and 50% POE demand forecasts, Lilydale ZSS, MW and MVA**



Data source: SP Ausnet

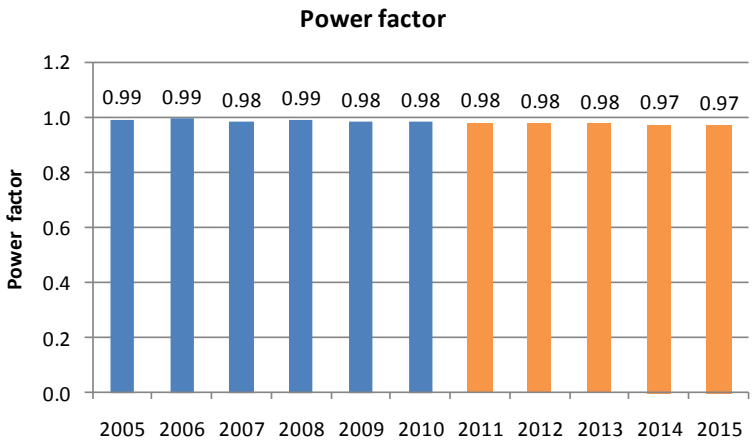
Figure 16 **Adjusted historical and 50% POE demand forecasts, Lilydale ZSS, MW**



Data source: SP Ausnet

In terms of the relationship between the MW and MVA forecasts, ACIL Tasman notes that the power factor remains relatively constant over time and that the two sets of forecasts are consistent.

Figure 17 **Historical and forecast power factor, Lilydale ZSS**



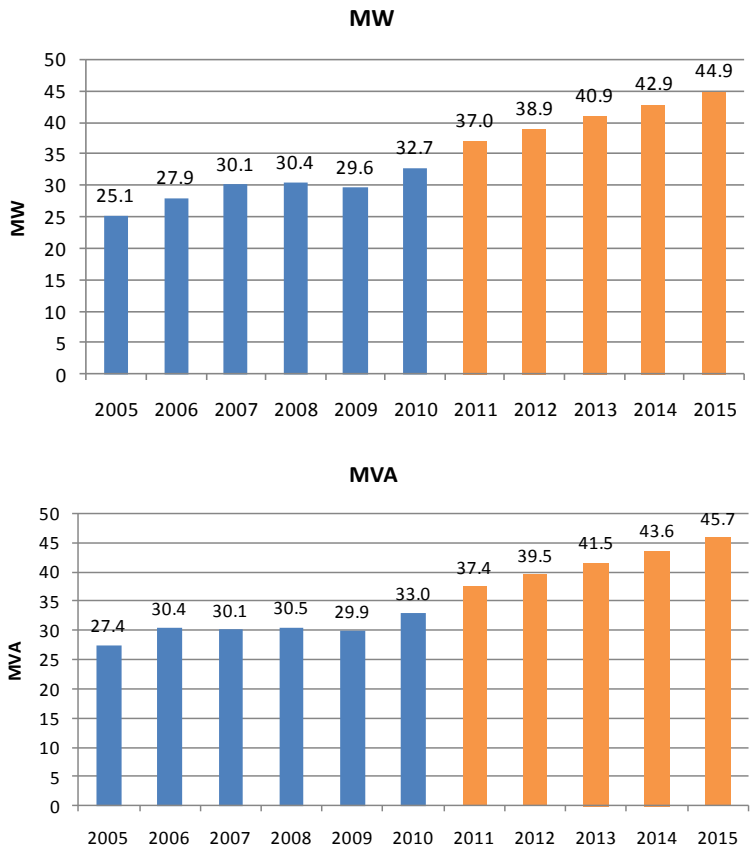
Data source: SP Ausnet

2.4.7 Moe

Demand at the Moe zone substation is forecast to grow from 32.7 MW in 2010 to 44.9 MW in 2015. This is equivalent to an annualised rate of growth of 6.5% per annum. This is compared to a historical rate of growth of 5.5%[3].

[3] As there were no reported major loads or permanent transfers there is no need to adjust the original series.

Figure 18 **Historical and 50% POE demand forecasts, Moe ZSS, MW and MVA**



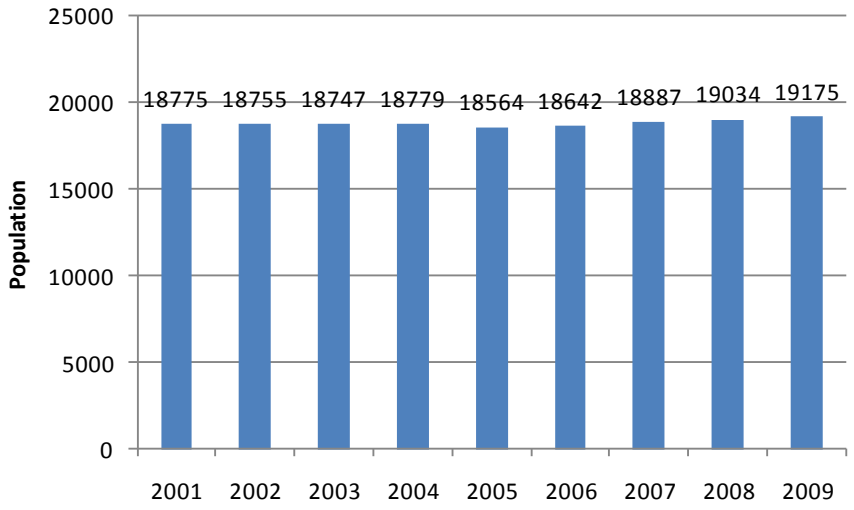
Data source: SP Ausnet

Despite load growth of over 5% historically it is not clear to ACIL Tasman why the load growth is expected to accelerate during the next regulatory period. A visual inspection of Figure 18 shows that demand follows an accelerated growth trajectory in the forecast period compared to it's historical behaviour. SP Ausnet however rates the Moe substation as having only medium growth prospects, whereas a rate of growth of 6.5% per annum is more consistent with higher growth areas.

In addition, SP Ausnet have not provided any substantiating evidence such as forthcoming block loads to support a faster rate of growth in demand at the Moe zone substation. ACIL Tasman also notes that the zone substation is located in an area where population growth has been and is likely to continue to be slow.

Figure 19 shows the population of the Moe statistical local area between 2001 and 2009. Population growth averaged only 0.8% per annum between 2005 and 2009.

Figure 19 **Population of Moe statistical local area (SLA), 2001 to 2009**



Data source: ABS, 3218.0 Regional Population Growth, Australia

In response to a query from the AER, SP Ausnet responded by stating that the growth rate between 2005 and 2009 was 7.6% per annum, which underpins the forecast growth rate for the zone substation in the next regulatory period compared to history. This however, is misleading because the 2009 demand that they use in the calculation is the actual peak not the temperature corrected one which is shown in Figure 18.

It should be noted that the weather conditions in the 2009 summer were some of the most extreme experienced in the last 100 years, with the maximum demand in the 2009 summer exceeding the demand corresponding to the 10% POE demand by a large margin. Calculations which use the non-weather corrected demand for 2009 will therefore be biased upwards to a significant degree. For this reason, ACIL Tasman uses weather corrected data points where they have been provided.

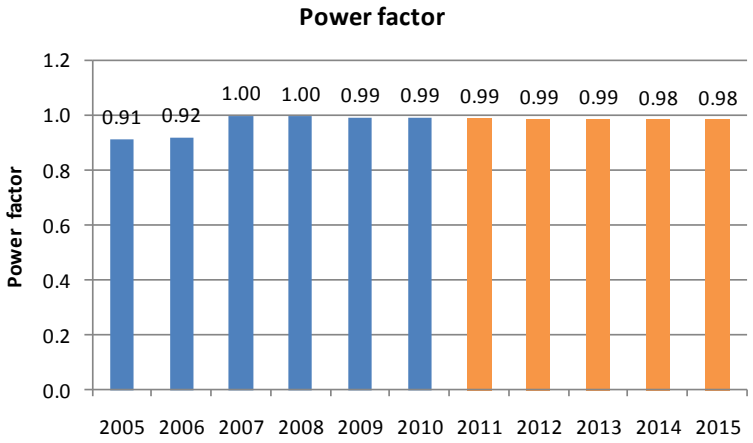
Using the weather corrected values, the annualised growth rate between 2005 and 2010 is 5.5% p.a and between 2005 and 2009 is only 4.2% per annum. These rates of growth are more consistent with the demographic characteristics that we observe in the area.

ACIL Tasman considers that given the lack of support for an accelerating rate of growth in demand at the Moe zone substation, that the annualised growth rate be constrained to not exceed the average historical rate of growth of 5.5% per annum. If SP Ausnet were to apply an average annualised growth rate of 5.5% from 2010 onwards, the 50 POE demand in 2015 would reach 42.7 MW, instead of the current forecast of 44.9 MW. This is a reduction of 4.9% by 2015. ACIL Tasman recommends that the forecasts in each year of the next regulatory period shown in Figure 18 be adjusted proportionally downwards by

4.9% in each year. This would preserve any cyclical behaviour that is embedded in the forecasts.

ACIL Tasman is satisfied that after considering the forecast power factor at the Moe zone substation that the MW and MVA forecasts are consistent. However the MVA forecast should be constrained using the forecast power factor relationship to the revised MW forecast.

Figure 20 **Historical and forecast power factor, Lilydale ZSS**



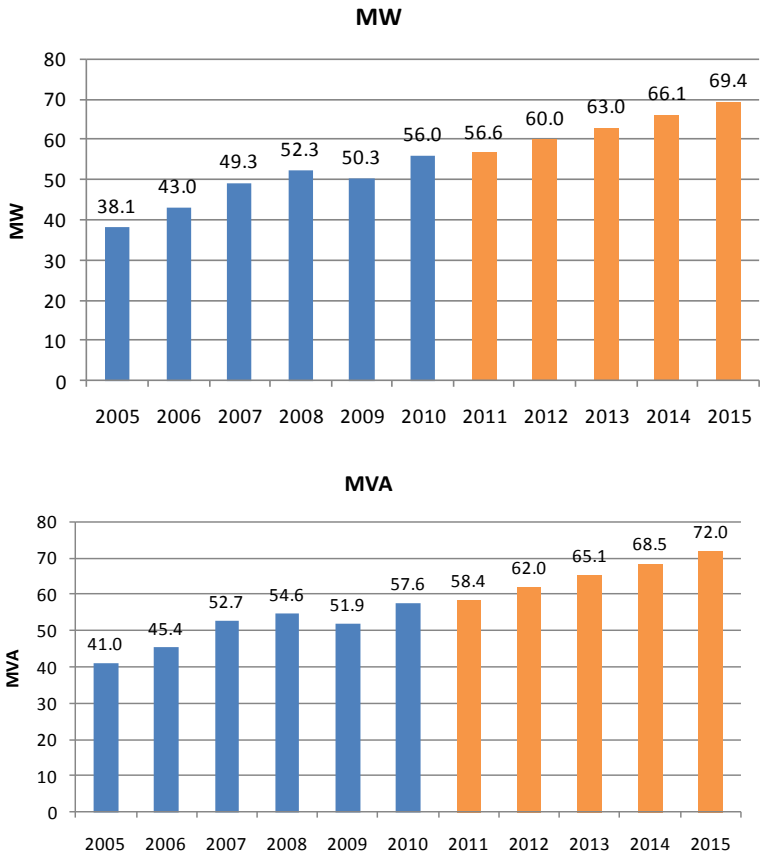
Data source: SP Ausnet

2.4.8 Ringwood North

Demand at the Ringwood North zone substation is forecast to reach 69.4 MW by 2015 from 56 MW in 2010. This is equivalent to an annualised growth rate of 4.4% per annum compared to a more robust historical rate of growth in the five year period between 2005 and 2010 of 8% (see Table 3).

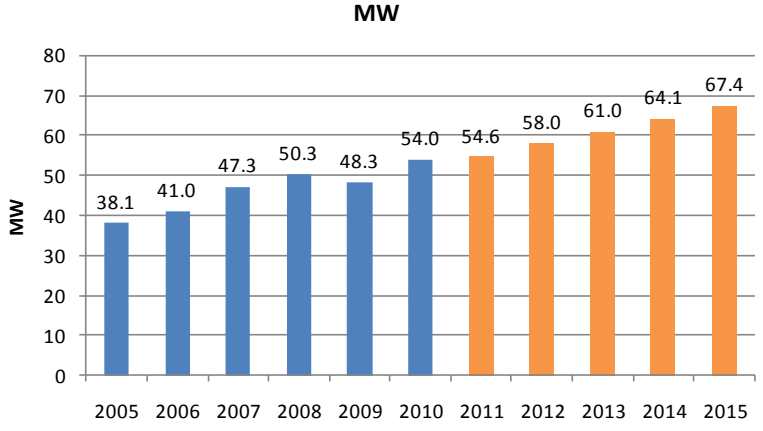
The time series presented in Figure 21 is distorted slightly by a 2 MW transfer to the zone substation in 2006. After removing the effect of this transfer the adjusted series is shown in Figure 22. Growth in the five years between 2005 and 2010 averaged 7.2% p.a in this adjusted series and is projected to grow at 4.6% in the forecast period.

Figure 21 **Historical and 50% POE demand forecasts, Ringwood North ZSS, MW and MVA**



Data source: SP Ausnet

Figure 22 **Adjusted historical and 50% POE demand forecasts, Ringwood North ZSS, MW**

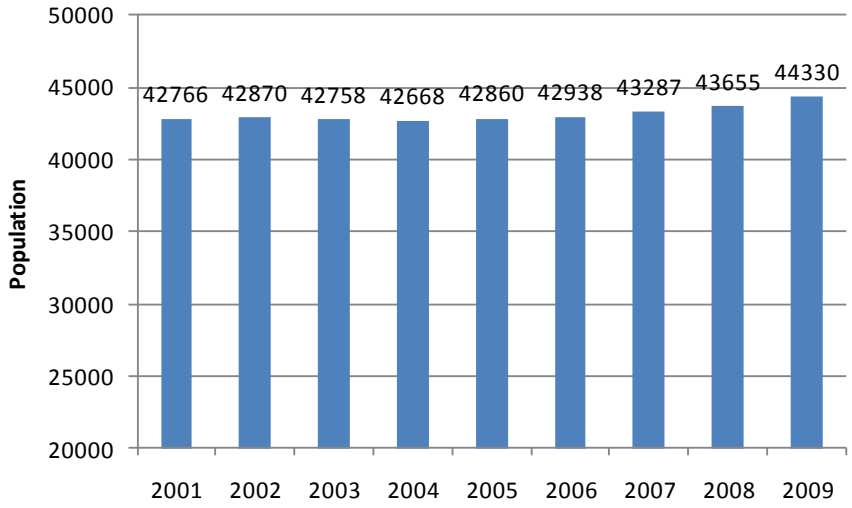


Data source: SP Ausnet

SP Ausnet rates this zone substation as being medium growth with most of the load growth arising from in-fill development. ACIL Tasman accepts this view

which is consistent with recent data obtained from the ABS showing that population growth in the Ringwood statistical local area has averaged 0.8% per annum in the 4 years between 2005 and 2009.

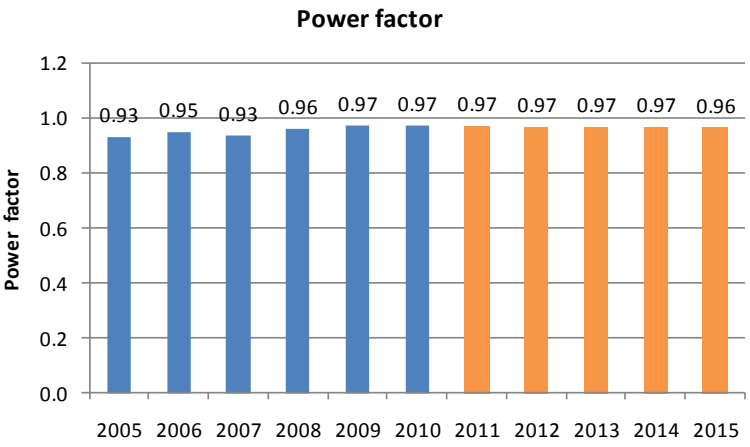
Figure 23 **Population of Ringwood statistical local area (SLA), 2001 to 2009**



Data source: ABS

ACIL Tasman also considered the relationship between the MW and MVA denoted forecasts at the Ringwood North zone substation by examining the power factor over time. As seen in Figure 24, Ringwood North has a relatively constant power factor over time indicating that the two sets of forecasts are moving in line with each other.

Figure 24 **Historical and forecast power factor, Ringwood North ZSS**



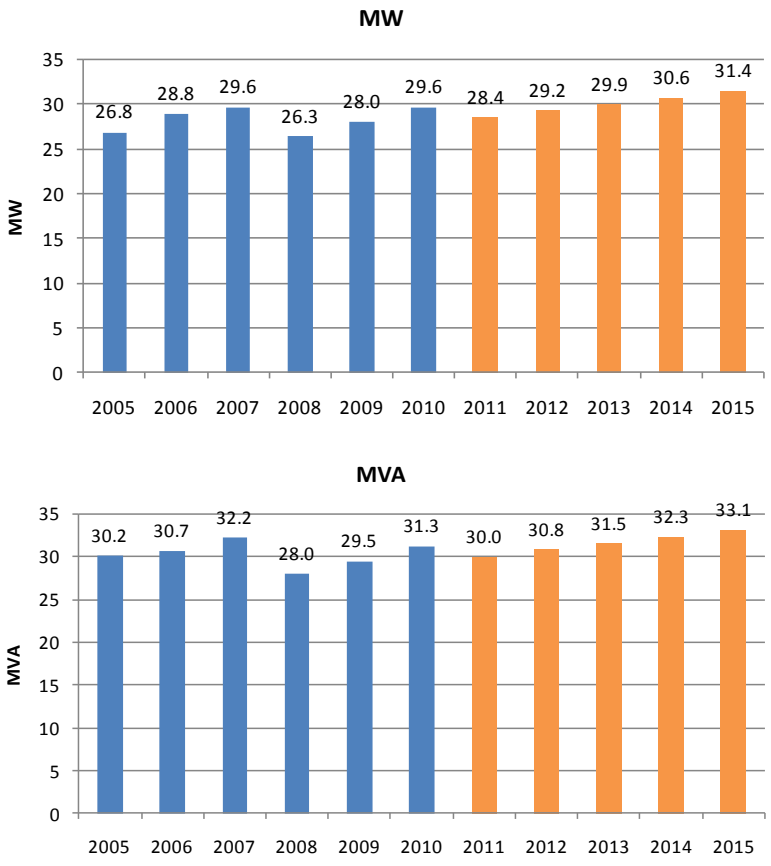
Data source: SP Ausnet

ACIL Tasman considers that the forecasts at the Ringwood North zone substation are reasonable, reflecting the increasing maturity of the area over time.

2.4.9 Woori Yallock

Woori Yallock is a low growth area on the eastern outskirts of Melbourne with recent slow load growth. SP Ausnet believes that the slow load growth at the zone substation will continue into the next regulatory period (see Figure 25).

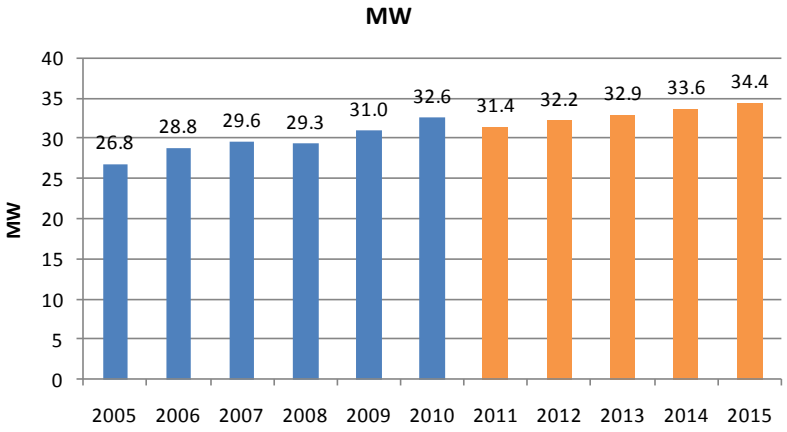
Figure 25 **Historical and 50% POE demand forecasts, Woori Yallock ZSS, MW and MVA**



Data source: SP Ausnet

In order to calculate historical and forecast growth rates, we adjusted the time series for a 3 MW transfer away from the zone substation in 2008. The adjusted series is shown in Figure 26 below. Based on this series, the annualised rate of load growth between 2005 and 2010 at Woori Yallock was 4% per annum. In the next regulatory period growth is forecast to be 1.1% per annum.

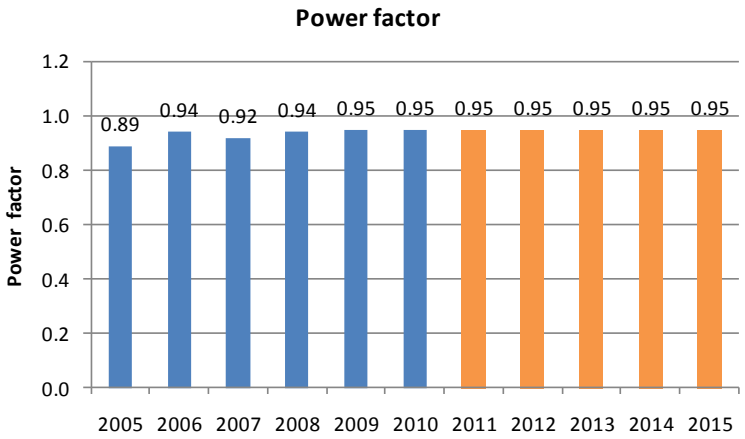
Figure 26 **Adjusted historical and 50% POE demand forecasts, Woori Yallock ZSS, MW**



Data source: SP Ausnet

Based on the power factors at the site, ACIL Tasman considers that there is no inconsistency between the MW and MVA forecasts.

Figure 27 **Historical and forecast power factor, Woori Yallock ZSS**



Data source: SP Ausnet

ACIL Tasman accepts SP Ausnet's assessment of the Woori Yallock zone substation as having few growth prospects and considers the forecasts of demand in the next regulatory period to be reasonable.

3 United Energy

ACIL Tasman has under instruction from the AER assessed the forecasts for the Doncaster, Dandenong South, Mentone and Noble Park zone substations.

Table 7 **Location of zone substations under review in SP Ausnet network**

Station	Code	Address	Suburb
Doncaster	DC	Eram Rd	Box Hill North
Dandenong South	DSH	Cnr Hammond & Greens Rd	Dandenong South
Mentone	M	Cnr Savona And Riviera Sts	Mentone
Noble Park	NP	Cnr Corrigan Rd & Wallarano Dr	Noble Park

Data source: United Energy

3.1 Customer break-down

Apart from Dandenong South, the zone substations are mainly residential and commercial areas that are generally well established with little new development taking place. The exception, Dandenong South is predominantly an industrial zone substation with significant additional commercial activity. Demand growth at the Dandenong South zone substation unlike the others, would be expected to be driven more by economic activity rather than population growth.

Table 8 **Energy use by customer type (%)**

	Energy Usage MWh (Mar 09 Quarter)			% Energy Usage (Mar 09 Quarter)		
Zone Substation	Domestic	Commercial	Industrial	Domestic	Commercial	Industrial
Doncaster (DC)	34,585	30,122	275	53.2%	46.4%	0.4%
Dandenong South (DSH)	2,693	27,046	35,401	4.1%	41.5%	54.3%
Mentone (M)	13,473	12,010	2,160	48.7%	43.4%	7.8%
Noble Park (NP)	25,470	38,452	7,771	35.5%	53.6%	10.8%

Data source: United Energy

3.2 Population growth within the United Energy network

Table 9 shows that growth rates within the LGAs comprising the United energy network have been generally slow. The areas are predominantly well

established with little potential for new housing developments Load growth within the United energy network is generally slow.

Table 9 **Historical growth rates of LGAs in United energy network**

Council	Contribution	1996	2001	2006	96-01 growth rate	01-06 growth rate	96-06 growth rate
Bayside (C)	All	80933	84097	86369	0.77%	0.53%	0.65%
Glen Eira (C)	All	113392	118138	123046	0.82%	0.82%	0.82%
Kingston (C)	All	122438	128171	132919	0.92%	0.73%	0.82%
Manningham (C)	All	103760	107920	108791	0.79%	0.16%	0.47%
Monash (C)	All	152552	156898	161936	0.56%	0.63%	0.60%
Mornington Peninsula (S)	All	110409	125378	132062	2.58%	1.04%	1.81%
Whitehorse (C)	All	135472	140751	144075	0.77%	0.47%	0.62%
Greater Dandenong (C)	All	126179	124536	125742	-0.26%	0.19%	-0.03%
Port Phillip (C)	Part	73092	80157	86882	1.86%	1.62%	1.74%
Stonnington (C)	Part	84300	87412	90156	0.73%	0.62%	0.67%
Frankston (C)	Part	103971	110179	116596	1.17%	1.14%	1.15%
Weighted Total		1075817	1124763	1161757	0.89%	0.65%	0.77%

Data source: ABS Census of Population and Housing

3.3 Block loads and permanent transfers

Before assessing the forecasts at each zone substation, an attempt to remove major block loads and permanent transfers has been made. These were obtained from United Energy's forecasting models and have been used to adjust both the historical and forecast demand to gain a clearer picture of the underlying growth at each respective zone substation. They are shown in Table 10.

Table 10 **United Energy: Historical and projected block loads, MW**

Zone Substation	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Historical						Forecast				
Doncaster	1.0	0.0	0.5	0.6	0.6	1.0	0.0	0.0	0.0	0.0	0.0
Dandenong South	0.0	0.0	0.0	0.5	1.0	1.0	1.0	0.5	0.0	0.0	0.0
Mentone	0.0	0.0	0.5	0.0	0.0	2.5	3.0	0.0	0.0	0.0	0.0
Noble Park	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Data source: United Energy forecasting model

The most significant projected block loads are at the Mentone zone substation and are new industrial loads. Four years of consecutive load increases at the Dandenong South zone substation are also new industrial loads.

The permanent transfers shown in Table 11 indicate that significant transfers are taking place at the Doncaster, Dandenong South and Noble Park zone substations.

Table 11 **United Energy: Historical and planned permanent transfers, MW**

Zone Substation	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Historical						Forecast				
Doncaster	0.0	0.0	-4.7	0.0	-2.4	0.0	0.0	0.0	0.0	0.0	-22.0
Dandenong South	1.1	0.0	0.0	-2.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0
Mentone	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Noble Park	0.0	0.0	0.5	0.0	1.1	-2.0	0.2	0.0	0.0	-22.3	0.0

Data source: United Energy model

The annualised growth rates for the selected zone substations for both the original series and series adjusted for major loads and permanent transfers shows that the calculated growth rates can change markedly when adjustments are made for transfers and block loads.

Because United energy have calculated their forecasts on a 10% POE basis, and the historical demands are non-weather corrected, there is a step change evident in the demand time series moving into the forecast period. ACIL Tasman deal with this discontinuity by calculating historical growth rates from 2005 to 2010, and calculating forecast period growth rates from 2011 onwards.

Table 12 **Historical and forecast growth rates at selected zone substations, percent**

Zone substation	Original		Adjusted	
	Historical, 2005 to 2010, % p.a.	Forecast, 2011 to 2015, % p.a.	Historical, 2005 to 2010, % p.a.	Forecast, 2011 to 2015, % p.a.
Doncaster (DC)	3.5%	-5.3%	4.6%	1.1%
Dandenong South (DSH)	3.1%	2.6%	1.8%	2.7%
Mentone (M)	2.9%	0.6%	1.6%	0.7%
Noble Park (NP)	3.7%	-5.7%	3.8%	1.2%
Sumof all zone substations	5.3%	2.4%	5.3%	2.4%

Data source: ACIL Tasman calculations

3.4 Zone substation by zone substation assessment

3.4.1 Doncaster

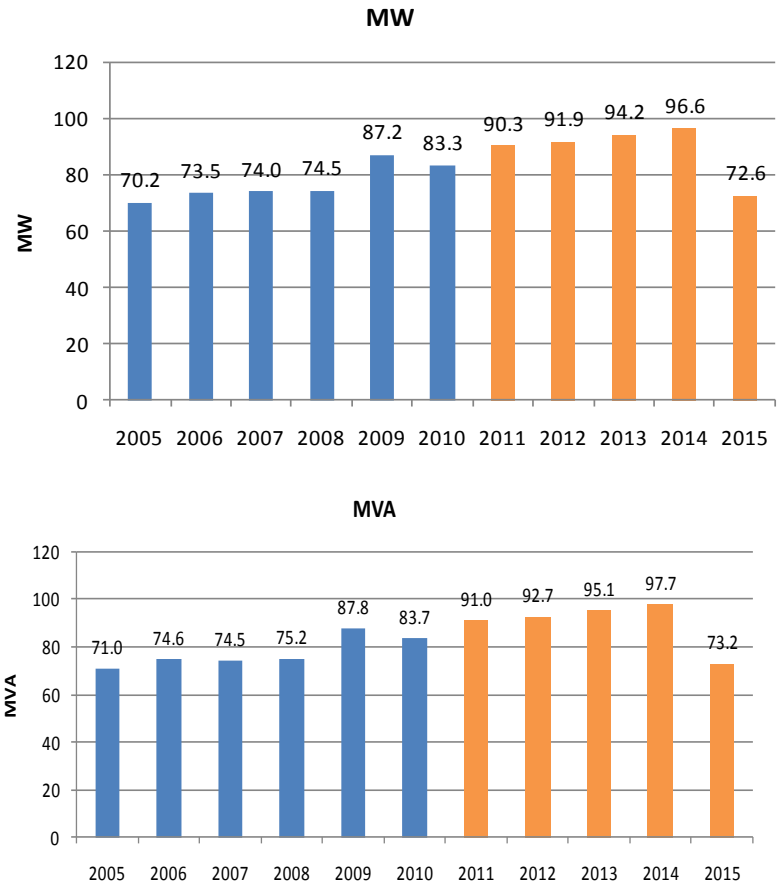
The Doncaster zone substation is predominantly residential/commercial with little industrial load and is located in a well established area of Melbourne. It

lies within the City of Manningham which is experiencing slow to moderate population and household growth. In the 5 years between the census of 2001 and 2006, population growth within the LGA averaged 0.16% per annum (see Table 9). Over the longer 10 year period from 1996 to 2006, growth in the LGA was 0.5% p.a.

Future load growth is therefore likely to come from urban in-fill development and additional electricity use per customer rather than new residential and commercial developments.

United Energy forecast 10% POE demand at the zone substation to reach 97 MW in 2014 before declining to 73 MW in 2015. This is due to a transfer away from the zone substation of 22 MW to the new Templestowe zone substation.

Figure 28 **Historical and 10% POE demand forecasts, Doncaster ZSS, MW and MVA**

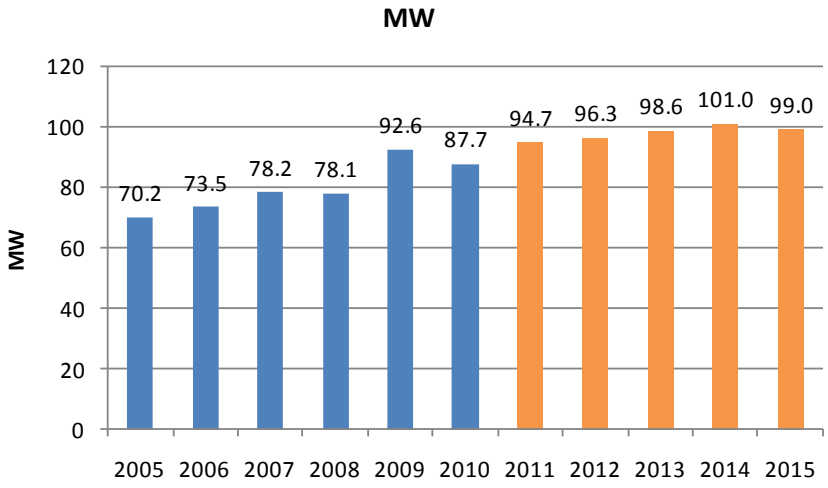


Data source: United energy

Although visual inspection of the unadjusted series in Figure 28 suggests that there is an acceleration in demand growth through the forecast period, ACIL Tasman notes the historical series is distorted by 2 large permanent transfers

away from the zone substation in 2007 and 2009. When the series is adjusted for permanent transfers as well as a number of block loads, the slope of the forecast line resembles the historical demand path more closely (see Figure 29).

Figure 29 **Adjusted historical and 10% POE demand forecasts, Doncaster ZSS, MW and MVA**



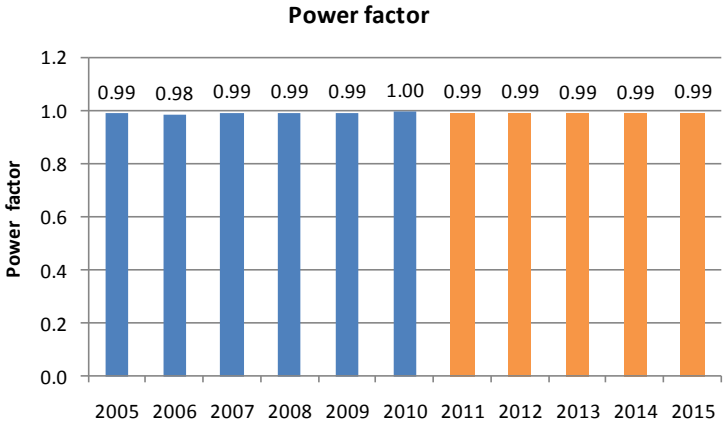
Data source: United Energy

After adjusting for transfers and block loads, the underlying growth in demand at the Doncaster zone substation was 4.6% per annum between 2005 and 2010, compared to 3.5% for the original series over the same period

Growth in the forecast period between 2011 and 2015 was 1.1% per annum after adjusting for the large downward step change in 2015.This rate of growth is consistent with the mature nature of the area.

A comparison of the MW and MVA forecasts by examining the power factor over time in Figure 30, shows that they are consistent with each other with a relatively constant power factor.

Figure 30 **Historical and forecast power factor, Doncaster ZSS**



Data source: United Energy

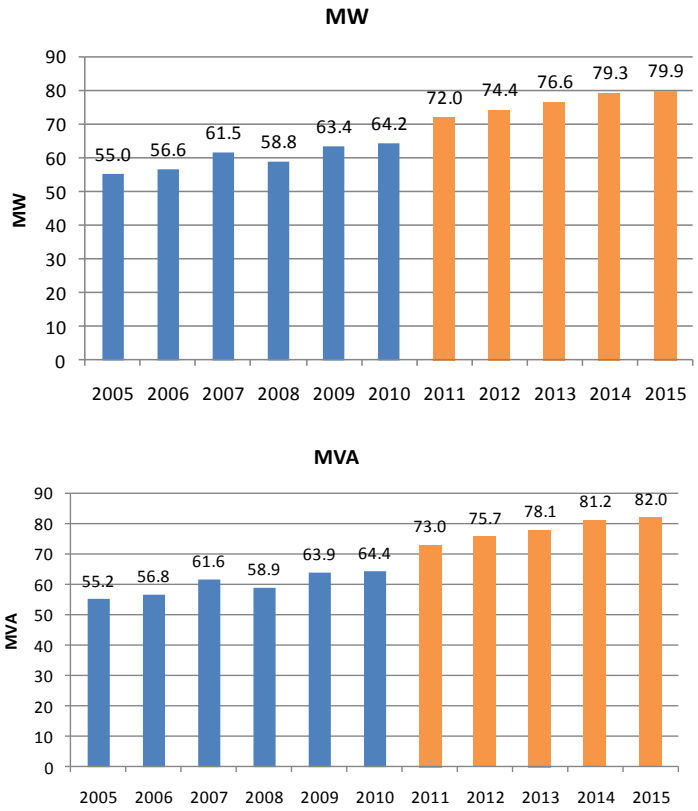
ACIL Tasman considers the demand forecasts for the Doncaster zone substations to be reasonable.

3.4.2 Dandenong South

The Dandenong South zone substation is a predominantly industrial/commercial zone substation with less than 5% of the total load being attributed to the residential sector.

Historical unadjusted growth at the zone substation averaged 3.1% between 2005 and 2010. This is compared with a forecast growth rate of 2.6% per annum between 2010 and 2015.

Figure 31 **Historical and 10% POE demand forecasts, Dandenong South ZSS, MW and MVA**



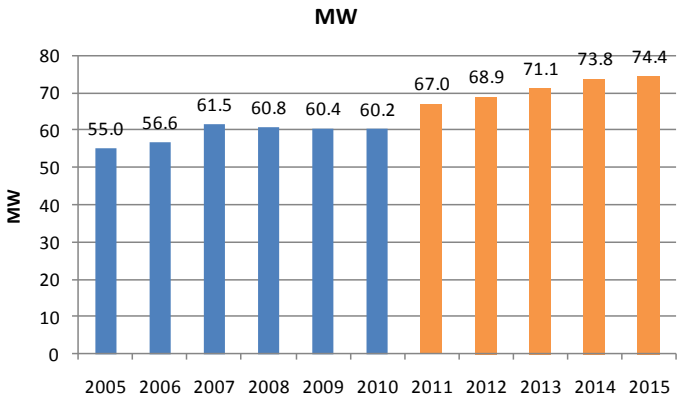
Data source: United Energy

The historical demand series however has been distorted by a number of transfers which when reversed out produce a significantly different picture. Historical growth in the adjusted series shown in Figure 32 declines to 1.8% p.a. after adjusting for block loads and permanent transfers. This is compared to a forecast growth rate of 2.7% in the forecast period.

United Energy notes that the Dandenong South supply area is expected to experience a higher demand growth compared to history due to increased development activity arising from improved transport links and infrastructure in the area, such as the East Link and Dingley arterial. United Energy also states that there are a number of housing developments already under construction in the area and ample greenfield land available for future developments. Furthermore, several industrial zones have been rezoned residential to make way for housing developments.

ACIL Tasman believes that the higher growth rate relative to the past is not unreasonable given the additional information provided by United Energy.

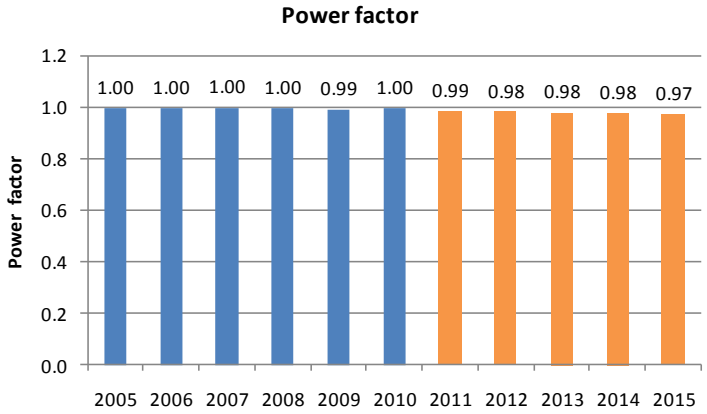
Figure 32 **Adjusted historical and 10% POE demand forecasts, Dandenong South ZSS, MW**



Data source: United Energy

Forecasts provided on a MW and MVA basis are generally consistent based on an examination of the power factor over time.

Figure 33 **Historical and forecast power factor, Dandenong South ZSS**



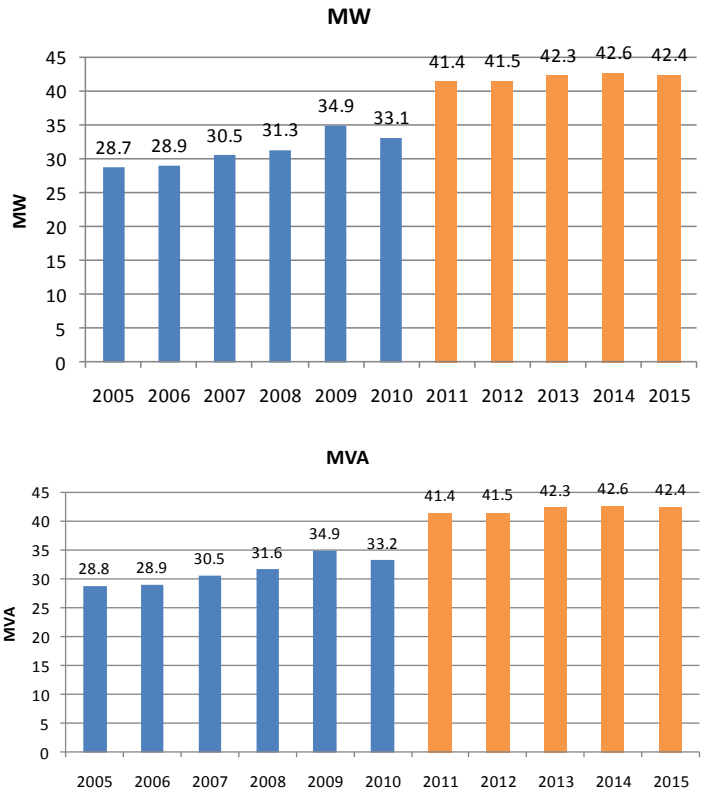
Data source: United Energy

3.4.3 Mentone

The Mentone zone substation is based in the well established local government area of Kingston in Melbourne's south east suburbs. Population growth in the area averaged 0.7% per annum between 2001 and 2006, an area of relatively slow growth.

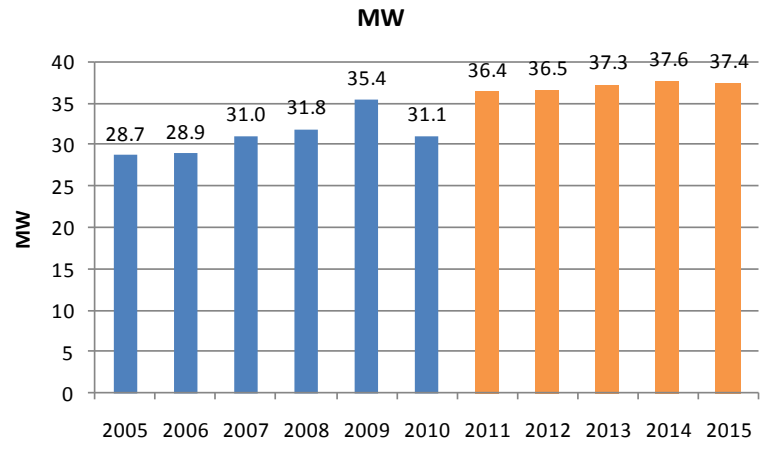
Forecasts of demand at the zone substation provided by United Energy are consistent with this view. Historical growth at the zone substation has averaged 1.6% p.a. in the 5 years to 2010 after adjusting for major block loads and permanent transfers. Growth in the adjusted forecast series is 0.7% p.a. between 2011 and 2015.

Figure 34 **Historical and 10% POE demand forecasts, Mentone ZSS, MW and MVA**



Data source: United energy

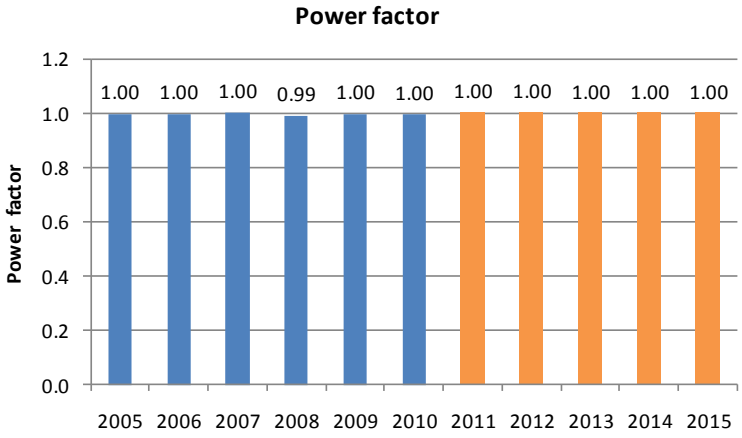
Figure 35 **Adjusted historical and 10% POE demand forecasts, Mentone ZSS, MW**



Data source: United energy

A constant power factor over time indicates that the MW and MVA forecasts are closely linked and consistent.

Figure 36 **Historical and forecast power factor, Mentone ZSS**



Data source: United energy

ACIL Tasman considers that the forecasts of demand at the Mentone zone substation are reasonable.

3.4.4 Noble Park

The zone substation at Noble Park is located within the City of Greater Dandenong with a mix of residential, commercial and industrial load.

United energy forecast demand at the zone substation to reach 88.6 MW by 2013 before a large step change downwards takes place in 2014. This is the result of a permanent transfer of 22.3 MW away from the zone substation to the proposed new zone substation at Keysborough.

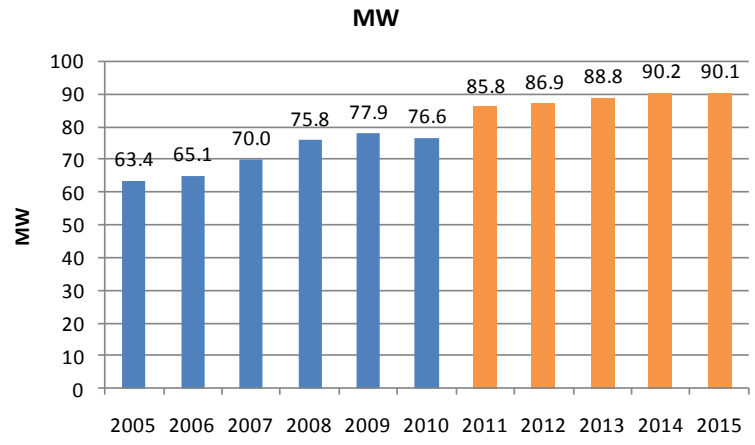
After adjusting for a small number of permanent transfers, the historical growth rate at the zone substation was 3.8% per annum. Growth in the period between 2011 and 2015 is forecast to be 1.2% per annum.

ACIL Tasman considers that the forecast rate of growth is broadly consistent with the slower growth profile of the area as well as the overall slower rate of growth of the whole United Energy network that is forecast for the next regulatory period.

Figure 37 **Historical and 10% POE demand forecasts, Noble Park ZSS, MW and MVA**

Data source: United energy

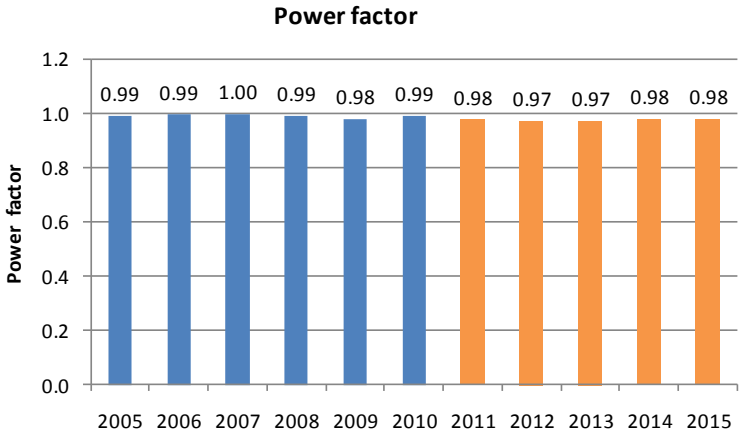
Figure 38 **Adjusted historical and 10% POE demand forecasts, Noble Park ZSS, MW and MVA**



Data source: United energy

Power factors at the zone substation indicate the both the MW an MVA forecasts are growing at similar rates and are consistent.

Figure 39 **Historical and forecast power factor, Noble Park ZSS**



Data source: United energy

ACIL Tasman considers that the demand forecasts for the Noble Park zone substation are reasonable.

4 Jemena

The zone substations chosen for further analysis in the Jemena network are shown in Table 13.

Table 13 **Location of zone substations under review in Jemena network**

Zone substation	Address	Suburb
Airport West (AW)	Moore Road	Airport West
Broadmeadows (BD)	Cnr Maffra and Barry Road	Broadmeadows
Coburg South (CS)	Cnr Hudson and Victoria St	Coburg
Flemington (FT)	Cnr Smith and Rankins Rd	Flemington
Pascoe Vale (PV)	Cnr Northumberland Rd and Arnold Circuit	Pascoe Vale

Data source: Jemena

4.1 Customer break-down

The zone substations have a mix of commercial, residential and industrial load apart from Pascoe Vale which has very little industrial load.

Table 14 **Customer breakdown by energy use, Percent**

Zone substation	Commercial	Industrial	Residential
	%	%	%
Airport West (AW)	55.7	17	27.3
Broadmeadows (BD)	62.3	16.1	21.5
Flemington (FT)	42.8	18.4	38.8
Pascoe Vale (PV)	65.3	0.1	34.6

Data source: Jemena

4.2 Population growth within Jemena network

Jemena's network contains both fast and slow growing regions in terms of population growth. In particular, the City of Hume and Melton Shire have experienced particularly strong historical population growth as a result of substantial residential development.

Table 15 **Historical growth rates of LGAs in Jemena network**

Council	Contribution	1996	2001	2006	96-01 growth rate	01-06 growth rate	96-06 growth rate
Hume (C)	All	116030	131585	147571	2.55%	2.32%	2.43%
Darebin (C)	Part	121794	123848	128132	0.34%	0.68%	0.51%
Moonee Valley (C)	Part	104849	106116	106041	0.24%	-0.01%	0.11%
Moreland (C)	Part	130093	131359	135209	0.19%	0.58%	0.39%
Brimbank (C)	Part	149131	163472	167970	1.85%	0.54%	1.20%
Hobsons Bay (C)	Part	74164	80432	80868	1.64%	0.11%	0.87%
Maribyrnong (C)	Part	59029	59770	63352	0.25%	1.17%	0.71%
Melton (S)	Part	39169	51823	78448	5.76%	8.65%	7.19%
Banyule (C)	Part	112594	114222	114194	0.29%	0.00%	0.14%
Weighted Total		511442	547106	584678	1.36%	1.34%	1.35%

Data source: ABS Census of Population and Housing

4.3 Block loads and permanent transfers

Substantial block loads and permanent transfers between the years 2009 and 2015 are shown in Table 16 and Table 17.

Table 16 **Projected block loads in the Jemena network, MW**

Zone substation	Code	2009	2010	2011	2012	2013	2014	2015
		Historical		Forecast				
Airport West	AW	0.0	3.0	2.1	2.2	2.6	2.6	NA
Broadmeadows	BD	0.0	2.2	1.6	1.5	2.1	2.0	NA
Coburg South	CS	0.0	1.6	0.9	0.7	2.3	1.8	NA
Flemington	FT	0.0	1.7	1.3	0.6	0.4	0.3	NA
Pascoe Vale	PV	0.0	0.2	0.1	0.1	0.2	0.3	NA

Data source: Jemena

Table 17 **Planned transfers in at selected zone substations within Jemena network, MW**

Zone substation	Code	2009	2010	2011	2012	2013	2014	2015
		Historical		Forecast				
Airport West	AW	0.0	0.0	-1.6	0.0	-14.3	0.0	NA
Broadmeadows	BD	0.0	0.0	0.0	0.0	0.0	0.0	-13.6
Coburg South	CS	0.0	1.2	0.0	0.0	0.0	0.0	NA
Flemington	FT	0.0	0.0	0.0	0.0	0.0	0.0	NA
Pascoe Vale	PV	0.0	0.0	0.0	0.0	0.0	0.0	NA

Data source: Jemena

Table 17 shows that there are comparatively few transfers planned within the Jemena network over this period.

Table 18 **Historical and forecast growth rates at selected zone substations in Jemena network, percent**

Zone substation	Original		Adjusted	
	historical, 2005 to 2010	forecast, 2010 to 2015	historical, 2005 to 2010	forecast, 2010 to 2015
Airport West (AW)	4.4%	0.2%	3.7%	1.4%
Broadmeadows (BD)	3.5%	1.6%	3.1%	2.8%
Coburg South (CS)	7.6%	5.3%	6.0%	3.0%
Flemington (FT)	4.4%	4.1%	3.2%	2.7%
Pascoe Vale (PV)	8.0%	1.0%	7.9%	0.7%
Sum of all zone substations	4.2%	2.1%	4.2%	2.1%

Data source: ACIL Tasman calculations

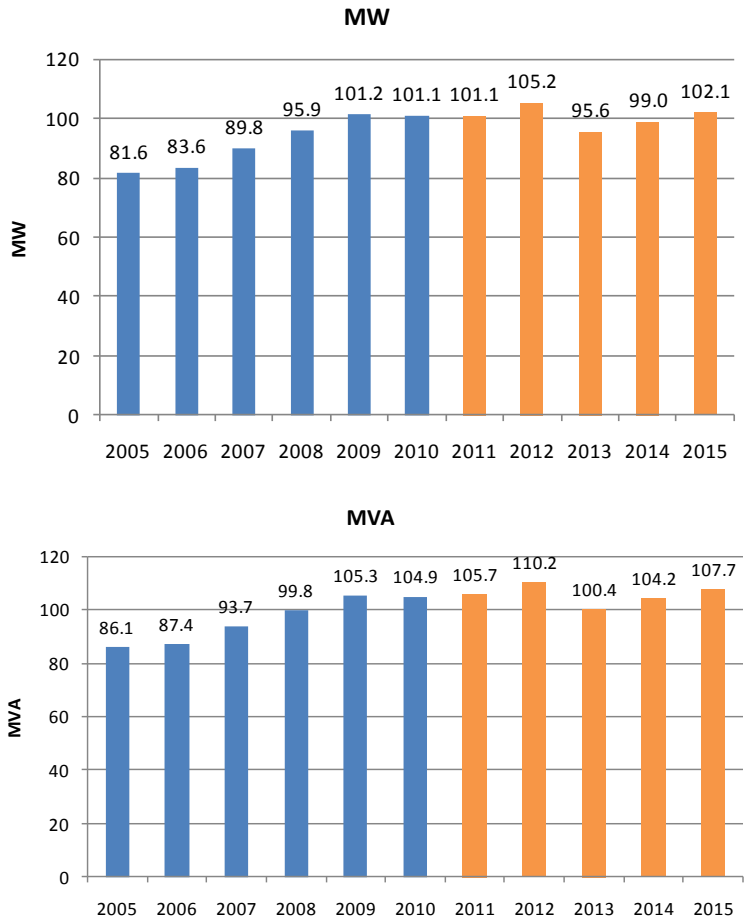
4.4 Zone substation by zone substation assessment

4.4.1 Airport West

The zone substation of Airport West is located in the City of Moonee Valley which is a well established area with slow historical population growth (see Table 15).

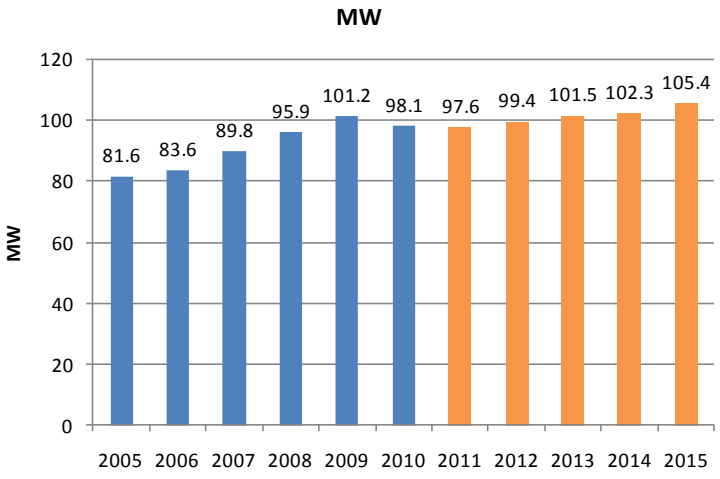
Demand is forecast to reach 102.1 MW by 2015. Historical growth at the zone substation between 2005 and 2010 was 3.7% p.a. after adjusting for block loads and permanent transfers. Growth over the entire forecast period is projected to be flat, although there is a step change due to a permanent transfer of 14.3 MW occurring in 2013. After accounting for transfers and any major new loads, growth over the next regulatory period is forecast to be 1.4% per annum. Given the maturity of the area surrounding the zone substation ACIL Tasman considers the forecasts for the Airport West zone substation to be reasonable.

Figure 40 **Historical and 50% POE demand forecasts, Airport West ZSS, MW and MVA**



Data source: Jemena

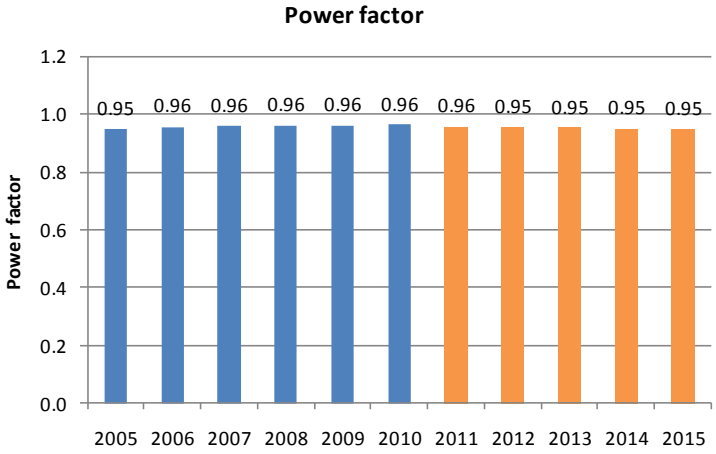
Figure 41 **Adjusted historical and 50% POE demand forecasts, Airport West ZSS,**



Data source: Jemena

Power factors for the Airport West zone substation are also relatively constant over time indicating that the MW and MVA forecasts are consistent.

Figure 42 **Historical and forecast power factor, Airport West ZSS**



Data source: Jemena

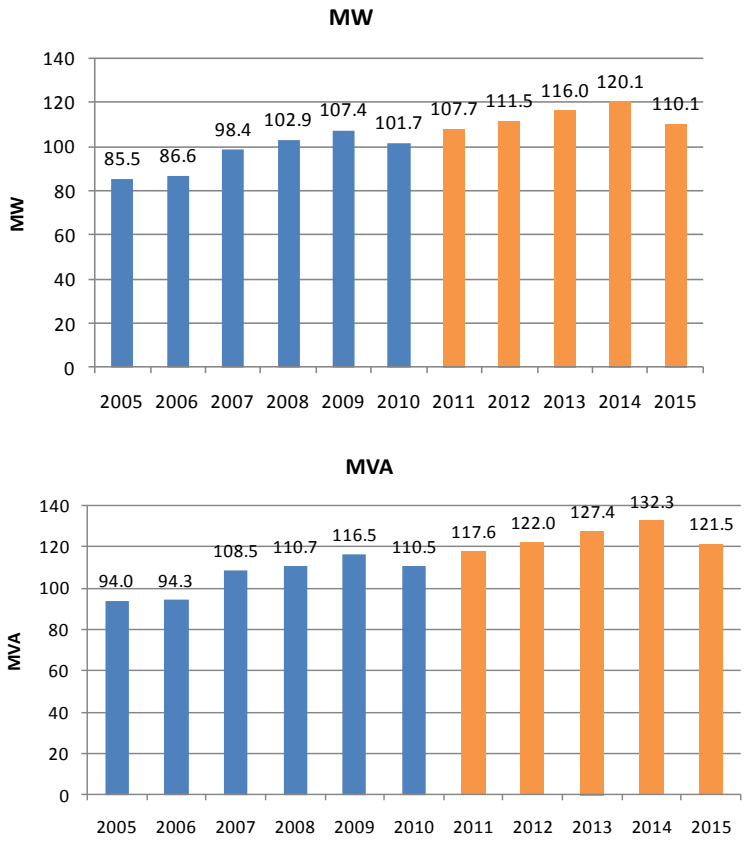
4.4.2 Broadmeadows

The Broadmeadows zone substation is located within the City of Hume, which has experienced historical population growth of 2.3% between the 2001 and 2006 Census, which is reasonably strong.

The zone substation is predominantly commercial, with a residential energy share of about 22%.

Figure 43 shows that maximum demand at the zone substation has increased from 86 MW in 2005 to 102 MW in 2010. Demand is then forecast to reach 120.1 in 2014 before falling to 110.1 in 2015. This step decline is due to a proposed permanent transfer away from the substation of 13.6 MW to the new zone substation at Broadmeadows South.

Figure 43 **Historical and 50% POE demand forecasts, Broadmeadows ZSS, MW and MVA**

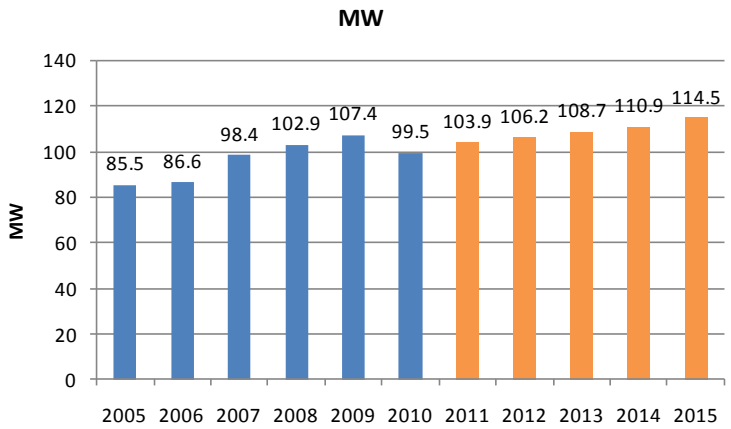


Data source: Jemena

After accounting for block loads and any known permanent transfers the historical rate of growth at the zone substation was 3.1% per annum, which is consistent with an area with a moderate rate of population growth where development has not quite yet reached saturation.

The rate of growth over the forecast period is expected to be 2.8% per annum. This is broadly consistent with historical behaviour and is in our view reasonable.

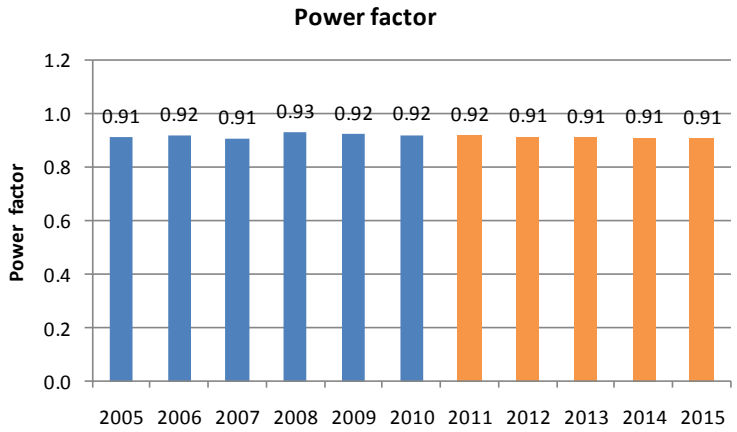
Figure 44 **Adjusted historical and 50% POE demand forecasts, Broadmeadows ZSS, MW**



Data source: Jemena

The power factor over time has remained relatively constant indicating consistency between the MW and MVA forecasts.

Figure 45 **Historical and forecast power factor, Broadmeadows ZSS**



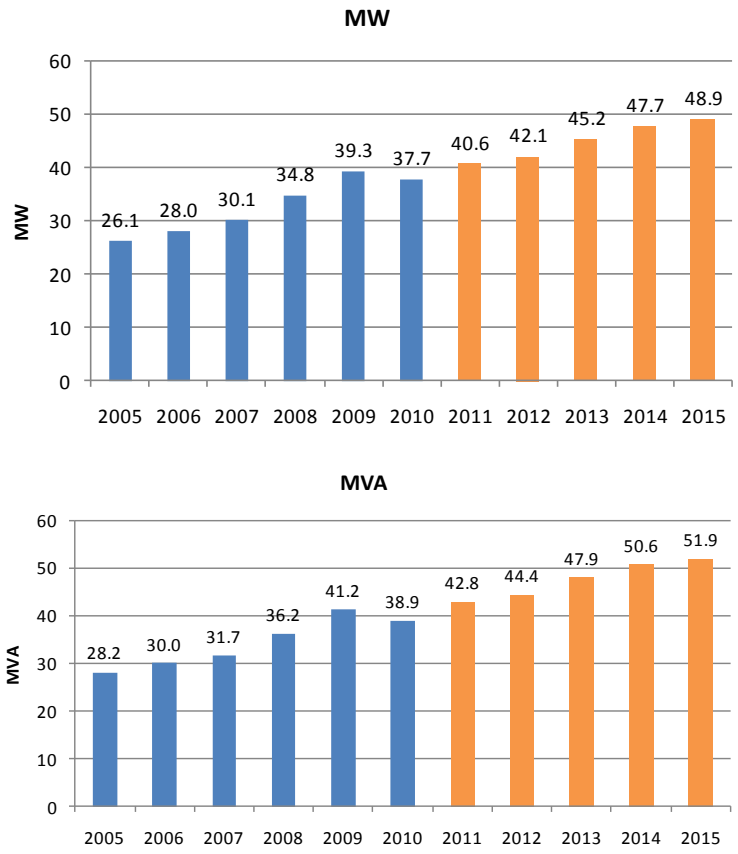
Data source: Jemena

4.4.3 Coburg South

Demand at the Coburg South zone substation is forecast to reach 48.9 MW by 2015. After adjusting for transfers and major block loads, the forecast growth rate between 2010 and 2015 is 3% p.a. Historical growth over the preceding 5 year period between 2005 and 2010 averaged 5%.

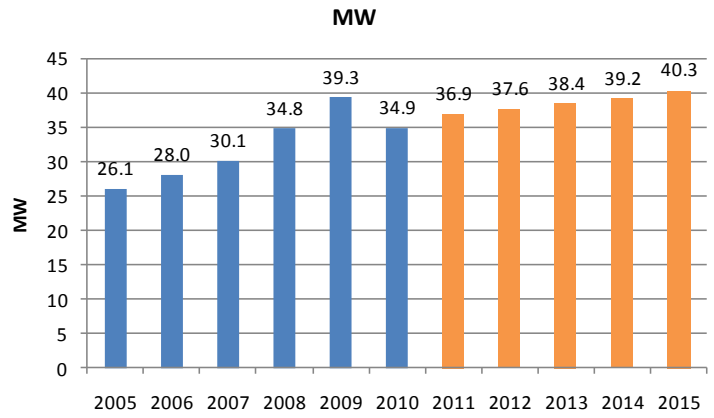
Coburg South is located within the City of Moreland in Melbourne's northern suburbs. Population growth in this area has generally been slow with relatively slow household formation arising mostly from infill development. ACIL Tasman agrees that the forecasts are reflective of the characteristics of the area.

Figure 46 **Historical and 50% POE demand forecasts, Coburg South ZSS, MW and MVA**



Data source: Jemena

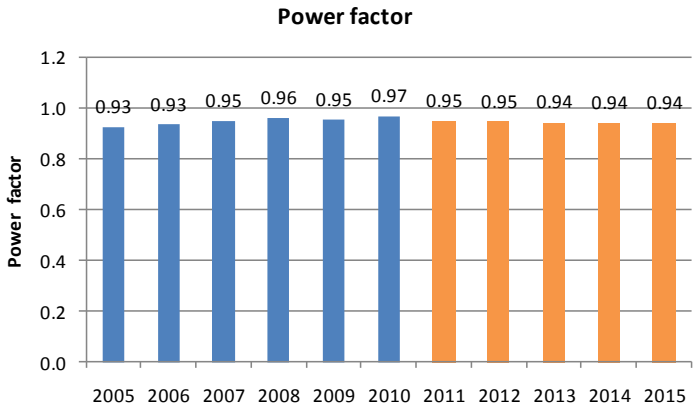
Figure 47 **Adjusted historical and 50% POE demand forecasts, Coburg South ZSS, MW**



Data source: Jemena

ACIL Tasman considers that the power factor applied in the forecast period is consistent with that observed in the historical period. ACIL Tasman therefore considers the MW and MVA forecasts to be consistent with each other.

Figure 48 **Historical and forecast power factor, Coburg South ZSS**



Data source: Jemena

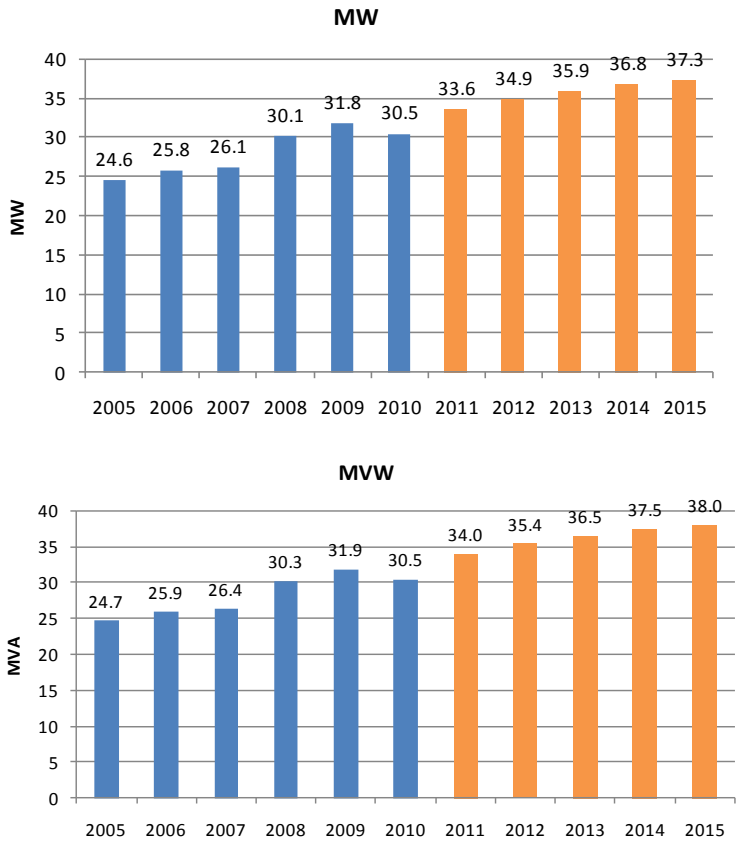
ACIL Tasman considers the demand forecasts for the Coburg South zone substation to be reasonable.

4.4.4 Flemington

Demand, after adjusting for a small number of block loads has grown at a rate of 3.2% p.a. at the Flemington zone substation between 2005 and 2010. In doing so it increased from 24.6 MW to 30.5 MW over the period. Demand growth between 2010 and 2015 is forecast to increase at the comparatively similar rate of 2.7% per annum.

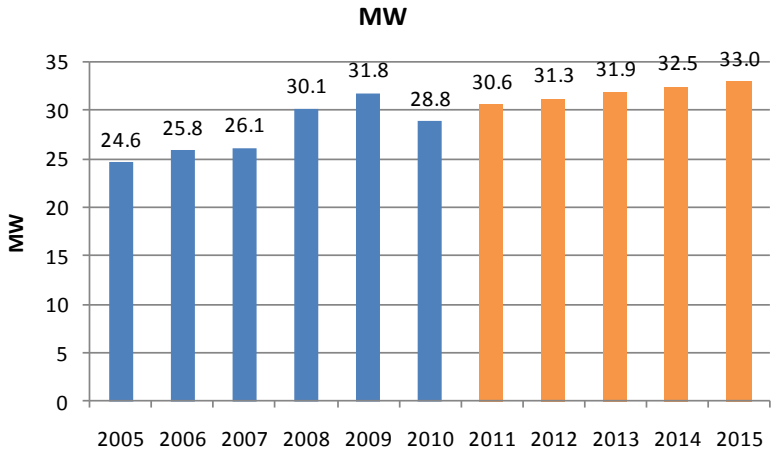
Flemington is located in the inner suburbs of Melbourne within the City of Moonee Valley. It is a well established and old suburb of Melbourne with relatively few opportunities for large scale development. In fact the population within the LGA did not show any growth between the Census' of 2001 and 2006.

Figure 49 **Historical and 50% POE demand forecasts, Flemington ZSS, MW and MVA**



Data source: Jemena

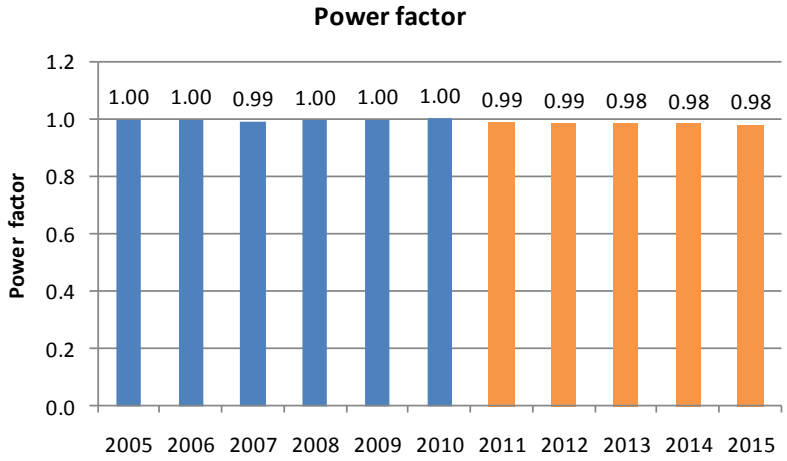
Figure 50 **Adjusted historical and 50% POE demand forecasts, Flemington ZSS, MW**



Data source: Jemena

ACIL Tasman considers that the MVA and MW forecasts, after examining the power factor, are broadly consistent over time.

Figure 51 **Historical and forecast power factor, Flemington ZSS**



Data source: Jemena

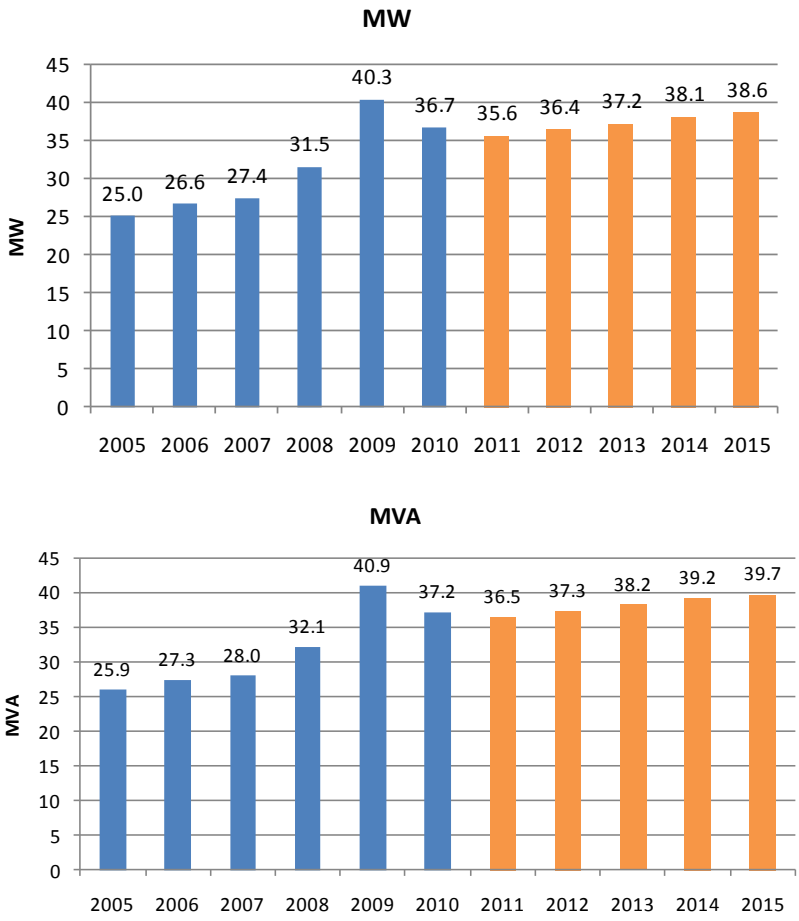
ACIL Tasman considers the demand forecasts for the Flemington zone substation to be reasonable.

4.4.5 Pascoe Vale

Historical load growth at the Pascoe vale zone substation has been rapid, rising from 25 MW in 2005 to 36.7 MW in 2010. This is equivalent to a rate of growth of around 8% per annum and is surprising given that Pascoe Vale is located within the well established and built up LGA of Moreland which has exhibited a slow rate of population growth.

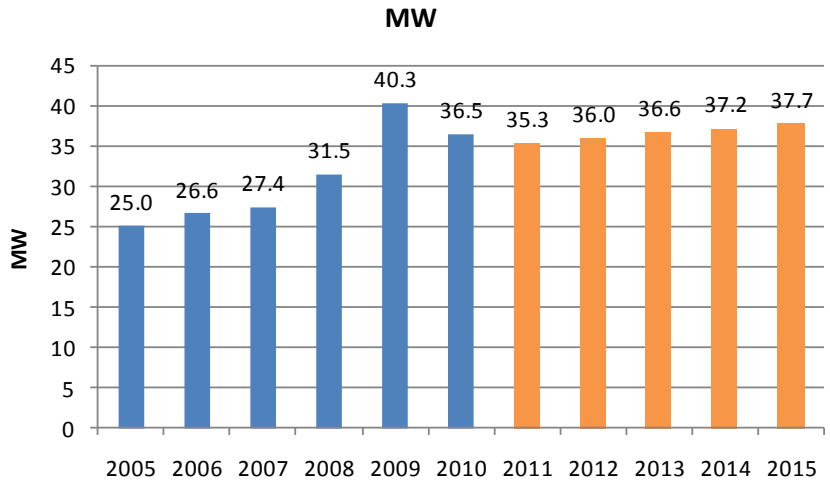
This may be due to permanent transfers or one-off block loads which occurred prior to 2009. However ACIL Tasman has not been able to obtain record of these from Jemena. Despite this, demand is forecast to grow at a much more subdued rate of 1.0% p.a. in the five year s to 2015, which is more reflective of the underlying characteristics of the region. At this rate of growth, demand is forecast to reach 38.6 MW in 2015 from 36.7 MW in 2010 (see Figure 52).

Figure 52 **Historical and 50% POE demand forecasts, Pascoe Vale ZSS, MW and MVA**



Data source: Jemena

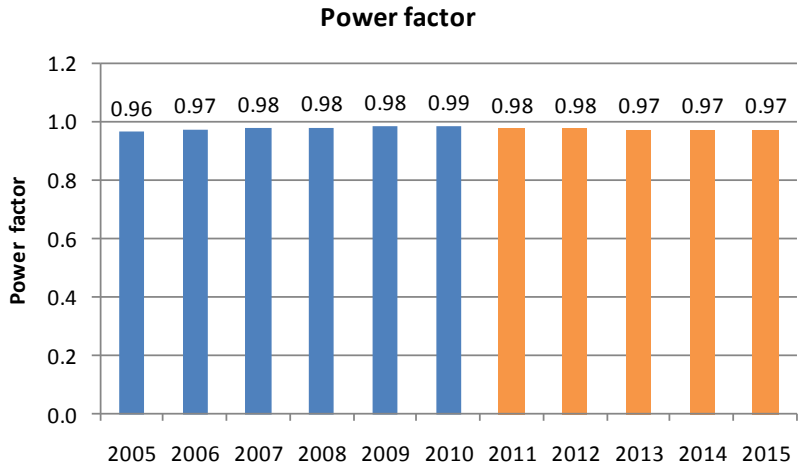
Figure 53 **Adjusted historical and 50% POE demand forecasts, Pascoe Vale ZSS, MW**



Data source: Jemena

The power factor over time is relatively constant, suggesting consistency between the MW and MVA forecasts for the zone substation.

Figure 54 **Historical and forecast power factor, Pascoe Vale ZSS**



Data source: Jemena

Despite the large discrepancy between historical and forecast growth rates at the zone substation, ACIL Tasman considers that the forecasts of demand at the Pascoe Vale are reasonable given the demographic characteristics of the area serviced by the zone substation.

5 Citipower

ACIL Tasman has under instruction from the AER chosen to more closely examine the forecasts of the 7 zone substations shown in Table 19. All are located within or relatively close to the central business district of Melbourne.

Table 19 **Location of zone substations under review in Citipower network**

Station	Code	Address	Suburb
Bouverie/Queensberry	BSBQ	Bouverie Street	Carlton
Docks Area	DA	Footscray Road	West Melbourne
Flinders-Ramsden	FR	Cnr Flinders Lane and Ramsden Place	Melbourne
Little Bourke	JA	Little Bourke Street	Melbourne
McIlraith Place	MP	McIlraith Place	Melbourne
Victoria Market	VM	Between Dudley and Walsh Street	Melbourne
Celestial Avenue	WA	Celestial Avenue	Melbourne

Data source: Citipower

5.1 Population growth in Citipower network

The LGAs comprising the Citipower network are shown in Table 20. The zone substations under assessment are all located within the City of Melbourne. Population growth within the City of Melbourne has historically been very strong, averaging 6.7% per annum in the 5 years between 2001 and 2006. This is due to the increasing trend of people living in the inner city, particularly the establishment of large high rise apartment complexes which have added substantially to the population of inner city Melbourne in recent years.

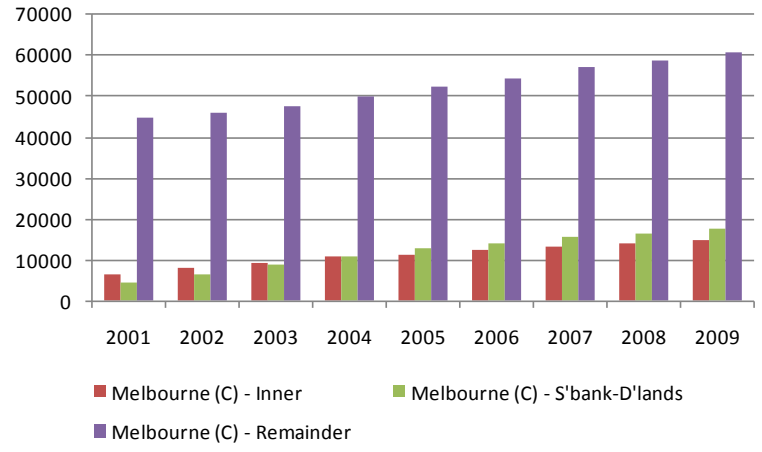
Table 20 **Historical population and growth rates of LGAs in Citipower network**

Council	Contribution	1996	2001	2006	96-01 growth rate	01-06 growth rate	96-06 growth rate
Boroondara (C)	All	144590	150233	153026	0.77%	0.37%	0.57%
Melbourne (C)	All	48560	67784	93746	6.90%	6.70%	6.80%
Yarra (C)	Part	65148	68018	70177	0.87%	0.63%	0.75%
Darebin (C)	Part	121794	123848	128132	0.34%	0.68%	0.51%
Moonee Valley (C)	Part	104849	106116	106041	0.24%	-0.01%	0.11%
Moreland (C)	Part	130093	131359	135209	0.19%	0.58%	0.39%
Port Phillip (C)	Part	73092	80157	86882	1.86%	1.62%	1.74%
Stonnington (C)	Part	84300	87412	90156	0.73%	0.62%	0.67%
Weighted Total		515362	550481	590159	1.33%	1.40%	1.36%

Data source: ABS Census of Population and Housing

An examination of more recent alternative ABS data shows that the trend is continuing. Population growth in the inner city shown in red in Figure 55 has averaged 6.7% between 2005 and 2009. Growth in the Southbank-Docklands precinct averaged 7.6% p.a. over the same period. The remaining parts of the LGA showed slightly slower rates of growth of 3.7% per annum between 2005 and 2009. The overall rate of growth between 2005 and 2009 for the entire LGA was 4.9% per annum. This is significantly higher than that observed in many other parts of Melbourne.

Figure 55 **City of Melbourne population, 2001 to 2009**



Data source: 3218.0 Regional Population Growth, Australia

5.2 Customer breakdown

Despite the large population growth observed and expected within the City of Melbourne, residential customers form only a small proportion of the total

energy consumed at each zone substation. While the Bouverie/Queensberry and Victoria Market zone substations have a significant residential load, the others are nearly entirely commercial. This is to be expected within the Melbourne CBD which is dominated by office buildings.

Table 21 **Breakdown of energy usage by sector, Average between 2006 and 2009**

Zone substation	Commercial	Residential	Industrial
	%	%	%
Bouverie/Queensberry Street (BSBQ)	71.3	28.5	0.1
Flinders/Ramsden (FR)	92.4	7.6	0
Little Bourke (JA)	89.6	7.5	2.9
Victoria Market (VM)	75.5	23.2	1.3

Data source: Citipower

5.3 Block loads and permanent transfers

Both historical and forecast major loads for the selected zone substations within the Citipower network are shown in Table 22 below. The table shows that there are relatively few expected large block loads, with the exception of the Bouverie/Queensberry zone substation which is expecting significant new load from the Royal Children's hospital in 2010 and 2011.

Table 22 **Major block loads in the Citipower network, historical and forecast, MW**

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Station		Historical							Forecast			
Bouverie/Queensberry	BSBQ	0.0	0.0	0.0	0.0	2.6	1.9	4.2	0.0	0.0	0.0	0.0
Docks Area	DA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flinders-Ramsden	FR	0.0	2.7	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Little Bourke	JA	4.8	4.7	4.5	3.2	4.7	3.4	0.0	0.0	0.0	0.0	0.0
McIlraith Place	MP	3.5	7.8	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0
Victoria Market	VM	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Celestial Avenue	WA	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Data source: Citipower load forecasting model

Before any comparison is made between historical and forecast growth rates, any permanent (and temporary) transfers which affect the peaks need to be

removed from the series to allow comparison on a like for like basis. These are shown in Table 23.

Table 23 **Permanent transfers in the Citipower network, historical and forecast, MW**

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Station		Historical						Forecast				
Bouverie/ Queensberry	BSBQ	3.0	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Docks Area	DA	0.0	0.0	-1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flinders-Ramsden	FR	0.0	0.8	2.2	0.0	-6.1	4.6	-4.6	0.0	0.0	0.0	0.0
Little Bourke	JA	0.0	4.0	0.0	-1.4	-4.1	4.0	-4.0	0.0	0.0	0.0	0.0
McIlraith Place	MP	0.0	-0.8	-2.2	0.0	-1.1	6.0	-6.0	0.0	0.0	0.0	0.0
Victoria Market	VM	-3.0	3.0	0.0	0.0	0.0	-6.0	6.0	0.0	0.0	0.0	0.0
Celestial Avenue	WA	1.6	-1.6	0.0	0.0	2.6	-8.6	6.0	0.0	0.0	0.0	0.0

Data source: Citipower load forecasting model

The adjusted and original growth rates are shown in Table 24 below. Growth rates are calculated using the time series commencing in 2006, for which 50% POE temperature corrected values are provided for both the historical and forecast period.

Table 24 **Historical and forecast growth rates at selected zone substations in Citipower network, MW**

Zone substation		Unadjusted		Adjusted	
		historical, 2005 to 2010	forecast, 2010 to 2015	historical, 2005 to 2010	forecast, 2010 to 2015
Bouverie/Queensberry	BSBQ	1.6%	5.0%	-1.9%	3.3%
Docks Area	DA	3.6%	8.0%	3.6%	8.0%
Flinders-Ramsden	FR	5.1%	0.4%	3.5%	2.1%
Little Bourke	JA	8.3%	5.5%	5.1%	8.2%
McIlraith Place	MP	2.2%	1.3%	1.0%	2.6%
Victoria Market	VM	2.8%	6.9%	4.3%	5.2%
Celestial Avenue	WA	-5.1%	5.8%	-2.6%	3.8%
Sum of all non-coincident zone subs		1.6%	2.9%	1.6%	2.9%

Data source: ACIL Tasman calculations

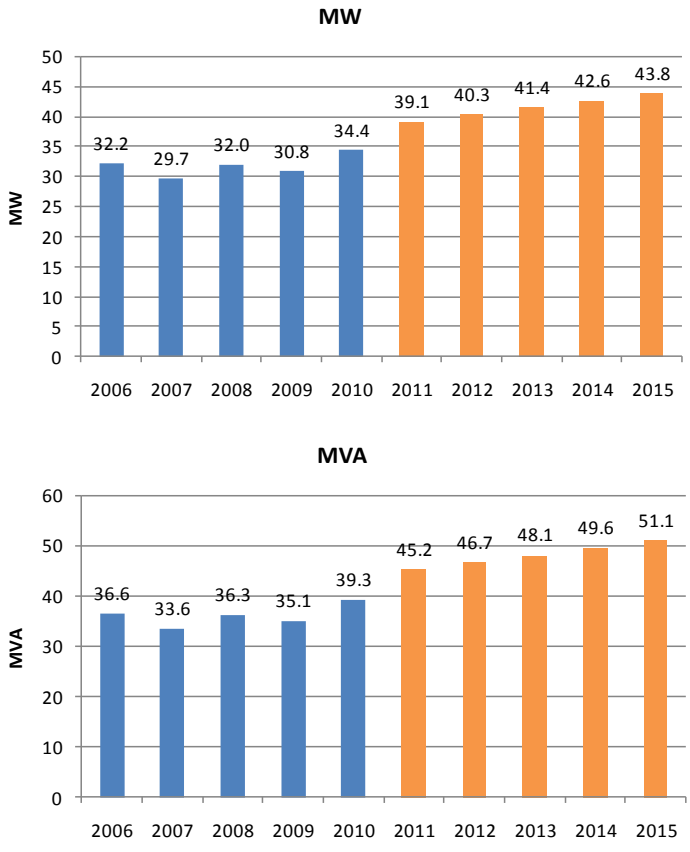
5.4 Zone substation by zone substation assessment

5.4.1 Bouverie/Queensberry Street

Growth at the Bouverie/Queensberry Street zone substation has been slow within the period between 2006 and 2010, increasing from 32 MW in 2006 to 34 MW in 2010. This is equivalent to a growth rate of 1.6% p.a. Citipower expects demand to accelerate in the next regulatory period to 44 MW in 2015.

This is equivalent to an annualised growth rate of 5.0% p.a. between 2010 and 2015. ACIL Tasman notes that a significant component of this growth is due to some significant block loads that are expected to come online during this period. In particular the development of the Royal Children's Hospital in Flemington is expected to add 4 MW to demand in 2010 and 2011.

Figure 56 **Historical and 50% POE demand forecasts, Bouverie/Queensberry Street ZSS, MW and MVA**



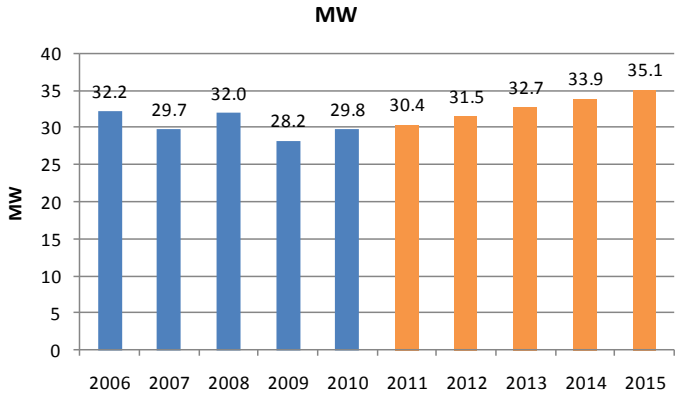
Data source: Citipower

After adjusting for this large load, the growth path of the zone substation appears to follow a more reasonable path, growing at an annualised rate of 3.3% per annum (see Figure 57). This appears to differ significantly from the

adjusted historical growth rate which shows a decline of -1.9% p.a. between 2006 and 2010. However, this has arisen because we have removed a 2.6 MW major load from the time series in 2009, which does not actually appear as a discrete step change in the original series and so should possibly be disregarded and considered to be a part of the underlying trend.

If the 3.3% forecast growth rate is compared to the 1.6% original historical rate of growth, the forecasts do not appear to be unreasonable. This is particularly so considering that the total system level growth of the non-coincident zone substations within the Citipower network is forecast to grow at 2.9% p.a between 2010 and 2015, compared to a growth rate of 1.6% per annum between 2006 and 2010.

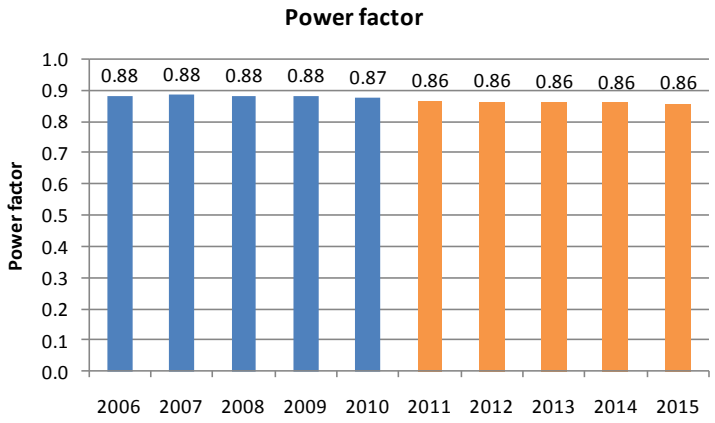
Figure 57 **Adjusted historical and 50% POE demand forecasts, Bouverie/Queensberry Street ZSS, MW**



Data source: Citipower

The historical and forecast power factors aere shown in Figure 58 below. After correcting the original error in the RIN these appear to be consistent, with forecasts denoted in MW broadly in line with the MVA forecasts.

Figure 58 **Historical and forecast power factor, Bouverie/Queensberry Street ZSS**



Data source: Citipower

5.4.2 Docks Area

Between 2006 and 2010, demand at the Docks Area zone substation has grown at a rate of 3.6% per annum, rising from 24.7 MW in 2006 to 28.4 MW in 2010. Over the 5 years between 2010 and 2015, demand is forecast to accelerate to 8% per annum.

Demand at the zone substation is forecast to grow from 28.4 MW to 41.7 MW between 2010 and 2015, compared to growth of only 3.6 MW between 2006 and 2010.

ACIL Tasman raised a query as to the source if the acceleration in the growth rate. Citipower responded by stating that Docks Area received significant new general load applications in each year, and that they added 1.82 MVA to the forecast as new loads in each year to account for these. This value corresponds to the weighted average of new load applications received, adjusted for diversity as well as adding a factor of 0.5 in recognition of undeveloped greenfield sites. ACIL Tasman is prepared to accept this analysis at face value, however we note that new load applications do not necessarily translate into new loads.

If we apply a power factor of 0.83 to the 1.82 MVA, corresponding to the average power factor over the forecast period, then this amounts to about 1.5 MW of new load each year. Allowing for organic growth in existing customers of around 2%, this can be expected to add an additional 0.5 MW to the load growth. Taken together, load can be expected to increase by around 2.1 MW per year over the forecast period. This is in fact approximately what Citipower add in new load over the forecast period, except for a large jump of 4.8 MW between 2010 and 2011.

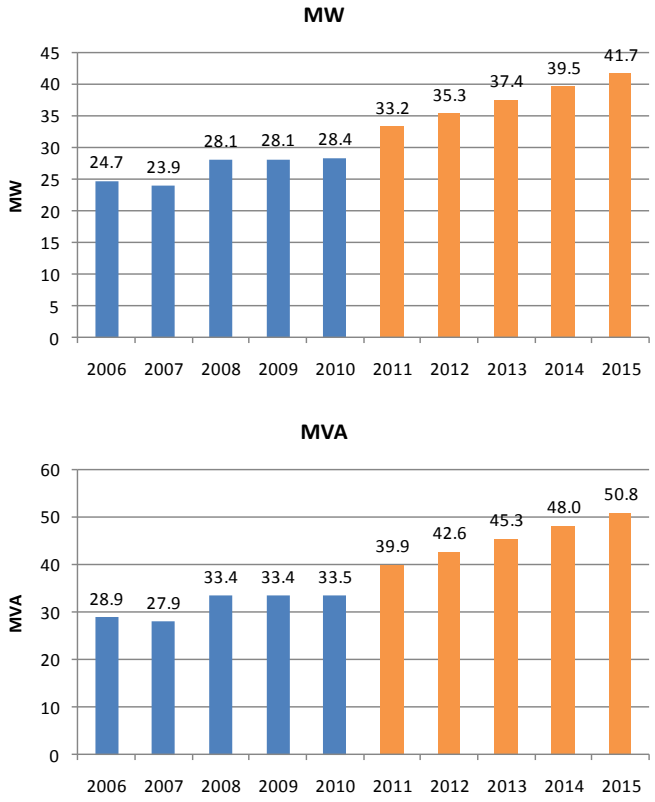
It is ACIL Tasman's view that this step change is responsible to a significant degree for the accelerated growth rate and is excessive, given Citipower's own analysis. If the forecasts were restricted to increase by 2.1 MW per annum through to 2015, from a starting point of 28.4 MW in 2010, then the load would reach 38.9 MW by 2015. This is a reduction of 6.7% on the current 2015 forecast of 41.7 MW.

ACIL Tasman therefore recommends the existing forecasts from 2011 to 2015 shown in Figure 59 be reduced proportionately by 6.7%, thus preserving any cyclical behaviour embedded in the forecasts (ie. the step change between 2010 and 2011 will remain but will be smaller). The MVA forecasts need to be adjusted by the same percentage to preserve consistency between the two sets of forecasts.

After applying this reduction the adjusted rate of annualised growth in the MW forecasts between 2010 and 2015 is 6.4% per annum. This is still a significantly faster rate of growth compared to that observed historically at the zone substation and gives considerable weight to Citipower's expectations of strong future growth in new loads.

ACIL Tasman also notes that a rate of growth of 6.4% p.a versus historical growth of 3.6% is also consistent with the acceleration in growth observed across the entire Citipower network during the forecast period. We therefore consider this rate of growth to be reasonable.

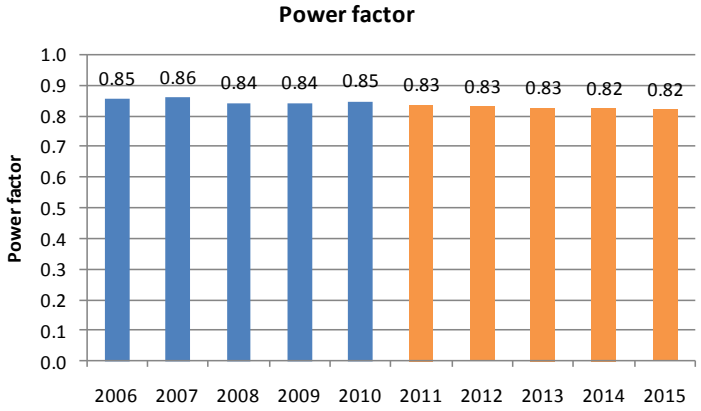
Figure 59 **Historical and 50% POE demand forecasts, Docks Area ZSS, MW and MVA**



Data source: Citipower

ACIL Tasman notes that, in response to an AER query regarding a large step change in the forecast power factor compared to those observed historically, Citipower made an adjustment to the historical MVA forecasts to correct a referencing error. After the correction is applied, the forecast power factors are generally consistent with those observed historically despite declining slightly. ACIL Tasman accepts that the forecast power factors are reasonable and that the MW and MVA forecasts are consistent.

Figure 60 **Historical and forecast power factor, Docks Area ZSS**



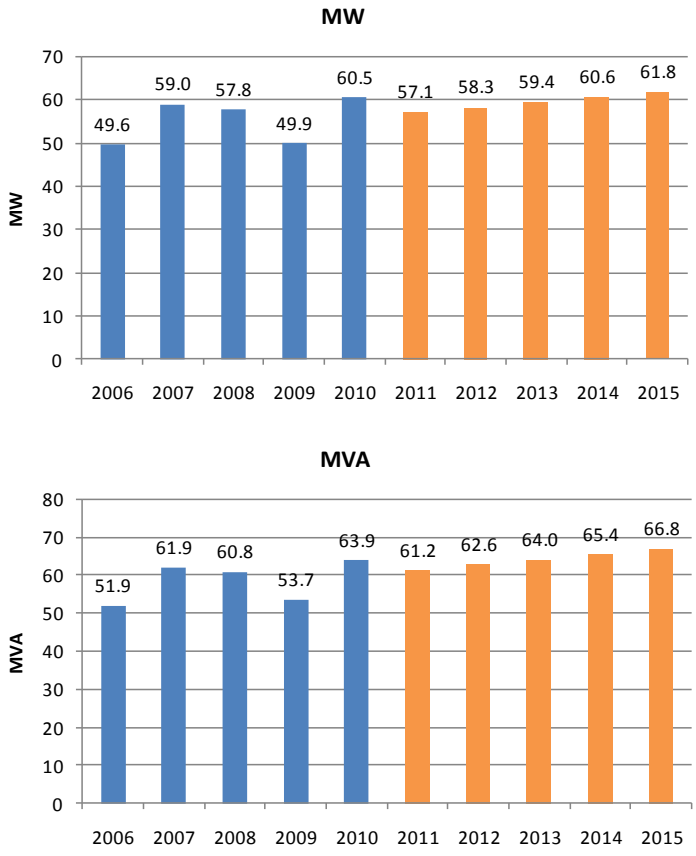
Data source: Citipower

5.4.3 Flinders/Ramsden

The Flinders/Ramsden zone substation has grown from 49.6 MW in 2006 to 60.5 MW in 2010. This is equivalent to an annualised growth rate of 5.1% p.a. Citipower then forecasts relatively slow growth at the zone substation between 2010 and 2015.

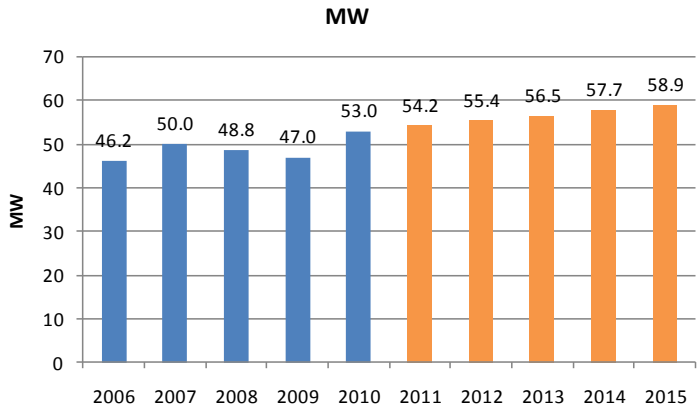
After adjusting for major block loads in 2006 and 2007, as well as a transfer into the zone substation of 2.2 MW in 2007 and several other large transfers from 2009 onwards, we find that the underlying historical rate of growth is considerably slower than it first appears to be. Growth between 2006 and 2010 after adjustments for one off major events reduces the forecast growth rate to 3.5% per annum. The adjusted historical and forecast time series is shown in Figure 62. Growth in the forecast period for the adjusted series is 2.1% per annum, which is in our view reasonable.

Figure 61 **Historical and 50% POE demand forecasts, Flinders/Ramsden ZSS, MW and MVA**



Data source: Citipower

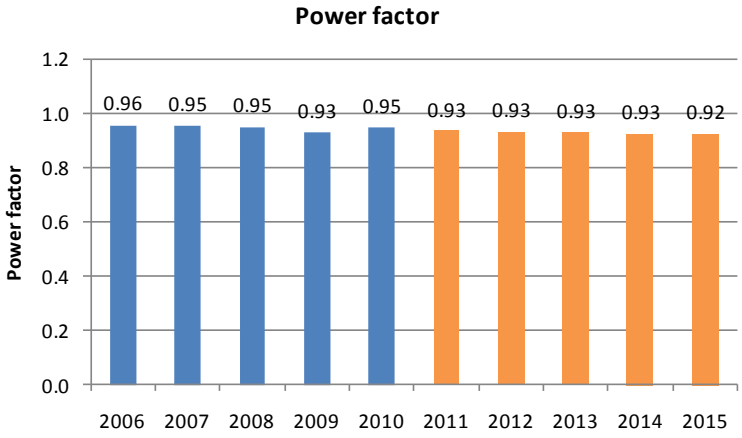
Figure 62 **Adjusted historical and 50% POE demand forecasts, Flinders/Ramsden ZSS, MW**



Data source: Citipower

Although there is a slight decline in the power factor over time in the forecast period compared to the historical data, ACIL Tasman is satisfied that the MW forecasts are broadly consistent with the MVA denoted forecasts.

Figure 63 **Historical and forecast power factor, Flinders/Ramsden ZSS**



Data source: Citipower

5.4.4 Little Bourke

The Little Bourke zone substation is growing at a considerable rate of growth between 2006 and 2010, growing from 73 MW in 2006 to 100.4 MW in 2010, a growth rate equivalent to over 8% per annum. This rate of growth is impacted by some block loads and several transfers of 4 MW between 2006 and 2010.

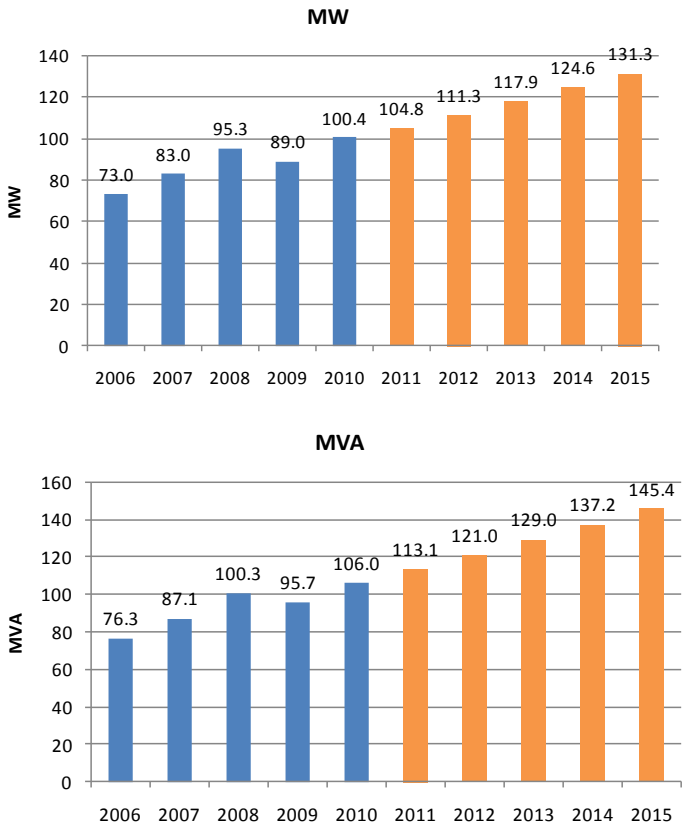
After correcting for these movements, the historical growth rate becomes 5.1% over the same period. The adjusted series is shown in Figure 65. The adjusted forecast rate of growth between 2010 and 2015 is 6.3% per annum, indicating an acceleration in the underlying rate of growth compared to the historical period. ACIL Tasman considers there are two underlying reasons for this.

First, an examination of the historical block loads in Table 22 shows that they occurring in every year between 2006 and 2010 and could be regarded as part of the underlying trend rather than one-off loads that are not likely to be repeated. In this instance, the true historical underlying growth rate will lie closer to the unadjusted rate rather than the adjusted rate.

Second, even if the block loads are treated as one-off items and are removed from the analysis, the increase in the adjusted forecast growth rate compared to the adjusted historical growth rate is not inconsistent with the general increase in growth rates for the sum of all non-coincident zone substations between the historical and forecast period.

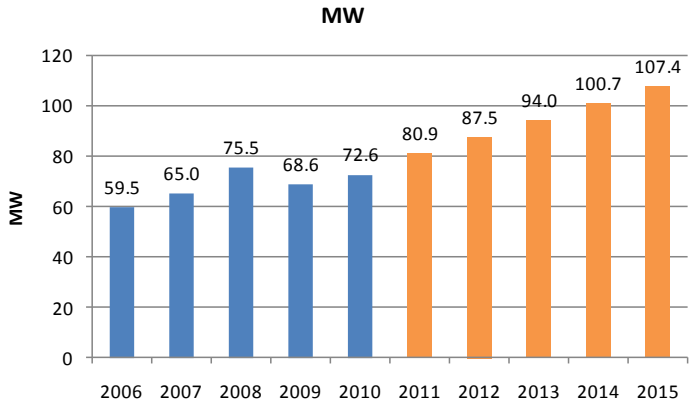
ACIL Tasman considers the MW forecasts for the Little Bourke zone substation to be reasonable.

Figure 64 **Historical and 50% POE demand forecasts, Little Bourke ZSS, MW and MVA**



Data source: Citipower

Figure 65 **Adjusted historical and 50% POE demand forecasts, Little Bourke ZSS, MW**



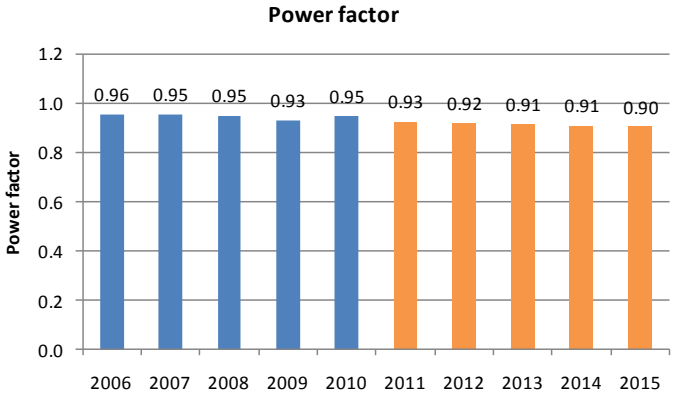
Data source: Citipower

ACIL Tasman expressed some concerns regarding a general decline in the forecast power factor, which is not evident in the historical period (see Figure 66). The average power factor for the period from 2006 to 2010 is 0.95, whereas Citipower apply a power factor of 0.93 in 2011 and allow this to

decline to 0.90 in 2015. Citipower responded to a query from the AER on this matter by stating that a 12 MVar capacity bank has recently been installed at the Little Bourke Street zone substation which is responsible for the improved power factor from 2011 onwards.

ACIL Tasman therefore concludes that the MW and MVA forecasts for the Little Bourke zone substation are reasonable.

Figure 66 **Historical and forecast power factor, Little Bourke ZSS**



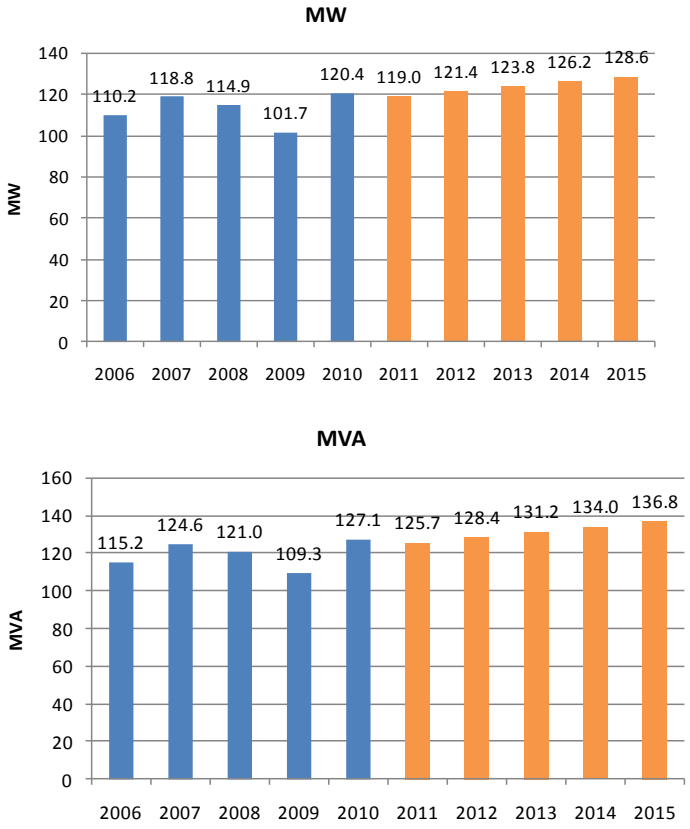
Data source: Citipower

5.4.5 McIlraith Place

The zone substation at McIlwraith Place has experienced a relatively slow rate of historical growth. Demand has increased from 110.2 MW in 2006 to 120.4 MW in 2010, equivalent to a rate of growth of 2.2% per annum.

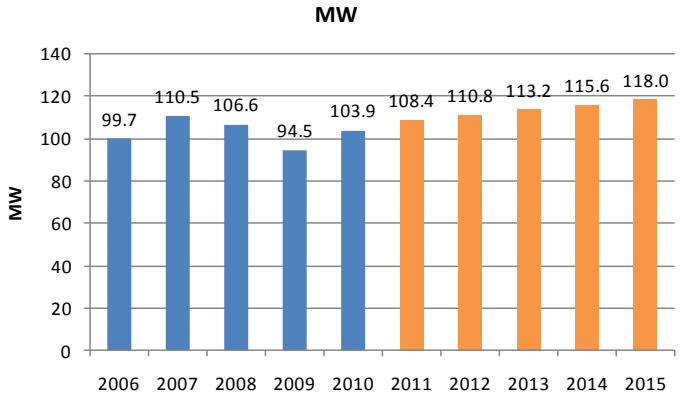
After correcting for some large block loads, particularly in 2006 and 2010, as well as permanent transfers , the adjusted historical growth rate becomes 1.0% per annum (see Table 24). This compares to a forecast growth rate between 2010 and 2015 of 2.6% per annum. Given that growth remains slow at the zone substation, although faster than that observed historically, the forecasts are generally consistent with an acceleration in the rate of demand growth across the entire Citipower network. ACIL Tasman therefore considers that the demand forecasts for the McIlraith Place zone substation are reasonable.

Figure 67 **Historical and 50% POE demand forecasts, McIlraith Place ZSS, MW and MVA**



Data source: Citipower

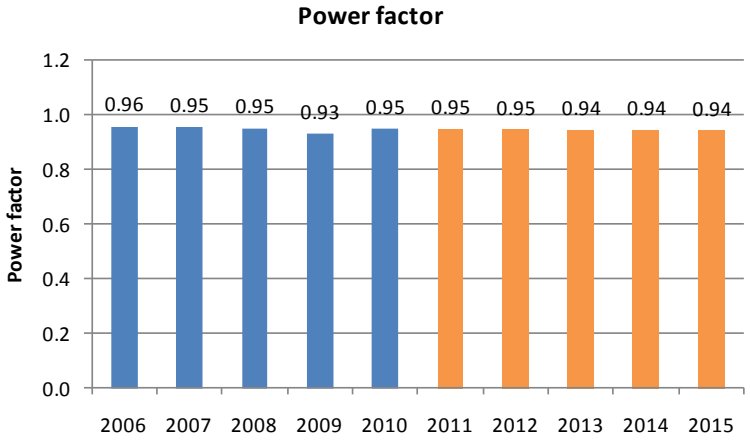
Figure 68 **Adjusted historical and 50% POE demand forecasts, McIlraith Place ZSS, MW**



Data source: Citipower

The power factor over time at the zone substation has remained relatively constant. ACIL Tasman is therefore satisfied that the MW and MVA forecasts are consistent.

Figure 69 **Historical and forecast power factor, McIlraith Place ZSS**



Data source: Citipower

ACIL Tasman considers that the demand forecasts for the McIlwraith zone substation are reasonable.

5.4.6 Victoria Market

Temperature corrected demand at the Victoria Market zone substation has grown from 58.4 MW in 2006 to 74.8 MW in 2009, before dipping substantially to 65.2 MW in 2010. Demand is then forecast to grow to 91.1 MW by 2015 (see Figure 70).

ACIL Tasman expressed some concern that the dip observed in 2010 is highly unusual, particularly as the data are all expressed on a temperature corrected basis. This is different to what is observed at the other zone substations that have been assessed where some of them exhibit a dip in 2009. This is not surprising given that the sum of all non-coincident demands across all Citipower zone substations actually shrank by 2.6% in 2009 and is consistent with a slowing in economic conditions at that time. However, in 2010 the system actually increases by 1.4%. The observed dip in 2010 at the Victoria Market zone substation is therefore out of step with the rest of the forecasts. In response to a query from the AER, Citipower indicated that the dip observed in 2010 was exacerbated by a large transfer of 6 MW away from the zone substation to be reversed before the following year.

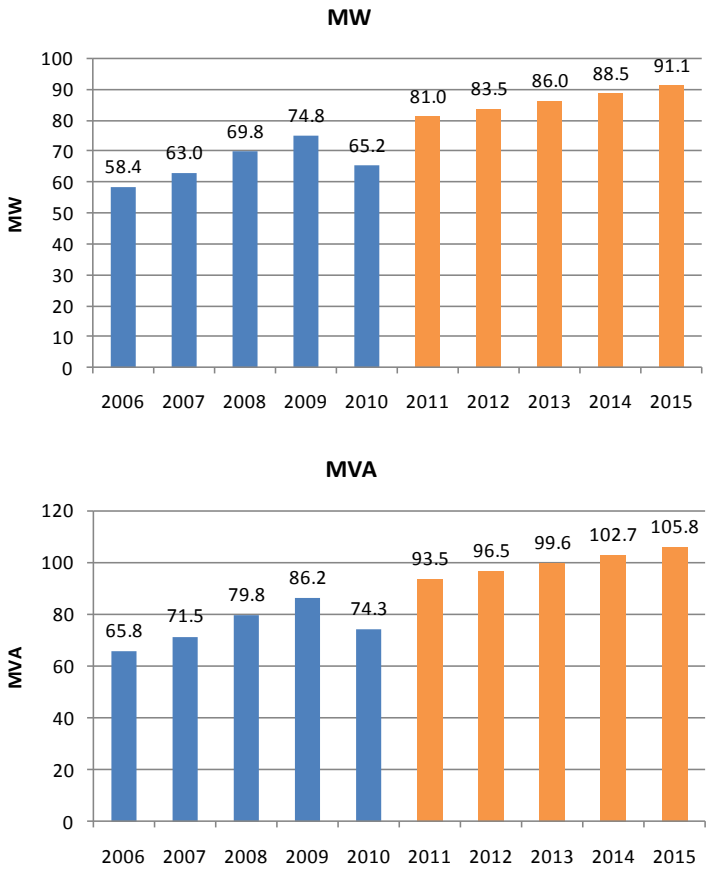
The dip in 2010 has the effect of reducing the historical rate of growth substantially, and then increasing the rate of growth in the forecast period, as the 2010 data point is used as the base from which calculations are made.

After adjusting for transfers and major block loads, historical growth at the Victoria Market zone substation was 4.3% per annum from 2006 to 2010 compared to an unadjusted historical rate of growth of 2.8%. The unadjusted

forecast rate of growth was 6.9% p.a. After adjustments this declines to 5.2% per annum. ACIL Tasman considers that this forecast rate of growth in broadly consistent with adjusted historical growth and the fact that the Citipower network is growing considerably faster over the forecast period compared to history.

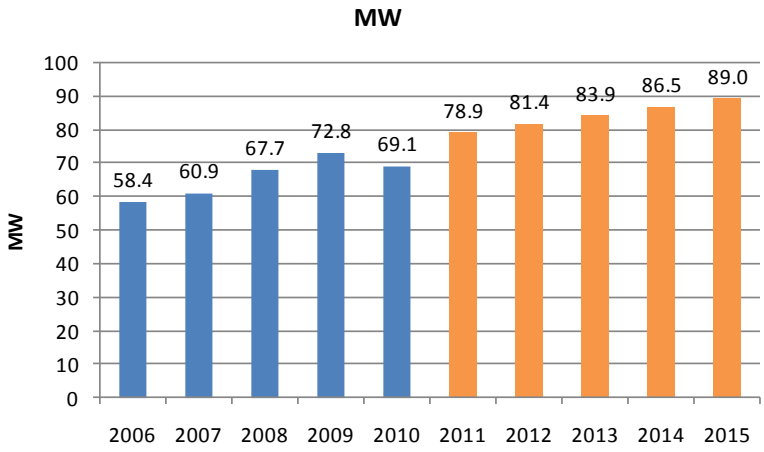
ACIL Tasman therefore considers Citipower's MW forecasts for the Victoria market zone substation to be reasonable.

Figure 70 **Historical and 50% POE demand forecasts, Victoria Market ZSS, MW and MVA**



Data source: Citipower

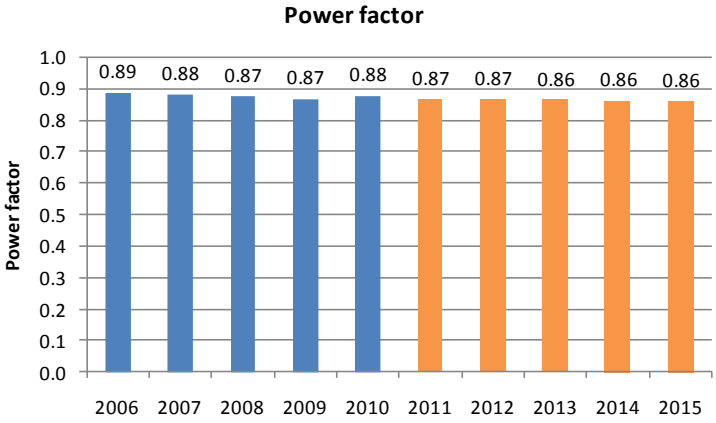
Figure 71 **Adjusted historical and 50% POE demand forecasts, Victoria Market ZSS, MW**



Data source: Citipower

ACIL Tasman considers the power factors over the historical and forecast periods to be consistent (Figure 72).

Figure 72 **Historical and forecast power factor, Victoria Market ZSS**



Data source: Citipower

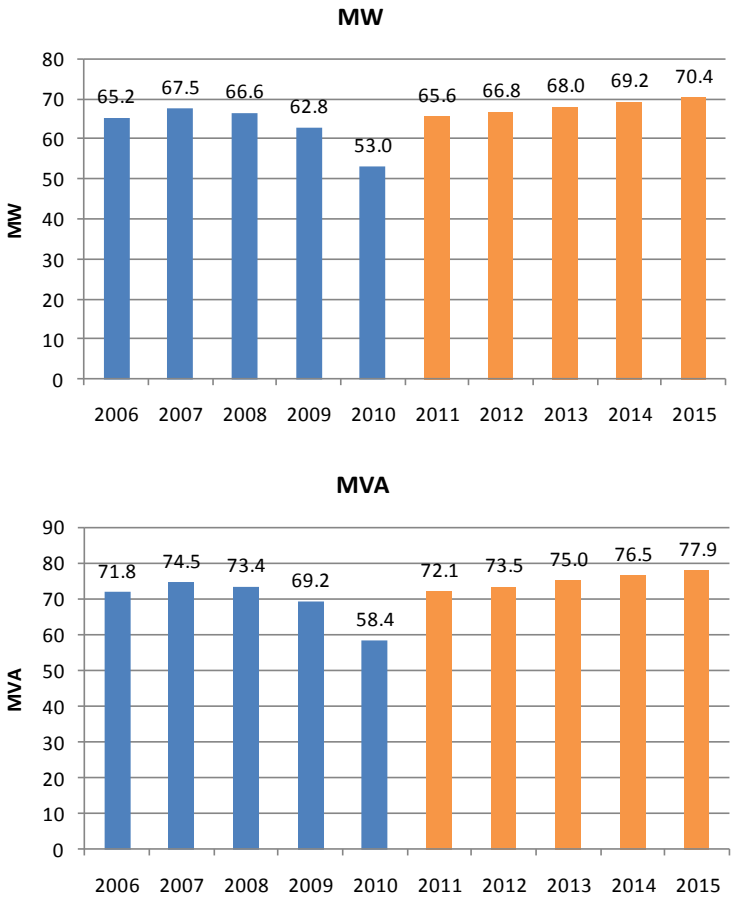
5.4.7 Celestial Avenue

The zone substation at Celestial Avenue exhibits behaviour similar to the Victoria Market zone substation. Demand at the zone substation remained relatively stable between 2006 and 2008 at around 66 MW, before declining in 2009 to 63 MW, in line with the entire system, and then dropping again to 53 MW in 2010.

ACIL Tasman sought further clarification from Citipower on the likely causes of this decline. If this apparent step change can be considered temporary as Citipower appear to be treating it, then the forecasts for the next regulatory

period are reasonable. However, if the 2010 figure is to be treated as a permanent step change then ACIL Tasman considers that the forecasts for the next regulatory period are almost certainly too high. In response to a query from the AER, Citipower responded by stating that the dip in 2010 is largely the result of a 6 MW transfer away from the zone substation to be reversed in the following year.

Figure 73 **Historical and 50% POE demand forecasts, Celestial Avenue ZSS, MW and MVA**



Data source: Citipower

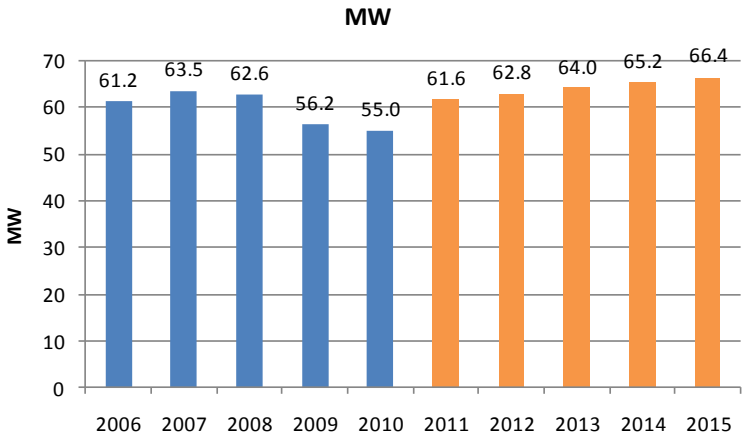
Before any adjustments, the historical and forecast growth rates shown in Table 24 appear to be highly distorted, with demand shrinking at a rate of 5.1% per annum between 2006 and 2010, and then growing rapidly at an average rate of 5.8% per annum between 2010 and 2015.

Adjustments made for block loads and transfers reduce the impact of the large dip in 2010, however they do not change the underlying trend to a significant degree (see Figure 74).

After adjustments for transfers and block loads, the historical annualised growth rate increases to -2.6% per annum (from -5.1%). The adjusted forecast rate of growth then declines relative to the unadjusted rate to 3.8% per annum.

On this basis and the absence of any major future block loads, ACIL Tasman therefore considers the forecast rate of growth for the Celestial Avenue zone substation to be too high relative to the observed historical series.

Figure 74 **Adjusted historical and 50% POE demand forecasts, Celestial Avenue ZSS, MW**



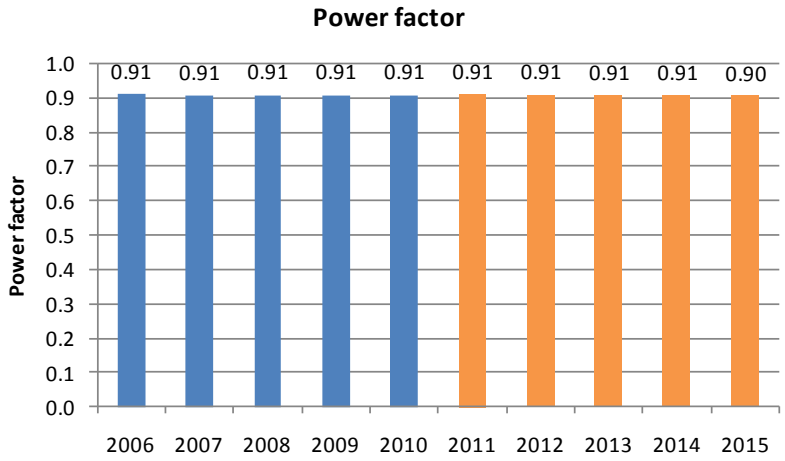
Data source: Citipower

The question then arises as to what is an appropriate correction. ACIL Tasman recommends that in the absence of further information the forecasts be permitted to increase back up to 67.5 MW by 2015. This value corresponds to the peak demand observed during the historical period in 2007.

A maximum demand of 67.5 MW in 2015 corresponds to a reduction of 4.1% on the original forecast for 2015. To preserve any cyclical effects, ACIL Tasman therefore recommends that the forecast for each year from 2011 onwards in be reduced proportionally by 4.1%. This adjustment needs to be applied to both the MW and MVA forecasts.

Based on the historical and forecast power factors, and after correcting for an error in the original series provided by Citipower, ACIL Tasman is satisfied that the MW and MVA forecasts are consistent with each other.

Figure 75 **Historical and forecast power factor, Celestial Avenue ZSS**



Data source: Citipower

6 Powercor

The zone substations within the Powercor network that have selected for further assessment are shown in Table 25 below.

Table 25 **Location of zone substations under review in Powercor network**

Zone substation	Address	Suburb
Cobram East (CBE)	Cnr Chapel and Healy Roads	Cobram East
Eaglehawk (EHK)	Prouses Road	North Bendigo
Geelong East (GLE)	St Albans Road	Geelong East
Woodend (WND)	Parkers Lane, Woodend	Woodend
Waurn Ponds (WPD)	Ghazeeporee Rd	Waurn Ponds

Data source: Powercor

6.1 Customer breakdown at selected zone substations

These zone substations represent a diverse group with some such as Woodend and Waurn Ponds having a predominantly residential customer base, others such as Geelong East and Eaglehawk being predominantly commercial, and Cobram East, which although predominantly commercial has a higher than average industrial load.

Table 26 **Customer breakdown by energy use at selected Powercor zone substations, Percent**

Station	Commercial	Industrial	Residential	Rural
	%	%	%	%
Cobram East (CBE)	53	20	22	5
Eaglehawk (EHK)	49	11	38	2
Geelong East (GLE)	52	8	39	0.4
Woodend (WND)	31	2	65	2
Waurn Ponds (WPD)	39	1	60	0.4

Data source: Powercor

6.2 Population growth in the Powercor network

The historical population growth rates in some of the LGAs and Statistical divisions are shown in Table 27. The Powercor network is comprised of both very rapidly growing local government areas such as Melton and Wyndham, which grew at annualised rates of 8.7% p.a. and 5.7% p.a respectively in the period between 2001 and 2006, as well as some mature areas where growth has been more subdued.

Table 27 **Historical growth rates of LGAs in Powercor network**

Council	Contribution	1996	2001	2006	96-01 growth rate	01-06 growth rate	96-06 growth rate
Brimbank (C)	Part	149131	163472	167970	1.85%	0.54%	1.20%
Hobsons Bay (C)	Part	74164	80432	80868	1.64%	0.11%	0.87%
Maribyrnong (C)	Part	59029	59770	63352	0.25%	1.17%	0.71%
Melton (S)	Part	39169	51823	78448	5.76%	8.65%	7.19%
Barwon	All	228238	241446	254502	1.13%	1.06%	1.10%
Western District	All	96398	96289	97852	-0.02%	0.32%	0.15%
Central Highlands	All	129828	135263	140619	0.82%	0.78%	0.80%
Wimmera	All	50132	49093	47546	-0.42%	-0.64%	-0.53%
Mallee	All	85331	87471	88797	0.50%	0.30%	0.40%
Loddon	All	150543	158365	165868	1.02%	0.93%	0.97%
Wyndham (C)	All	73897	85176	112160	2.88%	5.66%	4.26%
Goulburn	Part	178606	186950	194662	0.92%	0.81%	0.86%
Weighted total		1064416.5	1124326.5	1199994	1.10%	1.31%	1.21%

Data source: ABS Census of Population and Housing

6.3 Block Loads and permanent transfers

As has been done throughout this report we have sought to identify both major block loads and permanent transfers over time in order to adjust for and remove any biases that may arise in the underlying demand time series. These are shown in Table 28.

There are a number of significant one-off block loads at the Eaglehawk and Waurn Ponds zone substations. At Eaglehawk, 4.5 MW of additional load is expected as the redevelopment of the Bendigo Base hospital comes online.

Waurn Ponds, located in the Greater Geelong region is expected to have significant additional load arising from a major residential development as well as a major upgrade to the Waurn Ponds shopping centre.

Table 28 **Forecast major block loads in the Powercor network**

		2010	2011	2012	2013	2014	2015
Zone substation			Forecast				
Cobram East	CBE	0	0	0	0	0	0
Eaglehawk	EHK	0	0	0	4.5	0	0
Geelong East	GLE	0.6	0.8	1.8	0	0.9	1
Woodend	WND	0.0	0.0	0.0	0.0	0.0	0.0
Waurn Ponds	WPD	8.5	4.25	5.15	4	3	1

Data source: Powercor

Few permanent transfers are planned at the selected zone substations apart from a 2.5 MW transfer away from Geelong East from 2014 and some small transfers away from Waurn Ponds which occurred in 2009 and 2010.

Table 29 **Planned transfers in the Powercor network**

Zone substation		2009	2010	2011	2012	2013	2014	2015
				Forecast				
Cobram East	CBE	0	0	0	0	0	0	0
Eaglehawk	EHK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geelong East	GLE	2.0	0.0	0.0	0.0	0.0	-2.5	0.0
Woodend	WND	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waurn Ponds	WPD	-1.0	-2.0	0.0	0.0	0.0	0.0	0.0

Data source: Powercor

The historical and forecast rates of growth for both the original series and the series adjusted for block loads and permanent transfers is shown in Table 30 below. In the case of Cobram East and Woodend there are no block loads or planned permanent transfers so that the original and adjusted series growth rates are identical.

It is also important to note that the overall rate of growth for the sum of all non-coincident demands for the whole Powercor network declined from 4.5% per annum between 2005 and 2010 to 3.2% per annum for the forecast period. In assessing each individual zone substation ACIL Tasman notes that there should be a tendency for the rate of growth to be slower in the next regulatory period compared to the past.

Table 30 **Historical and forecast growth rates at selected zone substations in Powercor network, MW**

Zone substation	Unadjusted		Adjusted	
	historical, 2005 to 2010	forecast, 2010 to 2015	historical, 2005 to 2010	forecast, 2010 to 2015
CME Cobram East	2.9%	2.8%	2.9%	2.8%
EHK- Eaglehawk	2.9%	6.5%	2.9%	2.6%
GLE Geelong East	6.1%	1.7%	4.0%	1.1%
WND Woodend	1.3%	4.2%	1.3%	4.2%
WPD Waurn Ponds	3.4%	8.2%	3.7%	2.2%
Sum of all zone substations	4.5%	3.2%	4.5%	3.2%

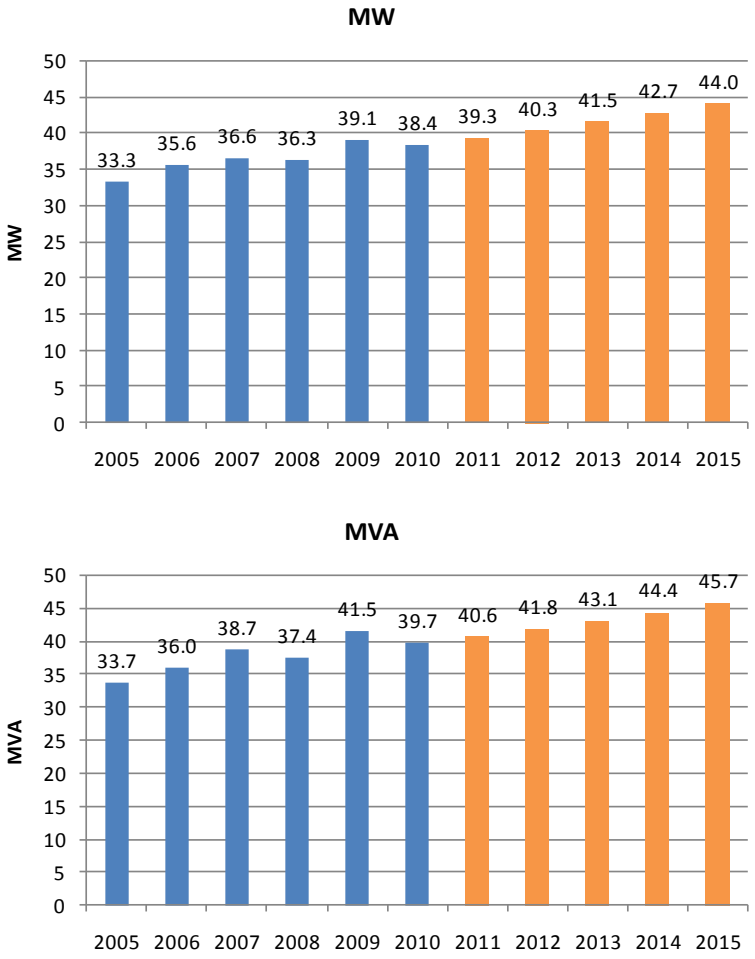
Data source: Powercor

6.4 Zone substation by zone substation assessment

6.4.1 Cobram East

The Cobram East zone substation is located in the Goulbourn Valley region in northern Victoria. While population growth in the Goulbourn statistical division has been slow, averaging only 0.8% per annum between the census of 2001 and 2006, growth prospects around the town of Cobram and Yarrawonga which are serviced by the zone substation are significantly brighter than for the whole Goulbourn region.

Figure 76 **Historical and 50% POE demand forecasts, Cobram East ZSS, MW and MVA**



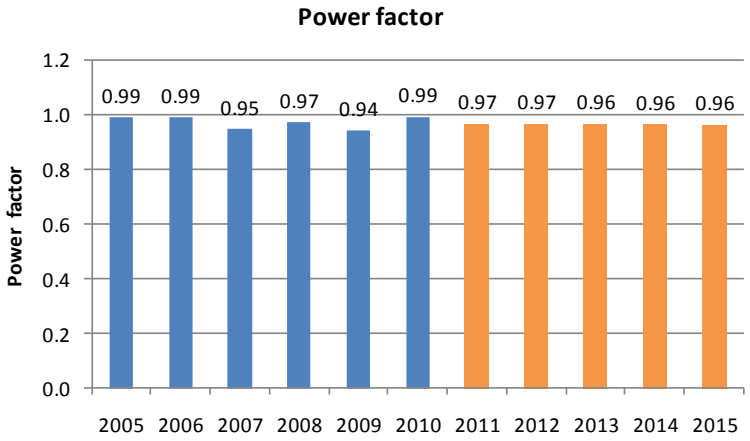
Data source: Powercor

Powercor forecasts demand to reach 44 MW by 2015. This is equivalent to an annualised rate of growth of 2.8% between 2010 and 2015. This is comparable to the annualised historical rate of growth observed at the zone substation of 2.9% per annum. Powercor in response to the AER information request have

also cited the Moira Shire's Cobram Strategy Plan, in which population growth in the area is expected to be around 2 to 3% per annum out to 2025[4].

Based on the growth prospects of the towns of Cobram and Yarrawonga, and forecast demand growth rates for the zone substation which are similar to those observed historically, ACIL Tasman considers the demand forecasts for Cobram East to be reasonable. An examination of the power factor over time shows that the MW and MVA forecasts are also generally consistent over time.

Figure 77 **Historical and forecast power factor, Cobram East ZSS**



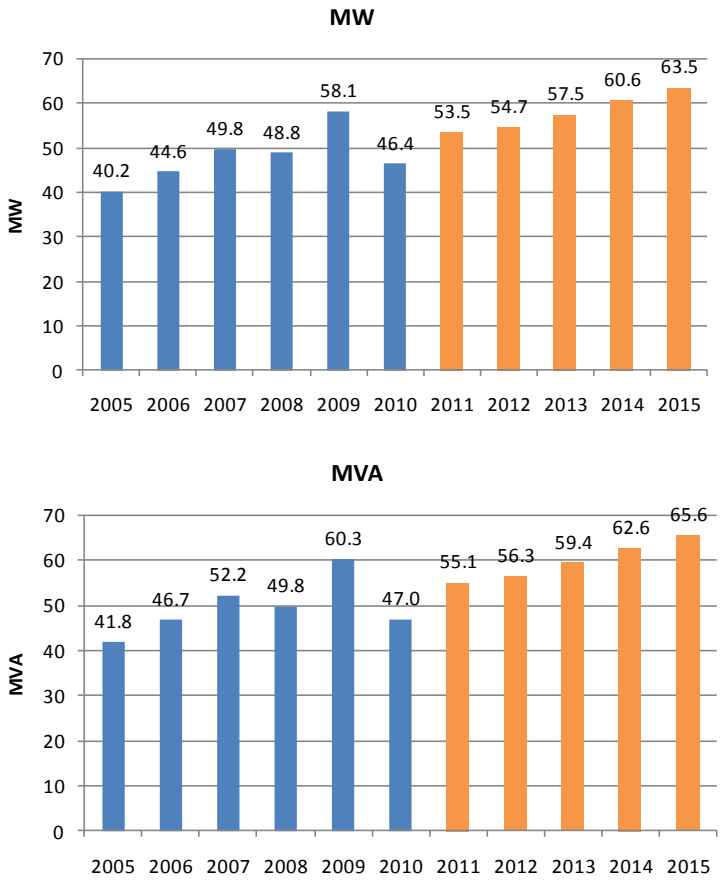
Data source: Powercor

6.4.2 Eaglehawk

Eaglehawk is located in Central Victoria to the north of Bendigo. Demand at the zone substation increased from 40.2 MW in 2005 to 58.1 MW in the extreme year of 2009, before falling back to 46.4 MW in 2010. Between 2005 and 2010, the annual rate of growth at the zone substation averaged 2.9% per annum. Demand growth in then forecast to accelerate from 46.4 MW in 2010 to 63.5 MW in 2015, which is equivalent to a growth rate of 6.5% per annum.

[4] Cobram 2025, Cobram Strategy Plan, November 2007, prepared by Coomes Consulting Group for Moira Shire http://www.moira.vic.gov.au/OpenSol/OSHomepage.nsf/WEBView/C751E06BDAB754B7CA2575D200043E71/$FILE/PL11+001+Strategy+Plan+Final+Report.pdf

Figure 78 **Historical and 50% POE demand forecasts, Eaglehawk ZSS, MW and MVA**



Data source: Powercor

While this growth rate looks very high, it is important to note that there was a significant new load of 4.5 MW added to the forecast in 2013 which corresponds to the redevelopment of the Bendigo Base hospital. Powercor have stated that they have only added 4.5MW to the forecast when the customer has indicated that the load is likely to be 9 MW. Powercor have therefore applied some degree of conservatism in their assessment of the block load.

Furthermore, Powercor have advised that the 2011 forecast has been substantially increased due to the de-commissioning of the Anne Caudle hospital co-generator. The effect of this co-generator's closure will be to add 6.2 MW to the forecast from 2011. ACIL Tasman treats this load as a major block load which we remove from the time series to enable better analysis of the underlying trend over time (see Figure 79).

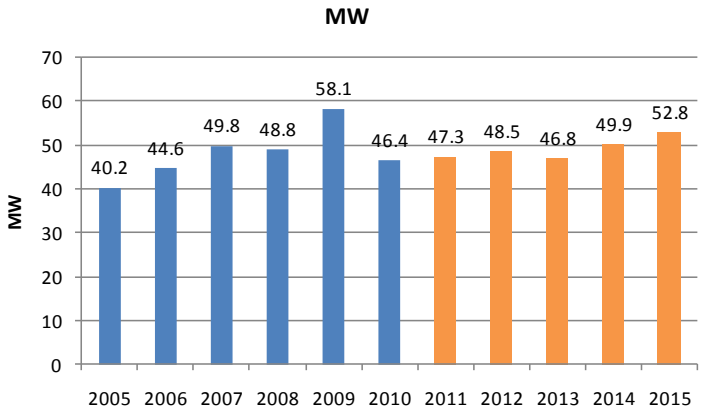
After we adjust for these one-off loads, the forecast growth rate declines to 2.6% per annum between 2010 and 2015. This is broadly consistent to that observed historically. Powercor have stated in their response to an AER

request for information that the future rate of growth in demand at the Eaglehawk zone substation is likely to be fast relative to that observed in the past. This is because the Eaglehawk supply area has been targeted by the City of Greater Bendigo as a location for future residential and industrial development.

ACIL Tasman believes that there is likely to be a considerable lag before the Council's plans result in new developments and notes that there have been no major residential or industrial developments factored into the forecasts apart from the Bendigo hospital redevelopment.

Despite this, as the forecast rate of growth does not deviate significantly from that observed historically, ACIL Tasman is satisfied that the forecasts provided by Powercor for the Eaglehawk zone substation are reasonable.

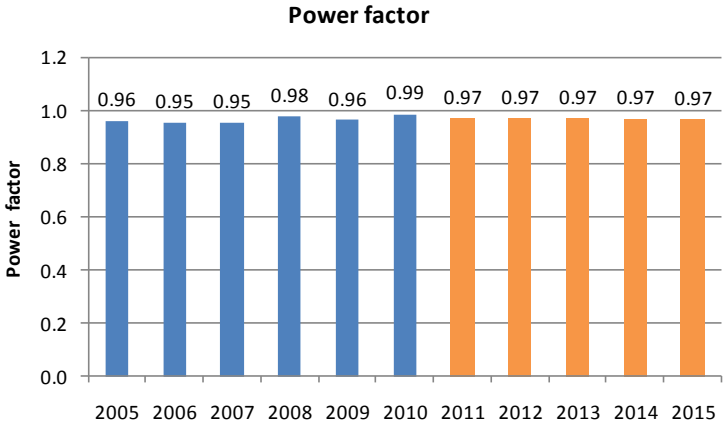
Figure 79 **Adjusted historical and 50% POE demand forecasts, Eaglehawk ZSS, MW**



Data source: Powercor

It is ACIL Tasman's view that the power factors applied to derive the MVA forecasts over the forecast period are reasonable, and that the two sets of forecasts are consistent.

Figure 80 **Historical and forecast power factor, Eaglehawk ZSS**



Data source: Powercor

6.4.3 Geelong East

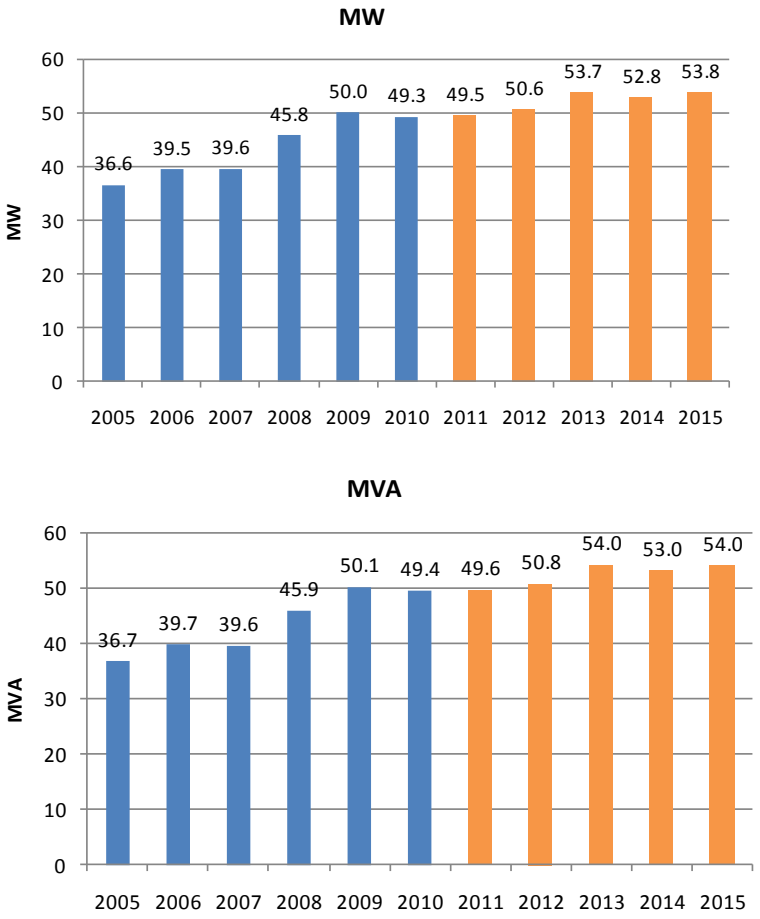
Demand at the Geelong East zone substation has grown consistently from 37 MW in 2005 to 49 MW in 2010. Demand at the zone substation is forecast to continue growing, reaching 54 MW by 2015 (see Figure 81).

The historical growth rate over the five year period to 2010 was 6.1% p.a. compared to a growth rate of 1.7% during the forecast period. After adjusting for block loads and transfers the growth rates become 4.0% p.a and 1.1% p.a respectively for the historical versus forecast period.

ACIL Tasman notes that part of the step change evident between 2007 and 2008 was driven by transfers to the zone substation from elsewhere in the Powercor network.

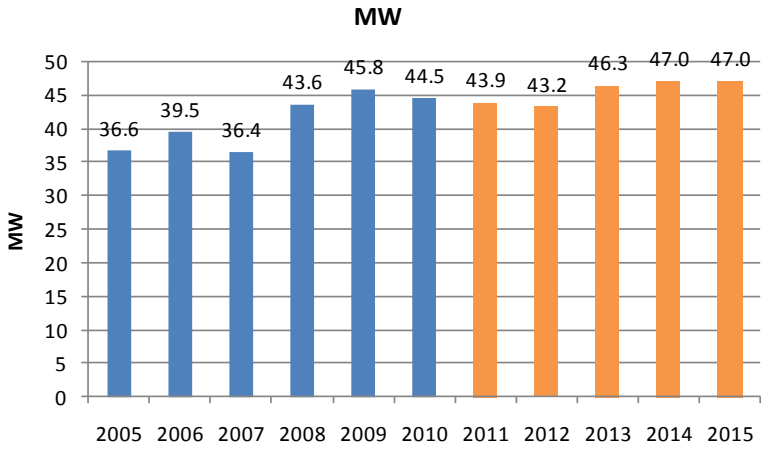
ACIL Tasman considers the Powercor MW forecasts for the Geelong East zone substation to be reasonable.

Figure 81 **Historical and 50% POE demand forecasts, Geelong East ZSS, MW and MVA**



Data source: Powercor

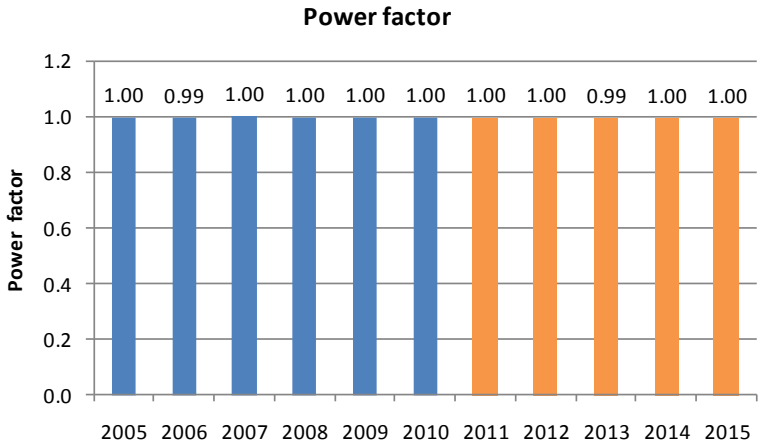
Figure 82 **Adjusted historical and 50% POE demand forecasts, Geelong East ZSS, MW**



Data source: Powercor

Powercor have applied a power factor that is consistent with the historical behaviour of the series. The MW and MVA forecasts are therefore consistent.

Figure 83 **Historical and forecast power factor, Geelong East ZSS**



Data source: Powercor

6.4.4 Waurn Ponds

Demand at the Waurn Ponds zone substation has grown fom 56 MW in 2005 to 66 MW in 2010. This is equivalent to a growth rate of 3.4% per annum. Demand is forecast to grow to 97.4 MW in 2015, equivalent to a growth rate of 8.2% per annum from 2010. This represents a significant acceleration in growth compared to historical behaviour (see Figure 84).

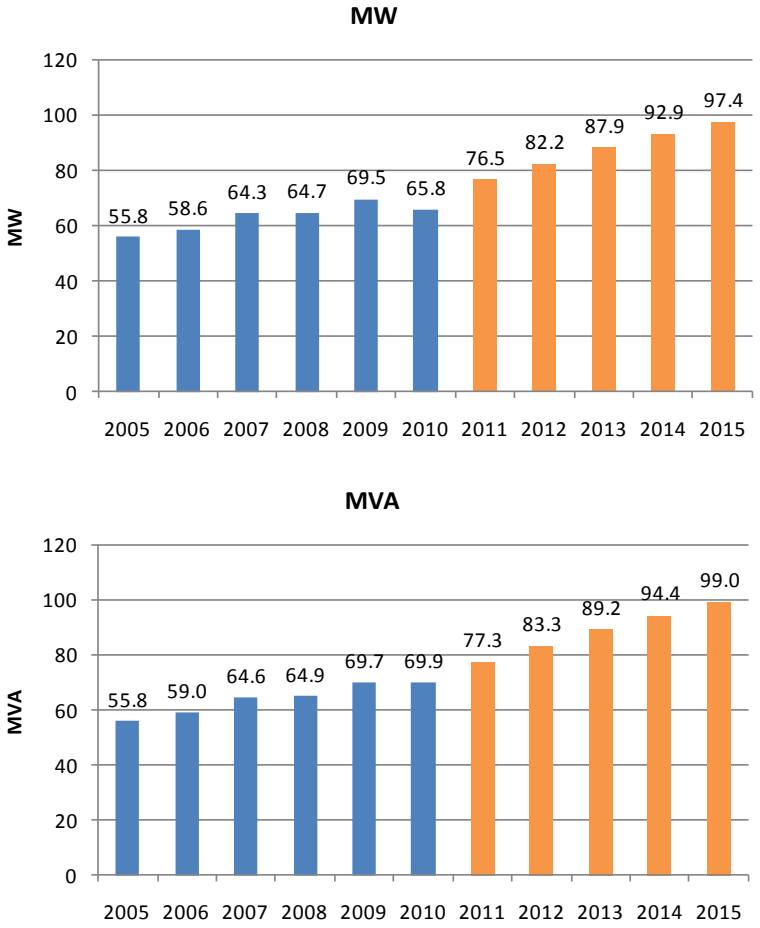
While at first glance this may appear excessive it is important to note that the Waurn Ponds zone substation services an area with significant greenfield potential for development. Located on the southern outskirts of Geelong, significant new load is planned from the residential development of the Armstrong Creek precinct, which is expected to accommodate up to 55,000 to 60,000 people when the development is completed in 11 years. The population of Waurn Ponds as at the 2006 census was only 2,326.

Powercor has factored in significant block loads from this development. Between 2010 and 2015, 11 MW of additional load have been added to demand from the Armstrong Creek development alone. Moreover, there is an additional 1.2 MW of load forecast to arise from the Wandana Heights estate residential development, between 2010 and 2013.

The Waurn Ponds zone substation is also projected to face increased commercial and industrial demand of 4.6 MW in 2010 from a number of industrial projects as well as 5.5 MW from the extension of the Waurn Ponds shopping Centre in 2012/13. There were also 3 MW of permanent transfers

away from the zone substation in 2009 and 2010, which have the effect of making historical growth appear slower than it was in reality.

Figure 84 **Historical and 50% POE demand forecasts, Waurn Ponds ZSS, MW and MVA**

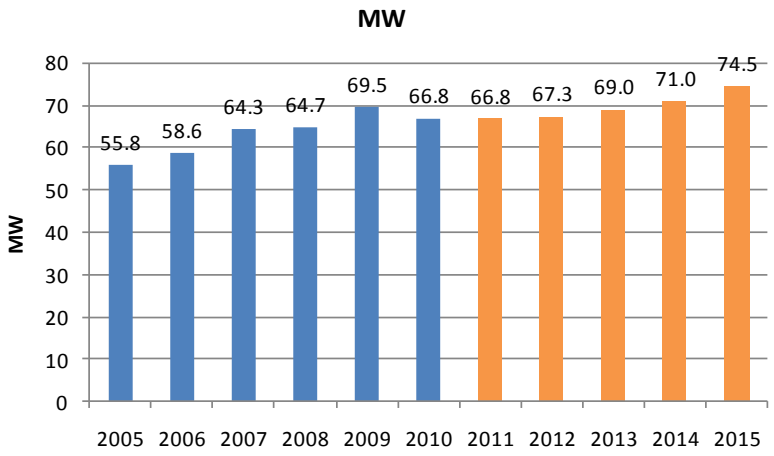


Data source: Powercor

After adjusting for the new major loads as well as permanent transfers, the growth in the forecast series more closely resembles that observed in the historical one (see Figure 85). After adjustments, growth at the Waurn Ponds zone substation averaged 3.7% per annum between 2005 and 2010. Between 2010 and 2015, the forecast growth rate of the adjusted series is 2.2% p.a. This is broadly consistent with the overall decline in growth between the historical and forecast period for all of the zone substations comprising the Powercor network.

ACIL Tasman therefore considers that the forecasts for the Waurn Ponds zone substation are reasonable given what we know about the characteristics of the region serviced by the zone substation and the pipeline of future development activity.

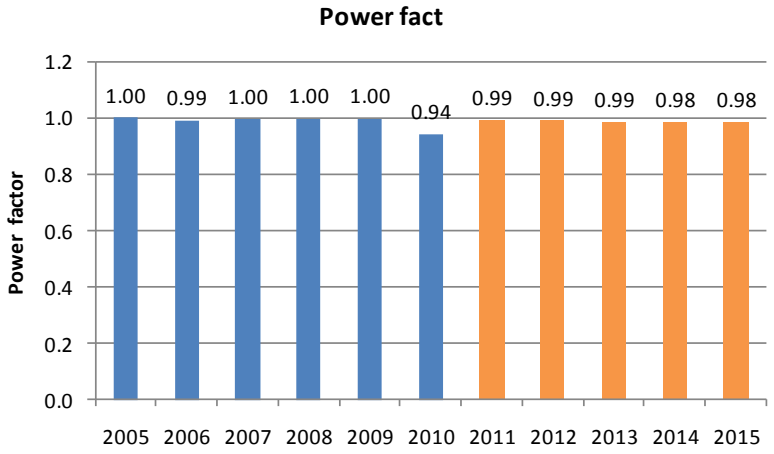
Figure 85 **Adjusted historical and 50% POE demand forecasts, Waurn Ponds ZSS, MW**



Data source: Powercor

The power factor between the MW and MVA forecasts is shown in Figure 86 below. It is ACIL Tasman's view that the power factor applied in the forecast period is reasonable and consistent with historical behaviour.

Figure 86 **Historical and forecast power factor, Waurn Ponds ZSS**



Data source: Powercor

6.4.5 Woodend

Demand at the Woodend zone substation increased from 47.5 MW to 50.7 MW between 2005 and 2010 (see Figure 87). This is equivalent to an annualised rate of growth of 1.3% p.a.

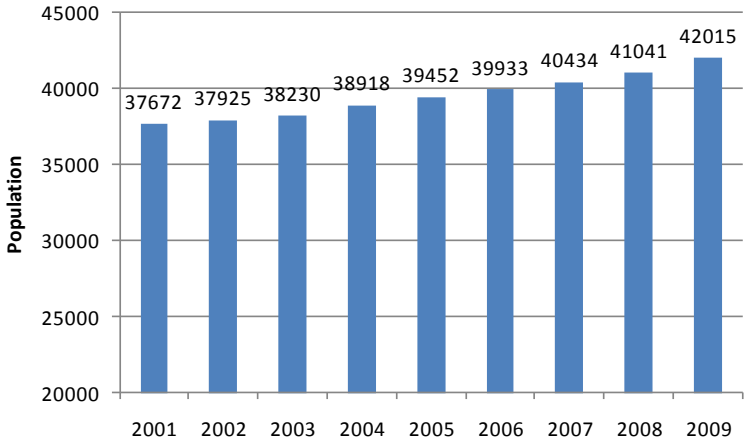
In the next regulatory period demand is forecast to increase from 50.7 MW in the 2010 base year to 62.2 MW in 2015. This is equivalent to an annualised rate of growth of 4.2% p.a. in the next regulatory period and represents

significant increase in growth over the historical period. There are no major block loads or permanent transfers embedded in the time series from 2009 onwards. Prior to 2009 we do not have any record of actual block loads or transfers.

Woodend is located in the Shire of Macedon ranges local government area. The Macedon Ranges Shire has shown a reasonably strong rate of population growth increasing from 39,452 in 2005 to 42,015 in 2009. This is equivalent to a rate of growth of 1.6% per annum. The population of Macedon ranges is also projected to increase to 57,595 by 2036[5]. Population growth in the Macedon Ranges is partly driven by the strong growth of Melbourne as it offers an attractive alternative to living in the city, but is still within daily commuting distance.

In anticipation of future growth the Shire Council has proposed an expansion of the Gisborne area by rezoning some areas for residential, commercial and industrial[6].

Figure 87 **Population of Macedon Ranges Shire council, 2001 to 2009**



Data source: 3218.0 Regional Population Growth, Australia

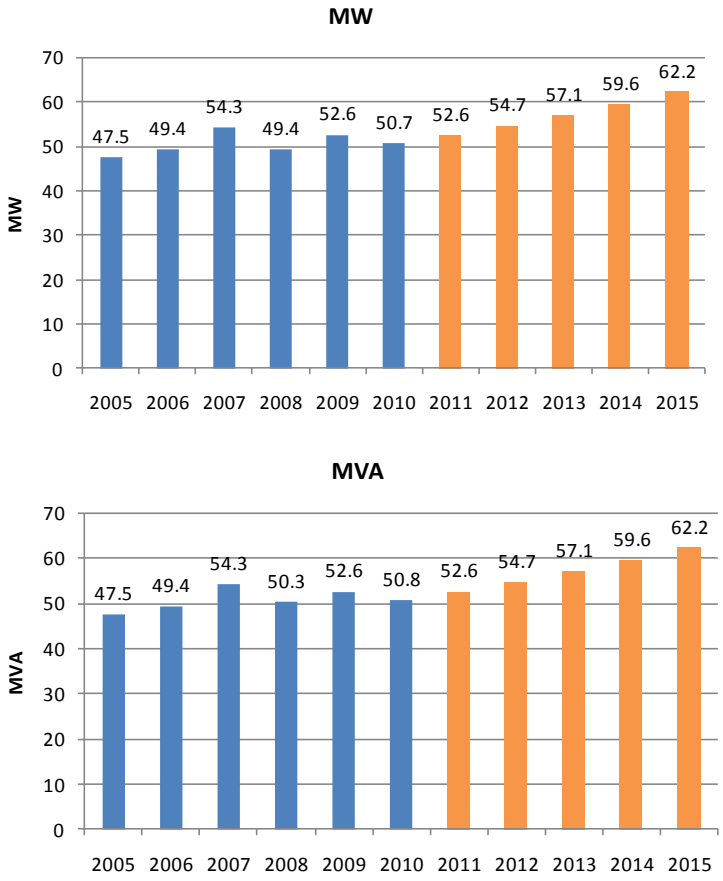
In response to an information request from the AER, Powercor have indicated that the Woodend zone substation as a predominantly morning winter peaking station has been subject to a load management program to remove hot water related peaks and smooth out the load profile, over the historical period. This has the effect of reducing the historical rate of growth. Powercor expects future load growth to be driven by split system air conditioning systems and

[5] See http://www.mrsc.vic.gov.au/Files/AACOMBINEDMRShireAndTownProjections2006-2036.pdf

[6] Details of the Gisborne development plan can be found at http://www.mrsc.vic.gov.au/Files/P3_GisborneODP_OutlineDevelopmentPlan.pdf

cooking loads. As a result, the zone substation will begin peaking in the early evenings thus removing the impact of hot water load management. Future demand is therefore expected to start growing again in line with population growth and increasing disposable incomes.

Figure 88 **Historical and 50% POE demand forecasts, Woodend ZSS, MW and MVA**

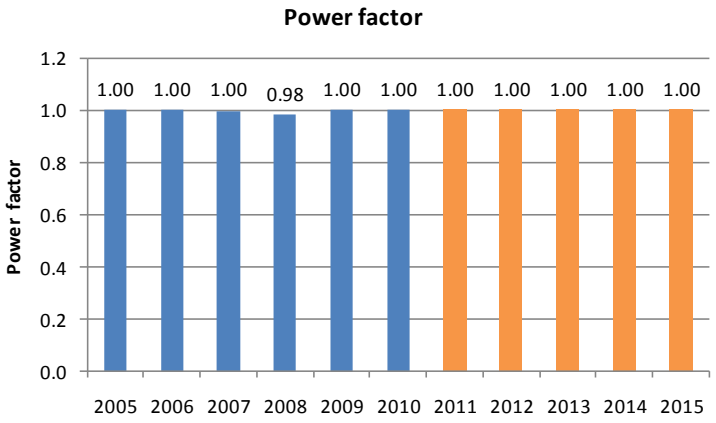


Data source: Powercor

ACIL Tasman considers that the solid population growth of 1.6% p.a. within the Macedon Ranges LGA and the Shire Council's proposed expansion plans for the Gisborne area are not inconsistent with an annualised rate of growth of around 4%. Given that demand growth for existing connections could be of the order of 2 to 2.5% per annum, and if household formation occurs at the same rate of growth as the overall population historically, that is 1.6% per annum, then ACIL Tasman considers that a rate of demand growth somewhere around 4% is not unreasonable. ACIL Tasman therefore believes that the forecasts for the Woodend zone substation are reasonable.

The power factor at the zone substation shown in Figure 89 is relatively constant over time indicating that the MW and MVA forecasts for the zone substation are consistent.

Figure 89 **Historical and forecast power factor, Woodend ZSS**



Data source: Powercor

A Curriculum Vitae

A.1 Paul Hyslop, Project Director and peer review

Paul Hyslop is Chief Executive Officer of ACIL Tasman. Paul has twenty years experience in the energy sector with particular involvement in electricity, gas and water. He has worked in a broad range of areas including business management, business development, mergers and acquisitions, business regulation, energy market development and regulation and power system operation.

Paul has held senior executive roles at the Queensland electricity generator, CS Energy (2006-08), the US based independent power producer, Edison Mission Energy (1997-2005), and at Snowy Hydro (1996-97) and was also employed at ACIL Tasman as a Principal Consultant in (2005-06). During the period 1990-96 he was employed at Hydro Tasmania where he was responsible for the operation of the Tasmanian power system. This included responsibility for managing the transmission of power and operation of the Tasmanian transmission network

At CS Energy Paul was responsible for business development, fuel and water including coal and gas. He led a number of successful developments including gas field farm in arrangements with Arrow Energy, Metgasco and Mosaic. He also led the negotiation of a number of long term coal, gas and water contracts.

While at Edison Mission Energy as Vice President Marketing and Trading for the Asian Pacific region, Paul led the commercial development of the greenfield gas fired power station, Valley Power in the Latrobe Valley. He also led the commercial teams on a number of other developments and acquisitions including the acquisition of the Edison Mission Energy's controlling stake in Contact Energy in New Zealand. Contact Energy had a range of power stations including gas, geothermal and hydro. Paul was also responsible for Edison Mission Energy's electricity trading and risk management operation in Australia which he setup and led over the period 1997 to 2004.

While at Snowy Hydro, Paul was responsible for establishing the electricity trading function including interfacing the trading function with the schemes water management practices and constraints. This included managing constraints imposed by downstream water users.

During his time with the Hydro Tasmania, Paul was responsible for the operation of the power system which included all generation and transmission which included system load forecasting.

Paul was the inaugural chair of the National Generator's Forum during the critical period prior to and during the start of the National Electricity Market and served on a number of market committees relating to various matters including, transmission planning, pricing and regulation, ancillary services and market governance. This included the design and development of trading instruments for energy, ancillary services and interregional transmission rights.

Paul Hyslop holds a variety of formal qualifications including degrees in Electrical Engineering, Arts (political science), Economics, Applied Finance and has completed an MBA. He is also part way through a Masters degree in Economics.

A.2 Jim Diamantopoulos – Econometric modelling and forecasting, Melbourne

Jim is a Senior Consultant in ACIL Tasman's Melbourne office.

He has a strong background in the application of economic, financial and econometric modelling techniques in the analysis of economic problems and issues. Since joining ACIL Tasman, Jim has worked on a range of modelling projects in the energy, transport, water, agriculture and other sectors.

Most recently, Jim was involved in a project for a large DNSP to construct a simulation model of electricity peak demand and energy for the South East Queensland region. The model allows for the analysis of the impact of changes in carbon emissions policies, MRET, electricity prices, trends in appliance energy efficiency and market penetration of various appliances to estimate the impact on both peak summer and winter load and annual energy sales. The model also considers the impact of demand side management initiatives and assesses the likely impact of changes in building efficiency standards, photovoltaic cells and solar hot water systems. Because the model also maps out key economic relationships between demand and economic activity, the model will also be a useful tool to assess the impact of the current financial and economic crisis on peak electricity demand and total energy sales.

In a separate project, Jim critically reviewed summer and winter peak demand and energy forecasting methodology. He developed several methodological improvements, particularly relating to the DNSP's approach to temperature correction or normalisation. As part of the project he applied a multiple regression and Monte Carlo modelling approach to generate 10 year system level annual summer and winter peak day forecasts at the 10 and 50 POE level. Additional analysis was also conducted at the zone substation, bulk supply and connection point level and further methodological improvements were identified for the client.

Recently, Jim was engaged by the WA Office of Energy to create a suite of Excel based simulation models that enable the user to analyse the economics of a range of gas network reticulation options. Options analysed included the development of Greenfield/Brownfield LNG and LPG reticulation options, and the extension of a natural gas pipeline. Capital and operating costs for each of the reticulation options were constructed based on a range of assumptions and the models were solved for a customer per unit gas price that generated a predetermined rate of return to the service provider.

Other relevant projects Jim has been involved in include:

- Econometric analysis and modelling of residential electricity demand for the Australian Greenhouse Office
- Forecasting urban water demand as part of a pricing submission for the Lower Murray Urban and Rural Water Authority.
- Analysis of the relative competitiveness of geothermal energy against other sources of electricity generation.
- Analysis of the financial and technical performance of Malaysia's electricity providers against their international counterparts
- A major study commissioned by the Smart Water Fund, involving the development of a survey of water use by industrial users, application of econometric methods to estimate the price elasticity of demand for water for industrial users and a policy analysis of available pricing options promoting water conservation.

Jim holds a Master of Economics degree from Monash University, specialising in econometrics, a Bachelor of Economics degree with Honours, and a Graduate Diploma of Applied Finance and Investment.

A.3 Jeremy Tustin, Project Manager, Melbourne

Jeremy Tustin is a senior consultant in ACIL Tasman's Melbourne office. He has a degree in Economics from the University of Adelaide. His background is in competition and consumer protection and economic regulation, in particular in the energy and water sectors.

Jeremy has expertise in the National Electricity Market. In the electricity sector, he has advised on and prepared submissions relating to issues such as congestion management, appropriate mechanisms of support for renewable electricity generation and energy efficiency.

Jeremy's energy background includes significant experience in greenhouse and renewable policy. He represented South Australia on the National Emissions Trading Taskforce, which was the joint taskforce of Australian States and Territories that was first to propose a cap and trade emissions trading system

for Australia. In this area, Jeremy and his team developed and interpreted models of the impact an emissions trading scheme would have on South Australia and in developing a mechanism for offsets. Jeremy was also closely involved with the development of South Australia's solar feed-in law.

In relation to energy efficiency, Jeremy developed a reporting methodology for the South Australian Government's target to improve the energy efficiency of its buildings. He also coordinated interdepartmental activity in relation to that target, developed strategies to achieve it and prepared public reports on progress.

Jeremy spent a number of years with the Australian Competition and Consumer Commission, where he conducted investigations and managed litigation in a range of industries and relating to a variety of alleged misconduct. Examples included alleged cartel behaviour in the fire protection industry, collusion and alleged misuse of market power in country newspapers and mergers in various grocery industries. He prepared the Australian Competition and Consumer Commission's submission to the (Cole) Royal Commission into the Building and Construction Industry.