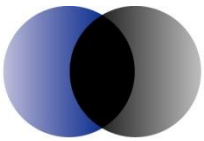
Victorian Electricity Distribution Price Review

Review of revised growth forecasts

Prepared for the Australian Energy Regulator

Thursday, 14 October 2010



ACIL Tasman

Economics Policy Strategy

ACIL Tasman Pty Ltd

ABN 68 102 652 148
Internet www.aciltasman.com.au

Melbourne (Head Office)
Level 4, 114 William Street
Melbourne VIC 3000

Telephone (+61 3) 9604 4400
Facsimile (+61 3) 9604 4455
Email melbourne@aciltasman.com.au

Brisbane
Level 15, 127 Creek Street
Brisbane QLD 4000
GPO Box 32
Brisbane QLD 4001

Telephone (+61 7) 3009 8700
Facsimile (+61 7) 3009 8799
Email brisbane@aciltasman.com.au

Canberra
Level 1, 33 Ainslie Place
Canberra City ACT 2600
GPO Box 1322
Canberra ACT 2601

Telephone (+61 2) 6103 8200
Facsimile (+61 2) 6103 8233
Email canberra@aciltasman.com.au

Darwin
GPO Box 908
Darwin NT 0801

Email darwin@aciltasman.com.au

Perth
Centa Building C2, 118 Railway Street
West Perth WA 6005

Telephone (+61 8) 9449 9600
Facsimile (+61 8) 9322 3955
Email perth@aciltasman.com.au

Sydney
PO Box 1554
Double Bay NSW 1360

Telephone (+61 2) 9389 7842
Facsimile (+61 2) 8080 8142
Email sydney@aciltasman.com.au

For information on this report

Please contact:

Paul Hyslop/ Jeremy Tustin
Telephone (07) 3009 8700/ (03) 9604 4411
Email p.hyslop@aciltasman.com.au
j.tustin@aciltasman.com.au

Contributing team members:

Jim Diamantopoulos

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1 Introduction

In July 2010, the five Victorian electricity distribution businesses (the businesses) submitted revised regulatory proposals to the Australian Energy Regulator for the 2011 to 2015 regulatory control period. These were in response to the AER's draft distribution determination of June 2010 and the Businesses initial regulatory proposals, which were submitted in November 2009.

The businesses in question are Citipower and Powercor Australia (Citipower and Powercor respectively), Jemena Electricity Networks (Vic) Ltd (JEN), SPI Electricity Pty Ltd (SP AusNet) and United Distribution (United) (collectively 'the businesses').

In April 2010 ACIL Tasman provided the AER with reports setting out its assessment of the Businesses forecasts of maximum demand and electricity sales and customer numbers. The AER has now engaged ACIL Tasman to provide advice in relation to the same aspects of the Businesses' revised proposals. That advice is contained in this report.

This report builds on ACIL Tasman's earlier reports and should be read in conjunction with them. The report proceeds as follows.

Chapter 2 recaps on the Businesses' initial regulatory proposals and ACIL Tasman's assessment of them.

Chapter 3 summarises the revised proposals and reaches the conclusion that the outputs of NIEIR's core models are reasonable forecasts of growth in the absence of policy intervention by Governments. Chapter 4 then considers the revised policy impacts and recommends that certain changes be made to the growth forecasts.

Chapters 5 to 9 then deal with each Businesses' revised proposal in turn.

2 ACIL Tasman's assessment of the initial forecasts

ACIL Tasman's assessment of the Businesses' maximum demand, electricity sales and customer numbers forecasts (collectively "growth forecasts") are set out in the following reports to the AER:

1. Victorian Electricity Distribution Price Review: Review of maximum demand forecasts, 19 April 2010 (the maximum demand report)
2. Victorian Electricity Distribution Price Review: Review of electricity sales and customer numbers forecasts, 21 April 2010 (the electricity sales report)

This section provides an overview of the growth forecasts in the business's initial proposals and ACIL Tasman's assessment of those forecasts which is also summarised in this section.

Each of the Businesses engaged the National Institute of Economic and Industry Research (NIEIR) to provide forecasts of electricity sales for their respective regions. Each business relied on those forecasts in its initial regulatory proposal and thus each business took the same methodological approach to forecasting electricity sales.

In summary, the methodology for forecasting both electricity sales and maximum demand used a multi-stage approach. First, NIEIR applied a forecasting methodology that drew on past trends and forecasts of key drivers to forecast the likely level of electricity sales and maximum demand as they would be if no further policy interventions were made. In this report, ACIL Taman describes these as NIEIR's 'core models'.

Second, NIEIR estimated the impact of a number of government policy measures on electricity sales and maximum demand and adjusted the underlying estimate accordingly. These adjustments are calculated outside the core models.

2.1 Core model – electricity sales

ACIL Tasman's understanding of the core model used to produce the initial electricity sales forecasts is summarised in the earlier electricity sales report. First, total sales are disaggregated into residential and business sales. Estimates these two categories of sales are made separately for each distribution business and then aggregated to provide a total forecast.

Among other inputs the core model relies on an assumption regarding electricity price. In the initial proposals, the electricity sales forecasts were prepared on the assumption that the Carbon Pollution Reduction Scheme

(CPRS) would be introduced in 2011 with capped permit prices. It was then assumed that the CPRS -5 scenario would apply to 2015, with a gradual change to the CPRS-15 scenario by 2025.[1]

In addition, the core model takes account of the phase out of electric resistance hot water heaters announced by the MCE in December 2008.

ACIL Tasman was provided with somewhat limited information in relation to the core model for forecasting electricity sales. While this made it difficult to draw firm conclusions regarding the methodology, ACIL Tasman considered it to be generally sound and capable of producing a reasonable forecast of what electricity sales would be in the absence of further government policy intervention.[2]

However ACIL Tasman considered that the outputs of the core model were not reasonable forecasts of 'policy free' electricity sales in this particular case. This was because in ACIL Tasman's view the input assumptions with regard to economic growth were outdated and population growth were unreasonably low. Accordingly, ACIL Tasman recommended that the businesses re-run the core model using updated input assumptions to obtain more reasonable forecasts.

2.2 Core model – maximum demand

Broadly, NIEIR's core model for maximum demand forecasting can be thought of as dividing demand into temperature sensitive and temperature insensitive components, forecasting each of these independently and then aggregating them to produce total forecasts.

Temperature insensitive demand was forecast based on growth in temperature insensitive energy consumption projections, driven by economic and industry drivers such as NIEIR's forecasts of gross regional product in each of the five distribution areas.

Temperature sensitive demand was forecast using a simulation approach based on synthetically generated distributions of temperature and demand. These distributions were generated using half hourly maximum demand data provided by the businesses. The forecast of temperature sensitive load also took account of NIEIR's forecasts of air conditioner sales.

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1 See for example NIEIR, "Electricity sales and customer number projections for the Powercor Australia region to 2019", November 2009, p38.

2 As is discussed below, ACIL Tasman has now been provided with further information regarding this model.

ACIL Tasman received limited information with regard to the forecasting methodology which made it difficult to draw concrete conclusions about the reasonableness of the forecasts in the business's initial proposals. Nevertheless, ACIL Tasman considered that the core methodology had a number of features that are a necessary and desirable part of any demand forecasting process and was generally sound.

However ACIL Tasman considered that the outputs of the core maximum demand model were not reasonable forecasts of 'policy free' electricity sales in this particular case. This was also because in ACIL Tasman's view, that the input assumptions regarding economic growth were outdated and population growth were unreasonably low. Accordingly, ACIL Tasman recommended that the businesses re-run the core maximum demand model using updated input assumptions to obtain more reasonable forecasts.

2.3 Policy impacts – electricity sales and maximum demand

This distribution price determination is being conducted at a time when various government policies, at both the State and Commonwealth level, have the potential to impact on electricity sales and maximum demand. Some of these policies are already in place and others may be introduced during the regulatory period.

The core models rely on historical relationships to project energy sales and maximum demand and hence would not account for changes in electricity sales and maximum demand due to policy interventions. Accordingly, their outputs were adjusted to account for these impacts.

The growth forecasts in the initial regulatory proposal incorporated forecasts of policy impacts as summarised in Table 1.

Table 1 **Policy impacts accounted for in electricity sales forecasts**

Policy	Residential impact	Commercial impact
Lighting MEPS	Yes	Yes
One Watt Standby Target	Yes	Yes
Insulation rebate program	Yes	No
Solar panel policies	Yes	No
Victorian Energy Efficiency Target	Yes	No
Electric hot water phase out	Yes	Yes
MEPS – air conditioners	Yes	Yes
6 star building standards	Yes	No
Advanced Metering Infrastructure	Yes	No
Electric cars	No	Yes

Source: NIEIR, electricity sales forecast reports to the businesses, November 2009, table 6.1

ACIL Tasman considered each of the policy adjustments in its earlier reports. In some cases it regarded the policy adjustment as reasonable, in others not. ACIL Tasman's views regarding those policy adjustments not considered reasonable are set out below.

2.3.1 Lighting MEPS

The estimated impact of the minimum energy performance standard for lighting (lighting MEPS) was based on the assumption that behaviour had moved ahead of policy to some extent. As a consequence the estimate was appreciably greater than the Commonwealth Government's estimate of the impact of the same policy.

ACIL Tasman recommended that the estimated impact of the lighting MEPS should be constrained to the Commonwealth Government's estimate.

2.3.2 One watt standby target

The Businesses forecasts were adjusted downwards to account for a one watt standby target.

According to the International Energy Agency, Australia has such a target. However, ACIL Tasman also noted that, while different Governments have made various attempts to reduce the power used by domestic appliances while in standby mode there is no committed policy, of either the Commonwealth or Victorian Government, to introduce a comprehensive requirement of this kind. Accordingly, ACIL Tasman recommended that this policy impact should be disregarded.

2.3.3 Insulation rebate program

Several months after the Businesses' forecasts were submitted, the Commonwealth Government terminated its insulation rebate program. Accordingly, while some insulation had already been installed, the impact of this policy, which was forecast on the basis that it would continue, was overstated.

ACIL Tasman recommended that adjustments be made to the forecasts to account for the early termination of the program.

2.3.4 Advanced Metering Infrastructure

With the exception of SP AusNet, the Businesses forecast a reduction in average annual energy consumption of eight per cent when eligible customers receive smart meters as part of the rollout of advanced metering infrastructure (AMI). Accordingly, the Businesses reduced their electricity sales forecasts by this amount adjusted for the scheduled AMI rollout.

In ACIL Tasman's view, the choice of eight per cent is not supported by the relevant literature. Further, several months after the Businesses submitted their forecasts, the Victorian Government announced a moratorium on the introduction of time of use tariffs until at least 2011 (although the meters themselves would still be rolled out).

For these reasons, ACIL Tasman recommended that it was not reasonable for these forecasts to be used and that they should be disregarded.

SP AusNet took a different approach to forecasting the impact of the AMI rollout, intending to calculate the impact itself rather than rely on NIEIRs' estimate. However, SP AusNet's forecasts included both NIEIR's estimate of the impact as well as SP AusNet's, effectively double counting the AMI impact. SP AusNet sought to correct this during the course of the review, but corrected forecasts were not available in time for ACIL Tasman to consider them. In the absence of forecasts that were not double counted, and taking the moratorium into account, ACIL Tasman recommended that the AER disregard the impact of the AMI rollout on SP AusNet's forecasts.

3 The revised proposals

On 20 and 21 July 2010, each of the businesses submitted a revised proposal to the AER. In these proposals, each of these businesses submitted revised economic and population growth forecasts and responded to the various issues the AER had raised regarding the initial growth forecasts.

The five businesses took similar approaches to their growth forecasts in their revised proposals. In particular:

1. each business obtained a forecast of maximum demand (system level), electricity sales and customer numbers from NIEIR
2. each business prepared its own spatial (zone substation) forecasts and reconciled these with the system level maximum demand forecast prepared by NIEIR, although there is some variation in the methodology used in the reconciliation.

Methodologically, each business has taken the same approach to preparing growth forecasts as it took in the initial proposals. The key changes are as follows:

- each businesses has adopted updated forecasts of economic and population growth for all growth forecasts
- each business has adopted NIEIR's adjusted treatment of the Carbon Pollution Reduction Scheme (CPRS) for electricity sales and maximum demand forecasts
- each businesses has adopted adjusted impacts for policies other than the AMI rollout for electricity sales and maximum demand forecasts
- For the impact of the AMI rollout:
  - Citipower, Powercor and United have adopted NIEIR's revised estimates of the impact of the AMI rollout
  - Jemena Electricity Networks (JEN) has adopted Frontier Economics estimate of the impact of the AMI rollout on energy and NIEIR's estimate of the impact maximum demand[3]
  - SP AusNet has prepared its own internal model to estimate the impact of AMI, although it has not adjusted its forecasts for this effect due to the AER's determination that the impact of tariff reassignment, including TOU tariffs, must be excluded from the electricity sales forecasts.

[3] Frontier Economics did not make an estimate of the impact on Maximum Demand.

In addition, each business has revisited its spatial maximum demand forecasts in light of the AER's requirement that these be reconciled with an independent system level forecast.

These issues are discussed at a summary level below as follows:

- The core methodology for forecasting electricity sales is discussed in section 3.1 and for maximum demand in section 3.2
- The revised input assumptions are discussed in section 3.4
- The revised policy adjustments are discussed in sections 4

The impacts of these changes, and the revised growth forecasts themselves, are then discussed business by business in chapters 5 to 9.

3.1 Electricity sales forecasts

3.1.1 Core model - methodology

Each business has obtained an updated report from NIEIR regarding electricity sales and customer numbers. As was the case with the initial proposals, the information that has been provided concerning the methodologies used to produce these forecasts is limited, although some of the businesses have provided more information than before. In particular, Citipower, Powercor and JEN provided a report by Frontier Economics regarding NIEIR's methodology for forecasting electricity sales (only) and a paper by NIEIR regarding its approach to forecasting electricity sales and economic conditions.

In its earlier report regarding electricity sales and customer numbers, ACIL Tasman expressed the view that NIEIR's core forecasting methodology for electricity sales is generally sound, but that the input assumptions regarding economic and population growth should be updated.

ACIL Tasman notes that, Frontier Economics found that the lack of consolidated documentation regarding NIEIR's methodology complicated its review. However, Frontier Economics reached the view that, NIEIR's core model meets world best practice standards and has all of the elements Frontier Economics considers desirable. Frontier Economics also considered that NIEIR's approach in calculating post model adjustments to account for policy impacts is reasonable although the magnitude of those impacts was beyond its brief.[4]

[4] Citipower, Powercor and Jemena also provided further reports from Frontier Economics regarding the policy adjustments. These are considered in more detail elsewhere in this report.

Given its earlier conclusion regarding the core forecasting methodology, and the fact that these have apparently not changed for the revised proposals, ACIL Tasman has not revisited them in this report.

ACIL Tasman's view remains, therefore, that if the inputs to NIEIR's core electricity sales forecasting model are reasonable then its outputs will be reasonable forecasts of the likely level of electricity sales absent further government policy intervention. ACIL Tasman's views regarding the reasonableness of the key inputs are discussed in section 3.4.

3.2 Core model – maximum demand

Similarly to electricity sales, each business also obtained an updated report from NIEIR regarding maximum demand forecasts. As was the case with the initial proposals, the information that has been provided concerning the methodologies used to produce these forecasts is limited.

NIEIR's approach to forecasting maximum demand is similar to its approach to forecasting electricity sales. It begins with a core forecasting model that uses econometric techniques to forecast growth in maximum demand based on economic and other drivers. The outputs of this core model are essentially forecasts of what maximum demand would be with no further government policy intervention. These outputs are then adjusted 'post model' to account for NIEIR's estimates of the likely impact of relevant policies on maximum demand.

In the earlier report regarding maximum demand, ACIL Tasman expressed the view that, while it was difficult to draw concrete conclusions about it due to a lack of detailed information, NIEIR's methodology has a number of features that are a necessary and desirable part of any demand forecasting process. While there were some questions regarding the input assumptions, the methodology itself appeared sound.

As is noted above, ACIL Tasman has assumed, in the absence of information to the contrary, that NIEIR employed the same methodology to prepare the forecasts in the revised proposal as was used in the initial proposals. Given this, and given ACIL Tasman's earlier views regarding this methodology, it is not considered further here.

In ACIL Tasman's view, as with electricity sales, if the inputs to NIEIR's core maximum demand forecasting model are reasonable then its outputs will be reasonable forecasts of the likely level of maximum demand absent further government policy intervention. ACIL Tasman's views regarding the reasonableness of the key inputs are discussed in section 3.4.

3.3 Core model – customer numbers

NIEIR takes new customer estimates from its construction industry model, which estimates changes in the dwelling stock. Estimates of residential customer numbers are driven by population growth forecasts, while non-residential customer numbers are driven by historical growth and energy intensity.

On the basis that it is commercially confidential, NIEIR was reluctant to describe its model for forecasting customer numbers in detail during ACIL Tasman's review of the growth forecasts in the initial proposals. NIEIR's description of the methodology was set out in ACIL Tasman's earlier report regarding electricity sales and customer numbers and ACIL Tasman has been provided with no further information regarding this methodology since that time.

ACIL Tasman has been provided with insufficient information to reach a conclusion as to the reasonableness or otherwise of the customer numbers forecasts. However, as is discussed in relation to each business in chapters 5 to 9 below, the forecasts are reasonably consistent with historic trends. This suggests that the forecasts themselves are not unreasonable.

3.4 Key Inputs

As noted above, ACIL Tasman's view is that, as long as the inputs are reasonable, NIEIR's models will produce reasonable forecasts of the likely level of electricity sales and maximum demand absent further Government intervention.

In the earlier reports, ACIL Tasman's expressed the view that the economic and population growth forecasts used in preparing the growth forecasts were unreasonably low. In ACIL Tasman's view this resulted in the forecasts themselves being unreasonably low.

In addition, ACIL Tasman noted that the delay in the commencement of the CPRS would also have an impact on the growth forecasts, although this was not apparent when the forecasts were prepared.

In the revised proposals, the businesses have adopted forecasts that NIEIR prepared based on updates to their forecasts of economic and population growth and taking account of the delay in the CPRS. These revised inputs are considered in the following sections.

3.4.1 Economic growth forecasts

Demand for electricity is driven, to a significant extent, by economic growth. In the residential sector, economic growth drives increases in disposable income which in turn leads to additional demand for and use of appliances and comfort in the home. Economic growth is also a driver of population growth which helps to contribute to customer number growth over time.

Commercial and industrial electricity use is also driven by economic growth. Increases in industrial output and commercial activity are expected to lead to higher electricity sales over time.

A sound forecast of economic growth is essential in forecasting electricity sales and maximum demand on a distribution network.

The growth forecasts in the Businesses initial regulatory proposals were based on NIEIR's projections of economic growth for each distribution area. Those growth forecasts were created by disaggregating NIEIR's Victorian GSP projections to the regional level.

In its earlier reports, ACIL Tasman compared NIEIR's forecasts of economic growth with forecasts published by other organisations. That comparison showed that, in 2009 when the initial regulatory proposals were prepared, NIEIR's expectation was that Victorian economic growth would be lower in the next regulatory period than it was between 2005 and 2009. In 2009, NIEIR's projection was that GSP growth would average 1.8% between 2011 and 2015. By comparison, Victorian GSP growth between 2005 and 2009 averaged 2.1 per cent annually, almost 17% faster than NIEIR's 2009 projection.

ACIL Tasman also considered the fact that, between 2010 and 2015, NIEIR's projected rate of Victorian GSP growth was 0.5 percentage points below the medium scenario that VENCorp (now AEMO) used in preparing the 2009 Annual Planning Report for Victoria.

Given that they were prepared in early 2009, when it was unclear how strongly Australia and Victoria would be affected by the Global Financial Crisis, it is not surprising that NIEIR's forecasts of Victorian GSP growth were lower than others that were prepared later. As an example of changing views over time, shortly before ACIL Tasman prepared its report, the Assistant Governor (Economic) of the Reserve Bank of Australia expressed the view that

Australia's economic performance in 2009 was significantly better than was expected one year ago.[5]

To account for Australia's unexpectedly rapid recovery from the Global Financial Crisis, ACIL Tasman recommended that the DB's electricity sales forecasts should be amended to take account of a more current estimate of economic growth. In the revised proposals, the Businesses have taken this recommendation into account.

The electricity sales forecasts the Businesses have submitted in their revised regulatory proposals are based, again, on NIEIR's forecasts of economic growth, although these have been updated to reflect recent conditions.[6]

Table 2 and Figure 1 below summarise NIEIR's economic growth forecasts and compare them with forecasts from the Victorian Department of Treasury and Finance and the Australian Energy Market Operator (prepared by KPMG Econtech). Notably NIEIR's revised forecasts are that the Victorian economy will grow faster than forecast by others in the early part of the regulatory period and will then slow. Figure 1 also shows the average NIEIR growth rate over the regulatory review period, which is approximately consistent with the average of AEMO's medium growth scenario.

ACIL Tasman considers that the revised economic growth forecasts are reasonable as the basis for the growth forecasts.

Table 2 **Victorian Economic Growth Forecasts**

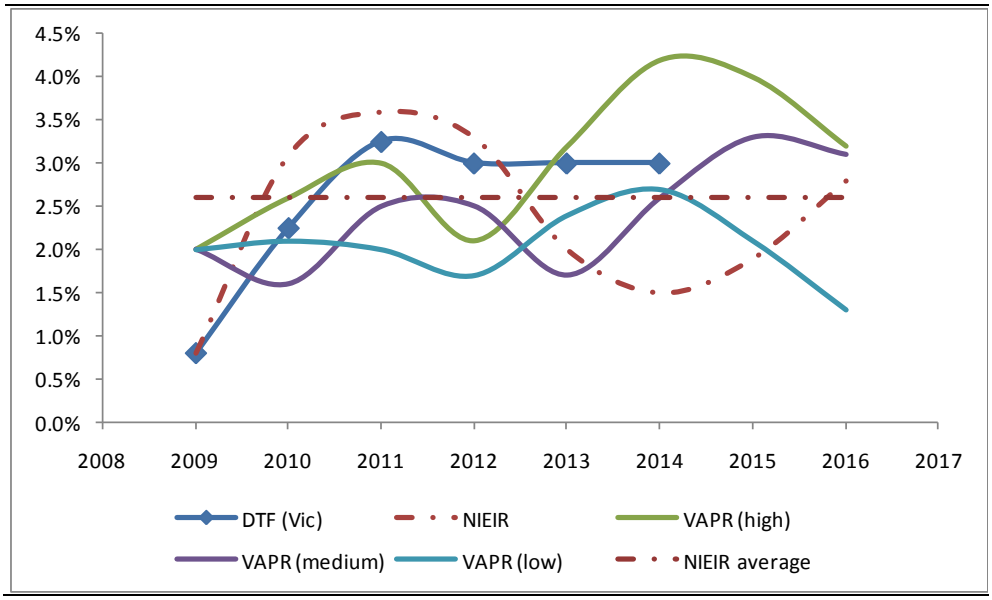
Fin year ending July	2010	2011	2012	2013	2014	2015	2016	average
Department of Treasury and Finance (Vic)	2.3%	3.3%	3.0%	3.0%	3.0%			2.9%
NIEIR	3.1%	3.6%	3.3%	2.0%	1.5%	1.9%	2.8%	2.6%
VAPR (high)	2.6%	3.0%	2.1%	3.2%	4.2%	4.0%	3.2%	3.2%
VAPR (medium)	1.6%	2.5%	2.5%	1.7%	2.6%	3.3%	3.1%	2.5%
VAPR (low)	2.1%	2.0%	1.7%	2.4%	2.7%	2.1%	1.3%	2.0%

Source: Department of Treasury and Finance (DTF) *2010-11 Budget Paper No. 2,* Strategy and Outlook*, p19, NIEIR, Electricity sales and customer numbers for the Citipower region 40 2019, June 2010, p27, Australian Energy Market Operator, Victorian Annual Planning Report, June 2010, p245*

5 "The Current Economic Landscape" speech by Mr Philip Lowe, Assistant Governor (Economic), Reserve Bank of Australia, available online at http://www.rba.gov.au/speeches/2010/sp-ag-180210.html

6 See, for example, NIEIR, Electricity sales and customer numbers for the Citipower region 40 2019, June 2010, pp26-30.

Figure 1 **Victorian economic growth forecasts**



Source: Department of Treasury and Finance (DTF) *2010-11 Budget Paper No. 2,* Strategy and Outlook*, p19, NIEIR, Electricity sales and customer numbers for the Citipower region 40 2019, June 2010, p27, Australian Energy Market Operator, Victorian Annual Planning Report, June 2010, p245*

3.4.2 Population growth

Population growth is important to the growth forecasts because it drives household formation and customer numbers.

In the earlier report, ACIL Tasman showed that, in the 5 years to June 2009, the Victorian population grew at a rate of 1.73% p.a. This growth was quite rapid compared to that observed over longer time horizons, with annualised growth over the last 10 years of 1.48% p.a. and over a 20 year time horizon of 1.15% p.a.

The Businesses' initial growth sales forecasts were based on a projected slowdown in Victorian population growth in the next regulatory period. In the six years from June 2009-10 to 2014-15, the average rate of population growth for Victoria was projected to be 1.2%% p.a.

ACIL Tasman's earlier report also showed that this population growth projection was conservative compared to those obtained from other sources such as the Victorian Department of Treasury and Finance and the Australian Bureau of Statistics.

ACIL Tasman considered the population growth forecast underpinning the initial electricity sales forecasts to be unreasonably pessimistic, particularly in light of recent growth. Accordingly, ACIL Tasman recommended that a fresh set of energy forecasts should be prepared using NIEIR's model and the ABS B series population forecasts.

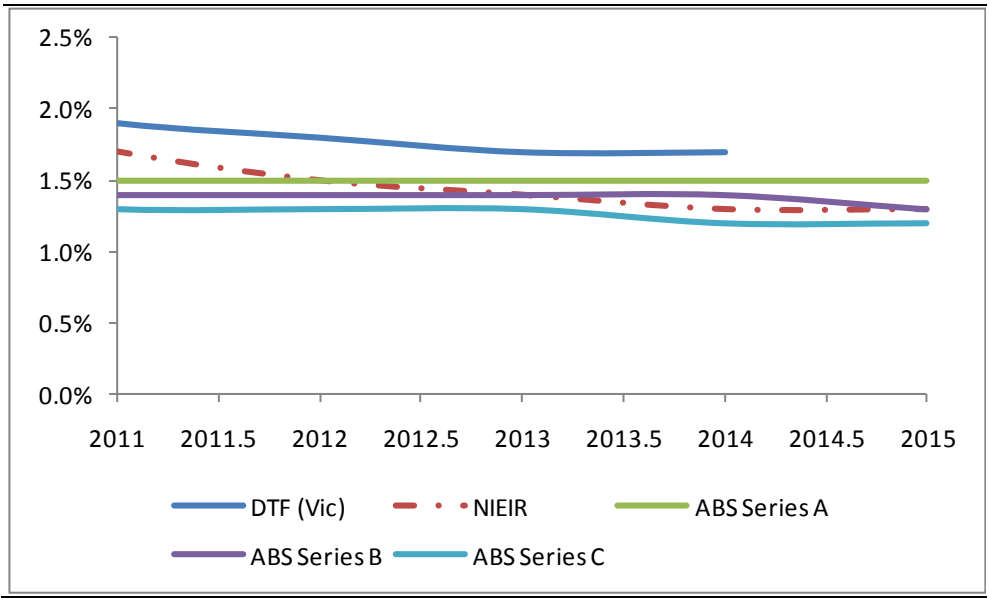
The electricity sales forecasts the Businesses have submitted in their revised regulatory proposals are based, again, on NIEIR's forecasts of population growth, although, as with the economic growth forecasts, these have been updated to reflect recent conditions.[7]

The electricity sales forecasts in the Businesses revised proposals are based on an updated projection of population growth with an average of 1.4% per annum. Figure 2 and Table 3 below show this updated projection along with updates of projections published by the Victorian Department of Treasury and Finance and the ABS.

NIEIR's revised forecasts are slightly less optimistic than the Victorian Government's forecasts in the early part of the regulatory period and fall relative to the Victorian Government forecasts as time passes which is consistent with NIEIR's forecast of lower economic growth later in the forecast period.

NIEIR's revised forecasts are consistent, in average terms (see Table 3), with the ABS 'B series' forecasts.

Figure 2 **Victorian population growth forecasts**



Data source: ABS, 3220.0 Population Projections, Australia 2006 to 2101, Victorian Treasury, Victorian Budget Papers 2009-10, NIEIR, Electricity sales and customer numbers reports prepared for distribution businesses.

[7] See, for example, NIEIR, Electricity sales and customer numbers for the Citipower region 40 2019, June 2010, pp26-30.

Table 3 **Victorian population growth forecasts**

Year	2011	2012	2013	2014	2015	Average
DTF (Vic)	1.9%	1.8%	1.7%	1.7%		1.8%
NIEIR	1.7%	1.5%	1.4%	1.3%	1.3%	1.4%
ABS Series A	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
ABS Series B	1.4%	1.4%	1.4%	1.4%	1.3%	1.4%
ABS Series C	1.3%	1.3%	1.3%	1.2%	1.2%	1.3%

Data source: DTF (Vic) *2010-11 Budget Paper No. 2,* Strategy and Outlook2
NIEIR *-NIEIR, electricity sales reports to businesses, June 2010, table 3.2*
ABS ABS, 3220.0 Population Projections, Australia 2006 to 2101

The AER's population adjustments

In its draft determination, the AER arrived at the view, consistent with ACIL Tasman's advice, that the population growth forecasts underpinning the businesses (initial) growth forecasts were unreasonably low. As a result, it rejected them as an input into NIEIR's growth forecasting models. The AER considered that the business's growth forecasts should be based on population growth assumptions that at least match the ABS' B-series forecasts, which represent a moderate rate of population growth.

In light of this, the AER made adjustments to the business's electricity sales forecasts as set out in Table 5.15 of the draft determination. The figures in that table were calculated by ACIL Tasman and were set out in our earlier report regarding electricity sales. In applying those adjustments the AER noted that, for reasons set out in ACIL Tasman's earlier report and the AER's draft determination, while ACIL Tasman calculated the impacts at the AER's request, ACIL Tasman did not recommend that the AER rely upon them. Rather, ACIL Tasman's recommendation was that the shortcomings it had identified in the business's growth forecasts would be addressed by preparing a fresh set of energy forecasts using NIEIR's model and the ABS B series population forecasts.

In their revised regulatory proposals, the businesses have made two points in response to the AER's population adjustments.

First, most of the businesses have pointed out that the calculations themselves contained an error in that, while ACIL Tasman referred to the B-series population growth forecasts, the calculations were based on the A series, which is a higher growth scenario. ACIL Tasman acknowledges this error, which caused the population impacts it calculated to be overstated. As a result, the AER's revised forecasts of electricity sales were also overstated.

Second, most of the businesses argued that the AER's population adjustments should not be used as they have various shortcomings and do not possess the

best practice characteristics set out in ACIL Tasman's earlier reports. ACIL Tasman agrees with this assessment which is why the shortcomings were listed in ACIL Tasman's earlier report.

Each business's revised regulatory proposal contains forecasts based on a fresh set of growth forecasts. These growth forecasts are based, in part, on updated population growth forecasts. As discussed above, these population growth forecasts are not the same as the ABS' B-series, but they are approximately consistent with it and hence ACIL Tasman considers them to be reasonable.

3.4.3 Policy changes in the core models

Unlike the other policy measures discussed in the next section, two policy interventions are incorporated in the base forecasts produced by NIEIR's core model(s).[8] These are the CPRS, which influences the forward electricity prices used in the core model and the phase out of electric resistance water heaters.

Carbon Pollution Reduction Scheme

During the course of the initial review, after the forecasts themselves were prepared, there were numerous new developments in relation to the CPRS. These uncertainties have continued since ACIL Tasman's review report was completed and appear likely to continue into the regulatory period itself.

In the draft determination, which was released in June 2010, the AER requested that the businesses prepare their revised forecasts on the assumption that the CPRS would commence on 1 January 2012.

Late in June 2010, Australia's Prime Minister changed. In July 2010, the new Prime Minister called an election for 21 August 2010. At the time of writing the result of that election was not clear and the two major parties have strongly different views on the CPRS. Accordingly, it is very difficult to make a reasonable prediction regarding the future of the CPRS.

The Businesses' growth forecasts were prepared on the assumption that the CPRS would be delayed until 2013.[9] Notably, this is later than the AER requested initially, but is consistent with recent changes and would tend to increase the electricity sales forecasts.

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[8] ACIL Tasman's understanding is that the hot water policy does not influence NIEIER's maximum demand model on the assumption that electric resistance hot water heaters are typically used at off peak times.

[9] See for example NIEIR, "Electricity sales and customer numbers forecast for the SP AusNet distribution region to 2019 (class and network tariff)" June 2010, p9

At the time of writing, ACIL Tasman regards it as likely, although far from certain, that either the CPRS or an alternative greenhouse emissions reduction policy will be introduced sometime during the forecast period and that this will cause electricity sales to be somewhat lower than they would otherwise have been. Further, it would appear likely that, assuming it has comparable emissions reduction targets to the CPRS, any greenhouse emissions reduction policy that is introduced will cause the price of electricity to increase at least to some extent towards the levels expected under the CPRS and possibly higher.

ACIL Tasman notes that this is roughly consistent with NIEIR's expectation that it is most likely that the CPRS will be introduced in 2014 with similar impacts to those modelled by Treasury for the CPRS.[10] However, it appears from NIEIR's reports that these forecasts were prepared on the assumption that the CPRS will begin in 2013, earlier than what NIEIR considers to be the most likely case.[11]

In the current context, the assumption that underpins the modelling, namely that the CPRS will commence in 2013 and follow a trajectory similar to the original CPRS-5 scenario seems reasonable, although it may well turn out differently. Accordingly, ACIL Tasman recommends that no further changes should be made to the growth forecasts to account for the impacts of the CPRS.

If this assumption turns out to be incorrect there will be implications for the electricity sales forecasts. Generally speaking:

- the longer that the CPRS is delayed and/ or
- the more that greenhouse policy induced electricity price rises are limited relative to the modelled CPRS -5 levels,

the more the energy sales forecasts discussed here will be an underestimate. The reverse is also true.

Therefore, if the CPRS actually commences later (earlier) than modelled, electricity sales are likely to be more (less) than estimated here. Similarly, if further steps are taken to limit the extent to which the CPRS causes electricity prices to increase, energy sales would be higher than forecast. At the time of

[10] See for example NIEIR, "Electricity sales and customer numbers forecast of the SP AusNet distribution region to 2019 (class and network tariff)" June 2010, p49. Note that elsewhere in the report (p. 9) NIEIR indicates that this modelling was done with the CPRS beginning in 2013.

[11] See, for example, NIEIR, "*Electricity sales and customer number forecasts fo rhte SP AusNet distribution region to 2019 (class and network tariff)*", June 2010, p9.

writing, though, there is insufficient information to estimate the size of these impacts.[12]

Water heater phase out

Water heating is the second largest energy user in Victorian households, accounting for about 23% of total use in the average Victorian house.[13] In July 2009 the Council of Australian Governments agreed to implement a national process to phase out electric resistance water heaters from 2010.[14]

As is discussed in more detail in ACIL Tasman's earlier report, this policy is expected to cause significant reductions in the use of electricity for water heating over coming years.

The impact of this policy is accounted for in NIEIR's core model. According to NIEIR's June 2010 electricity sales reports, this was done in two parts to reflect the fact that electricity for water heating is usually sold on either a dedicated tariff or a residential two rate tariff.

Firstly, NIEIR has assumed that average sales on the dedicated hot water tariff will decline at 6.7% per annum, reflecting an assumed life of 15 years for electric resistance hot water systems. In this case, the policy makes little or no difference to the declining trend that was already evident in the data.

Secondly, NIEIR notes that the use of the residential two rate tariff is varies substantially for different types of businesses. Basically, this tariff is in high usage in (mainly rural) areas where reticulated gas is unavailable and in low usage in more densely populated urban areas where reticulated gas is available.

The businesses have not given details of their estimates of the impact of this policy on two rate tariff sales. In this respect, NIEIR says that:

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[12] In September 2010 the Prime Minister announced her intention to establish a multi-party committee to explore options for introducing a carbon price to Australia and to help build consensus in Australia on how to tackle climate change. That committee was subsequently established on the basis that a carbon price is required to reduce carbon pollution, to encourage investment in low emissions technologies and complement other measures including renewable energy and energy efficiency.

The Committee's role is to consider options for introducing a carbon price. These include a carbon tax and an emissions trading scheme.

At the time of writing, the committee had met once. It is too early to know details such as the likely timing, form and size of the carbon rpice that the Committee will eventually recommend.

[13] Department of Primary Industries, http://www.new.dpi.vic.gov.au/energy/energy-policy/energy-efficiency/water-heaters, accessed 26 March 2010.

[14] This was one of the actions in the National Partnership Agreement on Energy Efficiency, which COAG signed at its 27th meeting on 2 July 2009 in Darwin, see http://www.coag.gov.au/coag_meeting_outcomes/2009-07-02/index.cfm#tabs.

> The policy impacts for each DB for hot water policy range from near zero for some DBs, to some small impacts where the two rate tariffs are important. It would not be possible to quantify the impact of changes in hot water policy on the two rate tariffs as hot water use cannot be separately identified in the metering data. In the two rate tariffs, off peak includes not only overnight use, but weekend electricity use as well.[15]

Consistent with this, unlike the reports presented with the initial regulatory proposals, the electricity sales forecast reports presented with the revised proposals do not include estimates of the impact of the hot water phase out on residential sales. They do, however, include estimates of the impact of this policy on commercial hot water sales, although it is not clear how these were calculated, given the quote above.

In its earlier report regarding the electricity sales forecasts, ACIL Tasman described its application of the NIEIR methodology in reverse in an attempt to 'back out' the implied total electricity use for water heating from the estimated impact of the hot water phase out (that had been withdrawn by that stage). The backing out exercise implied that, before the policy was introduced, the total residential use of electricity for water heating in the residential sector in the four distribution regions of Victoria other than SP AusNet's distribution region was approximately 330GWh per annum.[16] As was discussed in that report, that is likely to be significantly less than the actual usage of electricity for water heating, which the Department for Environment, Water, Heritage and the Arts has estimated at 1750GWh.

The substantial difference between these two figures (i.e. 330 and 1750 GWh per annum) is consistent with NIEIR's advice that there has already been a significant decline in electricity use for water heating and that this is reflected in the trend data upon which NIEIR's model is based.

ACIL Tasman also notes that Frontier Economics considered the issue of reduction in electricity used for water heating in a report for Citipower that was submitted with the revised regulatory proposals of Citipower, Powercor and JEN.

In its report, Frontier considers the key parameters, namely:

- the life (and therefore rate of replacement) of electric water heaters

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[15] See for example NIEIR, "Electricity sales and customer numbers forecast of the SP AusNet distribution region to 2019 (class and network tariff)" June 2010, p44

[16] This is calculated by taking the annual change in the residential impact (i.e. the differences between columns in the residential sub-total row) and dividing by 6.2& (i.e. the rate at which NIEIR advised ACIL Tasman that its forecast of hot water electricity use declines). The average of these values is 328 GWh.

- the type of heaters that will be used to replace them under the new policy and
- the extent to which these heaters are being replaced regardless of the policy.

Frontier makes a set of assumptions about these parameters that are documented in its report. Some of them are adopted from a report NIEIR prepared for ETSA Utilities[17] and so may (or may not) be the same as those underpinning NIEIR's forecasts for the Victorian businesses. Other assumptions are Frontier's own.

Based on these assumptions, Frontier estimates reductions in residential electricity sales that can be attributed to this policy. These estimates are similar to the (now withdrawn) estimates set out in NIEIR's initial electricity sales reports. On this basis, Frontier Economics concludes that NIEIR's estimates are reasonable. Frontier also accepts NIEIR's commercial estimates given its verification of the residential estimates and the fact that the commercial estimates are small.

To summarise, Frontier Economics suggests that the estimates set out in table(s) 6.2 of the initial electricity sales reports are reasonable estimates of the impact of the phase out of electric resistance water heaters on electricity sales in Victoria. However, NIEIR has advised that these are not the estimates that it used in its model, so whether they are reasonable or not is immaterial.

ACIL Tasman accepts that it is reasonable to make adjustments to electricity sales forecasts to account for the impact of this policy. While NIEIR may not be able to quantify, or at least to identify separately, the estimated impact of this policy on electricity sales, the description in the revised electricity sales reports of the approach taken to account for it, while brief, suggests that the approach is not unreasonable. Accordingly, ACIL Tasman recommends that the AER makes no adjustment to the growth forecasts to account for this policy impact.

3.5 Underlying growth forecasts

As discussed above, the Businesses' growth forecasts can be considered in two parts:

- an underlying, or 'policy free' forecast (inclusive of the impact of the CPRS and the hot water phase out) and
- a set of policy adjustments.

[17] ETSA Utilities is the distribution network service provider in South Australia.

As a general proposition, ACIL Tasman would expect that the underlying forecasts would be broadly consistent with recent history, in particular given the revised economic and population growth forecasts.

In this section the revised underlying forecasts are compared to the revised initial forecasts and to history. The policy adjustments are discussed in section 4.

3.5.1 Underlying electricity sales forecasts

A number of post model adjustments were made to the outputs of NIEIR's core electricity sales forecasting model. These were made to account for the NIEIR's estimates of the impact of various policy changes on electricity sales.

ACIL Tasman has 'added back' the policy impacts reported in NIEIR's reports to the Businesses, so that the impact of the changes in input assumptions can be seen, thereby reconstructing the underlying forecasts that would have been produced by NIEIR's core model. These forecasts are shown in Table 4.

Table 4 **Revised proposals – 'policy free' electricity sales forecasts**

GWh	2010	2011	2012	2013	2014	2015
Citipower	6151	6232	6312	6337	6344	6395
JEN	4375	4376	4391	4361	4323	4315
Powercor	10635	10821	10955	11007	11033	11097
SP AusNet	7880	8060	8164	8196	8230	8316
United	7927	8024	8116	8144	8146	8181
Victoria	36968	37514	37937	38045	38076	38304

Data source: NIEIR, June 2010 electricity sales forecast reports to businesses, tables 6.17, 6.20 and 7.1.

For comparison, the corresponding forecasts from the initial regulatory proposals are presented in Table 5.

Table 5 **Initial proposals – 'policy free' electricity sales forecasts**

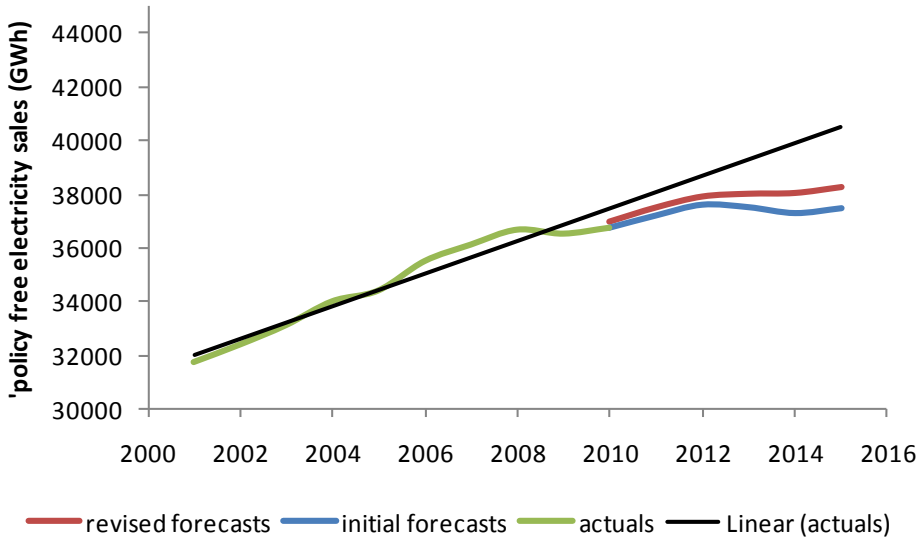
Year	2010	2011	2012	2013	2014	2015
Citipower	6030	6121	6223	6200	6126	6150
JEN	4367	4320	4345	4314	4269	4269
Powercor	10707	10874	10982	10954	10882	10902
SP AusNet	7835	7966	8039	8030	8040	8139
United	7845	7953	8046	8044	8007	8045
Victoria	36784	37235	37634	37542	37325	37505

Data source: NIEIR, November 2009 electricity sales forecast reports to Businesses, tables 6.2, 6.5 and 7.1.

Based on the Businesses' and NIEIR's description of the forecasting methodology, ACIL Tasman's understanding is that forecasts presented in Table 4 and Table 5 were prepared in the same way, and that they differ from

one another due only due to the change in input assumptions and the deferral of the CPRS. Figure 3 highlights the impact of these changes and shows the 'policy free' forecasts in the context of historical (actual) data.

Figure 3 **'Policy free' electricity sales forecasts – initial and revised**



Data source: NIEIR, June 2010 electricity sales forecast reports to Businesses, tables 6.17, 6.20 and 7.1 and November 2009 electricity sales forecast reports to Businesses, tables 6.2, 6.5 and 7.1.

As Figure 3 shows, the 'policy free' forecasts reflect a slower rate of growth in electricity sales during the regulatory period than has been observed in the past five years, in particular in the later years of the regulatory period.

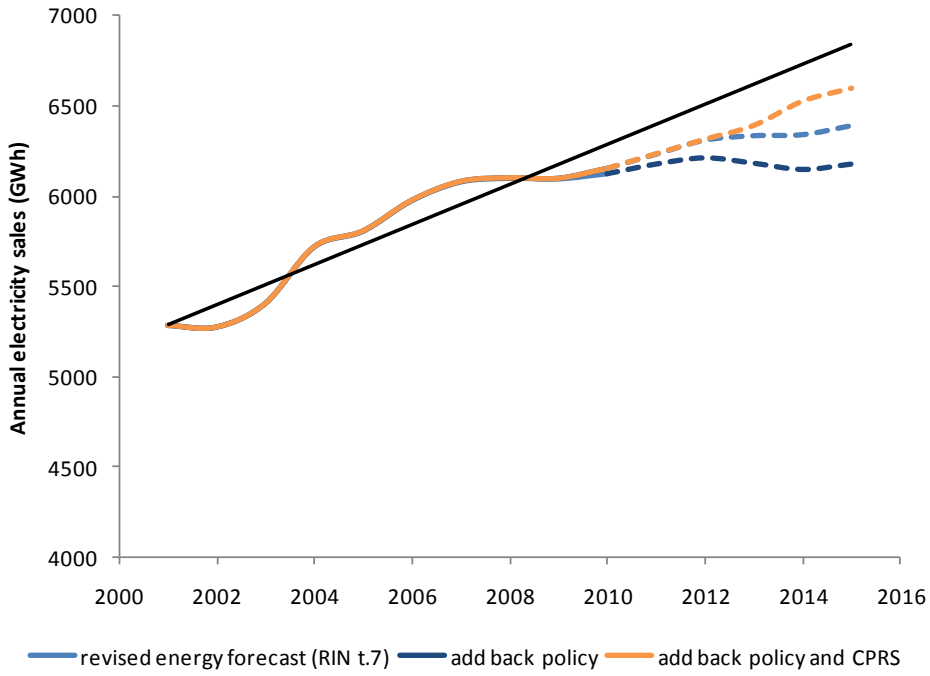
However using the updated inputs has reduced the move away from the historical trend. From 2005 to 2009, compound average annual growth in electricity sales was 1.6 per cent per annum. In the initial proposals projected growth in the regulatory period was slightly below 0.2 per cent per annum before policy adjustments. With the revisions to the inputs, the projection has increased to slightly above 0.5 per cent per annum.

The slowdown in electricity sales growth shown even in the revised electricity sales forecasts is consistent with the fact that the 'policy free' series plotted in Figure 3 assumes that the CPRS will be introduced during the regulatory period and that the phase out of electric resistance water heaters will continue. In other words, these forecasts are not entirely free of policy impacts.

While NIEIR did not provide separate estimates of the impact of the CPRS on electricity sales, Citipower submitted estimates of its effect in its region. This estimate was calculated by Frontier Economics based on NIEIR's elasticity and price assumptions and the modelling in its November 2009 report to Citipower.

In Figure 4, ACIL Tasman has added the estimated effect of both the CPRS and the other policy impacts back to Citipower's forecasts to provide an approximation of what NIEIR's estimate of electricity sales would have been if policy impacts including the CPRS were disregarded (note that the hot water policy is still incorporated).[18]

Figure 4 **Citipower – revised electricity sales forecast adjusted to remove policy impacts**



Data source: NIEIR, "electricity sales and customer numbers projections for Citipower region to 2019, July 2010 and Frontier Economics, "review of policy adjustments", July 2010.

While it can only be treated as indicative, Figure 4 does give a general sense of where NIEIR's electricity sales forecasts would be if the CPRS was disregarded. It shows that, with the impact of the CPRS removed, NIEIR's forecast of the rate of electricity sales growth in Citipower's region returns to a rate close to recent history.[19] On this basis, electricity sales in Citipower's region are projected to grow at an average of 1.42 per cent annually over the regulatory period, compared to 1.2 per cent from 2005 to 2009, although

[18] This figure should be treated as indicative only. It adds together two forecasts which were prepared on different bases. The figure was prepared by adding NIEIR's revised electricity sales forecasts to Frontier Economics' delayed CPRS impacts (from table 13 in Frontier's report to Citipower). ACIL Tasman notes that Frontier Economics estimates were based on NIEIR's *initial* report to Citipower. Therefore they are based on the *initial* forecasts of economic and population growth.

[19] i.e. the trend line and the forecast line are roughly parallel although they start from different points.

electricity sales are not forecast to grow as strongly as they did from 2001 to 2005, when growth was 2.4 per cent.

3.5.2 Underlying maximum demand forecasts

The approach the businesses took (through NIEIR) to forecasting maximum demand was similar to that for electricity sales in that the outputs of a core model were adjusted to account for various policy impacts. By contrast to the electricity sales forecasts, the magnitude of the estimated policy impacts on maximum demand was smaller.

Here, as in the previous section, the policy impacts are added back to the maximum demand forecasts to reconstruct the outputs of NIEIR's core model. The policy impacts are then considered separately in section 4.

Table 6 and Figure 5 below show the Businesses' revised maximum demand forecasts adjusted by adding back the various policy impacts (on summer peak demand).

Table 6 **Revised proposals – 'policy free' maximum demand forecasts**

(MW)	2010	2011	2012	2013	2014	2015
Citipower	1365	1435	1480	1534	1582	1623
JEN	958	993	1028	1063	1095	1117
Powercor	2362	2393	2505	2630	2738	2829
SP AusNet	1949	1984	2070	2195	2271	2368
United (10 POE)	2016	2256	2330	2410	2493	2513

Data source: NIEIR, June 2010 electricity sales forecast reports to Businesses, tables 6.17, 6.20 and 7.1.

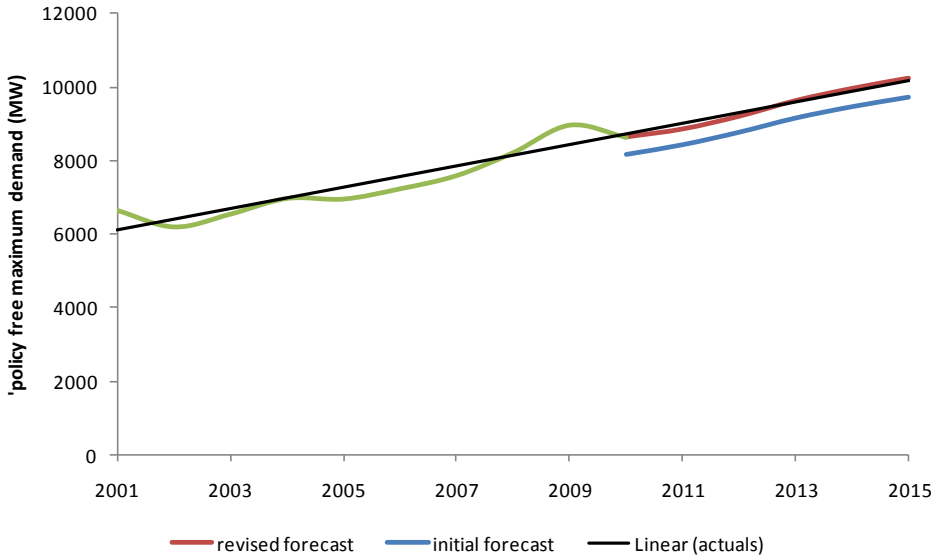
For comparison, the corresponding forecasts from the initial regulatory proposals are presented in Table 7.

Table 7 **Initial proposals – 'policy free' maximum demand forecasts**

(MW)	2010	2011	2012	2013	2014	2015
Citipower	1344	1363	1406	1467	1497	1520
JEN	960	995	1030	1066	1099	1120
Powercor	2151	2221	2316	2432	2521	2593
SP AusNet	1790	1859	1939	2049	2151	2245
United (10 POE)	2107	2194	2280	2336	2439	2489

Data source: NIEIR, November 2009 electricity sales forecast reports to businesses, tables 6.3, 6.6 and .

Figure 5 **Aggregated 'policy free' demand – 2005 to 2015**



Note: United conducts its planning on a 10 POE basis, while the other businesses work on a 50 POE basis. For consistency, this chart shows United's 50 POE forecasts.

Data source: NIEIR, November 2009 electricity sales forecast reports to businesses, tables 6.3, 6.6 and 8.1.

As Figure 5 shows, the 'policy free' forecasts reflect a slower rate of growth in maximum demand during the regulatory period than has been observed in the past five years, and faster growth than in the period 2001 to 2005. Specifically, compound average growth from 2001 to 2005 was 1.2 per cent. From 2005 to 2009, growth averaged 6.6 per cent. During the regulatory period, growth in the maximum demand forecasts of all five businesses averages 3.7 per cent.

As the figure also shows, updating the input forecasts has caused the growth forecast to be increased, both in levels and rate of growth. In the initial proposals growth during the regulatory period was projected to average 3.6 per cent annually. This is slightly lower than the current projection of 3.7 per cent per annum, although still significantly lower than the growth rate observed in the last few years.

In comparing historic and future growth rates, it is important to note that the past and future series presented here are not directly comparable. The difference is the impact of weather, and in particular the fact that the hottest days of the 2009 summer were hotter than any on record in Victoria. While some of the businesses provided the AER with weather corrected historical data, others did not, so the historical data shown in Figure 5 is not shown on a weather corrected basis. By contrast, the projections are on a 50 POE basis, i.e.

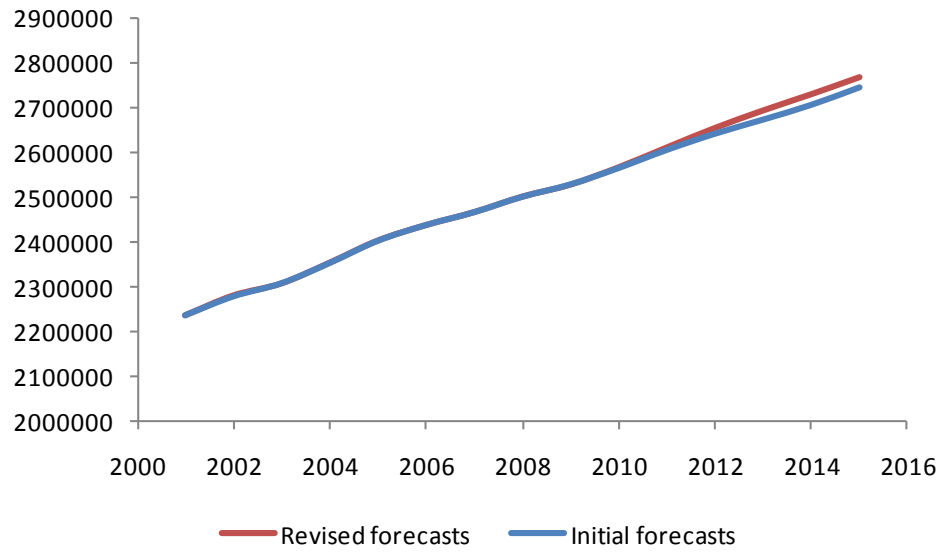
they are forecasts of the level that demand will exceed (or equal) one year in two.[20]

The effect is particularly evident in 2009, when maximum demand reached record levels on 29 January, when average daily temperature was 35C. By contrast, the maximum demand in 2010 was observed on 11 January at an average temperature of 31.3. Even this is slightly in excess of the 50 POE temperature for Victoria, which is 29.6, and which is the basis on which the forward projections are made (although some customer demand may not be present at that time due to the proximity with the Christmas break).

3.5.3 Customer numbers

As discussed above, the customer numbers forecasts are driven by the population forecast and informed by NIEIR's construction industry models. The initial and revised forecasts are presented in Figure 8. As can be seen, the revision in input assumptions resulted in a modest increase in forecast customer numbers. The revised forecast remains generally in line with historic trends.

Figure 6 **Aggregated customer numbers forecasts – initial and revised proposals**



Data source: NIEIR, electricity sales reports to businesses November 2009 and June 2010, table 7.2.

[20] Note that, while UED conducts its planning, and prepares its growth forecasts, on a 10 POE basis, its 50 POE forecasts are used here for consistency. United's 10 POE forecasts are considered in chapter 9.1.

3.6 Conclusion – underlying growth forecasts

For the reasons given above, ACIL Tasman's view is that the underlying growth forecasts represent a reasonable expectation of what electricity sales and maximum demand would be if there were no further relevant policy changes beyond the introduction of the CPRS and the phase out of electric resistance hot water systems. In addition, the combined forecast of customer numbers appears reasonable.

4 Policy adjustments

The second stage of NIEIR's forecasting methodology for both electricity sales and maximum demand was to estimate the impact that certain policy changes would have over the regulatory period. These were calculated outside the core models and 'post model' adjustments made separately.

ACIL Tasman considered the broad approach of making post model adjustments to account for policy impacts to be reasonable, especially where the policy itself is introduced for the first time and thus is likely to act as an exogenous shock to the trends that underpin the core model forecasts. ACIL Tasman notes that, in its report to Citipower, Frontier Economics also considers this approach to be reasonable.[21]

In some cases ACIL Tasman was concerned with the magnitude of the particular adjustments that were made. In other cases, the Government responsible for the policy made changes to it while the review was underway, requiring that the estimated impact of the policy be amended. ACIL Tasman recommended that the AER make a number of adjustments to the growth forecasts to account for these issues.

In its draft determination the AER accepted ACIL Tasman's advice regarding the impact of policy changes on electricity sales forecasts and substituted its own growth forecasts for those prepared by the businesses. In their revised proposals the Businesses have responded to the AER by changing to the way they estimate the impact of some policies. In other cases, the Businesses have responded to the AER's concerns and argued that their original forecasts should be retained, or that a third approach should be preferred.

In all cases, the impact of the policies as measured in MWh and MW has changed due to the changes in the underlying forecasts resulting from the updated economic and population growth forecasts that underpin the revised forecasts.

The following sections consider, in turn, each of the policy measures for which ACIL Tasman recommended that estimates be amended. They focus on the estimated impact on electricity sales rather than maximum demand, which is dealt with in a separate report, which concludes that, with a few adjustments to particular forecasts, the maximum demand forecasts that have been provided are reasonable.

[21] Frontier Economics, "Review of NIEIR's methodology for forecasting electricity consumption", April 2010, p30

However, that report does not deal directly with the impact of policy measures on maximum demand and ACIL Tasman considers that in some cases adjustment to one parameter should also be made to the other. Therefore, with the exception of the AMI rollout, where ACIL Tasman recommends adjustments, these are recommended to both electricity sales and maximum demand.

In addition to NIEIR's electricity sales forecasts reports, some of the businesses also submitted two reports prepared by Frontier Economics. The first of these reviews NIEIR's policy adjustments. The second reviews ACIL Tasman's recommended adjustments. United submitted a similar report prepared by Marsden Jacob Associates. The analysis contained in these reports is incorporated into the following sections.

4.1 Mandatory Energy Performance Standards - lighting

In the earlier report regarding electricity sales, ACIL Tasman recommended that the AER reduce the estimated impact on residential electricity sales of the mandatory energy performance standard (MEPS) for lighting. So that it did not exceed the estimate set out in the relevant regulatory impact statement (RIS).

The AER adopted this recommendation and adjusted the Businesses' forecasts accordingly.

Between them, the businesses presented two consultants reports that considered the impact of this MEPS and NIEIR's estimate of it and ACIL Tasman's earlier recommendation in relation to it. In its report to Citipower, Frontier Economics considered the impact of the MEPS and the appropriateness of ACIL Tasman's recommendation in its two reports to Citipower. It made two key points:

1. ACIL Tasman did not apply the same approach to NIEIR's estimate of the impact the MEPS would have on commercial sales. Had this been done it would have suggested that the estimates be increased.
2. Applying a similar approach to ACIL Tasman's to data provided by the Department for the Environment, Water, Heritage and the Arts (DEWHA) provides estimates that are greater than NIEIR's, indicating that NIEIR's estimates are conservative.

On the basis that ACIL Tasman considered the impact on residential savings but not commercial savings, Frontier Economics recommends that ACIL Tasman's recommendations should be rejected.

In a report for United, Marsden Jacob Associates also considered the impact of the MEPS and the appropriateness of ACIL Tasman's recommendation.

Marsden Jacob Associates could see no justification for basing the estimated impact of the lighting MEPS on the projected number of Victorian households.

4.1.1 Commercial sales

ACIL Tasman acknowledges that the discussion of the lighting MEPS in its earlier report is limited to its impact on residential sales. It does not follow from this that ACIL Tasman did not consider the impact on commercial sales.

In discussing the impact of the lighting MEPS, NIEIR (and therefore the businesses) referred to information that is available to it that it was not prepared to detail. According to NIEIR, that information suggests that energy efficient lights are already in such widespread use in the Commercial sector that there is little, if anything left to gain from the rollout of the MEPS. NIEIR suggested that this has been motivated by the amount of money that can be saved by commercial operations by changing their lighting. This is consistent with Frontier Economics observation that lighting accounts for one third of commercial electricity use.

In the earlier review, ACIL Tasman was happy to accept NIEIR's analysis of this issue and thus did not discuss it in the report.

Frontier Economics' analysis of the lighting MEPS (and that contained in the relevant RIS) addresses a different question than NIEIR's. Frontier relies on 2007/08 data published by ABARE in 2009. Starting from that data, Frontier calculates the total impact of the lighting MEPS based on the reduction implied by the RIS. As Frontier Economics points out, NIEIR's estimated impact is much smaller because NIEIR assumes that much of this effect had already taken place when the ABARE data was collected. In other words, behaviour, particularly in the commercial sector, had moved ahead of policy. This reduces the impact that can be expected occur during the regulatory period, and thus NIEIR's estimate of the impact of the MEPS.

Given that NIEIR's energy sales forecasting methodology begins with the most recently observed energy intensity, NIEIR estimated only the residual impact of the MEPS, i.e. the impact that remains to be felt during the regulatory period. This issue was discussed in ACIL Tasman's earlier report.

4.1.2 Residential sales

Given our acceptance of the impact on commercial sales, the analysis in the earlier report focussed on the impact of the MEPS on the residential sector. We also accepted the estimated impact on maximum demand, so the analysis focussed on the likely impact of the MEPS on residential electricity sales.

As was discussed in the earlier report, the impact that the MEPS would have in aggregate over the regulatory period, as NIEIR estimated it, was greater than the Commonwealth Government's estimate. This is contrary to behaviour having moved ahead of policy.

ACIL Tasman recommended that the Commonwealth Government's estimate of the impact of lighting MEPS on residential sales be used as an upper bound for the adjustments in this process. That estimate was that the full impact of the MEPS would reduce residential lighting electricity use by approximately 33% or 222 kWh from the 684 kWh per annum (per residence) thought to be used in 2005. This impact was 'grossed up' to the Victorian level using ABS data regarding the number of existing households in Victoria and NIEIR's growth rate.

Both Frontier Economics and Marsden Jacob Associates (MJA) commented on this approach. Their comments are dealt with in turn below.

Frontier Economics - DEWHA data is more recent

Frontier Economics' argued that data published by the Department of Water, Heritage and the Arts since the relevant RIS was prepared indicates that, before the MEPS was introduced, electricity use for lighting use was greater than assumed in the RIS calculations. The effect is that the total reduction in electricity sales, which is calculated as a percentage reduction of total use, would also be higher for any given expectation of the MEPS effectiveness. DEWHA's data suggests that the MEPS will be less effective than the RIS, with a 26 per cent reduction compared to 33% in the RIS.

Frontier Economics replicates ACIL Tasman's analysis using the DEWHA data, both total consumption and effectiveness, and indicates that these estimates lead to even larger reductions in electricity consumption than NIEIR's original estimates. ACIL Tasman accepts that these calculations are correct. However, this is not sufficient reason to accept Frontier Economics' analysis.

As with the commercial impact, the question that Frontier Economics has not addressed is the extent to which 'behaviour has moved ahead of policy', i.e. the extent to which, for whatever reason, people have replaced energy inefficient lighting with more efficient lighting regardless of the MEPS.

As discussed NIEIR's reports, behaviour has moved ahead of policy to a greater extent even than NIEIR first expected, largely due to the Victorian

Energy Efficiency Target.[22] As a result of this and Frontier Economics suggestion that it take account of low voltage halogen lights, NIEIR has revised its own estimates of the impact of the lighting RIS. The fact that NIEIR has taken this factor into account makes its estimate of the impact of the lighting MEPS preferable to Frontier Economics' estimate.

Marsden Jacob Associates – use of number of households was unjustified

MJA said that it could see no justification for using the number of households projected to be in Victoria during the regulatory period to estimate the impact of the lighting MEPS. It expressed the view that it would be more reasonable to allocate the total impact forecast for Australia to Victoria based on total electricity consumption. According to MJA, this approach "would have, at least, implied that some account was being taken of the impact of the lighting MEPS on the industrial and commercial sectors."

This argument appears to stem from MJA's assumption that the relevant adjustment related to both commercial and residential sales. This was not the case. Given that the commercial and industrial impact was treated separately, adopting MJA's approach would double count these.

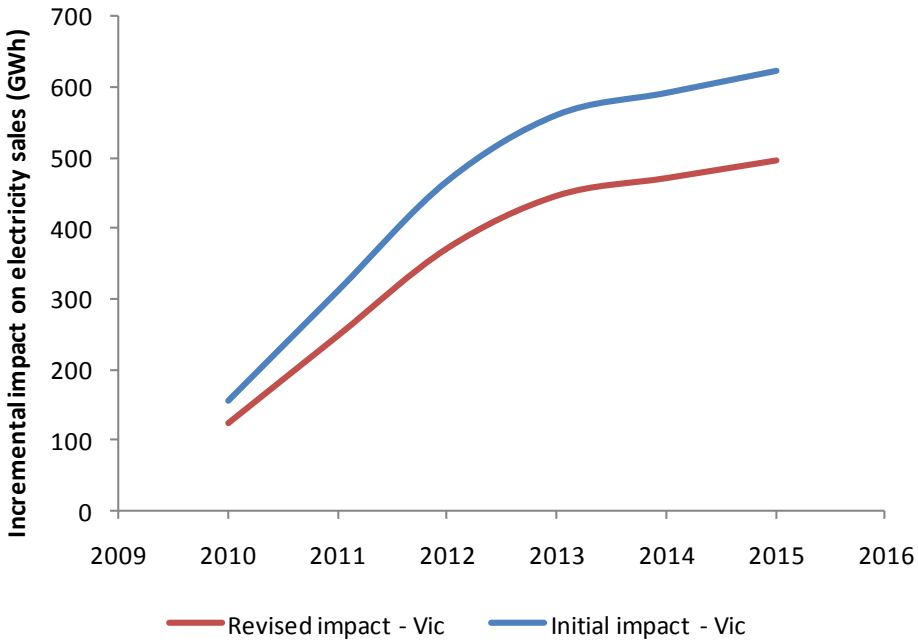
MJA also makes a point regarding the way that the AER applied ACIL Tasman's recommendation regarding the lighting MEPS. It argues that, by comparing the NIEIR's estimates and the impacts implied by the RIS and taking the lower of the two, the AER has created the appearance of bias.

4.1.3 Revised NIEIR estimates

In its revised reports to the businesses, NIEIR has revised its estimates of the impact the lighting MEPS will have on electricity sales during the regulatory period. Figure 7 illustrates.

[22] See, for example, NIEIR "*Electricity sales and customer numbers forecasts for SP AUsNet distribution region to 2019 (class and network tariff)*", June 2010, p62.

Figure 7 **Lighting MEPS – estimated impact on electricity sales (GWh)**



Data source: NIEIR, electricity sales reports to businesses, November 2009, t6.2 and June 2010, table 6.17

As Table 8 shows, the reduction in the impact is approximately 14 or 15 per cent each year of the regulatory period. This is a slightly larger increase than that originally recommended by ACIL Tasman despite the simultaneous increase in the economic and population growth forecasts. ACIL Tasman does not consider this estimate to be unreasonable.

Table 8 **Lighting MEPS – revised policy impact estimate – Victoria, GWh**

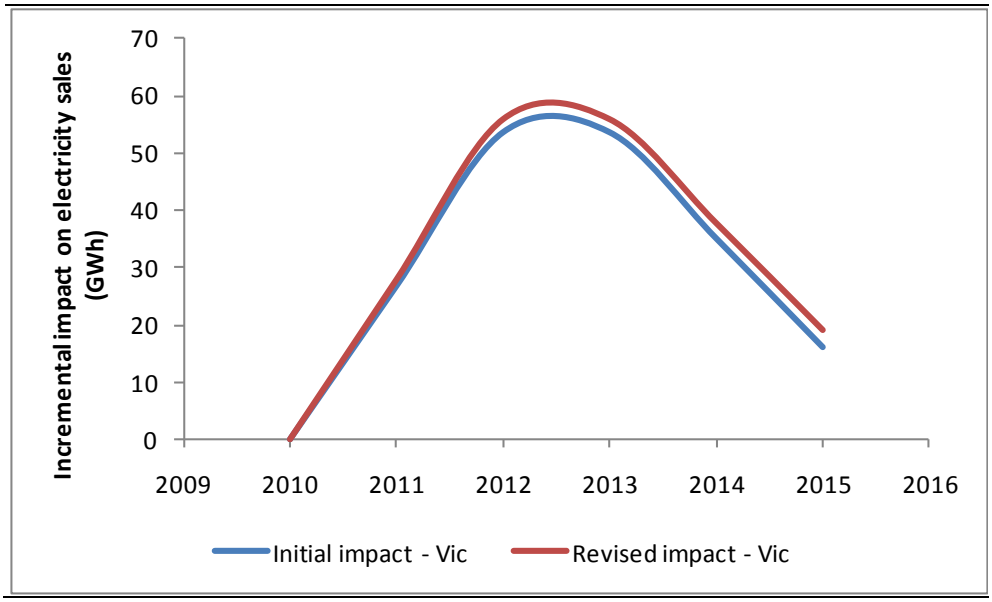
	2011	2012	2013	2014	2015
Initial impact (GWh)	110.75	110.75	66.46	22.15	22.15
Revised impact (GWh)	94.5	94.5	56.7	19	19
Reduction (%)	14.7%	14.7%	14.7%	14.2%	14.2%

Data source: NIEIR, electricity sales reports to businesses, November 2009, t6.2 and June 2010, table 6.17

4.2 Standby power

According to NIEIR, standby power accounted for 11 per cent of electricity use in Australian households in 2006. The Businesses' initial forecasts included a reduction in electricity sales due to a one watt standby target that NIEIR said is planned for all electrical appliances and equipment by 2012. The estimated impact of this policy on electricity sales in Victoria is shown in Figure 8 below.

Figure 8 **One watt standby target – estimated impact on electricity sales**



Data source: NIEIR, electricity sales reports to businesses, November 2009, t6.2 and June 2010, table 6.17

In its revised electricity sales reports NIEIR says that the forecasts it prepared for the initial regulatory proposals underestimated the impact of one watt standby by a negligible amount. This has been corrected in the revised reports, although no detail has been given as to the source of the error or the reason for the change. As Figure 8 shows, the two estimates are slightly different.

In its earlier report, ACIL Tasman pointed out that there is no single, comprehensive, committed policy of either the Commonwealth or Victorian Government, to introduce a mandatory requirement of this type. When this issue was discussed with the distribution businesses and NIEIR, they referred to a statement on the International Energy Agency's website that Australia has a one watt standby target[23], but were otherwise unable to refer ACIL Tasman to an Australian policy of this kind.

The revised regulatory proposals and the report by Frontier Economics refer to numerous product profiles with voluntary, and proposed mandatory, targets for standby performance. These product profiles are essentially precursors to the MEPS that will most likely be used to give legal effect to a one watt standby target if governments decide to pursue that course of action. As Frontier Economics says in its report, these product profiles have been introduced progressively since 2002. At that time, the MCE said that, where voluntary action is inadequate and/or if the MCE accepts that regulation is necessary to achieve the standby target, stage 2 of its one watt standby strategy

[23] See International Energy Agency, "Summary of Standby Power Regulatory Policies", available at https://www.iea.org/subjectqueries/standby.asp, accessed 11 March 2010.

"involves mandatory standby performance measures". Mainly on this basis Frontier takes the view that the initial strategy will either achieve its goal voluntarily or that it will be enforced. In Frontier's view "there is no evidence of deviation from the original strategy".[24]

Much more recently, on 2 July 2009, the Council of Australian Governments signed the national partnership agreement on energy efficiency. For present purposes the national partnership agreement on energy efficiency can be described as an agreement to introduce the energy efficiency measures in the "energy efficiency measures table" that was attached to the agreement itself.[25]

In light of this agreement, ACIL Tasman is less confident than the distribution businesses, NIEIR and Frontier that a one-watt standby target will be mandated during the coming regulatory period. This is for two main reasons. First, the National Partnership agreement and the measures table make no mention of standby power. Second, under the national partnership agreement, all measures will be subject to a regulatory impact assessment. No RIS has been issued to date for a one watt standby target as such, although if it is introduced the target would more likely be in the form of a series of individual MEPS for subsets of appliances.

While ACIL Tasman accepts that there may be some reduction in the standby power requirement of household appliances over the coming regulatory period, it considers NIEIR's assumption that all household appliances will be required to draw no more than one watt in standby mode to be unduly optimistic. Accordingly, ACIL Tasman remains of the view that the distribution Businesses' estimate of the impact of one watt standby power is not reasonable.

As a result, ACIL Tasman considers that the electricity sales and maximum demand forecasts are likely to be understated by the amounts set out in Table 9.

[24] Frontier Economics, "Review of ACIL Tasman recommendations", June 2010, p9.

[25] See http://www.ret.gov.au/Documents/mce/energy-eff/nfee/default.html, accessed 16 August 2010.

Table 9 **estimated policy impacts – one watt standby**

One watt standby	2011	2012	2013	2014	2015	Total
electricity sales (GWh)						
Citipower	3.5	3.7	3.5	1.6	1.4	13.7
JEN	3.3	3.4	3.3	1.2	1	12.2
Powercor	7.4	7.3	7.4	2.5	2.4	27
SP AusNet	6.7	6.7	6.7	2.3	2.2	24.6
United	7	7.1	7	2.5	2.3	25.9
Maximum demand (MW)						
Citipower	0.4	0.5	0.4	0.5	0.4	2.2
JEN	3.1	3.2	3.1	1	0.8	11.2
Powercor	6.9	6.8	6.9	2	1.9	24.5
SP AusNet	6.3	6.2	6.3	1.8	1.8	22.4
United	6.5	6.5	6.5	1.9	1.8	23.2

Data source: NIEIR, electricity sales reports to businesses, November 2009, table 6.2 and June 2010, table 6.17

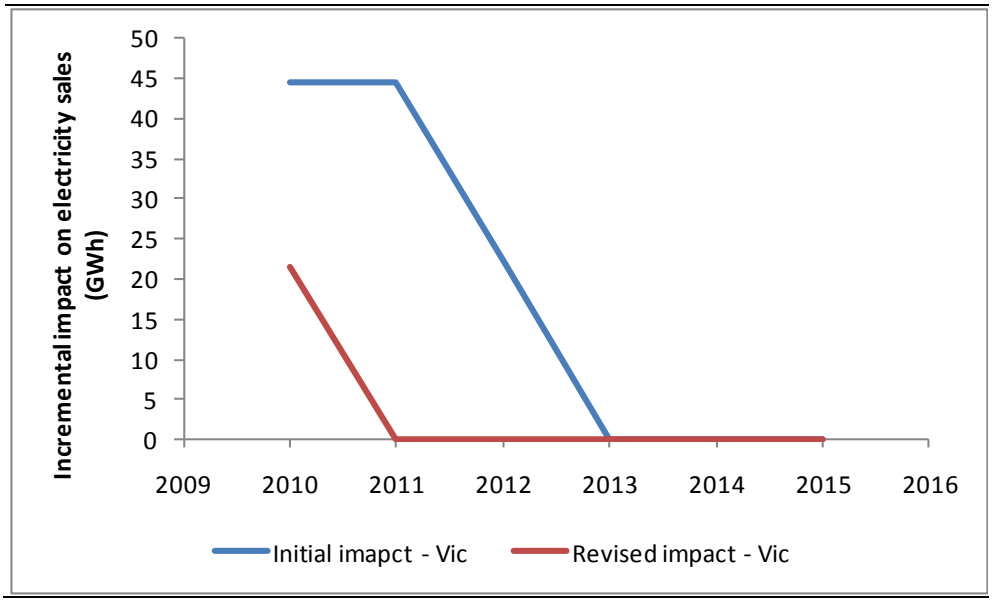
4.3 Insulation rebate scheme

The electricity sales forecasts in the Businesses' initial proposals were adjusted to account for the Australian Government's policy, which was current at the time the forecasts were submitted, of paying a rebate to householders who install insulation in their homes. On 19 February 2010, several months after the distribution businesses submitted their regulatory proposals, the Commonwealth Government discontinued this scheme. Accordingly, ACIL Tasman recommended that the projected impact of the scheme should be omitted from the electricity sales forecasts for the regulatory period, as the insulation rebate scheme would not extend into that period.

In their revised forecasts, the distribution businesses have accounted for this policy change by removing the forecast impact beyond the cancellation of the scheme. In addition, the forecasts have been adjusted to account for the fact that NIEIR understands that the impact of the scheme in 2009/10 was actually greater than it anticipated, although NIEIR does not provide details of the source of this information. On this basis, NIEIR has revised its overall uptake assumption so that 75% of eligible dwellings are insulated before the scheme was cancelled.

The result is that NIEIR's estimated impact has changed as shown in Figure 9 below.

Figure 9 **Insulation rebate – estimated impact on electricity sales**



Data source: NIEIR, electricity sales reports to businesses, November 2009, table 6.2 and June 2010, table 6.17

ACIL Tasman's concern with the way this policy impact was estimated in the initial proposals was limited to the future of the policy (and arose from changes that were made after the forecasts were prepared).[26] ACIL Tasman's concerns regarding the future of the policy have been addressed, so no further amendment is recommended.

4.4 Photovoltaics

This review is being conducted at a time when, for a number of reasons, solar panels are very popular with Australian householders. The Victorian Government has chosen to encourage the uptake of solar panels by offering a premium 'feed-in' tariff of 60c/kWh (equivalent to $600/MWh) to households who export electricity generated by solar panels to the grid.

In addition to the premium solar feed-in tariff, Victorians (and other Australians) who install solar panels can participate in the expanded Renewable Energy Target (RET) scheme by creating and selling Renewable Energy Certificates (RECs). These go some way to offset the upfront cost of the solar panel.

During the course of this review, the Commonwealth Government announced that it was adjusting the RET scheme. In terms of solar panels, the effect was that the risk of REC price variability was reduced as householders will now be paid a fixed amount per REC.

[26] See p.32 of ACIL Tasman's electricity sales and customer numbers report.

The take up of solar panels is potentially significant for distribution businesses. Based on the policy frameworks as they existed at the time the initial forecasts were prepared, the distribution businesses expect that solar panels will be installed in Victoria in coming years at the rates shown in Table 10. Given this rate of installation, NIEIR and the distribution business expect that the impact on electricity sales will be as set out in Table 10.

Table 10 **Take-up and impact of solar panels in Victoria**

Year (fin year ending June)	2009	2010	2011	2012	2013	2014	2015
Annual panels installed (Vic)	10000	14000	5000	5000	5000	4000	3000
Citipower (GWh)	1.13	2.03	2.5	2.97	3.39	3.72	3.96
SP AusNet (GWh)	2.38	4.27	5.26	6.25	7.14	7.84	8.34
Powercor (GWh)	2.62	4.69	5.78	6.87	7.85	8.61	9.16
JEN (GWh)	1.19	2.13	2.63	3.13	3.58	3.93	4.18
United (GWh)	2.47	4.43	5.46	6.49	7.42	8.14	8.65
total (GWh)	**9.79**	**17.55**	**21.63**	**25.71**	**29.38**	**32.24**	**34.29**

Data source: NIEIR, Electricity sales and customer numbers reports to the distribution businesses, table 6.14

In the earlier report, ACIL Tasman noted that the businesses had underestimated the number of solar panels installed in Victoria in 2009, although it did not consider the forecasts unreasonable.

For the revised forecasts, NIEIR has re-evaluated its forecasts in light of the data to which ACIL Tasman referred and other data relating to REC creation. As a result, the businesses increased their estimated impact on electricity sales by approximately 3GWh over the regulatory period. ACIL Tasman regards these amendments, and therefore the policy adjustments regarding solar panels, as reasonable.

4.5 Victorian Energy Efficiency Target

The Victorian Energy Efficiency Target, VEET, is a white certificate energy efficiency trading scheme. It places an obligation on energy retailers (electricity and gas) to deliver a certain quantity of energy efficiency improvements in the community. They satisfy this obligation by surrendering Victorian Energy Efficiency Certificates (VEEC), which are created when one of the 'prescribed activities' is carried out in a Victorian home.

The information provided in the initial proposals regarding the estimated impacts of the VEET was not sufficient to enable ACIL Tasman to reach a view as to whether they were reasonable. However, the estimated impacts themselves were modest, so ACIL Tasman did not recommend any change to them.

In its revised reports, NIEIR has provided some commentary regarding recent experience with VEEC creation. In summary, most VEEC created recently have come from lighting activity and a large proportion of what remains were created from water heating. These two activities are dealt with separately in NIEIR's forecasting methodology so no change has been made to the VEET estimates.

ACIL Tasman also notes that, based on an analysis of recent VEEC creation activity, Frontier Economics concludes that NIEIR's estimates of the impact of VEET are two low. This is due to NIEIR's assumption that only 10% of the VEET activity will be additional to other policies, whereas Frontier considers that 25% of VEET activity will be additional.

In total, NIEIR's estimate is that VEET will cause electricity sales over the regulatory period to be 364.5 GWh less than if VEET was not implemented. By contrast, Frontier Economics considers that VEET will reduce sales by 918 GWh, approximately 2.5 times as much

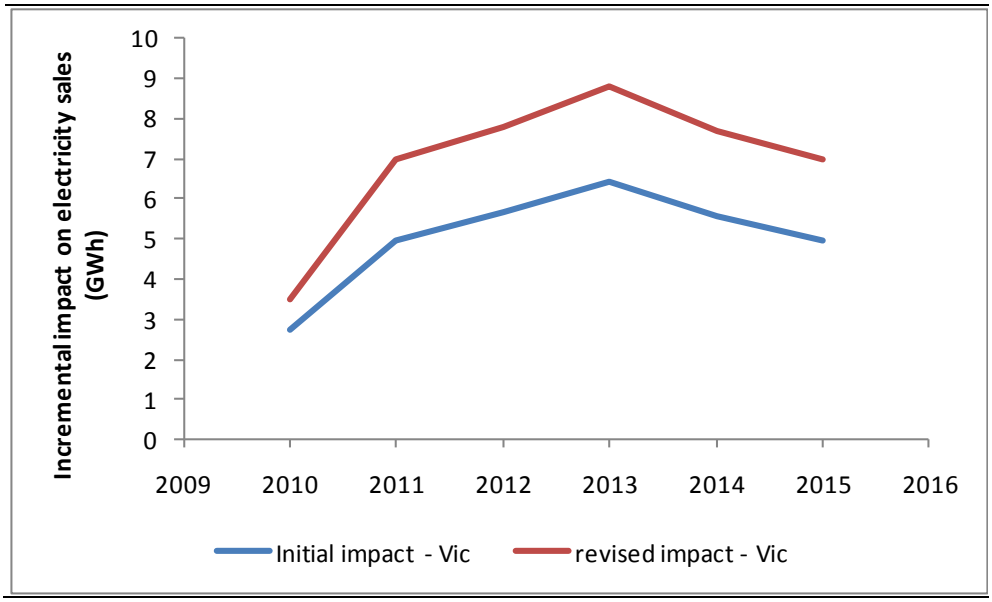
Finally, ACIL Tasman notes that, with the termination of the Commonwealth insulation rebate, there is a chance that insulation will be reinstated as an eligible activity under VEET. If this does happen, the VEET estimate will turn out to be on the low side. The forecasts have not been adjusted to account for this.

For the above reasons, ACIL Tasman considers it likely that the VEET estimates may well turn out to be 'on the low side', although this is uncertain. The forecasts that have been submitted appear to be reasonable.

4.6 Mandatory Energy Performance Standard – air conditioners

NIEIR's initial and revised forecasts of the impact of the air conditioner MEPS on electricity sales is set out in Figure 10.

Figure 10 **Air conditioning MEPS – estimated impact on electricity sales**



Data source: NIEIR, electricity sales reports to businesses, November 2009, table 6.2 and June 2010, table 6.17

This forecast is based on information, to which NIEIR has access, regarding air-conditioning sales by unit type. The initial forecasts were revised to take account of more recent data including what NIEIR reports was a record level of air conditioning sales in calendar 2009 in Victoria.[27]

As was the case in the earlier report, ACIL Tasman considers that the businesses have provided insufficient information regarding the way this estimate was prepared to enable a view to be reached as to whether it is reasonable. While amending the forecasts to take account of actual sales data is a reasonable step to take, the fact that this data is not available for scrutiny is less than ideal. However, in the broader context of this review, the forecast impact is not sufficiently large to warrant a more detailed analysis.

4.7 6 star building standards

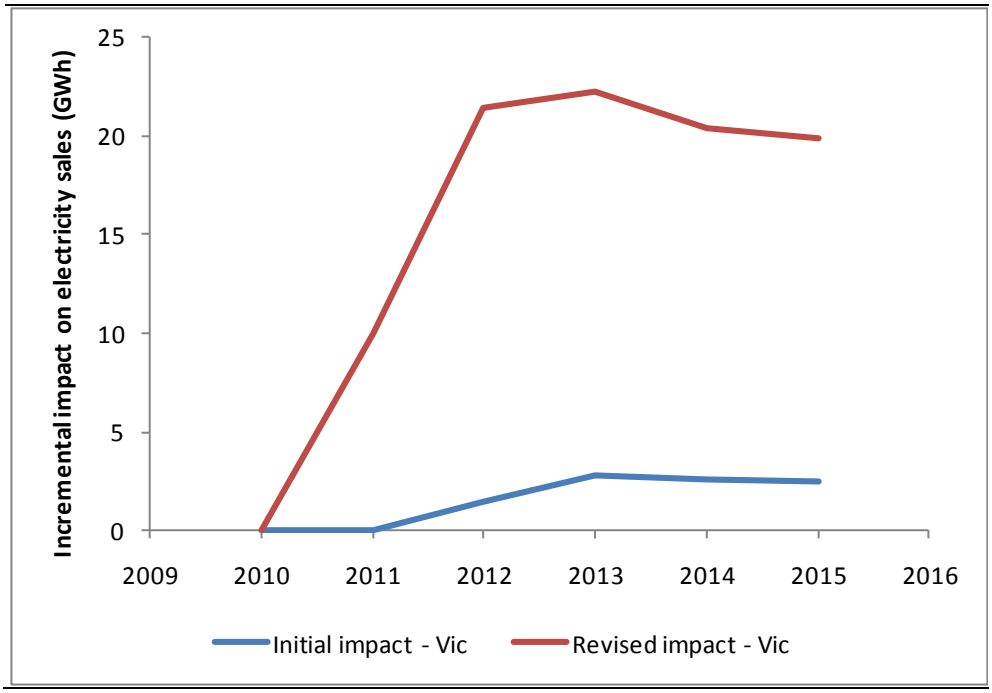
When the businesses submitted their initial proposals, new homes built in Victoria were required to meet a 5 star energy efficiency standard and there was some suggestion that COAG would move to increase this to a 6 star minimum. On 30 April 2010 the (Victorian) Minister for Planning announced that, effective from May 2011, all new homes in Victoria must be built to a 6-star standard.

In their initial proposals, the businesses assumed that this change would happen in 2012 and estimated a modest reduction in electricity sales as a result.

[27] NIEIR's reports to the businesses state that, in MW terms, demand in 2009 was 160 MW greater than forecast in 2009

This has now been increased to account for the fact that the new standard will apply sooner than initially expected. This change is shown in Figure 11 below.

Figure 11 **Energy efficient building standards –impact on electricity sales**



Data source: NIEIR, electricity sales reports to businesses, November 2009, table 6.2 and June 2010, table 6.17

This measure is only relevant for newly constructed homes and major renovations and is thus limited to a very small portion of overall electricity sales. It also needs to be considered in the context of trends for larger homes which, while more energy efficient, may nonetheless be large enough to have increasing, rather than decreasing, demand for electricity.

Particularly given its modest size ACIL Tasman does not recommend any adjustment to this policy impact.

4.8 Advanced metering infrastructure

In their initial proposals, the businesses included the estimated impact of the rollout of Advanced Metering Infrastructure (AMI) on their electricity sales and maximum demand forecasts.

ACIL Tasman was concerned with two aspects of these forecasts as was discussed in the earlier reports. Specifically, ACIL Tasman considered that:

1. A moratorium on the introduction of time of use tariffs would cause the impact of AMI on electricity sales and maximum demand to be deferred and

2. NIEIR's estimates of the impact that AMI would have on electricity sales was not reasonable.

These two issues are discussed in turn below, with a focus on the likely impact of the AMI rollout on electricity sales. As is discussed in the accompanying report, with a few exceptions ACIL Tasman regards the maximum demand forecasts as reasonable,. In addition, as discussed in the earlier reports, the available data and research upon which to base a forecast of the likely impact the AMI rollout will have on maximum demand is very limited. ACIL Tasman does not regard NIEIR's estimate of this impact as unreasonable.

4.8.1 Moratorium on time of use tariffs

As was discussed in ACIL Tasman's earlier reports, when the initial proposals were prepared, it was Victorian Government policy that AMI would be rolled out across the State by 2013. The businesses prepared their initial forecasts on the assumption that many of their customers would be on time of use tariffs for much of the regulatory period. The specifics were based on each business's roll out schedule.

On Monday, 22 March 2010, towards the end of ACIL Tasman's review of the electricity sales forecasts, the Victorian Government announced a moratorium on the introduction of time of use tariffs. The businesses were asked, by letter from the Minister for Energy and Resources, to defer the introduction of time of use tariffs although the rollout of the meters themselves has continued.[28]

The Government's intention, as expressed in those letters, was that the deferral would be subject to a comprehensive assessment of the impact of time of use tariffs on consumers, considering a range of circumstances. This was expected to be completed by the end of 2010 to allow for a more orderly introduction of network and retail time of use tariffs in 2011. The assessment was ongoing at the time of writing this report.

4.8.2 Impact of time of use tariffs on electricity sales

With the exception of SP AusNet, the Businesses' initial proposals included estimates of the impact of the AMI rollout that were prepared on the same basis. [29] In summary, the businesses adopted NIEIR's assumption that, when the AMI rollout is complete in 2015, electricity consumption by eligible

[28] Citipower and Powercor attached these letters to their regulatory proposals and the discussion here is based on these letters. ACIL Tasman understands that the other businesses received similar letters.

[29] All reference to the distribution businesses in relation to smart meters should be taken to exclude SP AusNet.

customers will be 8 per cent less than it would otherwise have been.[30] This estimate was based on NIEIR's review of a number of studies and trials that have been conducted in Australia and overseas. In particular, the judgement is based on NIEIR's observation that this was the result in the Energy Australia study, which it considers to be "the most relevant and local study".

As was discussed in detail in ACIL Tasman's earlier report regarding electricity sales, ACIL Tasman considers the assumption that the introduction of time of use tariffs will reduce electricity sales by 8% to be unreasonable.

4.8.3 The revised proposals

In the revised proposals, the businesses have taken three different approaches to estimating the impact of smart meters on electricity sales.

JEN has adopted Frontier Economics' conclusion that the introduction of smart meters will cause electricity consumption by[31]:

- residential customers to be 2.5% lower than otherwise
- commercial customers to be 0.5 per cent lower than otherwise.

Citipower, Powercor and United have adopted NIEIR's revised assumption that the introduction of smart meters will cause electricity consumption by eligible customers to be 4% lower than it would otherwise be.

SP AusNet has continued to rely on its internal model, although it has made no adjustment to its electricity sales forecasts due to the AER's decision to prevent the businesses from making tariff reassignments in their regulatory proposals.

The sections that follow summarise each of these approaches before providing ACIL Tasman's conclusions in relation to this issue.

NIEIR revised forecasts

The text relating to the AMI rollout in NIEIR's revised forecast reports is substantially the same as it was in the earlier reports. NIEIR refers to the same

[30] In analysing the business's regulatory proposals and NIEIR's reports, ACIL Tasman has been unable to replicate the 8 per cent figure. From the analysis that has been possible, it appears more likely that, contrary to a literal interpretation of the energy reports, the estimates are based on an 8% reduction in electricity sales to customers who will receive a smart meter, i.e. any customer whose consumption is greater than 160 MWh per annum is excluded.

[31] See Jemena, revised proposal, p52 and appendix 5.8 as amended by Jemena's letter to the AER of 31 August 2010.

summary of literature which ACIL Tasman considered in its earlier report. Based on that summary, NIEIR concludes that the "average overall per cent reduction is 8 per cent" of electricity sales. As is discussed in ACIL Tasman's earlier report, this is neither a reasonable interpretation of the literature summarised here nor a sound basis for estimating the likely impact of the rollout of smart meters on electricity sales.

NIEIR goes on to say that it has assumed that the smart meter rollout will cause electricity sales to residential customers to be four per cent lower than they would otherwise be. Other than saying that this is "taking the conservative view", NIEIR provides no basis for this choice.

NIEIR's revised reports do not refer separately to the way that the impact of the smart meter rollout on commercial electricity sales was estimated. However, according to email correspondence between NIEIR and JEN, it assumed that commercial sales would be reduced by one per cent.

Frontier Economics approach

In its report to Citipower, Frontier Economics considers the cost benefit analysis conducted for the Ministerial Council on Energy by consultants NERA and refers to a similar study conducted by the Department of Energy and Climate Change UK and a report done by Frontier Economics UK.

The NERA/MCE study made assumptions regarding elasticity and tariffs among other parameters and used these to calculate the likely impact of the AMI rollout across Australia from the bottom up. The MCE study concluded that the impact of AMI on electricity sales would be very modest, less than one per cent. It is noteworthy, though, that, the MCE assumed that 57.5 per cent of customers would remain on flat tariffs. This assumption reduces the aggregate impact substantially.

For reasons set out in its report to Citipower, Frontier Economics regards the MCE estimates as too low for present purposes. In particular, Frontier Economics considers that the elasticity assumptions are too low for Australian conditions and that the MCE understated the potential for savings from the feedback effect.[32] Frontier Economics also note that the reports to the MCE also provided a high demand response scenario where consumption was reduced by three per cent., although this was an assumed, rather than a predicted, impact.[33]

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[32] The feedback effect is the extent to which consumption is reduced due to information availability regardless of tariffs.

[33] As Frontier notes, this approach may have been taken because no Australian study reports elasticity estimates.

The DECC and Frontier Economics UK studies are similar to the MCE's high demand response scenario in that they are judgement based studies where the impact on consumption is assumed rather than calculated from 'bottom up'. Based on these studies, Frontier Economics concludes that it is reasonable to expect that, all else being equal, residential customers will use 2.5 per cent less energy when time of use tariffs are introduced than they would otherwise.

SP AusNet approach

Unlike the other distribution businesses, SP AusNet prepared a forecast of the likely impact a time of use tariff would have on energy sales to its customers from the bottom up.

This approach was discussed in detail in ACIL Tasman's earlier report regarding electricity sales and, with a few minor exceptions, the methodology itself is unchanged.

SP AusNet's reading of the literature is that it commonly indicates that the elasticity of demand ranges between -0.2 to -0.5. Having regard to these studies, SP AusNet's modelling includes the following elasticity of demand estimates:

- Own-price elasticity of peak summer, shoulder and winter peak demand of -0.15;
- Cross-price elasticity demand between -0.005 to -0.1; and
- Own-price elasticity of off-peak demand of zero.

In its draft determination, the AER said that the proper functioning of the Post Tax Revenue Model requires that the assumption that customers face the same tariff for the life of the regulatory period. Central to SP AusNet's approach to modelling the impact of the AMI rollout are assumptions regarding when customers will transition from their current tariffs to time of use tariffs. Given that SP AusNet has not been able to make these assumptions in the PTRM, it has not reflected them in its electricity sales forecasts.

Therefore, SP AusNet's forecasts, as set out in its revised proposal are made on the basis that no customers transition to time of use tariffs during the regulatory period. The customers already on time of use tariffs at the end of 2010 are assumed to remain on those tariffs.

Notwithstanding this, SP AusNet has used its model to calculate the impact of the AMI rollout based on the above assumptions and its current proposed tariffs (below). The result is that, in 2015 when all eligible customers have been transferred to the relevant time of use tariff, SP AusNet expects that electricity

sales to eligible customers will be 1.98% less than they would be if the AMI rollout did not happen.

In addition to the elasticities set out above, this impact is calculated on the assumption that SP AusNet's proposed time of use tariff structure is applied in accordance with its AMI rollout schedule. Therefore residential time of use tariffs are assumed to be (per kWh):

- In summer, 28c (peak time), 23c (shoulder time), and either 1.7 or 2.97c (off peak)
- In winter 22c (peak) and 1.7c or 2.97c (off peak)

4.8.4 ACIL Tasman's conclusions

At the time the forecasts were prepared, is was not clear when the Victorian Government would lift its moratorium on time of use tariffs or the length of any transition time that may be employed. As Frontier Economics has pointed out, a certain amount of energy savings may be achieved in advance of the introduction of mandatory time of use tariffs if these tariffs are offered voluntarily first.

Another area of uncertainty is the extent to which energy savings will be realised when time of use tariffs are in place. This will depend on a range of factors, some of which are at least partially within the business's control (such as the tariff levels) and others which are beyond their control. Some of these factors have been examined in previous studies, although, as was discussed in ACIL Tasman's earlier reports, there are a number of reasons to treat the results of these studies with caution.

In this section, ACIL Tasman considers first whether it is reasonable to make any post model adjustment to the growth forecast to account for the AMI impact and, if so, the appropriate level of that adjustment.

Is it reasonable to make a post model adjustment?

ACIL Tasman agrees with the businesses that it is reasonable to make an appropriate adjustment to forecasts of electricity sales and maximum demand to account for the AMI rollout.

At the very least, Victorian consumers will gain access to more detailed information regarding their electricity usage during the course of the regulatory period. As Citipower and Powercor observe in their revised proposals, there are a number of ways in which consumers will be able to access this information.

It is at least plausible that this information alone might have an impact on electricity sales, although ACIL Tasman expects that this impact would be

small. In ACIL Tasman's view, it is more likely that a significant impact on electricity sales would only be observed if a time of use tariff[34] is introduced as well.

In addition, notwithstanding the current moratorium, ACIL Tasman agrees with the businesses that there is at least a reasonable chance that time of use tariffs will become available to residential and small business customers at some time during the regulatory period. ACIL Tasman's understanding at the time of writing is that the government is proceeding on the assumption that tariffs will be introduced for the network component of retail tariffs, although not the energy component, at least not in the first instance. ACIL Tasman understands that there will probably be some additional constraints on how and when these tariffs can be used.

ACIL Tasman's view remains that the AMI rollout and the introduction of time of use tariffs can reasonably be expected to have an impact on electricity sales and maximum demand. Further, these impacts would not be accounted for by NIEIR's core models. Therefore, ACIL Tasman considers it reasonable to make an appropriate adjustment to NIEIR's core forecasts to account for the AMI rollout.

In the earlier reports ACIL Tasman noted that, other than SP AusNet, each distribution business had relied on NIEIR's estimate of the impact the AMI rollout would have on electricity sales and that this estimate was substantially overstated and therefore not reasonable. In the absence of a reasonable estimate of the impact,[35] we recommended that the AER reject any adjustment in the forecasts due to this policy measure. This was not to say that we expected that the AMI rollout would have no impact on electricity sales or maximum demand. Rather, we suggested that the AER make appropriate adjustments as better information becomes available during the regulatory period (this is discussed further in the next section).[36]

What adjustment is reasonable to make?

The businesses have proposed three different approached to estimating the impact the AMI rollout will have on electricity sales. In summary, these are that the AMI rollout will cause electricity sales to eligible customers to be:

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[34] This should not be read to imply that ACIL Tasman considers that a critical peak pricing structure would not also lead to reductions in electricity savings. On present information, it seems less likely that this tariff structure will be introduced so it has not been considered in detail.

[35] ACIL Tasman's scope of work was limited (relevantly) to assessing the impact of its views on existing forecasts,. It did not extend to preparing alternative forecasts.

[36] See p.56 of the electricity sales and customer numbers report.

- four per cent lower than otherwise for residential customers and slightly less than one per cent lower than otherwise for commercial customers (Citipower, Powercor and United)
- 2.5 per cent lower than otherwise for residential customers and 0.5 per cent lower for commercial customers (JEN/ Frontier Economics)
- Almost 2 per cent lower than otherwise (SP AusNet)

NIEIR's estimate – 4 per cent reduction

In ACIL Tasman's view, NIEIR's electricity sales reports to the businesses do not provide a sound basis for its assertion that the likely impact of the AMI rollout will be to reduce electricity sales to eligible customers by four per cent. As was noted in ACIL Tasman's previous report the summary of literature upon which NIEIR relies does not support its conclusion as to the likely impact the AMI rollout will have on electricity sales. ACIL Tasman notes that NIEIR's estimate is within the range suggested by Frontier Economics, but also that NIEIR makes no reference to either Frontier Economics' report or the studies it considers. It is not clear whether NIEIR had regard to that report in arriving at its revised estimate or whether this was reached simply by halving NIEIR's earlier estimate.

Frontier Economics and SP AusNet estimates

By contrast, ACIL Tasman considers that the approaches taken by Frontier Economics and SP AusNet are reasonable, although this does not necessarily mean that the estimates they have prepared are correct.

It is helpful to consider the estimated impact arising from SP AusNet's model, which calculates that residential sales to eligible customers will be reduced by 1.98 per cent. This is the result of SP AusNet's assumptions regarding elasticity and its proposed tariffs.[37]

There is significant reason to be cautious in relation to the elasticity estimates to which SP AusNet refers. To account for these, SP AusNet uses values of elasticity of demand that are about half the values estimated in the studies to which it refers, although these studies had higher estimates than others.

ACIL Tasman does not consider is unreasonable to expect that, if SP AusNet's proposed tariffs are implemented, electricity sales may be reduced in line with its estimates.

However, at the time of writing it seems unlikely that SP AusNet will be able to introduce the tariffs it proposed originally, at least not for the entire

[37] See above.

regulatory period. Therefore, the impact may not be reflective of the likely actual outcome.

If the time of use tariffs that are actually implemented during the regulatory period are 'flatter' than those proposed by SP AusNet, then the impact on electricity sales would be muted.

In ACIL Tasman's view, the estimates made by Frontier Economics and SP AusNet are likely to overstate the impact of the AMI rollout on electricity sales. This is due to the delay in implementation of time of use tariffs that will result from the moratorium.

In the absence of detailed information regarding the tariffs that will be implemented and their timing, ACIL Tasman is unable to provide a more likely estimate of the likely effect of the AMI rollout on electricity sales. To do so would require estimates of when the moratorium on time of use tariffs will be lifted and what the transitional arrangements will be as well as estimates of the impact of the tariffs themselves. It would also be necessary to estimate the impact that the 'feedback effect' would have during transition as well as the extent to which customers would take up voluntary time of use tariffs before they eventually become mandatory (assuming that this eventuates).

Given the uncertainty around these factors, ACIL Tasman's view is that it is not currently possible to produce an accurate estimate of the impact that the AMI rollout will have on electricity sales over the regulatory period.

Therefore, while it is reasonable to make an adjustment for the potential, or likely, impact that the policy will have, ACIL Tasman considers that:

- the (four percent) impacts proposed by Citipower, Powercor or United are too large to be reasonable estimates of the impact
- the (1.98 per cent) impact proposed by SP AusNet is only reasonable to the extent that it is reasonable to assume that SP AusNet's proposed tariffs are implemented
- the (2.5/0.5 per cent) impact proposed by JEN, which is similar to that proposed by SP AusNet, would also be reasonable if tariffs similar to those proposed by SP AusNet are implemented.

While ACIL Tasman is of the view that there is currently too much uncertainty regarding the introduction of time of use tariffs to make a reasonable estimate of their likely impact on electricity sales, we remain of the view that it is reasonable to make an adjustment for that impact. As United points out in its

regulatory proposal, to do otherwise transfers the risk associated with this policy uncertainty entirely to the businesses.[38]

4.9 General energy efficiency efforts

In addition to the above policy impacts, United referred to numerous policies that were implemented over the 2006 to 2010 regulatory period. It provided a report by Marsden Jacob Associates that related to these policies.

The general tenor of United's argument here is that energy efficiency has improved over the current regulatory period and Governments are likely to continue to introduce policies to introduce it further. United says that:

> Both the Australian and Victorian Governments have stated publicly that they are either adopting new policies or modifying existing policies with a specific intention of achieving even more substantial energy efficiency improvements in the economy; and both Governments are reviewing other existing policies with the intention of contributing to that same objective within the next regulatory period.
>
> Each of the existing policies, and the announced changes to policy, are supported by Regulatory Impact Statements (RIS) conducted in compliance with Council of Australian Governments (COAG) Best Practice Regulation Guide. Each of these RISs presents an estimate of the expected energy reductions. The cumulative RIS estimates of energy savings are material and were intended to impact on energy consumption in the 2005-10 period. Confirmed policy changes, and others where reviews have been confirmed by Governments are intended to intensify those impacts in the 2010-15 period and beyond.[39]

From the above, United concludes that:

> Given these circumstances, it is incongruous for the AER to assume the suite of energy efficiency policies implemented by COAG and the Victorian Government will have only a minor impact on energy consumption for customers connected to UED's distribution network.[40]

In ACIL Tasman's view, this is an oversimplification of its earlier recommendations to the AER and the AER's draft determination.

While United is clearly correct that Governments have taken various steps in the last few years to improve energy efficiency, it does not follow that these should be taken into account as explicit adjustments to NIEIR's model. As ACIL Tasman understands NIEIR's forecasting model, it is based on the most

[38] United, revised regulatory proposal, pp. 247 and 271.

[39] United, revised regulatory proposal, p 259

[40] United, revised regulatory proposal, p 259

recent available information regarding electricity sales and energy intensity and forecasts growth from this starting point.[41]

As a result, while it is reasonable to make post model adjustments for *future* policy efforts to improve energy efficiency, to make adjustments for changes that have already been implemented would in effect be double counting.

For each of the policy measures for which NIEIR has made post model adjustments, it has sought to estimate only the incremental impact on electricity sales, beyond what had already been observed in the base year. Considering, for example, the MEPS for lighting, NIEIR's adjustments to commercial sales are small based on its understanding that the majority of commercial lights have been fitted with energy efficient lights for some time, so the *additional* impact of the policy would be expected to be modest.[42]

Therefore, while ACIL Tasman considers it reasonable to make post model adjustments for identified policy measures, it is not reasonable to make further adjustments for policies that were introduced over the 2006 – 2010 regulatory period, at least not where their effect is already reflected in electricity sales data.

4.10 Policy impacts – marked by uncertainty

This price determination process is being conducted at a time of great uncertainty in the policy environment surrounding electricity sales. As discussed above, both the Australian and Victorian Governments have taken steps recently to improve the energy efficiency of Victorian homes and

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41 For a more detailed discussion, see ACIL Tasman's earlier report regarding electricity sales, section 4.3. See also Frontier's report to Citipower regarding NIEIR's electricity sales forecasting methodology, section 3.3. Note from Frontier's report that NIEIR is forecasting growth, not level, of sales and that this is applied to actual sales in the most recent period for which data is available.

42 NIEIR's view, as expressed in a communication with the AER on 23 February 2010, is that:

> "Fluorescent lighting is included in base load for supermarkets and Offices. Many small shops turn off their lights on 42 degree plus days to maximise the performance of their air-conditioners and fridges.
>
> Fluorescents have for a long time been dominant in the Commercial sector. For every one million incandescent globes, we estimate there are 50 million fluorescents units and 70-90 million tubes. It is these fluorescents lights that are on in shops and Offices at 4.30 pm not incandescents. In most commercial buildings, incandescent light fittings would only have been used in low use areas, special lighting fittings (e.g. emergency lighting), and space restricted areas. Small rooms such as single toilets or showers, small storage cupboards etc. There impact would be near zero as assumed by NIEIR.
>
> NIEIR has assumed no impact of lighting MEPS on the industrial sector."

businesses. These efforts seem likely to continue over the coming regulatory period and beyond.

The unprecedented nature of some of the policies discussed above, in particular the AMI rollout, makes it difficult, if not impossible to predict their impact with confidence. In some cases, even if the impact of the policy itself can be estimated with confidence, there is uncertainty regarding the timing, or even the existence, of the policy.

United raised the issue of uncertainty in its revised proposal:

> UED accepts that, like all forecasts, its revised forecasts contain elements of uncertainty. Energy volumes could be significantly higher than NIEIR's forecasts if consumers seek higher levels of service and comfort than assumed in the respective RISs. Energy volumes could also be significantly lower than this forecast if:
>
> - NIEIR's assumptions about the effectiveness of the suite of energy efficiency policies prove to be too modest (e.g. builders and home owners voluntarily adopt energy efficiency measures that exceed mandatory standards);
> - consumers respond to continuing public messages reinforcing the environmental and cost reduction benefits of energy efficiency policies (and mirror outcomes in the water sector where consistent messages promoting the benefits of water savings demonstrate strong resilience); and
> - due to impacts of further or modified energy efficiency policies that have been announced but are not included in NIEIR's modelling. [43]

In addition there is a chance that, over a five year regulatory period, policies that have not yet been announced, and therefore not accounted for in NIEIR's modelling, will be introduced. In this respect it is relevant to note that a Federal election was held during the course of this review, although its result was not clear at the time of writing. A Victorian election will also be held before the regulatory period commences.

There is a range over which the policy impacts are reasonable. As United has pointed out, if the AER 'locks in' an estimate that is at the low end of the reasonable range, it assigns the risk that that the policy will be more effective to the businesses. However the reverse is also true as where the AER accepts an estimate at the high end of the range, the risk is assigned to customers.

In ACIL Tasman's earlier report, it recommended that the AER disregard the (unjustifiably high) estimates of the AMI impact on electricity sales "with a view to making any necessary adjustments as and when the future of the introduction of time of use tariffs becomes clearer." Citipower and Powercor

[43] United, revised regulatory proposal, p 237

note in their revised proposals that ACIL Tasman did not identify a provision of the rules that would enable the AER to take this approach.

ACIL Tasman remains of the view that it may be preferable to retain the ability to adjust the electricity sales forecasts during the regulatory period as relevant uncertainties are resolved.

While the appropriate allocation of this risk between the businesses and customers is a matter for the electricity rules, the fact that the risk exists should be taken into account in preparing growth forecasts. Given that the risk cannot be quantified with the information available at present, it would be preferable to defer the decision until better information is available rather than to 'lock in' an erroneous estimate at this stage.

4.11 Policy impacts - conclusion

In summary, for the reasons set out above, ACIL Tasman considers the following:

1. It reasonable to make 'post model' adjustments for all of the policies the businesses have identified other than the one watt standby policy
2. The impact estimates proposed for all estimates other than one watt standby and the AMI rollout are reasonable, although the estimate for VEET may be on the low side
3. The estimated impact of the one watt standby target should be disregarded and the growth forecasts adjusted by adding this impact back
4. The modelled impact of the CPRS (in the core models) is a reasonable estimate given the assumption that the CPRS will commence on 1 July 2013. However, there is considerable uncertainty regarding whether, and when, the CPRS will commence and what carbon price it will cause. For the most part it appears likely that the approach the businesses have taken errs on the side of earlier introduction and greater reduction in electricity sales and maximum demand.
5. The impact of the AMI rollout cannot be estimated reasonably without more information than is available currently, in particular regarding the timing of the introduction of time of use tariffs and the level of those tariffs. However:
    a) The 4 per cent estimate of the AMI impact put forward by United, Citipower and Powercor is likely to be too high
    b) The estimated impact put forward by JEN (after the revisions made on 30 August 2010) is a reasonable expectation of the impact if time of use tariffs are in place for the entire regulatory period
    c) The estimated impact put forward by SP AusNet is a reasonable estimate of the impact of its proposed time of use tariffs, although it is

calculated on the assumption that these tariffs will be in effect for the entire regulatory period.

6. The growth forecasts of the businesses other than SP AusNet and JEN should be adjusted to bring the impact of the AMI rollout to the levels proposed by JEN:
   a) While SP AusNet estimated the impact of the AMI rollout as described here, for reasons related to its ability to reassign customers between tariffs in the Post Tax Revenue Model, the AMI rollout *was not taken into account* in its growth forecasts. In ACIL Tasman's view, it would be reasonable to adjust SP AusNet's forecasts by 2.5 per cent for residential sales and 0.5 per cent for eligible commercial sales to account for this policy.

ACIL Tasman notes that the impact of individual policies is less important than the final level of energy sales. In addition, in some cases the estimated policy impacts err on the side of lower electricity sales (AMI, CPRS) , while other estimates err on the side of higher sales/ smaller reduction (e.g. VEET, unannounced policies). Further, the growth forecasts do not take account of the possibility that new policies will be introduced during the course of the regulatory period. On balance, the policy adjusted forecasts of electricity sales appear to be reasonable.

5 Citipower

Figure 12 **Map of the Citipower region**

Citipower's network is approximately 157 square kilometres in size and covers central Melbourne and inner suburbs. It accounts for approximately 12% of Victoria's population and dwelling stock, with a slightly lower occupancy rate (persons per household) than average.[44]

Citipower's area accounts for almost 30% of Victoria's total gross state product including a dominant share of 'white collar' industries such as finance, property and business services, communication and public administration. Manufacturing, on the other hand, is relatively small in Citipower's area.

Consistent with the discussion in sections 3.4.1 and 3.4.2 regarding NIEIR's revised forecasts of economic and population growth, Citipower's revised proposal is based on higher forecasts of growth in gross regional product and population throughout its region.

Gross Regional Product in Citipower's area will grow, according to NIEIR's revised forecast, at 2.1 per cent annually over the forecast period. This is 0.6 percentage points below the Victorian average. By comparison, NIEIR's initial forecast for the Citipower region was that it would grow at 0.9 per cent annually, 0.3 per cent below the Victorian average.

[44] NIEIR states that Citipower's area includes 11.8% of the Victorian population and 12.3% of dwelling stock.

NIEIR forecasts that population growth in Citipower's area will be 1.2 per cent annually over the next regulatory period. This is 0.2 percentage points below the Victorian average. NIEIR's population growth forecast for Citipower's area includes a forecast of 6.7 per cent annual growth in Melbourne, with all other regions in Citipower's area growing at less than 1.0% per annum apart from Yarra, where the population is forecast to grow at 1.1 per cent annually.

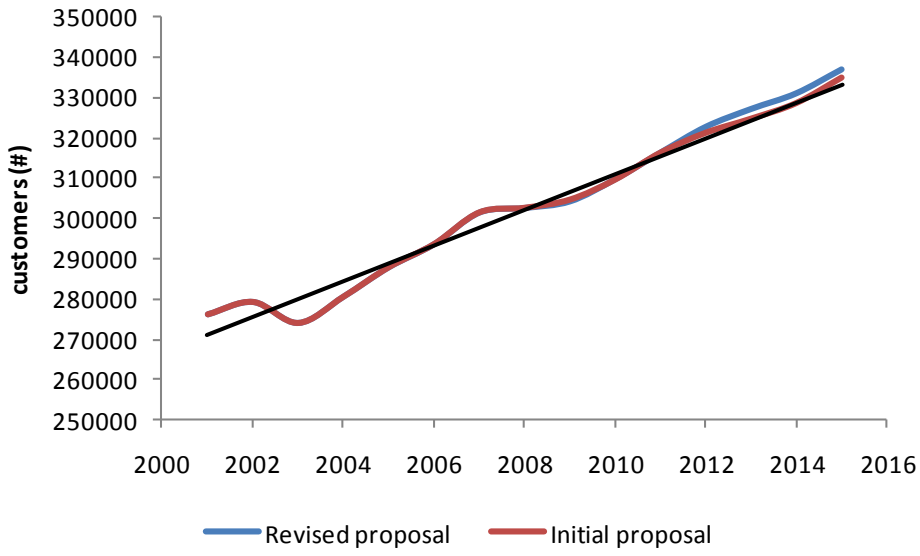
5.1 Citipower customer numbers

As noted in ACIL Tasman's earlier report the businesses have not provided sufficient information regarding the methodology by which the customer numbers forecasts were prepared to enable a conclusion as to their reasonableness to be reached. However, as also discussed in the earlier report, the forecasts were broadly in line with past trends.

In its revised proposal, Citipower states that it has addressed the AER's concerns regarding its earlier forecasts of customer numbers by adopting revised forecasts of economic and population growth. As discussed in sections 3.4.1 and 3.4.2 above, ACIL Tasman considers that NIEIR's revised forecasts of economic and population growth are reasonable.

Figure 13 shows Citipower's initial and revised customer numbers forecast.

Figure 13 **Citipower – forecast of customer numbers**



Data source: Citipower, initial RIN table 1, revised RIN table 1 and revised proposal table 4.8

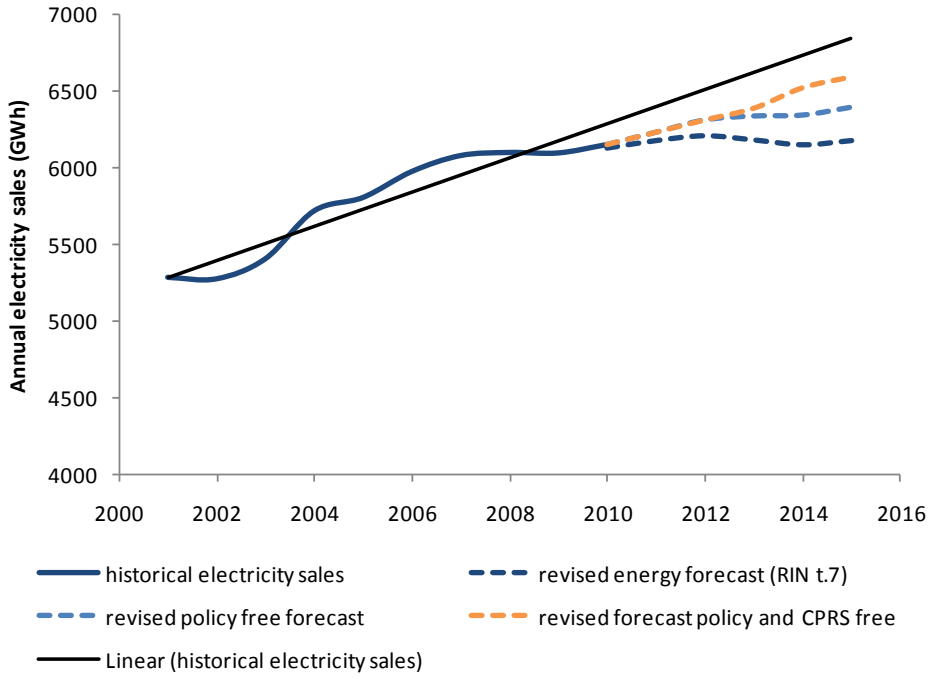
As Figure 13 shows, Citipower's forecast has increased by a small amount from its initial estimate. The increase is less than one per cent every year. The forecast is broadly consistent with past trends, as shown by the trend line in the figure (which is fitted to the initial series to highlight the increase).

In ACIL Tasman's view this is a reasonable forecast.

5.2 Electricity sales

Citipower adopted revised electricity sales and customer numbers forecasts that were prepared by NIEIR. These forecasts, as reconstructed by ACIL Tasman, are shown in Figure 14.[45]

Figure 14 **Citipower – electricity sales – 'policy free' basis**



Data source: Citipower, revised RIN table 7 and NIEIR, revised report to Citipower tables 6.17 and 6.20

As Figure 14 shows, Citipower's historical electricity sales growth showed an upward trend between 2001 and 2010. During this period, compound average annual growth was 1.7 per cent.

In the regulatory period, Citipower forecasts that growth will slow to 0.65 per cent per annum. The forecast impact of the CPRS is contributing to this, as are the various other policy impacts discussed below. If these are added back to the forecast, underlying growth in electricity sales during the forecast period is 1.42 per cent (dashed yellow line in Figure 14 - the hot water phase out is still included).

As discussed above, ACIL Tasman considers that NIEIR electricity sales forecasting methodology and the key inputs to it are a reasonable basis for

[45] Note that the impact of the CPRS was estimated by Frontier Economics.

forecasting electricity sales during the regulatory period absent further government policy intervention. In ACIL Tasman's view, the underlying forecasts, as depicted in Figure 14 are reasonable.

5.3 Policy adjustments

As discussed in chapter 4, ACIL Tasman considers that, with the exception of the one watt standby target and the AMI rollout, Citipower's forecasts of the impacts of policy adjustments are reasonable.

ACIL Tasman considers that the impact of the AMI rollout should be estimated at 2.5 per cent for residential customers and 0.5 per cent for commercial customers. In addition, the impact of the one watt standby target should be added back to the growth forecasts. The relevant adjustments set out in Table 11.

Table 11 **Citipower region – ACIL Tasman's proposed revisions to growth forecasts due to policy impacts**

	2011	2012	2013	2014	2015
Electricity sales					
AMI Rollout - initial (cumulative)	0	-13	-41	-64	-73
AMI rollout - revised (cumulative)	0	-8	-24	-37	-42
AMI rollout - revision (cumulative)	0	5	17	27	31
One watt standby - initial (cumulative	-4	-11	-18	-23	-26
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	4	11	18	23	26
revised total electricity sales forecast (GWh)	**6180**	**6226**	**6216**	**6198**	**6234**
Maximum Demand					
AMI Rollout - initial (cumulative)	-2	-6	-10	-14	-15
AMI rollout - revised (cumulative)	0	-2	-5	-7	-8
AMI rollout - revision (cumulative)	2	3	5	7	8
One watt standby - initial (cumulative	0	-1	-2	-3	-4
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	0	1	2	3	4
revised maximum demand forecast (MW)	**1433**	**1474**	**1523**	**1567**	**1606**

5.4 Maximum demand

ACIL Tasman had previously recommended that Citipower's maximum demand forecasts should be amended in the following three ways:

1. Revise the forecasts to take account of more up to date forecasts of economic and population growth
2. Reconcile the forecasts with an independently prepared system level forecast to take account of economic drivers

3. Make various adjustments to the forecasts relating to policy measures.

The AER accepted these recommendations and substituted Citipower's forecast of maximum demand with revised forecasts.

Citipower appears to have accepted some of the AER's revisions and rejected others. In its revised proposal, Citipower responded to the draft determination by making the following points:

- Citipower's internal, spatial forecasts have a history of being accurate although they have now been updated to reflect 2009 actual demand in general and lower than expected maximum demand in four zone substations in particular
- Citipower had not previously considered NIEIR's forecasts closely. It has done so now and, in doing so, identified a number of errors in them, which have been addressed in a revised report from NIEIR
- The sum of Citipower's internal spatial forecasts reconciles with NIEIR's amended forecasts within a reasonable margin of error.

For these reasons, Citipower argues that its internal spatial forecasts of maximum demand at the zone substation level are reasonable.

Each of Citipower's points and ACIL Tasman's earlier recommendations are addressed in the following sections.

5.4.1 Accuracy of Citipower's previous forecasts

In the draft determination, the AER compared the forecasts of maximum demand that the businesses presented to the Essential Services Commission of Victoria with actual maximum demand observed since then. In Citipower's case, the AER noted that the 2006 forecasts exceeded actual maximum demand by 19%.[46]

Citipower contends that this conclusion was flawed because it was based on a comparison of system data with *non-coincident* spatial data. In other words, the spatial data that the AER used cannot be expected to sum to the system due to the fact that demand peaks at different times in different places around the network.

Citipower submits that, if compared appropriately, its forecasts have been within five per cent of the observed 50 POE demand level in recent years and closer between 2006 and 2008.[47] Citipower also argues that its forecast of maximum demand in 2010 has proven to be within five per cent of the demand that was observed, with most of the over-estimate attributable to four

[46] AER, Draft Determination, p81, table 5.7

[47] Citipower's revised proposal contains the details at table 4.3

zone substations in the Fishermen's bend industrial precinct. Citipower has made adjustments to its spatial forecasts to account for the unexpectedly low demand observed at these zone substations.[48]

However, ACIL Tasman considers that the methodology employed by NIEIR is more capable of taking account of macro factors than can be accounted for at the spatial level. Therefore, ACIL Tasman remains of the view that spatial forecasts should be reconciled with independently prepared system level forecasts. As is discussed below, SKM's analysis of Citipower's forecasts indicates that there is an upward bias in the internal spatial forecasting methodology, which supports the view that the two forecasts should be reconciled to one another.

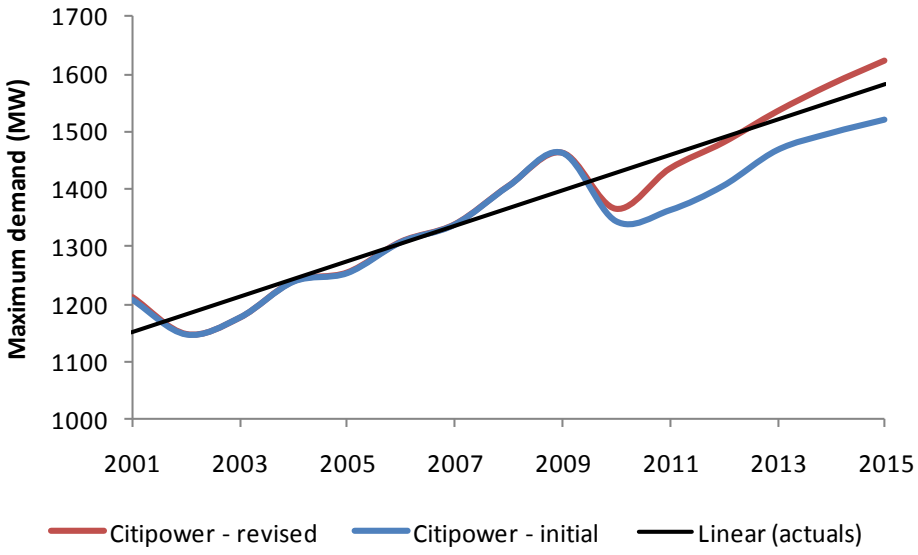
5.4.2 Revisions to NIEIR's forecasts

As noted above, Citipower has submitted a revised system level maximum demand forecast with its revised proposal. This forecast was prepared by NIEIR using the methodology outlined above. ACIL Tasman considers that, with the exception of minor changes to account for policy issues, it was prepared using a methodology capable of producing a reasonable forecast of the likely future level of maximum demand in Citipower's area.

Notably NIEIR's revised forecast of demand in Citipower's region is substantially different than NIEIR's initial forecast. This is illustrated in Figure 15 (note that policy impacts have been added back to this data).

[48] Citipower, Revised proposal, table 4.3, p112.

Figure 15 **Citipower – initial and revised maximum demand forecasts - 'policy free' basis**



Data source: Citipower, initial RIN table 9 and revised RIN table 8 to 2010 then table 12 adjusted for policy impacts as per NIEIR, Electricity sales and customer numbers for the Citipower region to 2019, tables 6.18 and 6.21

This increase is attributable in part to the increased input assumptions discussed in sections 3.4.1 and 3.4.2.

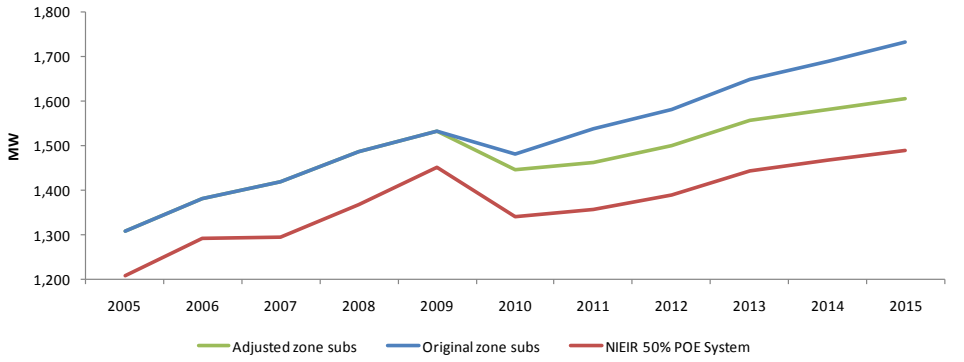
Citipower states that NIEIR's earlier report was based on incomplete data. In particular, it did not take account of 45 MW of supply to Citipower's region from cross boundary feeders and co-generation units in Citipower's region. Citipower states that this was taken into account in NIEIR's amended report. The report itself makes no mention of this, although the maximum demand figure for 2009 is 10 MW greater in the revised report than it was in the initial report.

In addition, Citipower noted that the actual maximum demand observed in 2010 at four zone substations in the Fisherman's Bend industrial precinct was notably lower than Citipower's initial forecast. Citipower has revised its forecasts for these four zone substations downwards accordingly.

5.4.3 Reconciliation between bottom up and top down forecasts

Citipower's initial internal spatial forecasts exceeded NIEIR's initial system level forecasts by a significant amount. This was highlighted in ACIL Tasman's earlier report and is summarised in Figure 16.

Figure 16 **Initial Proposal – Citipower - non-coincident zone substation forecasts, initial and adjusted and system forecasts - 50 POE**



Data source: Citipower initial RIN Table 10, NIEIR and ACIL Tasman calculations

Figure 16 shows the difference over time between NIEIR's initial system level maximum demand forecast and maximum demand at Citipower's zone substations, either actual (before 2010) or forecast (from 2010 to 2015). The data are not calculated on the same basis so some difference is to be expected; i.e. the summed zone substation data is the sum of non-coincident maximum demands and therefore would be expected to be greater than the system level maximum demand.

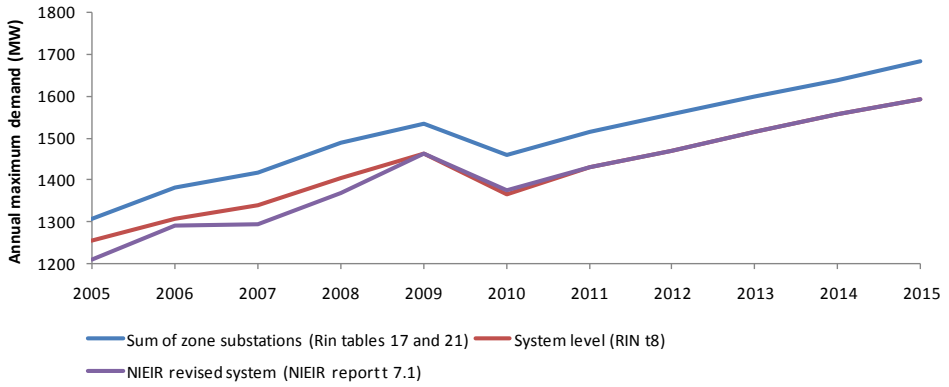
ACIL Tasman's earlier report sets out the expectation that, in the absence of a specific reason to the contrary, the average difference between the sum of the non-coincident zone substation data and the system level data should remain constant. Based on the information provided with the initial proposal, and in follow up meetings, ACIL Tasman considered that there was little justification for the Citipower spatial forecasts and the NIEIR system level forecast to be diverging over time. Accordingly, it recommended to the AER that the forecasts be brought back into line with one another.

The information that Citipower submitted with its revised proposal does not change ACIL Tasman's view in this respect and Citipower appears to accept this approach. While Citipower considers that the AERs' reconciliation of Citipower's spatial forecasts to NIEIR's system level forecast yielded unrealistic results, this is due to errors in NIEIR's forecasts. In the revised proposal, Citipower has conducted a reconciliation with NIEIR's revised forecasts.[49]

Figure 17 replicates Figure 16 above, with Citipower's revised forecasts.

[49] Citipower, revised proposal, p113.

Figure 17 **Revised Proposal – Citipower - non-coincident zone substation forecasts and system forecasts - 50 POE**



Data source: Citipower, Revised RIN TABLE and NIEIR, Maximum summer demand forecasts for Citipower to 2020, June 2010, table 7.1

It is clear from Figure 17 that Citipower's revised spatial forecasts diverge much less from NIEIR's system level forecasts than was originally the case.[50]

In describing the process by which it reconciled its spatial forecasts to NIEIR's system level forecasts Citipower draws on a report by consultants SKM.

SKM's report calculates that, on average over the last five years, maximum demand at the system level had been 96.46 per cent of the sum of maximum demands observed at each zone sub (i.e. non -coincident maximum demand). SKM recommends that this relationship should be preserved, within a confidence interval, between the bottom up spatial forecasts and the top down system forecast prepared by NIEIR.

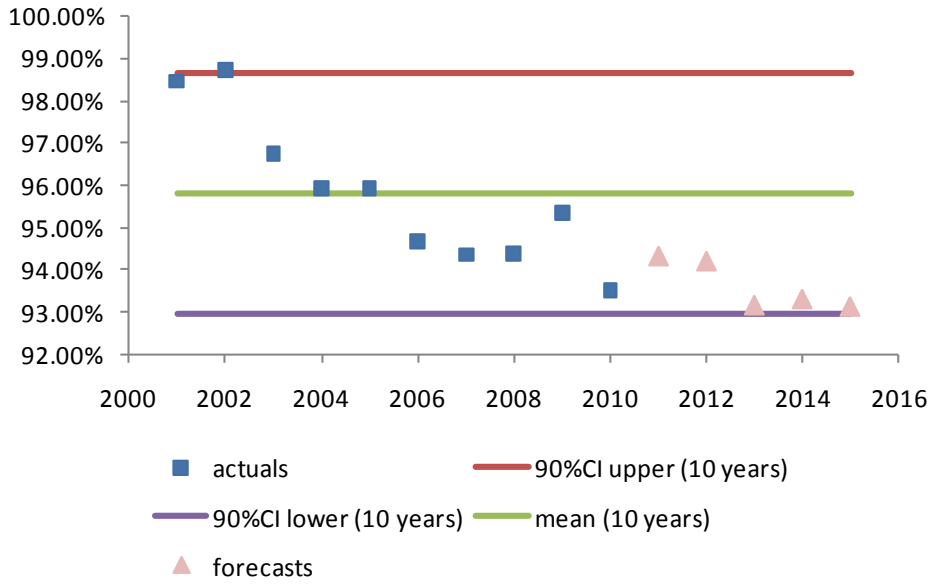
The difference between SKM's approach and that proposed by ACIL Tasman is that SKM adds a confidence interval around ACIL Tasman's point estimate.

SKM's analysis was based on Citipower's initial regulatory proposal. In Figure 18, ACIL Tasman has replicated it using the data from Citipower's revised proposal.[51]

[50] Figure 17 also shows a variation in the historic series used by NIEIR and Citipower prior to 2009. The reason for the difference is not given in the revised proposal, although it may be the same error which Citipower addressed from 2009. This should be checked with Citipower.

[51] Citipower's revised proposal contains slightly different data concerning maximum demand observed in 2001, 2002 and 2003, which influence the statistics upon which SKM and Citipower relied.

Figure 18 **Citipower – confidence interval analysis of system and spatial maximum demand forecasts**



Data source: Citipower, revised RIN, tables 8, 17 and 21.

Citipower's argument, based on SKM's analysis, is that because the ratio of the system forecast and the summed non-coincident zone substation forecasts does not fall outside the confidence interval shown by the upper and lower parallel lines, Citipower's internal spatial forecasts are not sufficiently different from the system level forecasts to require further adjustment.

In ACIL Tasman's view, the use of a confidence interval in this analysis is a flawed application of statistical techniques.

The main reason for this view is that, the fact that an observation falls within a confidence interval does not make that observation likely. Rather, the further an observation (or range[52]) is from the mean, the less likely it becomes. Therefore, SKM's analysis appears to suggest that Citipower's initial estimates for the last three years of the regulatory period were in fact very unlikely to be accurate estimates.

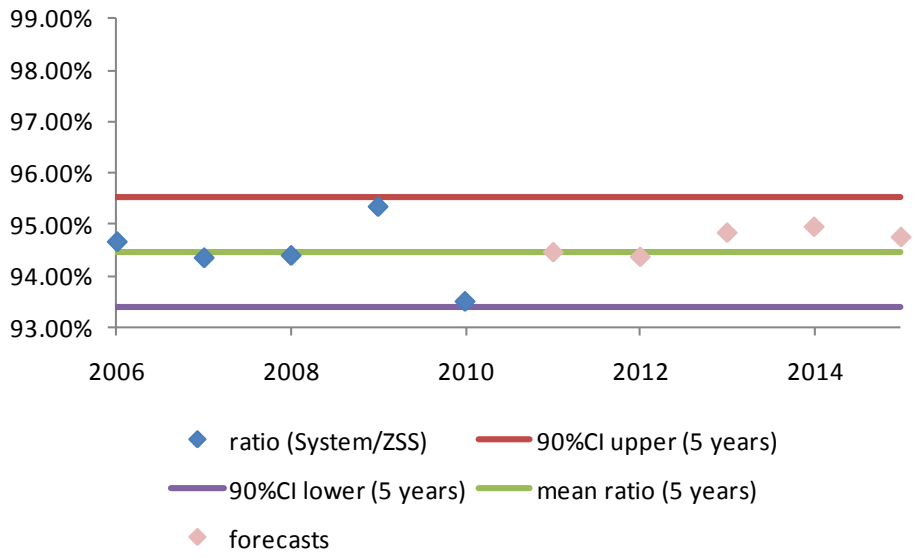
I addition, the inference testing upon which this analysis rests is based on the assumption that the underlying data is normally distributed or that there is enough observations to rely on the central limit theorem (which there is not in this case). In this case, the data does not appear to be normally distributed. Rather, a visual inspection indicates that it displays a downward trend for the

[52] In continuous distributions such as this there are an infinite number of values that an observation may take. It follows from this that the probability of any single observation being observed is infinitely small, i.e. zero. It is more accurate to consider the probability that an observation will be in a given range.

first five years and then stabilises. This is highlighted in Figure 19, which shows the average of the ratio as observed between 2006 and 2010. This is clearly lower than the average observed over the whole ten-year period, due entirely to the higher observations in the first five years.[53]

Figure 19 also shows that the result is very sensitive to the period over which the confidence interval is established, indicating that there is insufficient data to justify a confidence interval approach.

Figure 19 **Citipower – confidence interval approach using five years of data**



Data source: Citipower, revised RIN, tables 8, 17 and 21.

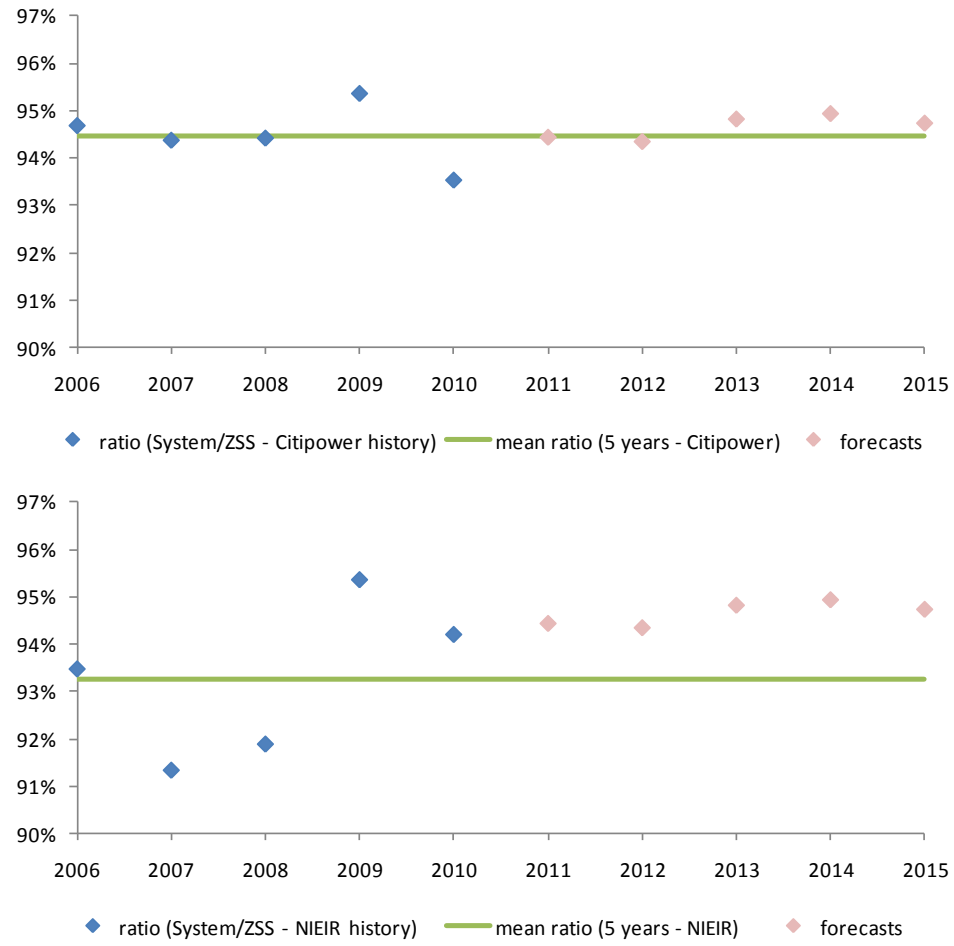
For these reasons, ACIL Tasman's does not regard the confidence interval approach as an improvement on its preferred approach, namely that:

- spatial forecasts should be reconciled to the system level forecasts, albeit with some minor variation in the ratios after reconciliation and
- the diversity between system and spatial level forecast should reflect recent (mean) history

Given this underlying approach, Figure 20 compares Citipower's forecasts with the historic mean diversity between system and zone substation level demand.

[53] It is also worth noting that the term 90% confidence interval can give the impression of a higher degree than is really implied. SKM has defined a confidence interval that is 1.64 standard deviations either side of a mean value. On the assumption that a variable is normally distributed, it is true that, if a single observation is drawn at random, there is a 90 per cent chance that it will be within this interval. From this, it also follows that there is only a ten per cent chance that an observation will fall outside this interval (or a five percent chance that it will be *either* higher or lower). In statistical terms, SKM's approach does not define the null hypothesis correctly.

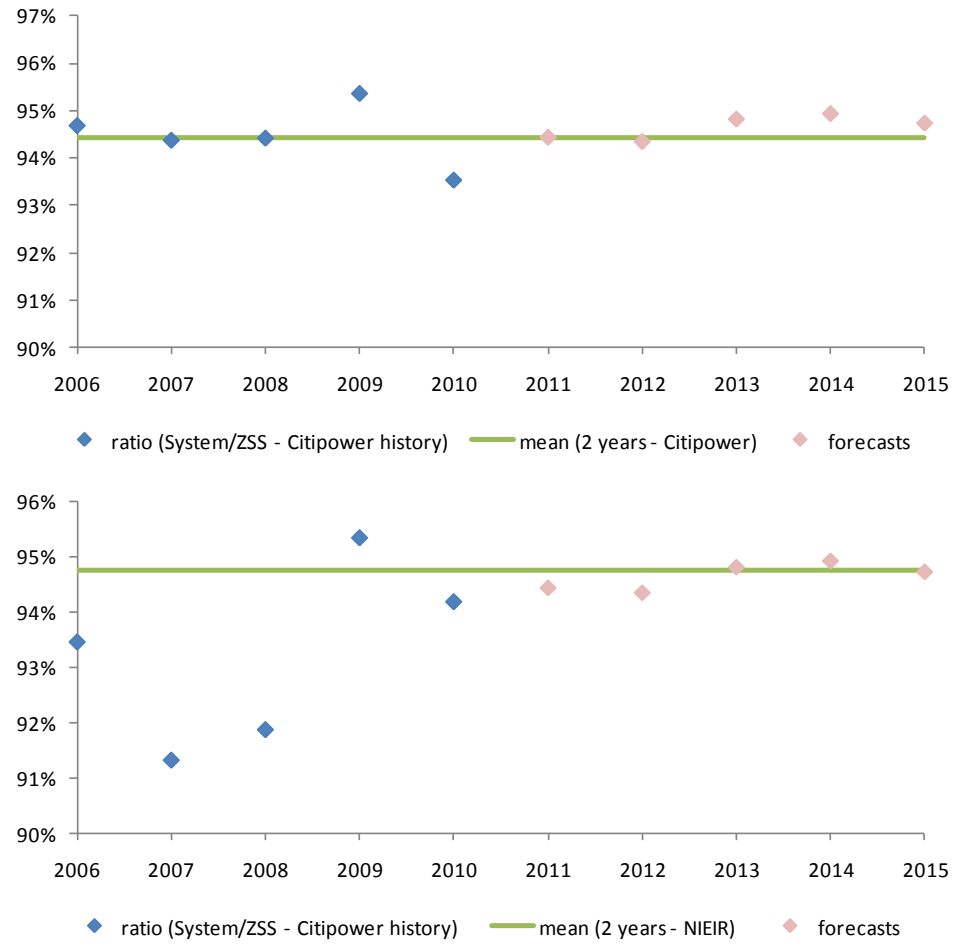
Figure 20 **Citipower – revised proposal – comparison of forecast and historical diversity over five years**



Citipower, revised RIN, tables 8, 17 and 21.

Figure 20 compares the diversity between zone substation and system level maximum demand using the two different historical series (see footnote 50). The figure shows that the discrepancy in system level maximum demand data between 2006 and 2008 causes the mean of the NIEIR series to be lower than that of the Citipower series. The result is that, when compared to the NIEIR series, the forecasts appear to be biased downwards. However, when compared to the Citipower series, the forecasts are consistent with the five year mean diversity.

Figure 21 **Citipower – revised proposal – comparison of forecast and historical diversity over two years**



Citipower, revised RIN, tables 8, 17 and 21

Figure 21 takes a shorter view of history and compares the diversity of Citipower's forecasts with the mean diversity over the last two years. Shortening the period makes very little difference to the analysis in terms of Citipower's history, but causes a noticeable change in the mean of the NIEIR series. In both cases, the diversity of the forecasts is approximately consistent with recent history.

As mentioned above, ACIL Tasman considers that spatial forecasts should be reconciled to independent system level forecasts, albeit with a minor variation after the reconciliation. In this case, as shown in Table 12, the variations that would need to be made to Citipower's forecasts to bring them into line with the historical mean diversity is no greater than half of one per cent for all cases other than the five year mean of NIEIR's series. ACIL Tasman does not consider it necessary to make further revisions to these forecasts other than to account for the policy impacts discussed above.

Table 12 **Citipower – revised proposal, variations in diversity over forecast period**

Adjustments		2011	2012	2013	2014	2015
Revised zone sub forecasts	(MW)	1515	1557	1598	1640	1683
NIEIR system forecast	(MW)	1,431	1,469	1,516	1,557	1,594
Target ZSS forecasts						
5 year Citipower mean		1515	1556	1605	1648	1688
2 year Citipower mean		1515	1556	1605	1649	1688
5 year NIEIR mean		1534	1576	1625	1669	1709
2 year NIEIR mean		1510	1550	1599	1643	1682
Deltas (MW)						
5 year Citipower mean	(MW)	0	-2	6	8	5
	(%)	0.0%	-0.1%	0.4%	0.5%	0.3%
2 year Citipower mean	(MW)	0	-1	7	9	6
	(%)	0.0%	-0.1%	0.4%	0.5%	0.3%
5 year NIEIR mean	(MW)	19	18	27	30	27
	(%)	1.3%	1.2%	1.7%	1.8%	1.6%
2 year NIEIR mean	(MW)	-5	-7	1	3	-1
	(%)	-0.3%	-0.4%	0.1%	0.2%	0.0%

6 Jemena Electricity Networks

6.1 Description of JEN network

Figure 22 **Map of JEN network**

JEN's distribution region covers approximately 950 square kilometres to the north of Melbourne. It incorporates industrial and residential areas as well as the Tullamarine Airport.

JEN's region accounts for approximately 12% of Victoria's population and dwelling stock. It is characterised by a relatively large proportion of manufacturing activity, with nearly 13% of Victoria's manufacturing output coming from JEN's area.[54]

Consistent with the discussion in sections 3.4.1 and 3.4.2 regarding NIEIR's revised forecasts of economic and population growth, JEN's revised proposal is based on higher forecasts of growth in gross regional product and population throughout its region.

On average, NIEIR's revised forecast is that population growth in JEN's area will be 1.1% per annum over the next regulatory period, which is 0.3

[54] This compares to only 9% of Victoria's GSP coming from this area.

percentage points below the Victorian average and 0.1 percentage points above NIEIR's initial forecast. Similarly, gross regional product in JEN's area is forecast to be 2.2 per cent per annum, increased from the 1.6 per cent per annum forecast initially. This still lags the Victorian average growth rate by 0.5 percentage points. Also lagging the Victorian average is the rate of growth in the dwelling stock, which NIEIR forecasts will be 1.5 per cent per annum in JEN's area, 0.2 percentage points behind the Victorian average.[55]

6.2 Customer numbers

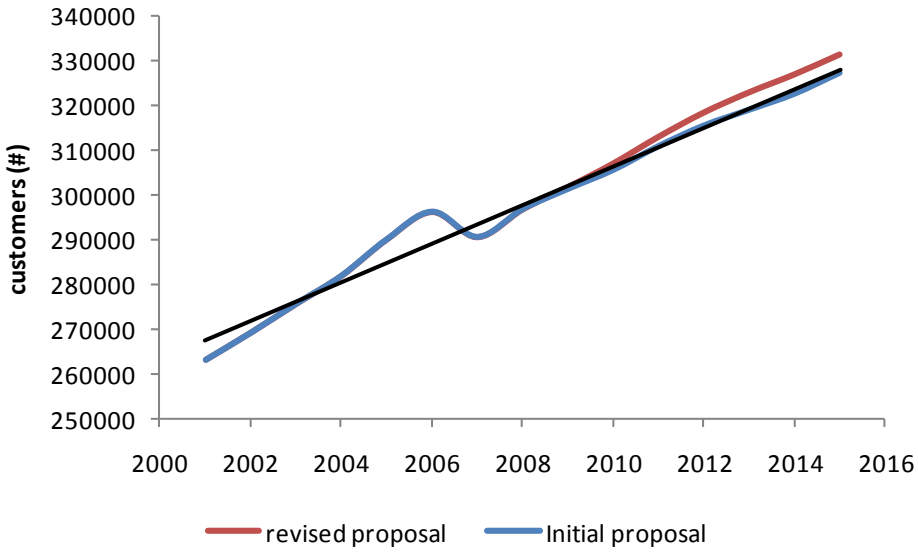
As noted in ACIL Tasman's earlier report the businesses have not provided sufficient information regarding the methodology by which the customer numbers forecasts were prepared to enable a conclusion as to their reasonableness to be reached. However, as also discussed in the earlier report, the forecasts were broadly in line with past trends.

In its revised proposal, JEN states that it has addressed the AER's concerns regarding with its earlier forecasts of customer numbers by adopting revised forecasts of economic and population growth. As discussed in sections 3.4.1 and 3.4.2 ACIL Tasman considers that NIEIR's revised forecasts of economic and population growth are reasonable.

Figure 23 shows JEN's initial and revised customer numbers forecast.

[55] The figure in NIEIR's report entitled "Figure 4.2: Dwelling stock growth – JEN regions 2009 to 2019 – Base scenario" contradicts the text. Otherwise than the heading, the figure is the same as the figure showing GRP growth rates. ACIL Tasman has assumed that this is a copy and paste error and disregarded figure 4.2.

Figure 23 **JEN – forecast of customer numbers**



Data source: JEN, initial RIN table 1, revised RIN table 1 and revised proposal table 5-4

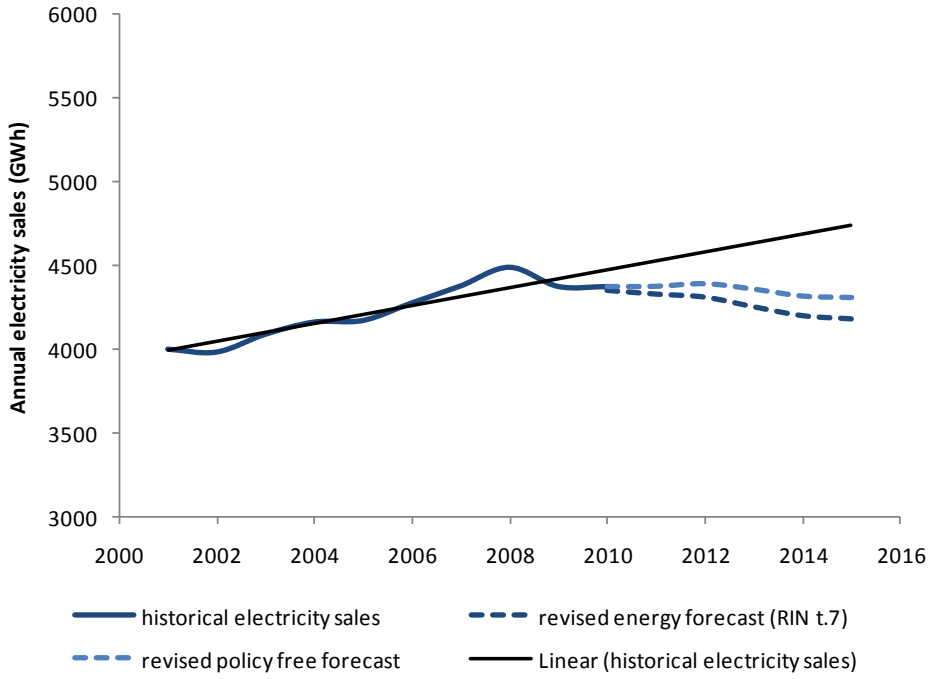
As Figure 23 shows, JEN's forecast has increased by a small amount from its initial estimate. The increase is approximately one per cent each year. The forecast is broadly consistent with past trends, as shown by the trend line in the figure (which is fitted to the initial series to highlight the increase).

In ACIL Tasman's view this is a reasonable forecast.

6.3 Electricity sales

JEN adopted revised electricity sales and customer numbers forecasts that were prepared by NIEIR. These underlying forecasts, as reconstructed by ACIL Tasman, are shown in Figure 24.

Figure 24 **JEN – electricity sales – 'policy free' basis**



Data source: JEN, revised RIN table 7 and NIEIR, Electricity sales and customer number projections for the Jemena region to 2019, June 2010, table 6.17 and 6.20

As Figure 24 shows, JEN's historical electricity sales growth showed an upward trend between 2001 and 2010. During this period, compound average annual growth was 0.9 per cent, noticeable slower than growth experienced by other businesses. Jen's electricity sales in 2009 were significantly lower than they had been in earlier years. ACIL Tasman understands that the closure of a single large customer accounts for approximately one third of this decrease. JEN attributes the rest to the impact of economic conditions on its large customers. ACIL Tasman cannot verify this impact, but notes that the forecasts are the result of NIEIR's model which is discussed above.

In the regulatory period, JEN forecasts that electricity sales will decline by 0.88 per cent per annum. The forecast impact of the CPRS is contributing to this, as are the various other policy impacts discussed below. If the policy impacts other than the CPRS and the hot water phase out are added back, underlying growth in electricity sales during the forecast period is still negative 0.35 per cent (dashed light blue line in Figure 24).

As discussed above, ACIL Tasman considers that NIEIR electricity sales forecasting methodology and the key inputs to it are a reasonable basis for forecasting electricity sales during the regulatory period absent further government policy intervention. In ACIL Tasman's view, the underlying forecasts, as depicted in Figure 24 are reasonable.

6.4 Policy adjustments

As discussed in chapter 4, ACIL Tasman considers that, with the exception of the one watt standby target, JEN's forecasts of the impact of policy adjustments are reasonable.

Therefore, ACIL Tasman considers that the impact of the one watt standby target should be added back to JEN's growth forecasts. The relevant adjustments are set out in Table 13.

Table 13 **JEN region – ACIL Tasman revisions to growth forecasts due to policy impacts**

JEN	2011	2012	2013	2014	2015
Electricity sales					
One watt standby - initial (cumulative)	-3	-10	-17	-21	-23
One watt standby - revised (cumulative)	0	0	0	0	0
One watt standby - revision (cumulative)	3	10	17	21	23
Revised total electricity sales forecast (GWh)	**4334**	**4322**	**4271**	**4221**	**4204**
Maximum Demand					
JEN	-1	-3	-4	-6	-8
One watt standby - initial (cumulative	0	0	0	0	0
One watt standby - revised (cumulative	1	3	4	6	8
Revised maximum demand forecast (MW)	**990**	**1020**	**1052**	**1082**	**1103**

6.5 Maximum demand

ACIL Tasman had previously recommended that JEN's maximum demand forecasts should be amended in the following three ways:

1. Revise the forecasts to take account of more up to date forecasts of economic and population growth
2. Reconcile the forecasts with an independently prepared system level forecast to take account of economic drivers
3. Make various adjustments to the forecasts relating to policy measures.

The AER accepted these recommendations and substituted JEN's forecast of maximum demand with revised forecasts.

JEN appears to have accepted some of the AER's revisions and rejected others. In revising its growth forecasts, JEN has:

- relied on NIEIR's revised forecasts of economic and population growth
- abandoned its own starting point and persuaded NIEIR to review its recorded value for maximum demand in its region in 2009

- reconciled its zone substation forecasts to NIEIR's system forecast so that the relationship between the two is "fairly constant".

As discussed in growth as discussed in sections 3.4.1 and 3.4.2, ACIL Tasman considers that NIEIR's revised forecasts of economic and population growth provide a reasonable basis for the growth forecasts. Further, ACIL Tasman considers that NIEIR's forecasting methodologies, when based on these inputs, produce reasonable forecasts of the likely level of maximum demand absent further government policy intervention.

The remaining two issues raised by JEN are discussed in turn below.

6.5.1 Change to the starting point

In JEN's initial proposal, it chose to use a different starting point for its forecasts than NIEIR used. This was to account for the fact that, in January 2009 when the year's peak was observed, some of JEN's customers were involuntarily off supply. JEN's rationale for varying from NIEIR's forecast in this way is that the maximum demand that was observed in January 2009, when JEN's system peak occurred, does not reflect the true demand as it existed at that time. Had JEN's network been stronger at that time, it would have been able to meet the needs of customers over and above what was actually observed and, accordingly, the observed peak in demand would have been higher. For this reason, JEN chose to apply NIEIR's forecast growth rate to its own estimate of 50 POE demand for 2009.

In the earlier report, ACIL Tasman did not agree with JEN's decision to adopt its own estimate of 50 POE demand for 2009 in preference to NIEIR's. There were two key reasons for this disagreement.

First, it was (and remains) ACIL Tasman's view that NIEIR's approach to estimating 50 POE demand is far superior to what can practically be done using a bottom up methodology (of which JEN's approach is an example). ACIL Tasman considers it far more likely that NIEIR's estimate of 50 POE demand for JEN's system is accurate rather than JEN's estimate. In simple terms, this is because JEN's estimate is based on a single observation whereas NIEIR's is based on the entire sample of demands and temperatures observed over several years. The peak day in early 2009 is just one of a large set of observations that contribute to NIEIR's estimate so whether the additional load on that day is included or excluded would be unlikely to change the estimates significantly.

Second, ACIL Tasman notes that the temperatures observed in January 2009 were unusually high, even for the time of year. From an econometric perspective this means that little is known about the way that electricity demand behaves at these temperatures, simply because they occur very

infrequently. This exacerbated the problem because JEN's approach, while appropriate for the spatial level, uses a weather correction methodology that is less sophisticated than NIEIR's.

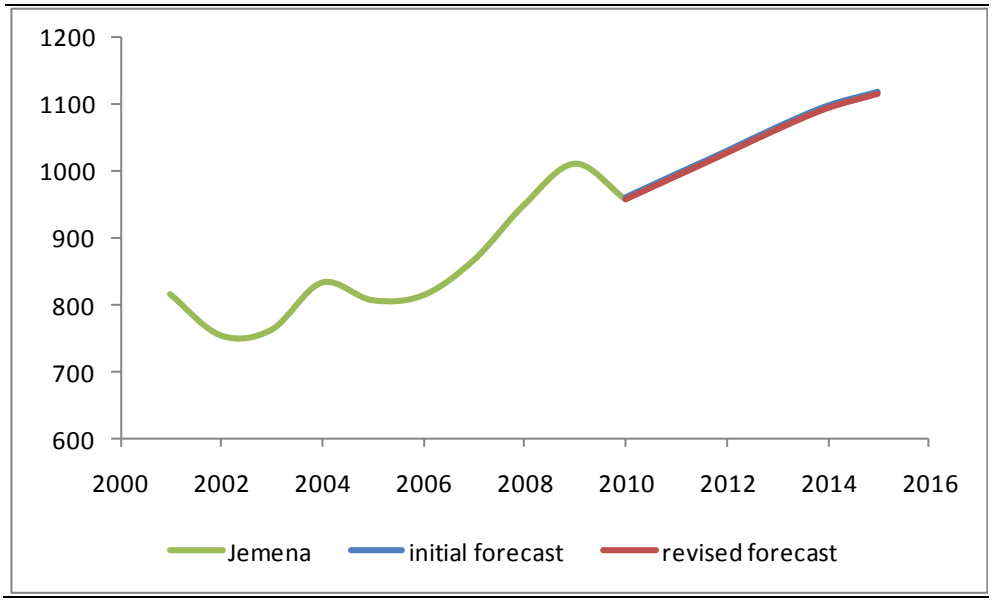
In the revised proposal, JEN has abandoned its initial starting point in favour of NIEIR's revised forecast, although the NIEIR forecast itself has been adjusted to account for the revised economic and population growth forecasts as well as a revised assessment of air-conditioning installations and NIEIR's recognition of the distribution outages in January 2009.

NIEIR advised JEN that, in preparing the June 2010 updated forecasts, it took account of updated half hourly data and JEN's advice that, due to involuntary distribution outages resulted in the peak demand on JEN's system being 25MW below what it might otherwise have been.

NIEIR goes on to confirm that this 25MW load reduction was not material to its estimate as the PeakSim model would have generated a similar outcome synthetically in any case.

NIEIR's revised report to JEN took account of other changes in driver variables discussed elsewhere in this report, with the result that JEN's (NIEIR's) system level forecast has been revised very slightly as shown in Figure 25.

Figure 25 **JEN – initial and revised maximum demand forecasts – 50 POE level**

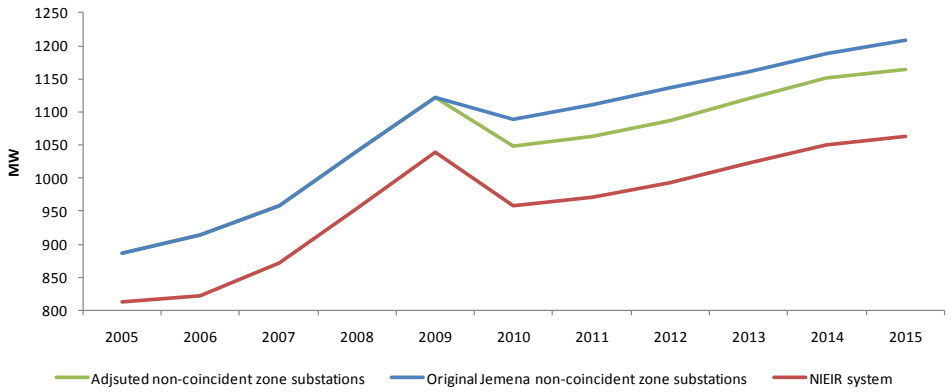


Data source: Jemena, Initial RIN table 9, and revised RIN table 8 and 12

6.5.2 Reconciliation between bottom up and top down forecasts

The relationship between JEN's initial non-coincident zone substation forecasts and its system forecast is shown in Figure 26.

Figure 26 **Initial proposal – JEN - non-coincident zone substation forecasts, initial and adjusted and system forecasts - 50 POE**



Data source: Data source: Jemena initial RIN table 9 and table 11, NIEIR, Maximum demand forecasts for Jemena electricity networks terminal stations to 2019, November 2009

JEN agrees with ACIL Tasman's initial recommendation to the AER that the diversity between system level forecasts and the sum of non coincident zone substation forecasts should remain constant over time.[56] In its revised regulatory proposal, JEN states that it has conducted a reconciliation of its spatial forecasts and that the diversity factor between these forecasts and NIEIR's system forecast (which JEN has adopted) is similar, when averaged over the five year period, to the ratio that was observed in the past five years.

Specifically, JEN states that the ratio of summed zone substation non-coincident demand to system level demand is: [57]

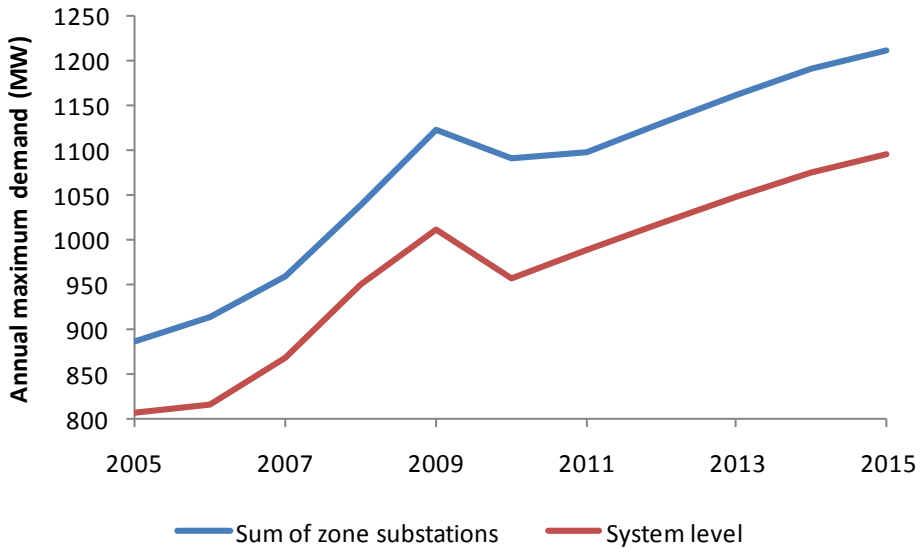
- 1.114 for the period 2006 to 2010
- 1.109 for the forecast period, 20011 to 2015

The effect of JEN's reconciliation is shown in Figure 27, shows the revised system and non-coincident zone substation (actual) maximum demand from 2005 until the end of the forecast period.

[56] Jemena, Revised regulatory proposal, p.53.

[57] Jemena, Revised regulatory proposal, p53 and appendix 5.9.

Figure 27 **Revised proposal - non-coincident zone substation and system maximum demand, actual and forecast - 50 POE**



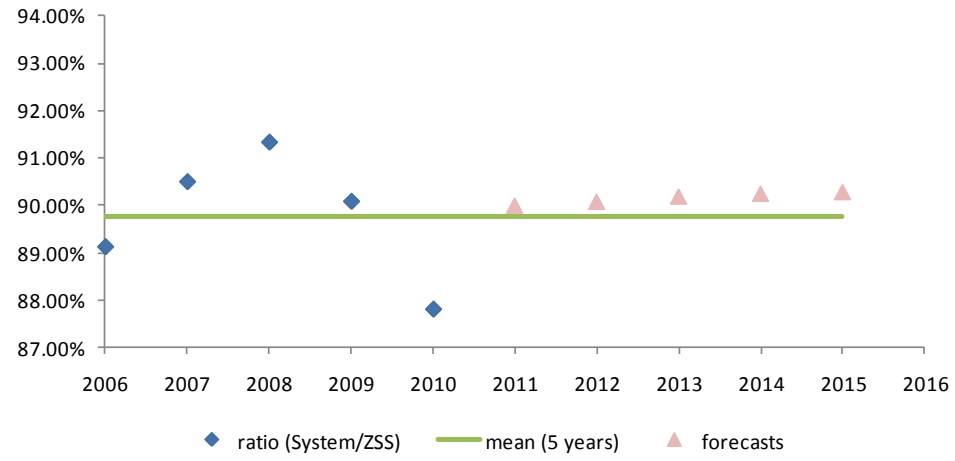
Data source: JEN, revised RIN table 12, 17 and 21

As is seen in the figure, and confirmed in the earlier figures plotting the ratio, the divergence between the two series over the forecast period is slight.

This is confirmed by Figure 28, which shows that the ratio of the forecasts is slightly above the mean historical ratio.[58]

[58] Jemena presents the inverse of the ratio plotted here. The fact that Jemena's ratio is slightly lower during the forecast period is consistent with the plot showing slightly higher.

Figure 28 **JEN - revised proposal - non-coincident zone substation and system maximum demand - actual and forecast - 50 POE**



Data source: JEN, revised RIN tables 12 17 and 21

ACIL Tasman's earlier report discussed the reasons for, and the importance of, reconciling spatial and system level forecasts. As a consequence, ACIL Tasman recommended that the business's maximum demand forecasts be adjusted so that the ratio between the system level forecast and the sum of the zone substations should not change over time.

There will inevitably be some variability in the ratio between these two levels of forecasts. Generally speaking, as an observation moves further from the mean, it becomes less likely that it will be observed. Therefore, while the mean is not guaranteed to be the correct forecast, it is the most likely.

The adjustment that would be required to hold the ratio between JEN's zone substation and system level forecasts constant at the five year mean level is between 0.2 and 0.6 per cent each year. This is shown in Table 14. In ACIL Tasman's view, these adjustments are sufficiently small that these forecasts do not require further adjustment other than to account for the policy impacts discussed above.

Table 14 **JEN – revised proposal, variations in diversity over forecast period**

JEN	2011	2012	2013	2014	2015
spatial forecast	1099.0	1130.0	1161.7	1192.1	1212.7
system forecast	989	1,018	1,048	1,076	1,095
adjustment (MW)	2.61	3.75	5.38	6.33	6.95
adjustment (%)	0.24%	0.33%	0.46%	0.53%	0.57%

Data source: JEN, revised RIN table 12 and 17 and 21

7 Powercor

7.1 Description of Powercor network

Figure 29 **Map of Powercor region**

Powercor's region contains significant areas of agricultural land. It contains 54% of Victoria's agricultural sector. It also contains almost 30% of Victoria's population and dwelling stock and almost one quarter of the State's agricultural sector. The finance, business, communications and public administrations sectors are underrepresented in Powercor's area relative to the rest of Victoria.

As was the case in the initial forecasts, NIEIR's revised forecast of population growth over the next regulatory period in Powercor's region varies significantly area by area. At one extreme, NIEIR forecasts annual growth of 2.4 per cent in Western Melbourne, up by 0.2 percentage points on the initial forecasts. This is dominated by growth in the fringe areas. At the other extreme, the forecast growth rate in the Wimmera is 0.6 per cent per annum, also up by 0.2 percentage points. NIEIR forecasts population growth of 1.8 per cent per annum for Powercor's area as a whole compared to 1.6 per cent in the initial forecasts.

The forecast growth in dwelling stock is approximately the same as that for population, although slightly faster than population growth across the board. In each of Powercor's regions, dwelling stock is forecast to grow at a slightly faster rate than population.[59]

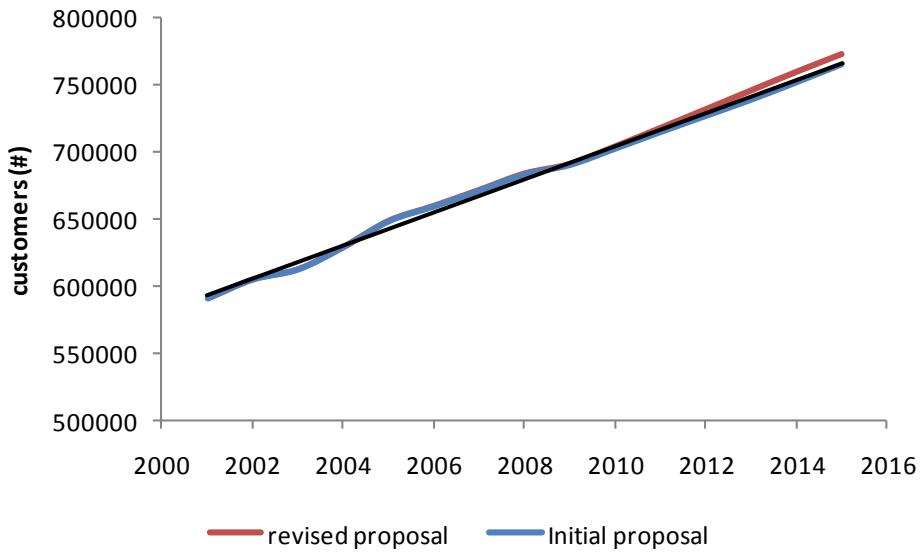
7.2 Customer numbers

As noted in ACIL Tasman's earlier report the businesses have not provided sufficient information regarding the methodology by which the customer numbers forecasts were prepared to enable a conclusion as to their reasonableness to be reached. However, as also discussed in the earlier report, the forecasts were broadly in line with past trends.

In its revised proposal, Powercor states that it has addressed the AER's concerns regarding its earlier forecasts of customer numbers by adopting revised forecasts of economic and population growth. As discussed in sections 3.4.1 and 3.4.2 ACIL Tasman considers that NIEIR's revised forecasts of economic and population growth are reasonable.

Figure 30 shows Powercor's initial and revised customer numbers forecast.

Figure 30 **Powercor – forecast of customer numbers**



Data source: Powercor, initial RIN table 1, revised RIN table 1 and revised proposal table 4.8

As Figure 30 shows, Powercor's forecast has increased by a small amount from its initial estimate. The increase is less than 0.5 per cent in the first three years

[59] ACIL Tasman has noted that its earlier maximum demand report said that growth in dwelling stock was slower than population growth in the initial forecasts. In both the initial and revised forecasts, growth in dwelling stock is slightly higher than population growth.

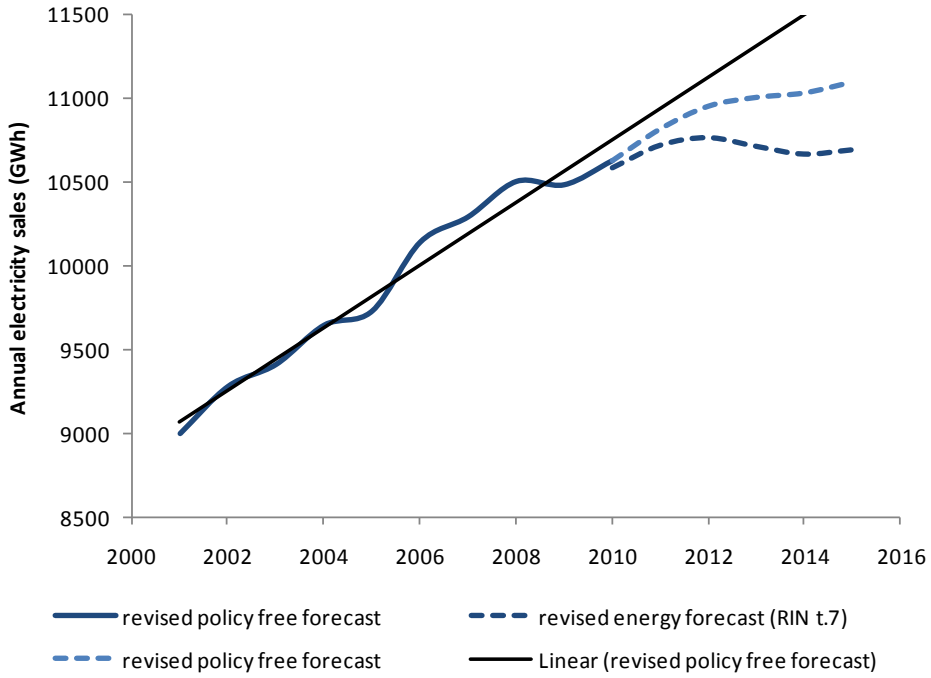
of the regulatory period and almost one per cent in 2014 and 2015. The forecast is broadly consistent with past trends, as shown by the trend line in the figure (which is fitted to the initial series to highlight the increase).

In ACIL Tasman's view this is a reasonable forecast.

7.3 Electricity sales

Powercor adopted revised electricity sales and customer numbers forecasts that were prepared by NIEIR. These underlying forecasts, as reconstructed by ACIL Tasman, are shown in Figure 31.

Figure 31 **Powercor – electricity sales – 'policy free' basis**



Data source: Powercor, revised RIN table 7 and NIEIR, revised report to Powercor tables 6.17 and 6.20

As Figure 31 shows, Powercor's historical electricity sales growth showed a strong upward trend between 2001 and 2010, second only to SP AusNet. During this period, compound average annual growth was almost two per cent.

In the regulatory period, Powercor forecasts that growth will decline by 0.06 per cent per annum. The forecast impact of the CPRS contributes to this, as do the various other policy impacts discussed below. If the policy impacts other than the CPRS and the hot water phase out are added back, underlying growth in electricity sales during the forecast period is positive at 0.63 per cent (dashed light blue line in Figure 31).

As discussed above, ACIL Tasman considers that NIEIR electricity sales forecasting methodology and the key inputs to it are a reasonable basis for forecasting electricity sales during the regulatory period absent further government policy intervention. In ACIL Tasman's view, the underlying forecasts, as depicted in Figure 31 are reasonable.

7.4 Policy adjustments

As discussed in chapter 4, ACIL Tasman considers that, with the exception of the one watt standby target and the AMI rollout, Powercor's forecasts of the impacts of policy adjustments are reasonable.

ACIL Tasman considers that the impact of the AMI rollout should be estimated at 2.5 per cent for residential customers and 0.5 per cent for commercial customers. In addition, the impact of the one watt standby target should be added back to the growth forecasts. The relevant adjustments are set out in Table 15.

Table 15 **Powercor region – ACIL Tasman revisions to growth forecasts due to policy impacts**

Powercor	2011	2012	2013	2014	2015
Electricity sales					
AMI Rollout - initial (cumulative)	0	-25.1	-77	-115.6	-128.9
AMI rollout - revised (cumulative)	0	-15	-47	-70	-78
AMI rollout - revision (cumulative)	0	10	30	46	51
One watt standby - initial (cumulative	-7	-22	-37	-47	-52
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	7	22	37	47	52
revised total electricity sales forecast (GWh)	**10726**	**10795**	**10779**	**10759**	**10794**
Maximum Demand					
AMI Rollout - initial (cumulative)	-4	-12	-19	-23	-24
AMI rollout - revised (cumulative)	0	-5	-9	-11	-12
AMI rollout - revision (cumulative)	4	7	10	11	12
One watt standby - initial (cumulative	-1	-3	-4	-6	-8
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	1	3	4	6	8
revised maximum demand forecast (MW)	**2390**	**2493**	**2610**	**2712**	**2799**

7.5 Maximum demand

ACIL Tasman had previously recommended that Powercor's maximum demand forecasts should be amended in the following three ways:

1. Revise the forecasts to take account of more up to date forecasts of economic and population growth
2. Reconcile the forecasts with an independently prepared system level forecast to take account of economic drivers
3. Make various adjustments to the forecasts relating to policy measures.

The AER accepted these recommendations and substituted Powercor's forecast of maximum demand with revised forecasts.

Powercor appears to have accepted some of the AER's revisions and rejected others. In its revised proposal, Powercor responded to the draft determination by making the following points:

- Powercor's internal, spatial forecasts have a history of being accurate
- Powercor had not previously considered NIEIR's forecasts closely. It has done so now and, in doing so, identified a number of errors in them, which have been addressed in a revised report from NIEIR
- Reconciling its internal, spatial forecasts with NIEIR's amended forecasts

For these reasons, Powercor argues that its internal spatial forecasts of maximum demand at the zone substation level are reasonable.

Each of Powercor's points and ACIL Tasman's earlier recommendations are addressed in the following sections.

7.5.1 Accuracy of Powercor's previous forecasts

In the draft determination, the AER compared the forecasts of maximum demand that the businesses presented to the Essential Services Commission of Victoria with actual maximum demand observed since then. In Powercor's case, the AER noted that the 2006 forecasts exceeded actual maximum demand by 13%.[60]

Powercor contends that this conclusion was flawed because it was based on a comparison of system data with *non-coincident* spatial data. In other words, the spatial data that the AER used cannot be expected to sum to the system due to the fact that demand peaks at different times in different places around the network.

In response to the AER's conclusion that Powercor has historically tended to overestimate maximum demand, Powercor stated that the forecasts it submitted to the ESC for the 2006-10 regulatory period forecasts have turned out to be below actual demand. Details are set out in Powercor's table 4.3, which shows that this is particularly evident 2009.

[60] AER, Draft Determination, p81, table 5.7

The fact that Powercor's forecast of 50 POE maximum demand was below the observed maximum demand in 2009 is unsurprising as the two figures are not presented on a like basis. According to Powercor's revised proposal (RIN template 6.3, table 8), 2009 maximum demand occurred on 29 January. As was discussed in ACIL Tasman's earlier report, the temperature conditions that occurred on that day were substantially above the 50 POE level and it follows from this that demand would be as well.

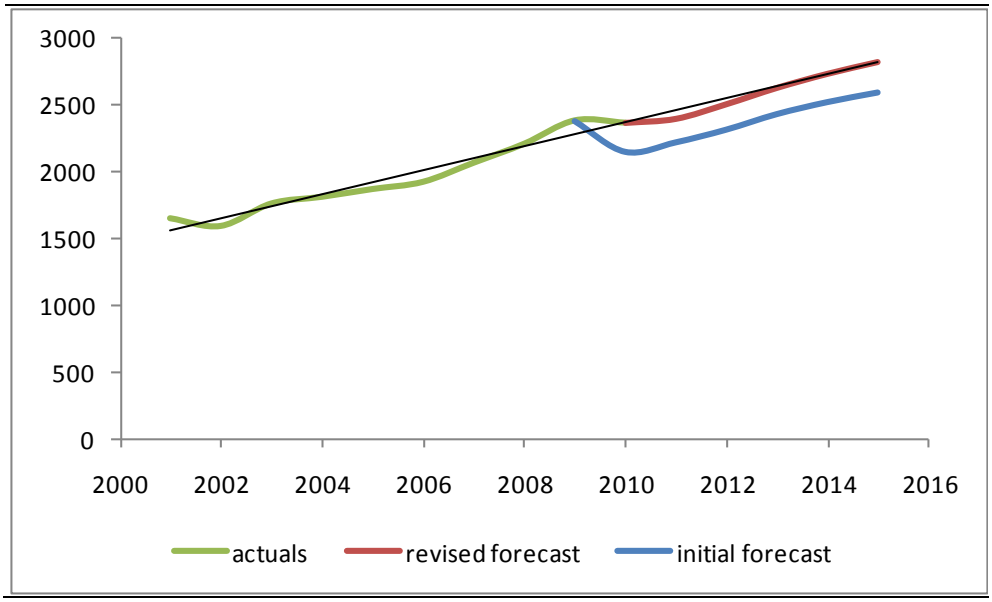
ACIL Tasman remains of the view that the methodology employed by NIEIR is more capable of taking account of macro factors than can be accounted for at the spatial level. Therefore, ACIL Tasman remains of the view that spatial forecasts should be reconciled with independently prepared system level forecasts. As is discussed below, SKM's analysis of Powercor's forecasts indicates that there is a downward bias in the internal spatial forecasting methodology.

7.5.2 Revisions to NIEIR's forecasts

As noted above, Powercor has submitted a revised system level maximum demand forecast with its revised proposal. This forecast was prepared by NIEIR using the methodology outlined above. ACIL Tasman considers that, with the exception of minor changes to account for policy issues, it was prepared using a methodology capable of producing a reasonable forecast of the likely future level of maximum demand in Powercor's area.

NIEIR's revised forecast of demand in Powercor's region is substantially different than NIEIR's initial forecast. This is illustrated in Figure 32 (note that policy impacts have been added back to this data).

Figure 32 **Powercor – initial and revised maximum demand forecasts - 'policy free' basis**



Data source: Powercor, initial RIN table 9 and revised RIN table 8 to 2010 then table 12 adjusted for policy impacts as per NIEIR reports to Powercor

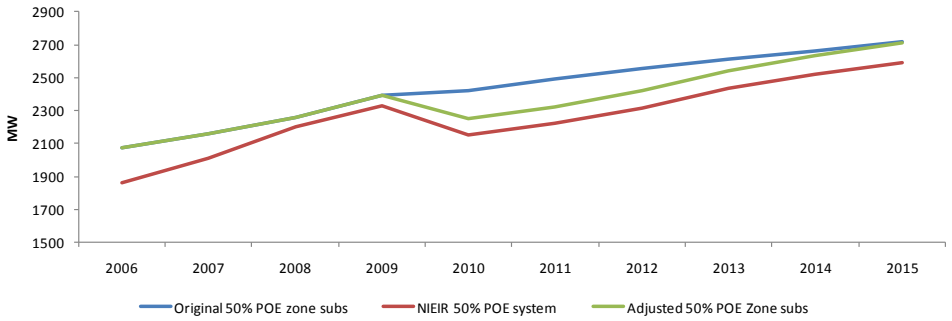
This increase is attributable in part to the increased input assumptions discussed in sections 3.4.1 and 3.4.2.

Powercor states that NIEIR's earlier report was based on incomplete data. In particular, it did not take account of the rearrangement of two 66kW supply points and the commissioning of an embedded generator at Shepparton. Powercor states that this was taken into account in NIEIR's amended report. The report itself makes no mention of this, although the maximum demand figure for 2009 is 41 MW greater in the revised report than it was in the initial report.

7.5.3 Reconciliation between bottom up and top down forecasts

Powercor's its internal spatial forecasts exceeded NIEIR's initial system level forecasts by a significant amount. This was highlighted in ACIL Tasman's earlier report and is summarised in Figure 33.

Figure 33 **Initial proposal – Powercor - non-coincident zone substation forecasts, initial and adjusted and system forecasts - 50 POE**



Data source Powercor initial RIN Table 10, and NIEIR, Maximum demand forecasts for Powercor terminal stations to 2019, November 2009

Figure 33 shows the difference over time between NIEIR's initial system level maximum demand forecast and maximum demand at Powercor's zone substations, either actual (before 2010) or forecast (from 2010 to 2015). The data are not calculated on the same basis so some difference is to be expected; i.e. the summed zone substation data is the sum of non-coincident maximum demands and therefore would be expected to be greater than the system level maximum demand.

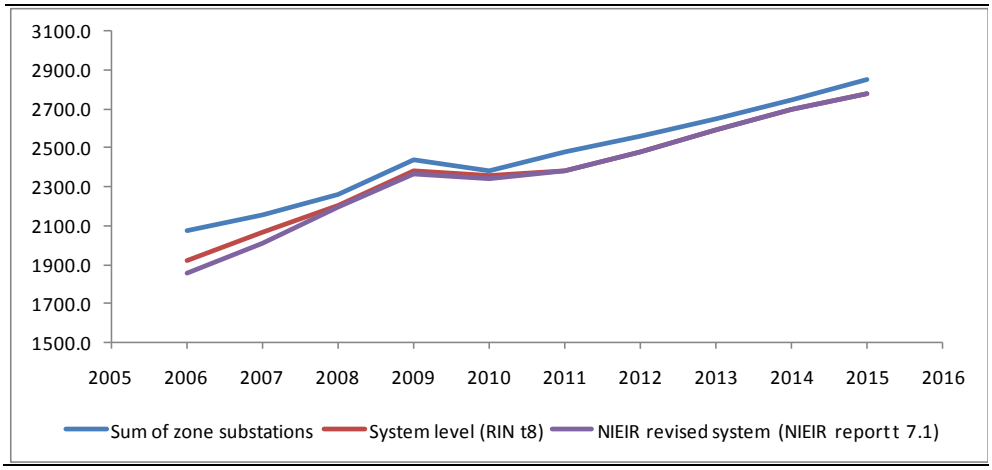
ACIL Tasman's earlier report sets out the expectation that, in the absence of a specific reason to the contrary, the average difference between the sum of the non-coincident zone substation data and the system level data should remain constant. Based on the information provided with the initial proposal, and in follow up meetings, ACIL Tasman considered that there was little justification for the Powercor spatial forecasts and the NIEIR system level forecast to be diverging over time. Accordingly, it recommended to the AER that the forecasts be brought back into line with one another.

The information that Powercor submitted with its revised proposal does not change ACIL Tasman's view in this respect and Powercor appears to accept this approach. While Powercor considers that the AER's reconciliation of Powercor's spatial forecasts to NIEIR's system level forecast yielded unrealistic results, this is due to errors in NIEIR's forecasts. In its revised proposal, Powercor has conducted a reconciliation with NIEIR's revised forecasts.[61]

Figure 34 replicates Figure 33 with Powercor's revised forecasts.

[61] Powercor, revised proposal, p105.

Figure 34 **Revised proposal – Powercor – non coincident zone substation forecasts and system forecasts**



Data source: Powercor, revised RIN tables 8, 17 and 21, and NIEIR, Maximum summer demand forecasts for Powercor Australia to 2020, June 2010, table 7.1

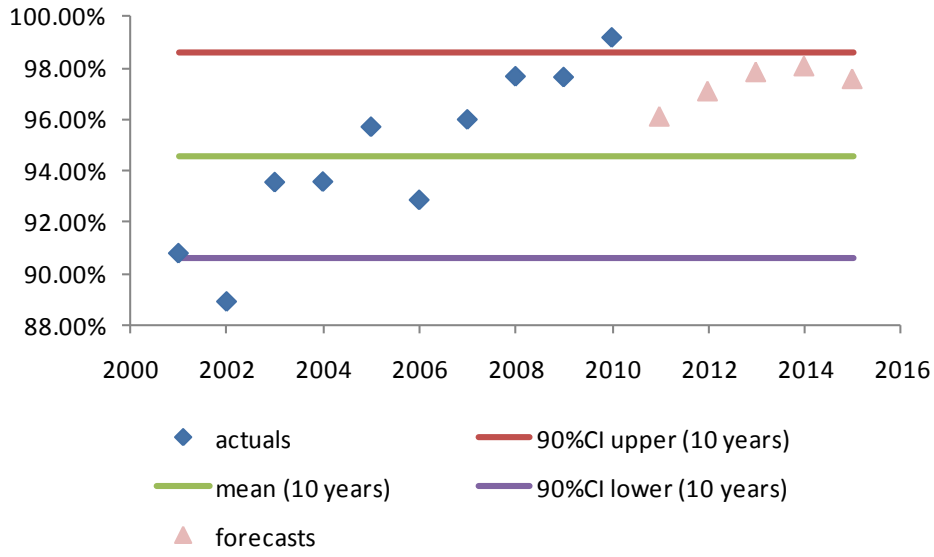
It is clear from Figure 17 that Powercor's revised spatial forecasts diverge much less from NIEIR's system forecast than was originally the case.

In describing the process by which it reconciled its spatial forecasts to NIEIR's system level forecasts, Powercor draws on a report by consultants SKM.

SKM's report calculates that, on average over the last five years, maximum demand at the system level had been 94.03 per cent of the sum of maximum demands observed at each zone sub (i.e. non -coincident maximum demand). SKM recommends that this relationship should be preserved, within a confidence interval, between the bottom up spatial forecasts and the top down system forecast prepared by NIEIR.

The difference between SKM's approach and that proposed by ACIL Tasman is that SKM adds a confidence interval around ACIL Tasman's point estimate.

Figure 35 **Powercor – confidence interval analysis of system and spatial maximum demand forecasts**



Data source: Powercor, revised RIN tables 11, 12, 17 and 21

SKM's analysis is summarised in Figure 35. Powercor's argument, based on this analysis, is that because the ratio of the system forecast and the summed non-coincident zone substation forecasts does not fall outside the confidence interval shown by the upper and lower parallel lines, Powercor's internal spatial forecasts are not sufficiently different from the system level forecasts to require further adjustment.

In ACIL Tasman's view, the use of a confidence interval in this analysis is a flawed application of statistical techniques.

The main reason for this view is that, the fact that an observation falls within a confidence interval does not make that observation likely. Rather, the further an observation (or range[62]) is from the mean, the less likely it becomes. Therefore, SKM's analysis appears to suggest that Powercor's initial estimates for at least two of the last three years of the regulatory period were in fact very unlikely to be accurate estimates.

In addition, the inference testing upon which this argument rests is based on the assumption that the underlying data is normally distributed or that there is enough data to rely on the central limit theorem (which there is not in this case). The data does not appear to be normally distributed. Rather, a visual

[62] In continuous distributions such as this there are an infinite number of values that an observation may take. It follows from this that the probability of any single observation being observed is infinitely small, i.e. zero. It is more accurate to consider the probability that an observation will be between a given range.

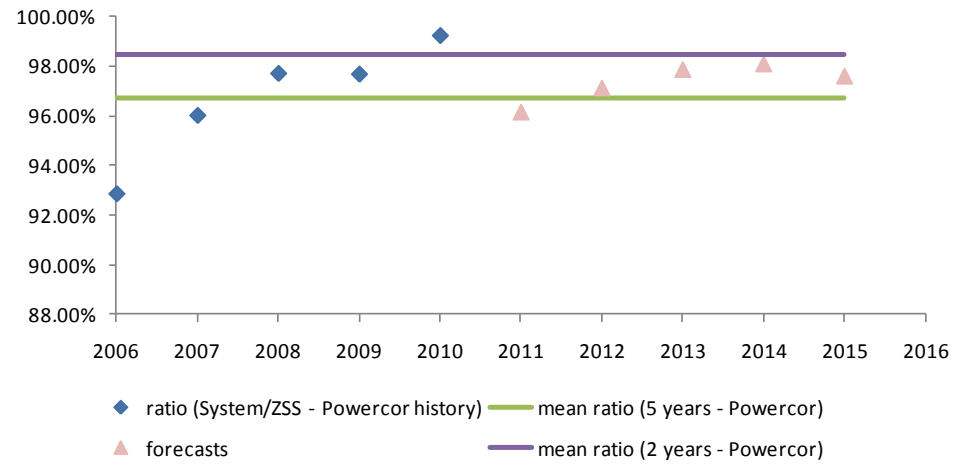
inspection of the data indicates that it displays an upward trend throughout the period.

For these reasons, ACIL Tasman's does not regard the confidence interval approach as an improvement on its preferred approach, namely that:

- spatial forecasts should be reconciled to the system level forecasts, albeit with some minor variation in the ratios after reconciliation and
- the diversity between system and spatial level forecast should reflect recent history

Given this, Figure 36compares Powercor's forecasts with the historic mean diversity between system and zone substation level demand.

Figure 36 **Powercor – revised proposal – comparison of forecast and historical diversity with Powercor historical series**

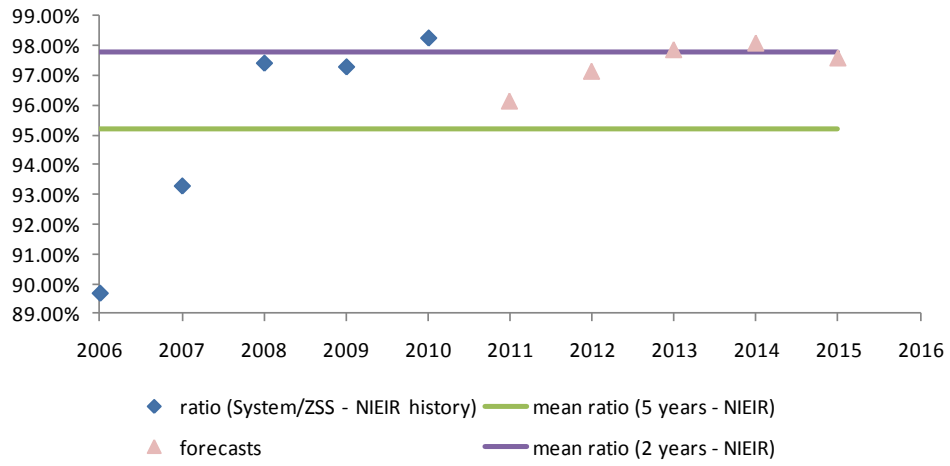


Data source: Powercor, revised RIN tables 11, 12, 17 and 21

Figure 36compares the diversity between the two forecasts using means calculated over different time periods. As is shown, the forecast diversity falls between the 2 and 5 year mean diversities. This is consistent with a greater weight being placed on the last two years than the three before them.

Figure 37 shows the same comparison as Figure 36, using NIEIR's historical series, which is slightly different than Powercor's. As is shown, the result is consistent, with the forecasts lying between the two and five year mean diversity ratios.

Figure 37 **Powercor – revised proposal – comparison of forecast and historical diversity with NIEIR historical series**



Data source: Powercor, revised RIN tables 11, 12, 17 and 21

As mentioned above, ACIL Tasman considers that spatial forecasts should be reconciled to independent system level forecasts, albeit with a minor variation after the reconciliation. In this case, as shown in Table 16, the variations that would be required vary, in both magnitude and sign, depending on the particular mean chosen. Both of the five year means suggest that the spatial forecasts may be biased downwards. As mentioned above, though, the forecasts are consistent with greater weight being placed on the reduced diversity between coincident and non-coincident peaks observed in recent years. ACIL Tasman does not consider it necessary to make further revisions to these forecasts other than to account for the policy impacts discussed above.

Table 16 **Powercor – revised proposal, variations in diversity over forecast period**

Adjustments	2011	2012	2013	2014	2015
actual zone sub forecasts	2481	2557	2652	2747	2848
NIEIR system forecast	2,385	2,483	2,596	2,695	2,780
Target ZSS forecasts					
5 year Powercor mean	2467	2568	2685	2787	2875
2 year Powercor mean	2423	2523	2637	2737	2824
5 year NIEIR mean	2506	2609	2727	2831	2921
2 year NIEIR mean	2440	2540	2655	2757	2843
Deltas (MW)					
5 year Powercor mean	-14	12	32	40	27
2 year Powercor mean	-58	-34	-16	-10	-25
5 year NIEIR mean	25	53	75	84	72
2 year NIEIR mean	-41	-16	3	9	-5
Deltas (%)					
5 year Powercor mean	-0.6%	0.5%	1.2%	1.4%	0.9%
2 year Powercor mean	-2.3%	-1.3%	-0.6%	-0.4%	-0.9%
5 year NIEIR mean	1.0%	2.1%	2.8%	3.1%	2.5%
2 year NIEIR mean	-1.7%	-0.6%	0.1%	0.3%	-0.2%

8 SP AusNet

8.1 Description of SP AusNet network

Figure 38 **Map of SP AusNet area**

SP AusNet's distribution region includes over 600,000 customers across eastern Victoria. This network spans approximately 46,000 kilometres across an area of 80,000 square kilometres.

SP AusNet's region accounts for approximately 24% of Victoria's population and 23% of its dwelling stock. It is characterised by a relatively large proportion of mining activity, with more than half of Victoria's mining activity in SP AusNet's area. It is also home to 35% of Victoria's agriculture industry.

On average, NIEIR forecasts that population growth in SP AusNet's area will be 1.6 per cent per annum, 0.2 percentage points above the Victorian average. Similarly, gross regional product in SP AusNet's area is forecast to be 3.2 per cent per annum, outperforming the Victorian average growth rate by 0.5 percentage points. Also outperforming the Victorian average is the rate of growth in the dwelling stock, which NIEIR forecasts will be 1.9 per cent per annum reflecting rapid growth in Melbourne's south eastern and north eastern growth corridors.

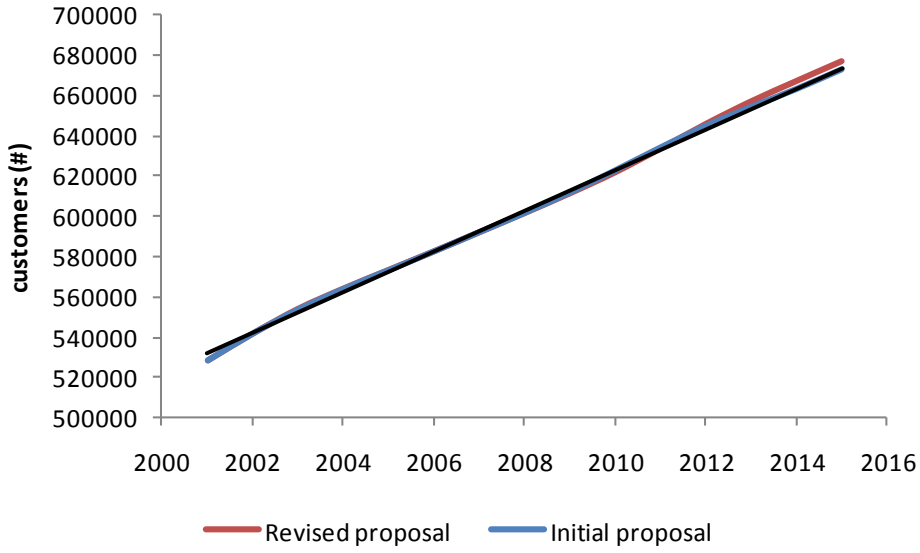
8.2 Customer numbers

As noted in ACIL Tasman's earlier report the businesses have not provided sufficient information regarding the methodology by which the customer numbers forecasts were prepared to enable a conclusion as to their reasonableness to be reached. However, as also discussed in the earlier report, the forecasts were broadly in line with past trends.

In its revised proposal, SP AusNet states that it has addressed the AER's concerns regarding its earlier forecasts of customer numbers by adopting revised forecasts of economic and population growth. As discussed in sections 3.4.1 and 3.4.2 ACIL Tasman considers that NIEIR's revised forecasts of economic and population growth are reasonable.

Figure 39 shows SP AusNet's initial and revised customer numbers forecast.

Figure 39 **SP AusNet – forecast of customer numbers**



Data source: SP AusNet, initial RIN table 1, revised RIN table 1 and revised proposal table 5.8

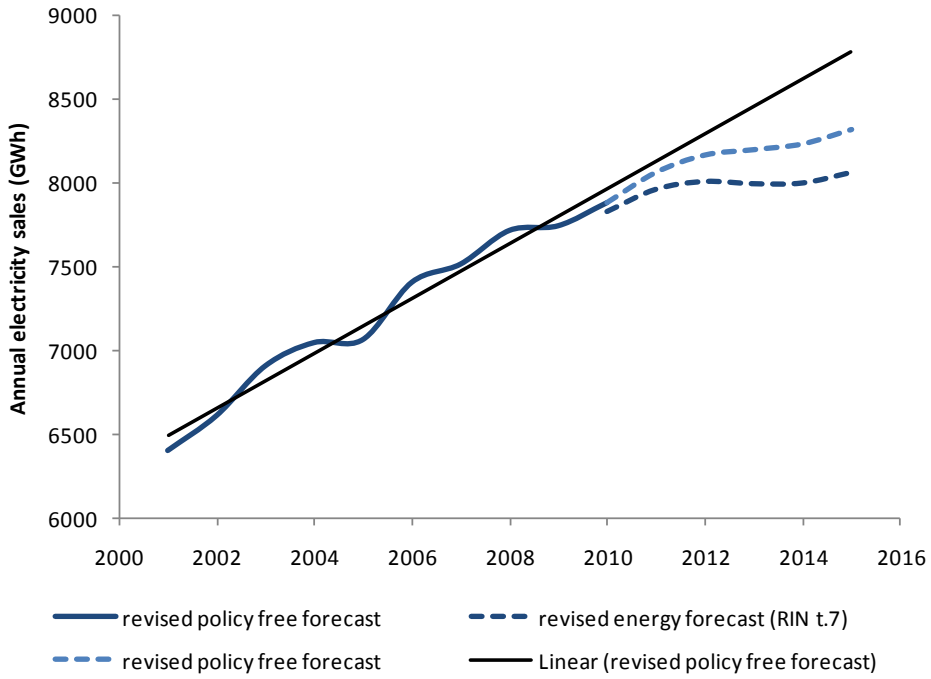
SP AusNet's forecast has decreased by 0.1 percent in the first two years of the regulatory period and then increased by approximately 0.5 per cent each year thereafter. The forecast is broadly consistent with past trends, as shown by the trend line in the figure (which is fitted to the initial series to highlight the increase).

In ACIL Tasman's view this is a reasonable forecast.

8.3 Electricity sales

SP AusNet adopted revised electricity sales and customer numbers forecasts that were prepared by NIEIR. These underlying forecasts, as reconstructed by ACIL Tasman, are shown in Figure 40.

Figure 40 **SP AusNet – electricity sales – 'policy free' basis**



Data source: SP AusNet, revised RIN table 7 and NIEIR, Electricity sales and customer number projections for SP AusNet region to 2019, June 2010, tables 6.17 and 6.20

As Figure 40 shows, SP AusNet's historical electricity sales growth showed a strong upward trend between 2001 and 2010. During this period, compound average annual growth was 2.3 per cent, the fastest experienced by the five businesses.

In the regulatory period, SP AusNet forecasts that growth will slow to 0.32 per cent per annum. The forecast impact of the CPRS contributes to this, as do the various other policy impacts discussed below. If the policy impacts other than the CPRS and the hot water phase out are added back, underlying growth in electricity sales during the forecast period is positive at 0.79 per cent (dashed light blue line in Figure 40).

As discussed above, ACIL Tasman considers that NIEIR electricity sales forecasting methodology and the key inputs to it are a reasonable basis for forecasting electricity sales during the regulatory period absent further government policy intervention. In ACIL Tasman's view, the underlying forecasts, as depicted in Figure 40 are reasonable.

8.4 Policy adjustments

As discussed in chapter 4, ACIL Tasman considers that, with the exception of the one watt standby target, SP AusNet's forecasts of the impact of policy adjustments are reasonable.

Therefore, ACIL Tasman considers that the impact of the one watt standby target should be added back to SP AusNet's growth forecasts. The relevant adjustments are set out in Table 17.

Table 17 **SP AusNet region – ACIL Tasman revisions to growth forecasts due to policy impacts**

	2011	2012	2013	2014	2015
Electricity sales					
One watt standby - initial (cumulative	-7	-20	-34	-43	-47
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	7	20	34	43	47
revised total electricity sales forecast (GWh)	**7975**	**8035**	**8035**	**8049**	**8116**
Maximum Demand					
One watt standby - initial (cumulative	-1	-2	-4	-6	-7
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	1	2	4	6	7
revised maximum demand forecast (MW)	**1977**	**2053**	**2167**	**2237**	**2331**

8.5 Maximum demand

ACIL Tasman had previously recommended that SP AusNet's maximum demand forecasts should be amended in the following three ways:

1. Revise the forecasts to take account of more up to date forecasts of economic and population growth
2. Reconcile the forecasts with an independently prepared system level forecast to take account of economic drivers
3. Make various adjustments to the forecasts relating to policy measures.

The AER accepted these recommendations and substituted SP AusNet's forecast of maximum demand with revised forecasts.

SP AusNet appears to have accepted some of the AER's revisions and rejected others. In its revised proposal, SP AusNet has:

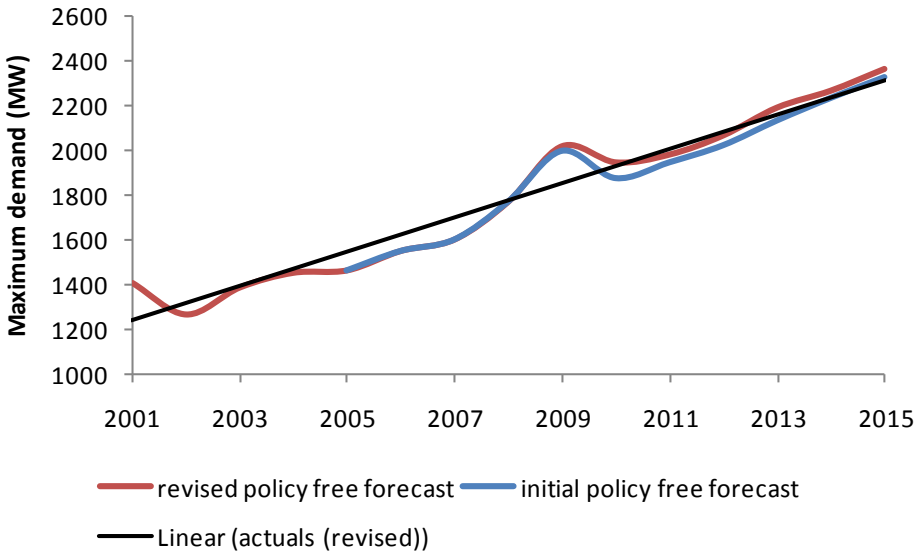
- obtained, and adopted, a revised forecast of system level maximum demand from NIEIR
- revised its spatial forecasts so that they do not exceed NIEIR's revised system level forecast

8.5.1 Revisions to NIEIR's forecasts

As noted above, SP AusNet has submitted a revised system level maximum demand forecast with its revised proposal. This forecast was prepared by NIEIR using the methodology outlined above and, as noted above, ACIL Tasman considers that, with the exception of minor changes to account for policy issues, it was prepared using a methodology capable of producing a reasonable forecast of the likely future level of maximum demand in SP AusNet's area.

NIEIR's initial and revised forecasts of system level demand are presented in Figure 41 (note that the policy impacts have been added back).

Figure 41 **SP AusNet – initial and revised maximum demand forecasts - 'policy free' basis**



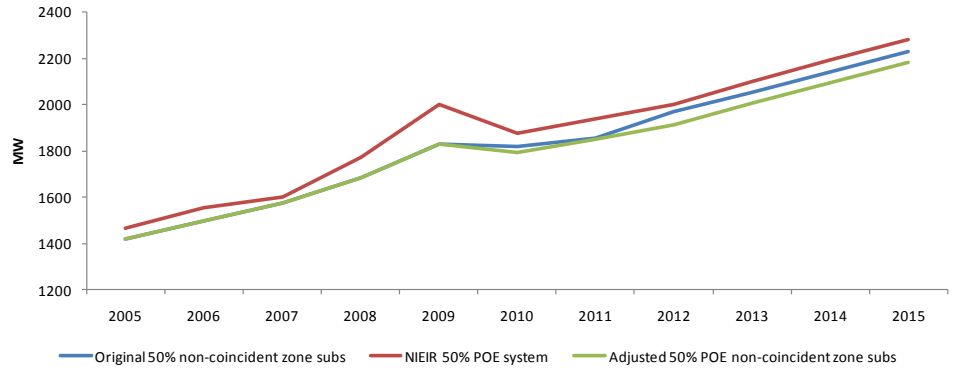
Data source: SP AusNet, initial RIN (table 9) and revised RIN (table 12) adjusted for policy impacts as per NIEIR, Electricity sales and customer number projections for SP AusNet region to 2019, June 2010, tables 6.18 and 6.21

Figure 41 shows that the impact of NIEIR's revised input assumptions has been to increase forecast growth in maximum demand to very close to the historical trend level. This is consistent with the increased input assumptions that were discussed in sections 3.4.1 and 3.4.2.

8.5.2 Reconciliation between bottom up and top down forecasts

SP AusNet notes that the relationship between its spatial (zone substation) and system level forecasts diverged over time. This was highlighted in ACIL Tasman's earlier report and is summarised in Figure 42.

Figure 42 **Initial proposal – SP AusNet - non-coincident zone substation forecasts, initial and adjusted and system forecasts - 50 POE**



Data source SP AusNet initial RIN Table 10, and NIEIR, Maximum demand forecasts for SP AusNet terminal stations to 2019, November 2009

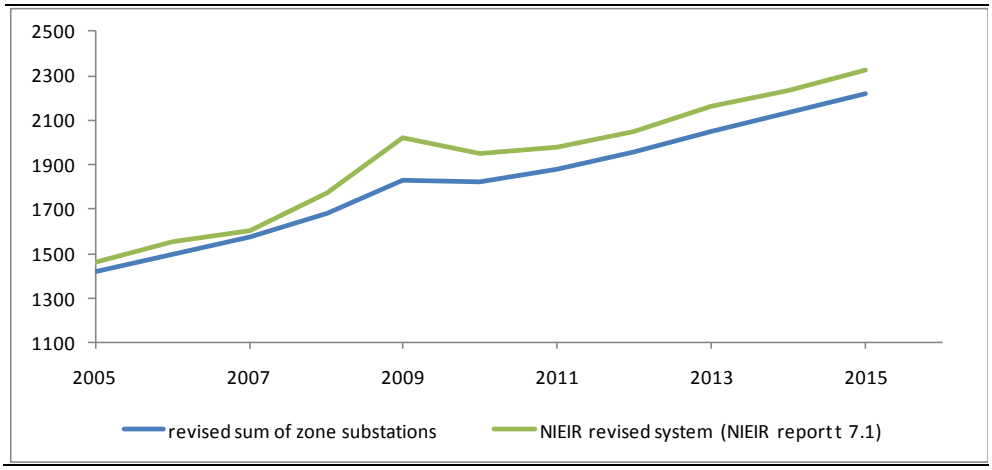
Figure 42 shows the difference over time between NIEIR's initial system level maximum demand forecast and maximum demand at SP AusNet's zone substations, either actual (before 2010) or forecast (from 2010 to 2015). The data are not calculated on the same basis so some difference is to be expected.[63]

ACIL Tasman's earlier report sets out the expectation that, in the absence of a specific reason to the contrary, the average difference between the sum of the non-coincident zone substation data and the system level data should remain constant. Accordingly, it recommended to the AER that the forecasts be brought back into line with one another.

The information that SP AusNet submitted with its revised proposal does not change ACIL Tasman's view in this respect. Rather, SP AusNet expressly accepts this approach and has reconciled its zone substation forecasts to give effect to this recommendation. This is shown in Figure 43.

[63] In SP AusNet's case, there is a large quantity of sub transmission connected load that is not reflected in the zone substation forecasts. For this reason the system coincident forecast exceeds the zone substation non-coincident forecast. On the assumption that the sub-transmission load is flat, the analysis conducted here is not affected.

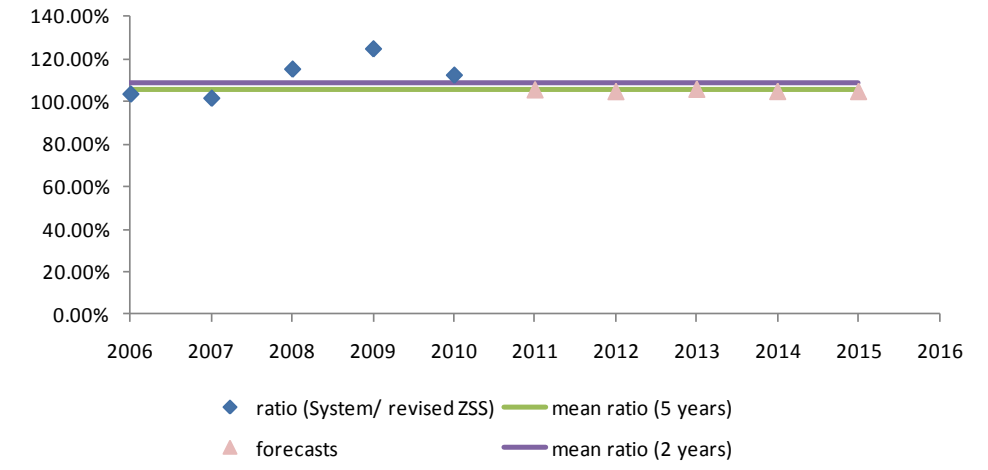
Figure 43 **Revised proposal – SP AusNet - non-coincident zone substation and system forecasts - 50 POE**



Data source: SP AusNet, revised RIN, tables 8, 11, 17 and 21 and NIEIR, Maximum summer demand for SP AusNet to 2020, June 2010, table 7.1

It is clear from Figure 43 that SP AusNet's revised spatial forecasts converge on NIEIR's system forecast less than was originally the case. Figure 44 provides a more detailed view of the diversity between the two forecast levels and the comparison between forecast and historical diversity. As the figure shows, the diversity ratio in SP AusNet's region was lower in the past two years than over the past five. This reflects the divergence between the two series in 2009 and 2010 shown in Figure 43 above.

Figure 44 **SP AusNet – revised proposal – non-coincident zone substation and system maximum demand – actual and forecast – 50 POE**



Data source: SP AusNet, revised RIN tables 11, 12 and 21 and initial RIN table 11.

As discussed in the earlier report, ACIL Tasman considers that spatial forecasts should be reconciled to independent system level forecasts, albeit with a minor variation after the reconciliation. In this case, as shown in Table 18, the variations that would be required to adjust these forecasts are relatively small.

ACIL Tasman considers that further change to these forecasts is not warranted.

Table 18 **SP AusNet – revised proposal, variations in diversity over forecast period**[64]

Adjustments	2011	2012	2013	2014	2015
actual zone sub forecasts	1876	1961	2048	2133	2221
NIEIR system forecast	1,977	2,050	2,163	2,231	2,323
Means					
actual mean diversity	105.0%				
mean ratio (5 years)	105.7%%				
mean ratio (2 years)	108.8%				
Target ZSS forecasts					
mean ratio (5 years)	1870	1940	2047	2111	2198
Deltas (MW)					
mean ratio (5 years)	-6	-21	-1	-22	-23
Deltas (%)					
mean ratio (5 years)	-0.3%	-1.1%	-0.1%	-1.0%	-1.0%

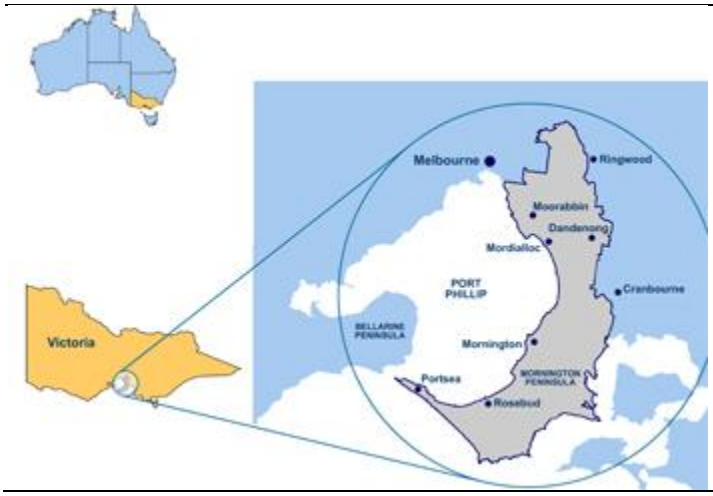
[64] Note that, unlike the other businesses, SP AusNet has adopted NIEIR';s system forecasts in its response to the regulatory information notice so only one set of statistics is presented.

9 United

9.1 United Description of United network

United's distribution region services the south-eastern suburbs of Melbourne and the Mornington Peninsula. It is largely urban in nature.

Figure 45 **Map of United area**



United's region accounts for approximately 23% of Victoria's population and dwelling stock. It is characterised by a large proportion of manufacturing activity, with slightly more than 29% of Victoria's manufacturing output coming from United's region.[65]

On average, NIEIR forecasts that population growth in United's area will be 0.9 per cent per annum over the next regulatory period, which is 0.4 percentage points below the Victorian average and 0.1 percentage points above the initial forecast. Also lagging behind the Victorian average is the forecast rate of growth in dwelling stock in United's region, which NIEIR forecasts will be 1.1 per cent per annum, 0.6 percentage points below the Victorian average of 1.7 per cent. By contrast, gross regional product in United's area is forecast to grow at 2.6 per cent per annum, below the Victorian average growth rate by 0.1 percentage points and 0.4 percentage points above the initial forecast.

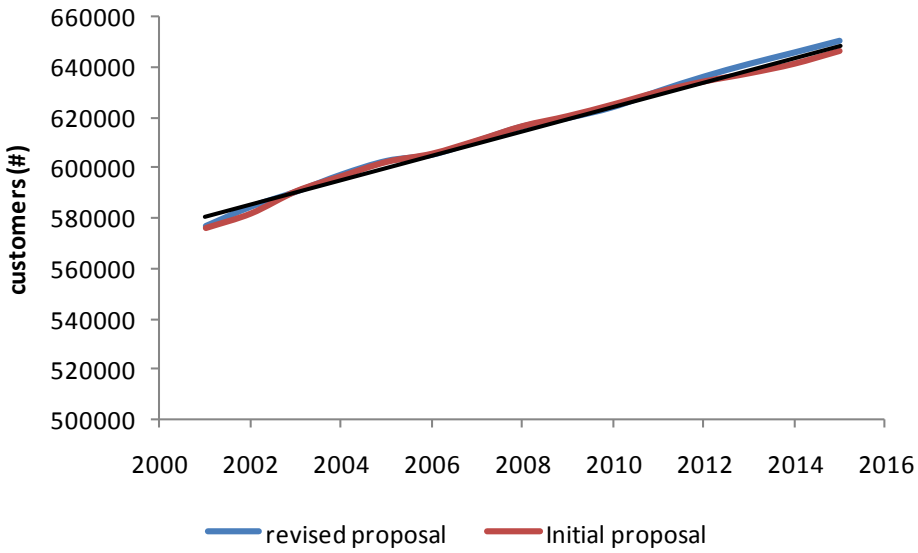
[65] This compares to 22.7% of Victoria's GSP coming from this area (in 2001) (NIEIR, "Maximum demand forecasts for United terminal stations to 2019", November 2009)

9.2 Customer numbers

As noted in ACIL Tasman's earlier report the businesses have not provided sufficient information regarding the methodology by which the customer numbers forecasts were prepared to enable a conclusion as to their reasonableness to be reached. However, as also discussed in the earlier report, the forecasts were broadly in line with past trends.

In its revised proposal, United states that it has addressed the AER's concerns regarding its earlier forecasts of customer numbers by adopting revised forecasts of economic and population growth. Figure 46 shows United's initial and revised customer numbers forecast.

Figure 46 **United – forecast of customer numbers**



Data source: United, initial RIN table 1, revised RIN table 1 and revised proposal table 13-7

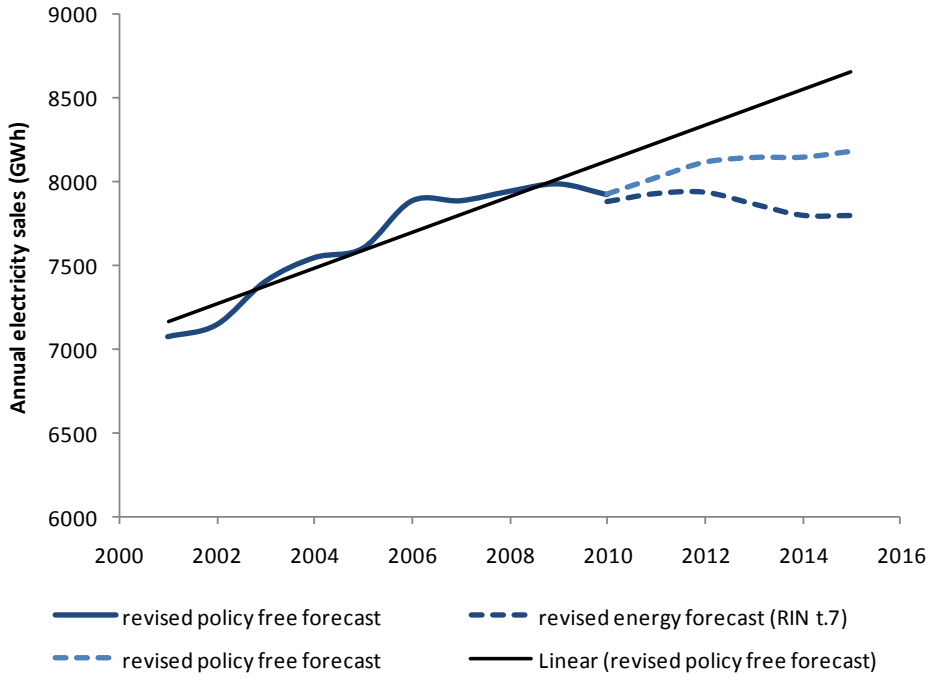
As Figure 46 shows, United's forecast has increased by a small amount from its initial estimate. The increase is less than one per cent every year. The forecast is broadly consistent with past trends, as shown by the trend line in the figure (which is fitted to the initial series to highlight the increase).

In ACIL Tasman's view this is a reasonable forecast.

9.3 Electricity sales

United adopted revised electricity sales and customer numbers forecasts that were prepared by NIEIR. These underlying forecasts, as reconstructed by ACIL Tasman, are shown in Figure 47.

Figure 47 **United – electricity sales – 'policy free' basis**



Data source: United, revised RIN t.7 and NIEIR, Electricity sales and customer number projections for United region, June 2010, tables 6.17 and 6.20

As Figure 47 shows, United's historical electricity sales growth showed an upward trend between 2001 and 2010. During this period, compound average annual growth was 1.7 per cent.

In the regulatory period, United forecasts that electricity sales will decline at the rate of 0.41 per cent per annum. The forecast impact of the CPRS contributes to this, as do the various other policy impacts discussed below. If the policy impacts other than the CPRS and the hot water phase out are added back, underlying growth in electricity sales during the forecast period is positive at 0.48 per cent (dashed light blue line in Figure 47).

As discussed above, ACIL Tasman considers that NIEIR's electricity sales forecasting methodology and the key inputs to it are a reasonable basis for forecasting electricity sales during the regulatory period absent further government policy intervention. In ACIL Tasman's view, the underlying forecasts, as depicted in Figure 47 are reasonable.

9.4 Policy adjustments

As discussed in chapter 4, ACIL Tasman considers that, with the exception of the one watt standby target and the AMI rollout, United's forecasts of the impacts of policy adjustments are reasonable.

ACIL Tasman considers that the impact of the AMI rollout should be estimated at 2.5 per cent for residential customers and 0.5 per cent for commercial customers. In addition, the impact of the one watt standby target should be added back to the growth forecasts. The relevant adjustments are set out in Table 19.

Table 19 **United region – ACIL Tasman revisions to growth forecasts due to policy impacts**

	2011	2012	2013	2014	2015
Electricity sales					
AMI Rollout - initial (cumulative)	0	-24	-73.8	-111.1	-124.1
AMI rollout - revised (cumulative)	0	-15	-45	-67	-74
AMI rollout - revision (cumulative)	0	9	29	44	50
One watt standby - initial (cumulative	-7	-21	-35	-45	-50
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	7	21	35	45	50
revised total electricity sales forecast (GWh)	**7936**	**7967**	**7932**	**7890**	**7899**
Maximum Demand					
AMI Rollout - initial (cumulative)	-3	-11	-18	-22	-24
AMI rollout - revised (cumulative)	0	-5	-9	-11	-12
AMI rollout - revision (cumulative)	3	6	9	11	12
One watt standby - initial (cumulative	-1	-2	-2	-2	-2
One watt standby - revised (cumulative	0	0	0	0	0
One watt standby - revision (cumulative)	1	2	2	2	2
revised 10 POE maximum demand forecast (MW)	**2253**	**2317**	**2388**	**2464**	**2479**

9.5 Maximum demand

ACIL Tasman had previously recommended that United's maximum demand forecasts should be amended in the following three ways:

1. Revise the forecasts to take account of more up to date forecasts of economic and population growth
2. Reconcile the forecasts with an independently prepared system level forecast to take account of economic drivers
3. Make various adjustments to the forecasts relating to policy measures.

The AER accepted these recommendations and substituted United's forecast of maximum demand with revised forecasts.

United appears to have accepted some of the AER's revisions and rejected others. In its revised proposal, United has:

- obtained, and adopted, a revised forecast of system level maximum demand from NIEIR

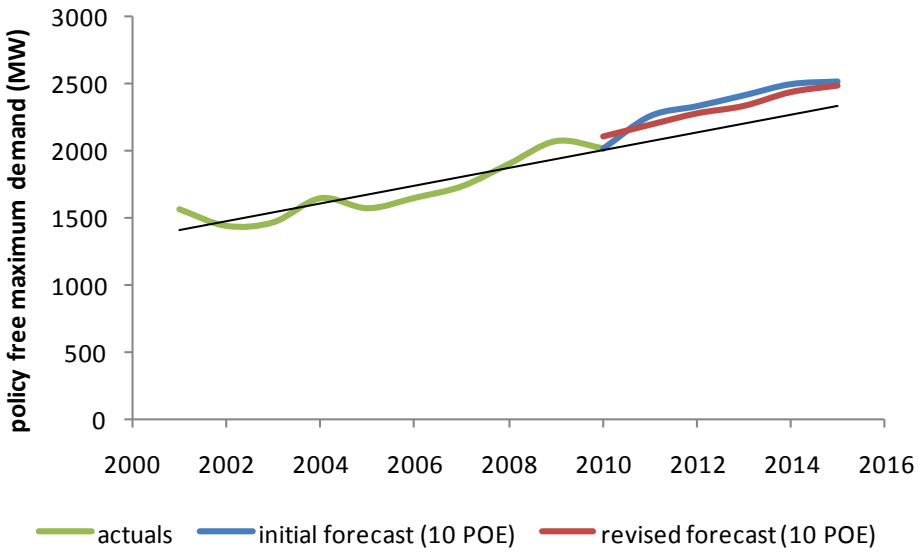
- amended its spatial forecasts.

9.5.1 Revisions to NIEIR's forecasts

As noted above, United has submitted a revised system level maximum demand forecast with its revised proposal. This forecast was prepared by NIEIR using the methodology outlined above. ACIL Tasman considers that, with the exception of minor changes to account for policy issues, it was prepared using a methodology capable of producing a reasonable forecast of the likely future level of maximum demand in United's area.

NIEIR's initial and revised forecasts are presented in Figure 48.

Figure 48 **United – initial and revised maximum demand forecasts - 'policy free' basis**



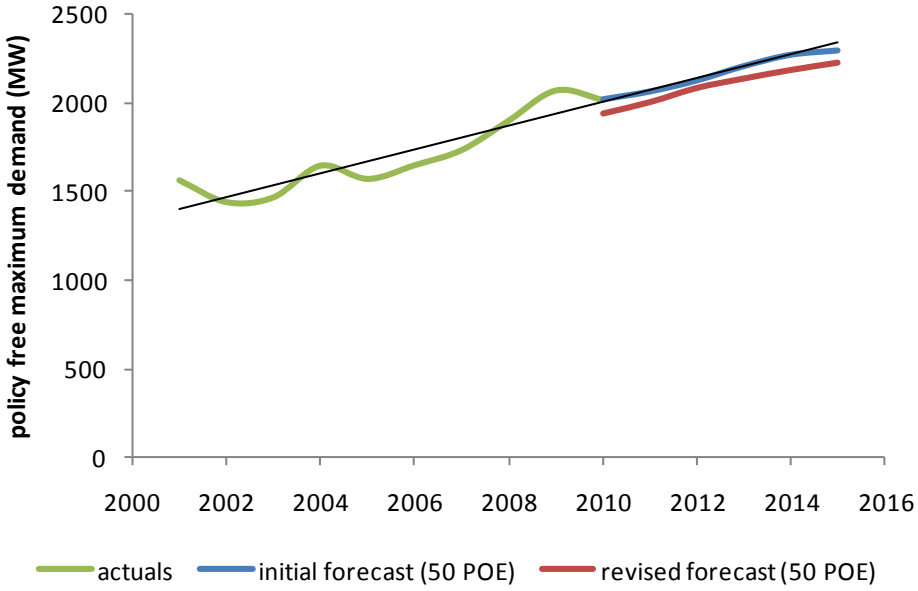
Data source: United, initial RIN table 9 and revised RIN table 8 to 2010 then table 12 adjusted for policy impacts as per NIEIR, Electricity sales and customer number projections for United region, June 2010, tables 6.18 and 6.21

As Figure 48 shows, NIEIR's forecast of system level demand in United's region is slightly higher than its initial forecast. This is consistent with the relatively modest increases in key drivers attributed to United's region (see section 9.1 and with the fact that, uniquely among the businesses, United forecasts maximum demand at the 10 POE level.

United's 10 POE forecasting approach also accounts for the fact that the forecasts show a step change above most of the historical data. This is

confirmed in Figure 49, which shows NIEIR's forecasts of 50 POE demand in United's region.[66]

Figure 49 **United – initial and revised 50 POE maximum demand forecasts, 'policy free' basis**



Data source: United, initial RIN table 9 and revised RIN table 8 to 2010 then table 12 adjusted for policy impacts as per NIEIR, Electricity sales and customer number projections for United region, June 2010, tables 6.18 and 6.21

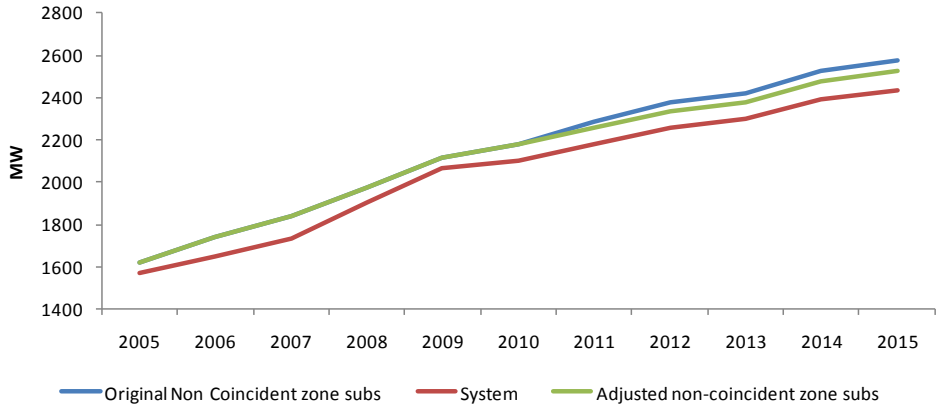
As Figure 49 shows, NIEIR's 50 POE forecasts for United's region are very much consistent with historic trends. This supports the suggestion that the forecasting methodology, and thus the 10 POE forecasts, is also consistent with history.

9.5.2 Reconciliation between bottom up and top down forecasts

The sum of United's initial spatial forecasts diverged only slightly from NIEIR's initial system level forecasts. This was highlighted in ACIL Tasman's earlier report and is summarised in Figure 50.

[66] Note that these forecasts have not necessarily been confirmed by United. They are presented here solely for illustrative purposes.

Figure 50 **Initial Proposal - adjusted United 50 POE non-coincident zone substation forecasts versus NIEIR 50 POE system forecasts**

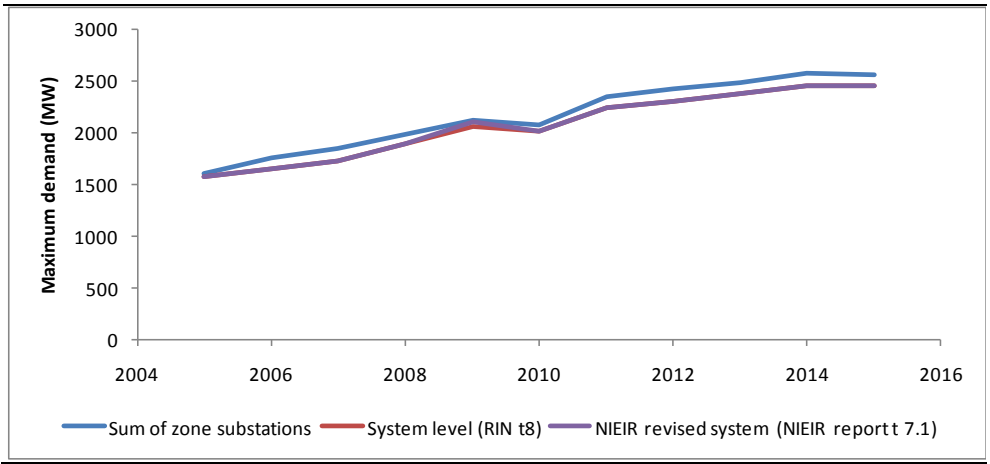


Data source United initial RIN Table 10, NIEIR and ACIL Tasman calculations

ACIL Tasman's earlier report sets out the expectation that, in the absence of a specific reason to the contrary, the average difference between the sum of the non-coincident zone substation data and the system level data should remain constant. Based on the information provided with the initial proposal, and in follow up meetings, ACIL Tasman considered that there was little justification for United's spatial forecasts and the NIEIR system level forecast to be diverging over time. Accordingly, it recommended to the AER that the forecasts be brought back into line with one another.

United has not disagreed with the need for a reconciliation, which was done in the initial proposal. As is seen in Figure 51, United's revised forecasts show less divergence from NIEIR's system level forecast than was originally the case.

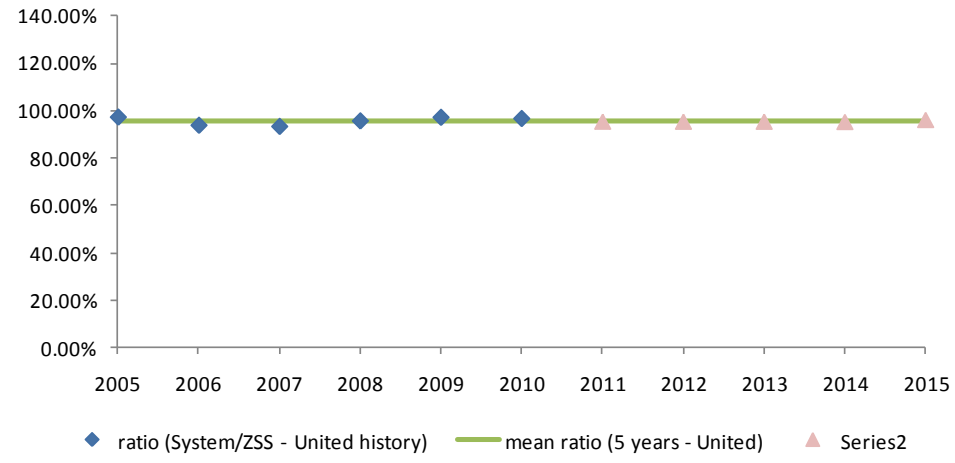
Figure 51 **United – initial and revised forecasts – 'policy free' basis**



Data source: United, revised RIN table 8 to 2010 then table 12, NIEIR, Electricity sales and customer number projections for united region, June 2010, table 7.1

Figure 52 provides a more detailed view of the diversity between United's different forecasts.

Figure 52 **United – system and spatial maximum demand forecasts**



Data source: United, revised RIN table 12 and 17

As Figure 52 shows, when compared to the last five years, the ratio between United's system and spatial forecasts is consistently very close to the mean.

The changes required to adjust these forecasts, which are shown in Table 20 for the sake of completeness, are relatively small. ACIL Tasman considers that further change to these forecasts is not warranted.

Table 20 **United – revised proposal, variations in diversity over forecast period**

Adjustments	2011	2012	2013	2014	2015
actual zone sub forecasts	2359	2424	2495	2576	2567
NIEIR system forecast	2,249	2,309	2,377	2,451	2,465
Means					
mean ratio (5 years - United)	95.4%				
mean ratio (5 years - NIEIR)	95.8%				
Target ZSS forecasts					
mean ratio (5 years - United)	2358	2421	2492	2570	2585
mean ratio (5 years - NIEIR)	2348	2412	2482	2560	2575
Deltas (MW)					
mean ratio (5 years - United)	-2	-2	-2	-6	18
mean ratio (5 years - NIEIR)	-11	-12	-12	-16	8
Deltas (%)					
mean ratio (5 years - United)	-0.1%	-0.1%	-0.1%	-0.2%	0.7%
mean ratio (5 years - NIEIR)	-0.5%	-0.5%	-0.5%	-0.6%	0.3%

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.