

# Appendix 5.5: Customer Initiated Works Report

Regulatory proposal for the ACT electricity distribution network 2019-24  
January 2018



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## Executive Summary

- The information in this Customer Initiated Works (CIW) Report has been categorised into Standard Control and Alternate Control. All costs shown are 2018/19 real dollars and include direct costs only.
- The CIW forecast for capex is largely dependent on land releases for development by residential, commercial and industrial customers and special purpose developments. It also provides for large spot loads that are known and considered—definite, likely or potential loads—depending on the timing of the developments.
- In essence, CIW is non-discretionary. Evoenergy is obliged to ensure that adequate budget finances exist to meet all customer requests in a timely and cost effective manner.
- Table 1 (Standard Control) and Table 2 (Alternate Control) provide the categorised forecast of customer initiated capital expenditure for the 2019-24 regulatory control period. For additional information, commentary and trends for each category refer to sections below.

**Table 1. 2019/20 to 2023/24 Customer Initiated Works Capex – Standard Control**

\$ million (2018/19)	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Commercial and industrial developments	6.3	5.0	6.4	8.4	6.5	<b>32.6</b>
Community and associated developments	0.0	0.0	(0.0)	0.0	0.0	<b>0.1</b>
New urban development	7.4	6.7	4.7	4.6	4.4	<b>27.7</b>
Rural developments	0.1	0.1	0.0	0.2	0.1	<b>0.5</b>
Services	1.5	1.9	2.0	1.3	1.9	<b>8.5</b>
Special customer requests	1.0	0.5	0.2	0.3	0.6	<b>2.5</b>
Urban infill	3.1	4.6	2.7	3.3	2.4	<b>16.2</b>
<b>Total capex</b>	<b>15.7</b>	<b>16.7</b>	<b>17.1</b>	<b>17.4</b>	<b>16.9</b>	<b>83.8</b>

**Table 2. 2019/20 to 2023/24 Customer Initiated Works Capex – Alternate Control**

\$ million (2018/19)	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Relocations & Replacement	2.8	2.8	2.8	2.8	2.8	14.0
Embedded Generation Medium-Large	0.4	0.4	0.4	0.4	0.4	2.1
<b>Total capex</b>	<b>3.2</b>	<b>3.2</b>	<b>3.2</b>	<b>3.2</b>	<b>3.2</b>	<b>16.1</b>

# 1 Overview

In developing the forecast of Customer Initiated Works (CIW) capital expenditure (capex), Evoenergy takes account of:

- direct customer or developer enquiries;
- major public and private development initiatives identified through public/media announcements;
- future development activity identified through the ACT Government planning, preliminary assessment and agency liaison/consultation processes;
- future development activity identified through discussions with the ACT Government on land release programs;
- investigation and reconciliation with ACT Government land release programs and BIS Shrapnel economic forecasting data; and
- historic expenditure in the various customer initiated work categories, adjusted to reflect the anticipated broader short-term economic environment.

Figure 1 outlines total (actual and forecast) Standard Control CIW capex against AER approved expenditure for the 2014-19 regulatory period. Total CIW capex is \$90.6 million, which represents around 28% of total capex for the period. This expenditure reflects an increase of around \$5 million (or 6%) over the AER's allowance of \$85.4 million. Further detailed analysis of the variations from year to year for each CIW category are contained in section 4.

**Figure 1. 2014-19 AER vs Actual / Forecast Comparison – Standard Control (2018/19\$)**

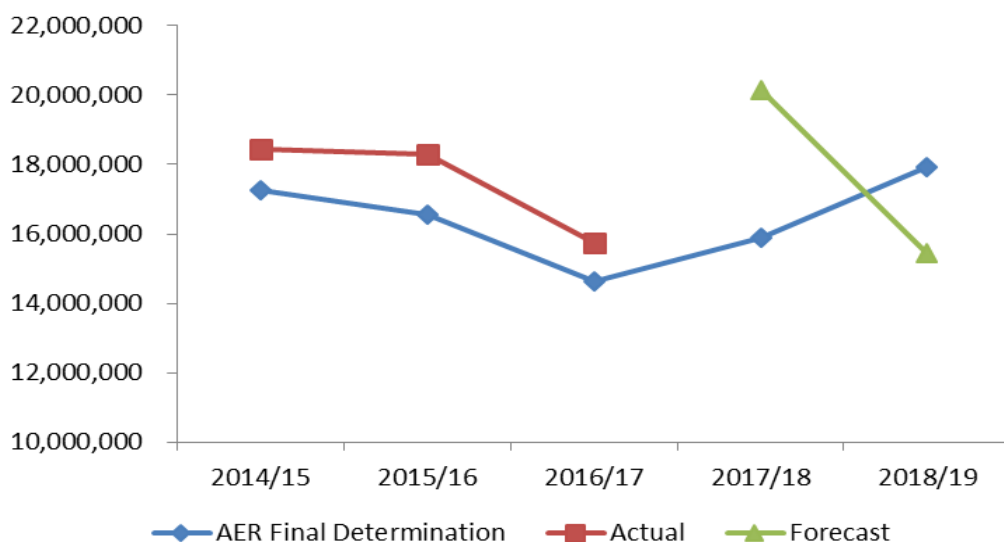
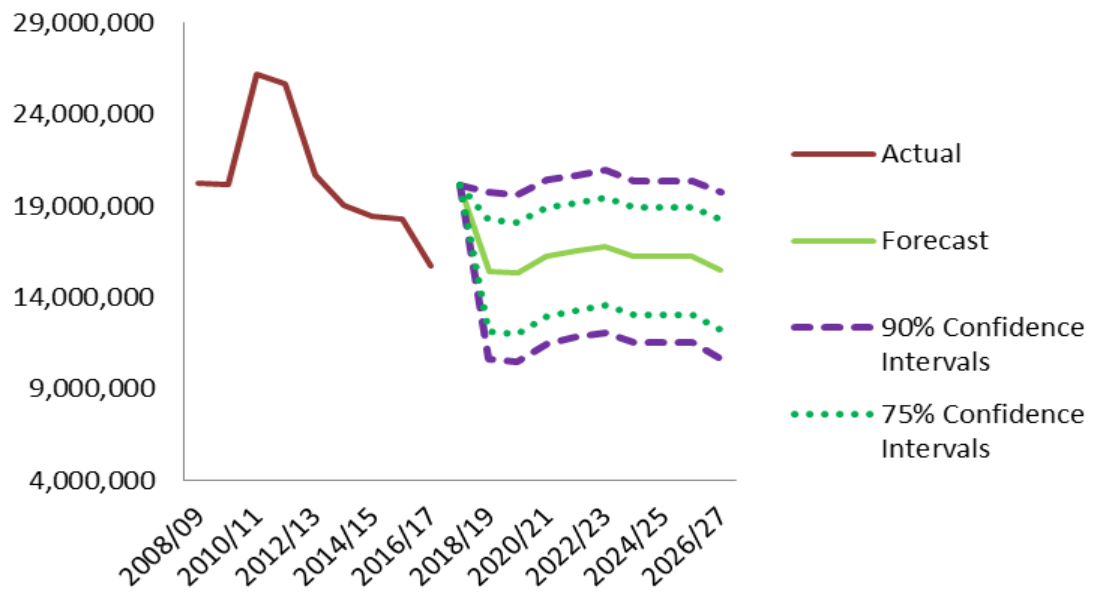


Figure 2 below compares the historical CIW costs and the ten-year forecast of CIW capex. CIW capex is expected to be lower in the 2019-24 regulatory period than in the period from 2008/09, and but remain relatively stable, averaging around \$16.8 million per year. This is in comparison to a forecast average of \$18.1 million for the 2014-19 regulatory period (and against an AER approved average allowance of \$17.1 million).

**Figure 2. 2019 - 24 Forecast – Standard Control (2018/19\$)**





## 1.1 Land releases

The CIW forecast for capex is largely dependent on land releases for development by residential, commercial and industrial customers and special purpose developments. It also provides for large spot loads that are known and considered—definite, likely or potential loads—depending on the timing of the developments.

Land released for development within the ACT is controlled by the ACT Government, which prepares and releases a four (4) year indicative land release program. The “Indicative Land Release Program 2016–17 to 2019–20<sup>1</sup>” sets out the government’s intended program for residential, commercial, industrial and community land releases. The land release program is indicative and subject to change as a result of variations in underlying market conditions, and/or government priorities.

Table 3 provides a comparison of the published land release programs over time. Publication of information on the land release program since 2014/15 indicates an increasing trend in the number of land releases. In June 2014, the average planned land releases for the next 4 years was 3,375. Two years later in June 2016, the average planned land releases for the next 4 year period increased by 32% to 4,445.

The latest information from the ACT Government (June 2017), provides for a decrease of about 9% per year since the June 2016 land release program. While it is true these land developments underpin the growth of the CIW capex program, significant uncertainties requires this to be supplemented with other forecasting methods. These methods are described in this report.

**Table 3. ACT Government published land release trend**

Published Date (ACT Gov)	14/15	15/16	16/17	17/18	18/19	19/20	20/21	4 Yr Avg
June 2014	3,600	3,300	3,300	3,300				13,500 3,375
June 2015		3,513	3,713	4,566	5,398			17,190 4,298
June 2016			4,550	4,430	4,700	4,100		17,780 4,445
June 2017				4,120	4,000	4,200	3,930	16,250 4,063

<sup>1</sup> <http://www.economicdevelopment.act.gov.au/buy-land-and-build/land-release>

The objectives of the land release programs<sup>2</sup> include:

- Enable urban renewal and activate key gateways to the city and its commercial centres;
- Facilitate housing diversity and the provision of affordable housing choices;
- Meet the demand for land in the Territory to stimulate economic activity in the residential, commercial/ mixed use, industrial and community sectors;
- Establish an appropriate inventory of serviced land;
- Support the operation of a competitive land development and construction market; and
- Achieve satisfactory returns from the sale of unleased Territory land.

## **1.2 Known and probable customer initiated projects**

Evoenergy maintains a database of known and probable new customer initiated projects, with estimates of the electrical loading for each project. This is updated as part of the annual planning process and then each quarter in each financial year.

Evoenergy becomes aware of customer initiated projects within about a 12 – 18 month timeframe before supply is required (typically shorter for loads < 100kVA). Consequently the forward five year forecast is a hybrid of “known and probable” projects combined with trend analysis. Refer to section 2.1 for further details.

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<sup>2</sup> <http://www.economicdevelopment.act.gov.au/buy-land-and-build/land-release>

## 2 Forecast

### 2.1 Methodology

Where statistically relevant, a “confidence level” has been applied to forecasts. A confidence interval is a range of values that describes the uncertainty surrounding an estimate. It represents how sampling, interviewing, measuring, and modelling contributes to uncertainty about the relation between the true quantity and the model estimate. For example, the 90% confidence interval for the forecast direct expenditure of commercial & industrial (C&I) category in 2018/19 is "\$4.7m to \$7.2m", which can be interpreted that we are 90% confident that the future C&I expenditure is between \$4.7m and \$7.2m.

The averaging period used for forecasting expenditure in certain categories of CIW has been selected to reflect historical trends.

### 2.2 Standard Control

#### Commercial and Industrial Developments

The forecast has been derived based on BIS Shrapnel 30 Years Forecast: Table 5.12 ACT in Chapter 5 - Outlook for Non-Residential Building;

#### Community and Associated Developments

There is no clear market indicator by which to forecast future activity levels. Historically, expenditure has been decreasing from approximately \$5 million in FY09/10 to approximately \$450,000 in FY12/13. From 2014/15 there have been no projects categorised as CIW Community and Associated Developments.

#### Rural Developments

There is no clear market indicator by which to forecast future activity levels. Expenditure forecast is of a provisional nature based on past averages.

#### Services

From 2014/15 the number of New Services has stabilised at around \$1.2 million per annum. This directly followed a period when the ACT Government released significant quantities of land for development in response to excess demand.

As stated, the level of new urban developments is expected to steadily decline to 26% by 2018/19, from the long term average. Evoenergy would expect to see a similar decline in new services in the 2019-24 regulatory period.

### **Special Customer Requests**

There is no clear market indicator by which to forecast future activity levels. Expenditure forecast tends to be of a provisional nature based on historic average expenditure.

### **Urban Infill**

The forecast and Confidence Intervals for the Urban Infill trends are based on BIS Shrapnel's Building and Construction Industry for "Medium Density Approved" and "High Density Approved" indicators.

### **New Urban Development**

The forecast has been derived based on BIS Shrapnel's Data - Dwelling Approvals Quarterly Forecasts from Building in Australia Update – Dec 2016. The LDA Land Release information is used as a 'top down' comparison, but historically has not been a reliable source to use as the basis of a forecast.

## **2.3 Alternate Control**

### **Meters**

As part of the Power of Choice regulatory reforms implemented from 1 Dec 2017, the CIW category of New Meters is no longer be the responsibility of the electricity distributor. From 1 Dec 2017 the forecast has been set to \$0.

### **Relocations & Replacement**

There is no clear market indicator by which to forecast future activity levels. Expenditure forecast tends to be of a provisional nature based on historic average expenditure.

### **Embedded Generation Medium-Large**

There is no clear market indicator by which to forecast future activity levels. Expenditure forecast tends to be of a provisional nature based on historic average expenditure.

## 2.4 Challenges

The uptake of solar PV roof-top installations present the following challenges:

- Installations as a component of the building construction provides some level of uncertainty in forecasting the actual metered electricity consumption due to the variables in the actual PV generation (although the Average Daily Output figures available from the Clean Energy Council<sup>3</sup>, has removed some of the uncertainty)
- Installations post building construction that have not had an allowance made during the customer contribution calculation for the provision of an electricity supply to the building; i.e. the actual revenue received by Evoenergy will likely be less than what was allowed for, resulting in Evoenergy cross-subsiding this component of the connection

Land developers are starting to explore the concept of “micro-grids”, which may limit the required new service to an estate to a high voltage connection. Whilst micro-grids are yet to be applied in practice in the ACT, the emergence of micro-grids are expected lead to a significant reduction in the new Urban Development portfolio expenditure.

The ACT government has not indicated whether it will continue with future renewable energy auctions. If this position changes, expenditure on the Embedded Generation portfolio is expected to significantly increase compared to forecast expenditure. Although the expenditure is expected to be 100% recoverable.

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<sup>3</sup> <https://www.solarchoice.net.au/blog/how-much-energy-will-my-solar-cells-produce/comment-page-1/>

### 3 Historical and 10 Year Forecast Comparison

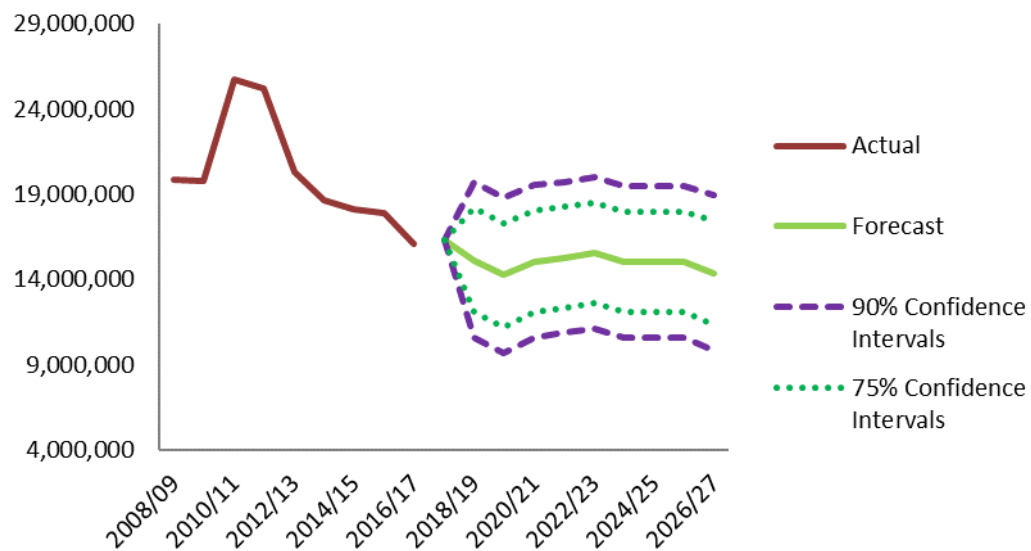
The following figures provide a graphical comparison of each CIW category for historical values from 2008/09 to 2016/17 and forecast values 2017/18 to 2026/27. For the forecast values a confidence interval has been provided. This confidence interval is based on a range of values that describes the uncertainty surrounding an estimate. It is constructed by modelling the contribution of sampling, interviewing, and measuring to the uncertainty of the relationship between the true quantity and Evoenergy's estimate of that value.

For example, the 90% confidence interval for the forecast direct expenditure of commercial & industrial (C&I) category in 2018/19 is "\$4.7m to \$7.2m", which can be interpreted that we are 90% confident that the future C&I expenditure is between \$4.7m and \$7.2m.

### 3.1 Graphs and Commentary

#### Standard Control

**Figure 3.** Total CIW capex – Standard control

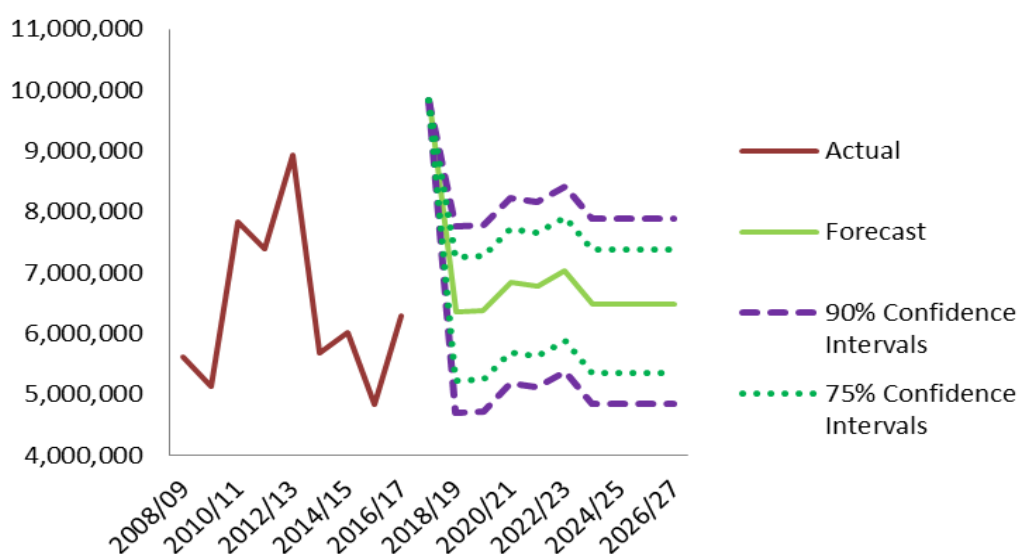


The forecast and confidence levels to 2026/27 indicates a reduction in the longer term average from around \$20 million to an average of around \$16 million per annum.

The key areas that are driving the reduction in CIW capex include:

- High commercial vacancy rates to continue
- No Community and Associated Developments and minimal Rural Development forecast (based on historic trends)
- Expenditure forecast for Urban Infill and New Urban Development expected to normalise to historic averages

**Figure 4. Commercial industrial expenditure**



Commercial and Industrial (C&I) projects involve the network connection (and associated network extension works) required for new commercial development, industrial development, or redevelopments within established areas that already have reticulated/services (i.e., the HV and/or LV).

C&I activity levels largely correlate with the activity levels in the construction industry due to newly constructed buildings typically requiring some form of network augmentation to provide new customer connection services.

Annual actual expenditure on total C&I developments range between \$5 million and \$9 million from 2008/09 to 2016/17. The forecast peak of \$9 million in the Social Institutional building sector in 2017/18 is largely contributed by the \$350 million University of Canberra Public Hospital project. There are no other known projects planned to commence over the forecast horizon. The forecast and confidence levels to 2026/27 indicates a return to the longer term average of between \$6 million and \$7 million per annum.

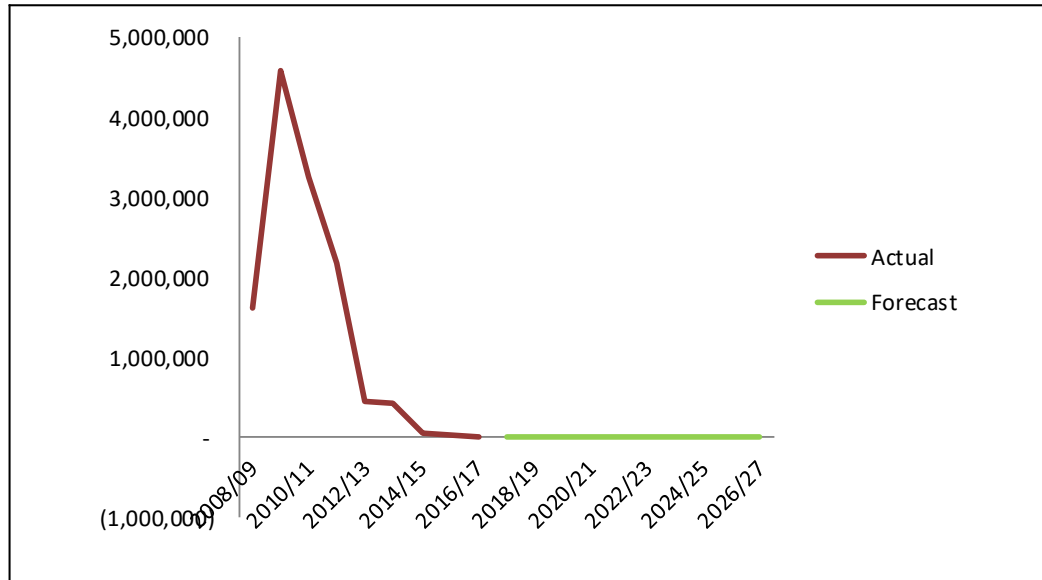
Evoenergy anticipates the current high commercial vacancy rate will continue ([currently at a steady 11.8%](http://www.theaustralian.com.au/business/property/rent-rises-on-horizons-as-office-vacancy-rates-hits-four-year-low/news-story/53862e5e18587d6f17c532ec948e2d59))<sup>4</sup>, resulting in a decrease in demand for new C&I projects

The forecast for commercial and industrial load trend has been derived based on BIS Shrapnel's 30 Years Forecast: Table 5.12 ACT in Chapter 5 - Outlook for Non-Residential Building.

<sup>4</sup> <http://www.theaustralian.com.au/business/property/rent-rises-on-horizons-as-office-vacancy-rates-hits-four-year-low/news-story/53862e5e18587d6f17c532ec948e2d59>



**Figure 5. Community and associated developments**

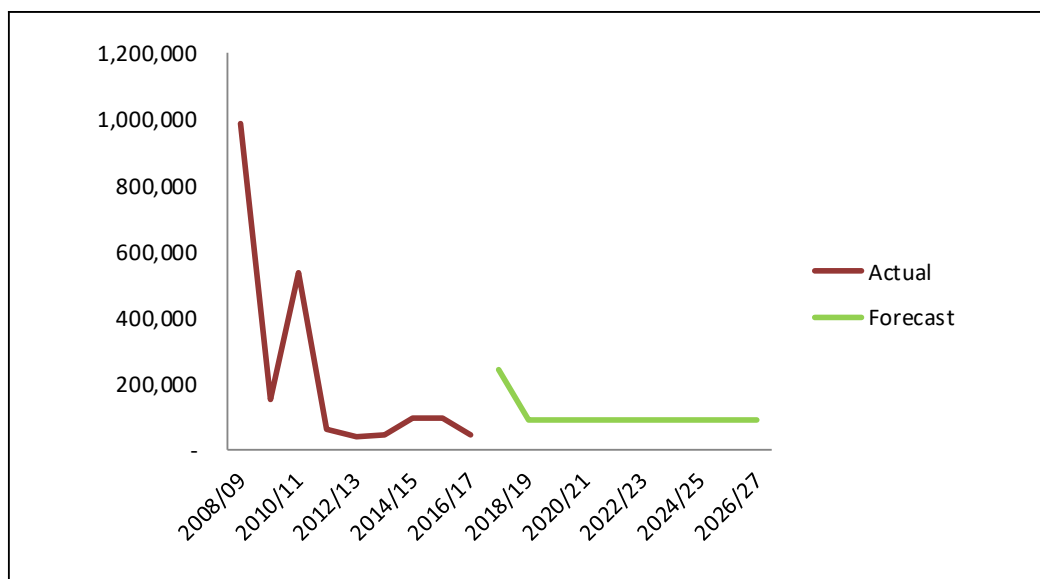


Typical community based development projects require augmentation or expansion of the electricity network, including for :

- Churches
- Schools and kindergartens
- Child care facilities
- Hospitals
- Public ovals, parks and sporting grounds and associated amenity buildings

There is no clear market indicator by which to forecast future community and associated development activity levels. Historically, expenditure decreased from approximately \$5 million in FY09/10 to approximately \$450,000 in FY12/13. From 2014/15 there have been no projects categorised as CIW Community and Associated Developments.

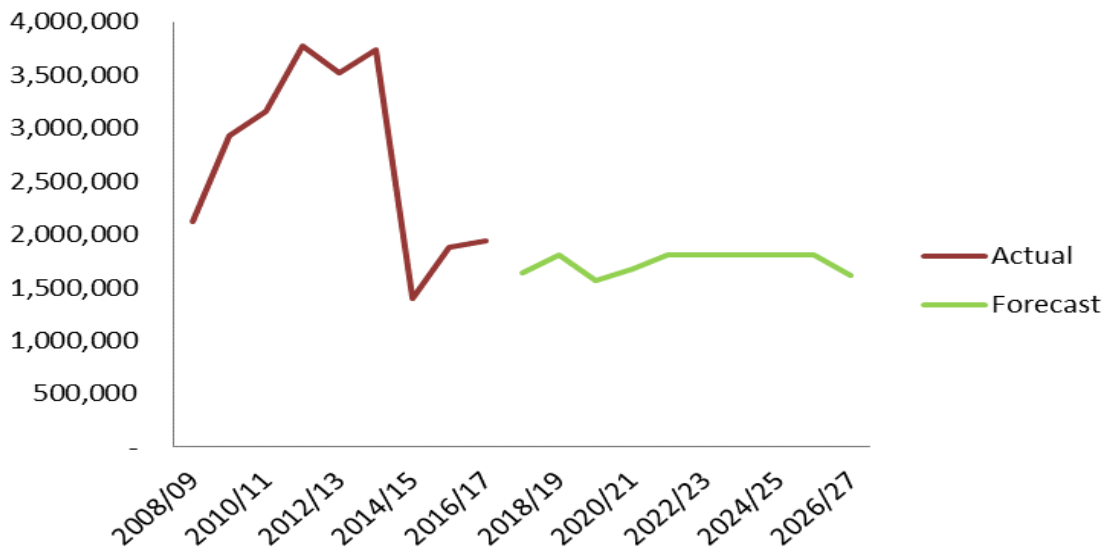
**Figure 6. Rural developments**



Rural development projects involve establishment of the electricity network reticulation infrastructure for rural land not previously reticulated/served or individual rural customers/loads and is applicable to residential, agricultural and commercial/industrial customers.

There is no clear market indicator by which to forecast future Rural Development activity levels. As such, expenditure forecast tends to be of a provisional nature. A provisional forecast of \$90k per annum has been included to 2026/27. This forecast level of \$90k per annum represents the average annual expenditure from 2012/13 to 2016/17.

**Figure 7. New Services**



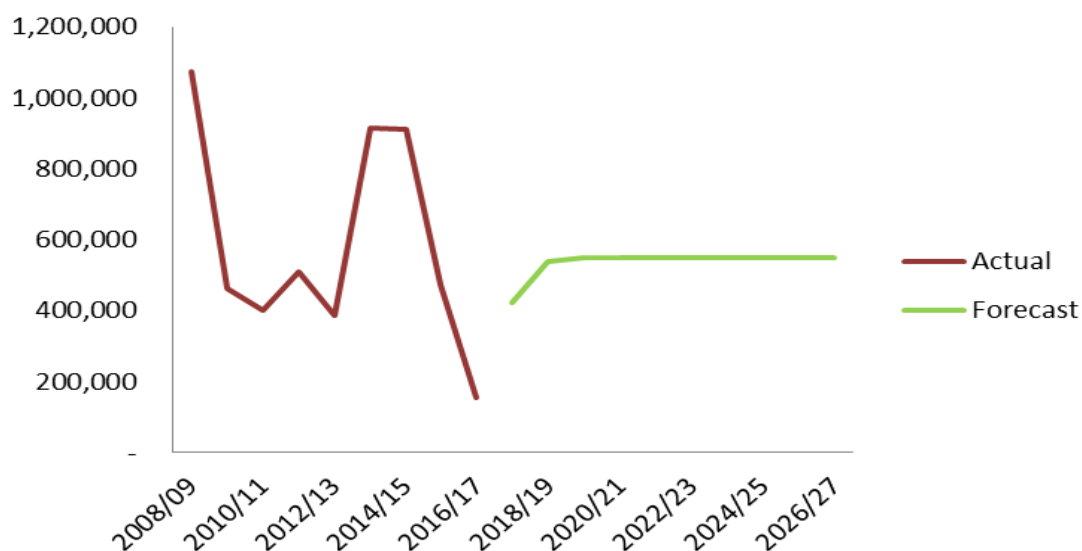
The New Services category of expenditure covers supply and installation of overhead or underground services for new domestic residential installations where the load is less than or equal to 100 Amps and the service can be connected of the existing LV mains reticulation without modification to the LV mains.

All new services in urban areas in the Evoenergy supply area are underground connection/services, whilst those in rural areas are overhead services.

Since 2014/15 the cost of connections for New Services has stabilised at around \$1.2 million per annum. This directly followed a period when the ACT had released major quantities of land to cope with a shortfall in land available.

As stated along with Figure 8, the level of new urban developments is expected to steadily decline to 26% of the long term average by 2018/19. Evoenergy would expect to see a similar decline in new services in the new regulatory period.

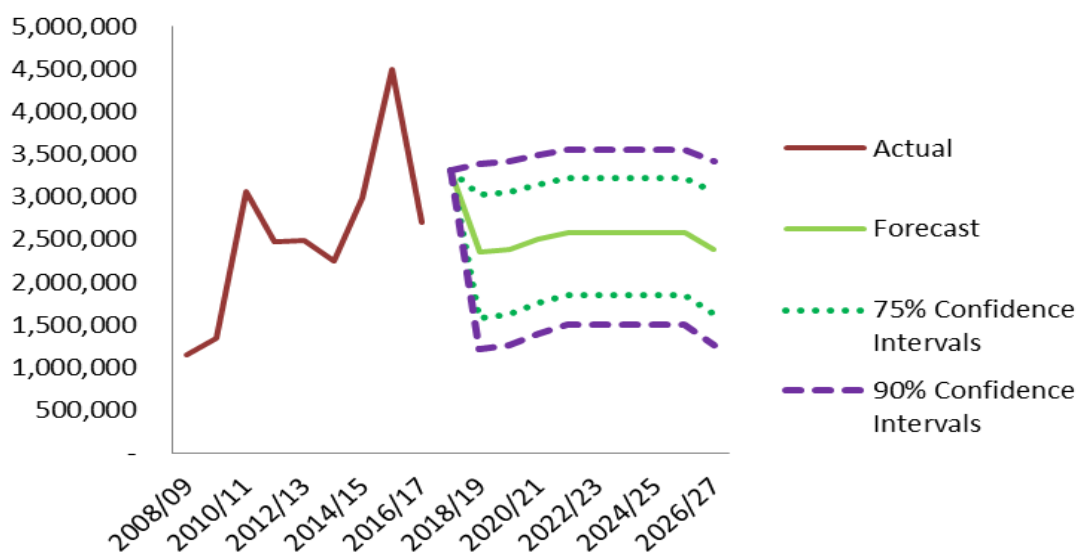
**Figure 8. Special customer requests**



Special customer request works undertaken by Evoenergy involve small to moderate expenditures and are typically identified through direct approaches from developers, government departments, telecommunication providers and members of the public.

There is no clear market indicator by which to forecast future Special Customer Requests activity levels. As such, expenditure forecast tends to be of a provisional nature. The level of special customer requests peaked in 2008/09, and again in 2013/14 (though at a lower level). The overall trend has been in decline since 2008/09. The forecast level of \$548k represents the average annual expenditure over the period 2009/10 to 2016/17.

**Figure 9. Urban infill**



Urban infill has been defined as the use of land within a built-up area for further construction, especially as part of a community redevelopment or growth management program or as part of smart growth. It focuses on the reuse and repositioning of obsolete or underutilized buildings and sites. Redevelopment or land recycling is development that occurs on previously developed land. Infill buildings are constructed on vacant or underutilized property or between existing buildings.

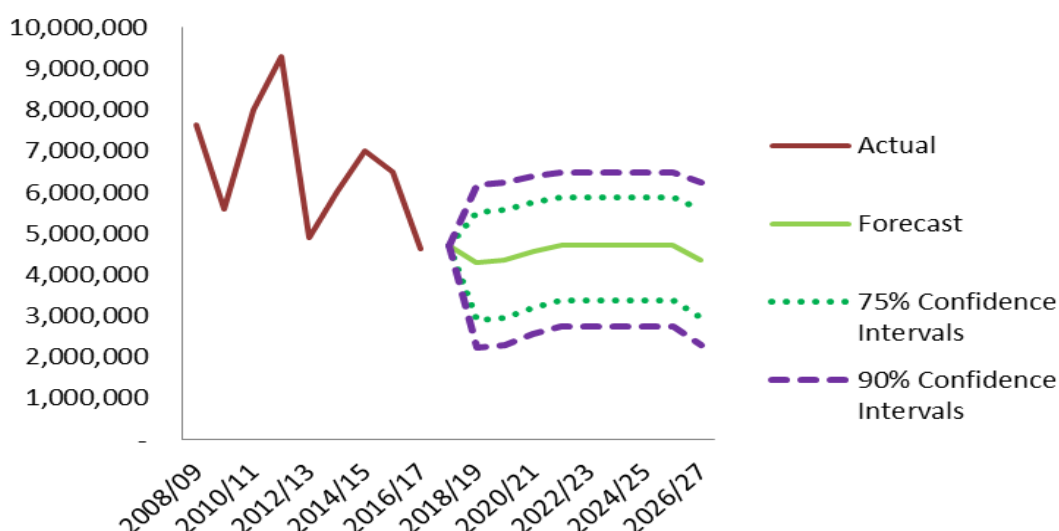
Urban infill projects involve the network connection and directly associated network extension works (headworks) required for new multi-unit residential developments or redevelopments within established areas that have already been reticulated/serviced through the New Urban Development program (ie, the HV and/or LV).

Urban Infill activity levels largely correlate with the activity levels in the construction industry because newly constructed buildings will typically require some form of network augmentation to better cater to the new load demand.

A provisional forecast of between \$2.4 million and \$2.6 million has been derived from the average expenditure in this category from 2008/09 to 2016/17. Confidence Intervals have also been provided to reflect the available published forecast data.

The forecast and Confidence Intervals for the Urban Infill trends are based on BIS Shrapnel's Building and Construction Industry for "Medium Density Approved" and "High Density Approved" indicators.

**Figure 10. New urban development expenditure**



New urban development projects involve establishment of the initial electricity network reticulation infrastructure for land within urban areas not previously reticulated/serviced. It is applicable to both residential and commercial/industrial estates. Residential estates typically involve more installed infrastructure than commercial/industrial, due to the higher certainty of proposed loads

Considerable effort has been made to ensure that all major development initiatives currently being considered have been identified. However, uncertainty in land release plans provides an inability to forecast with a great degree of confidence. Detailed CIW capex investment in this category beyond the first one or two years of the 2019–25 regulatory period are speculative only.

New urban development activity levels largely correlate with the activity levels in the construction industry because newly constructed buildings typically will require some form of network augmentation to better cater to the new load demand.

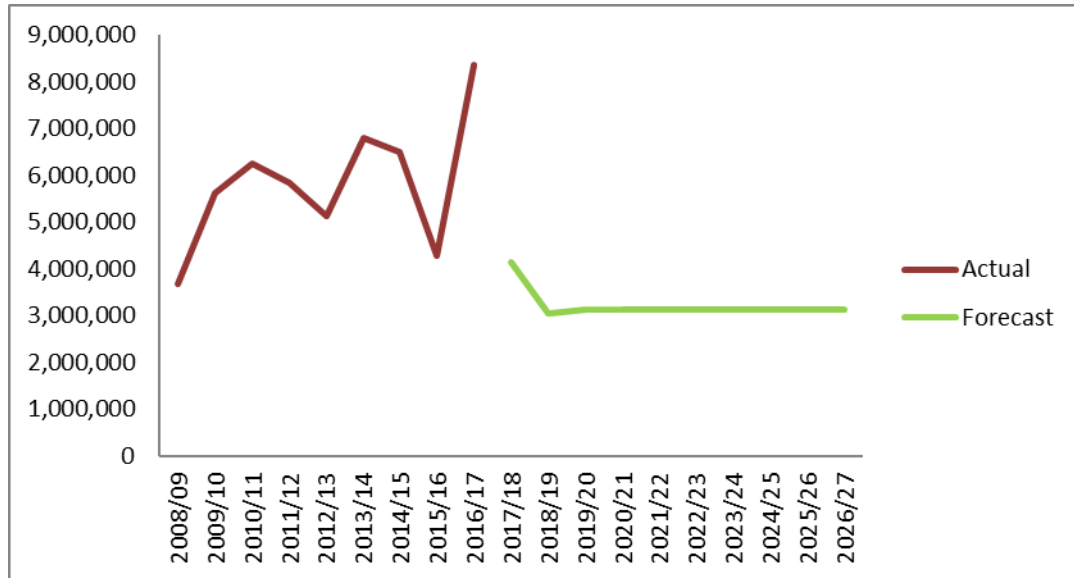
NUD expenditure has been subsiding since 14/15 with a slow-down in the LDA land release program, and better efficiencies within Evoenergy. The BIS Shrapnel report supports this, with the slow-down arrested in 17/18 and an increase in the LDA land release program from 18/19. Refer Table 3 for details of the land release program.

During the 2019–24 regulatory period, expenditure on new urban developments is expected to decline to stable level at about \$4.5million per annum. This is a reduction of 26% from the long term average of \$6.2m

The forecast for new urban development trend have been derived based on BIS Shrapnel's Data - Dwelling Approvals Quarterly Forecasts from Building in Australia Update – Dec 2016, along with a 'top down' check based on the ACT Government Published Land Release.

## Alternate Control

**Figure 11.** Total CIW expenditure - alternate control

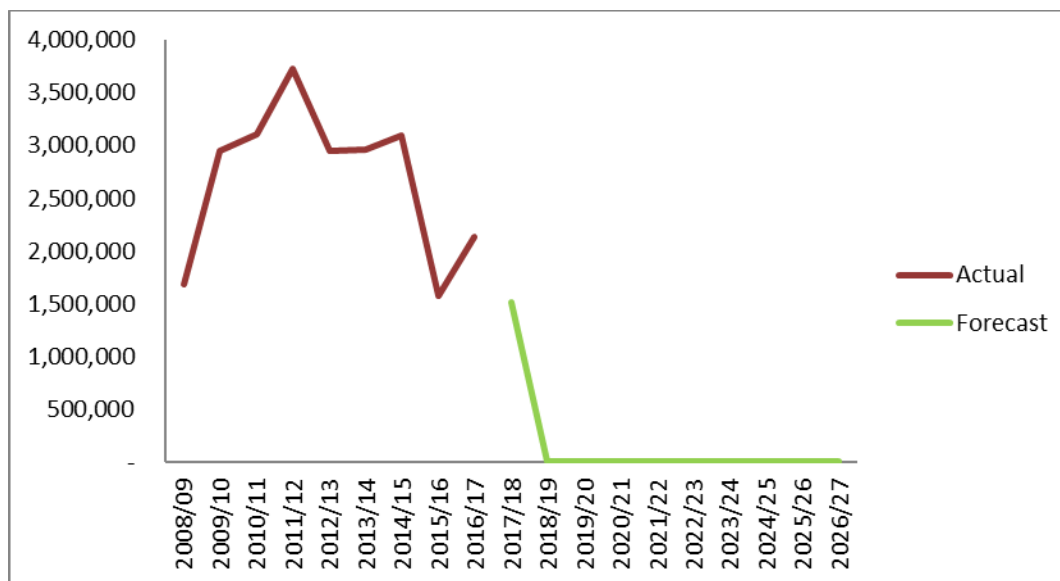


The forecast to 2026/27 indicates a reduction in the longer term average from around \$5.4 million to an average of around \$3.2 million per annum.

The significant contributors to this reduction includes:

- Delivery of 3 Major Embedded Generation projects not expected to continue into the forecast period:
  - Mugga Lane Solar Farm
  - Williamsdale Solar Farm
  - Royalla Solar Farm
- Major relocation activities not expected to continue into the forecast period.
  - Capital Metro Light Rail
  - ANU bulk supply point
- Removal of the New Meter Services from Dec 2017 as the Power of Choice industry reforms transfers the responsibility of metering to the electricity retailers. Additionally due to the revised ring-fencing guidelines, Evoenergy is unable to compete in this space.

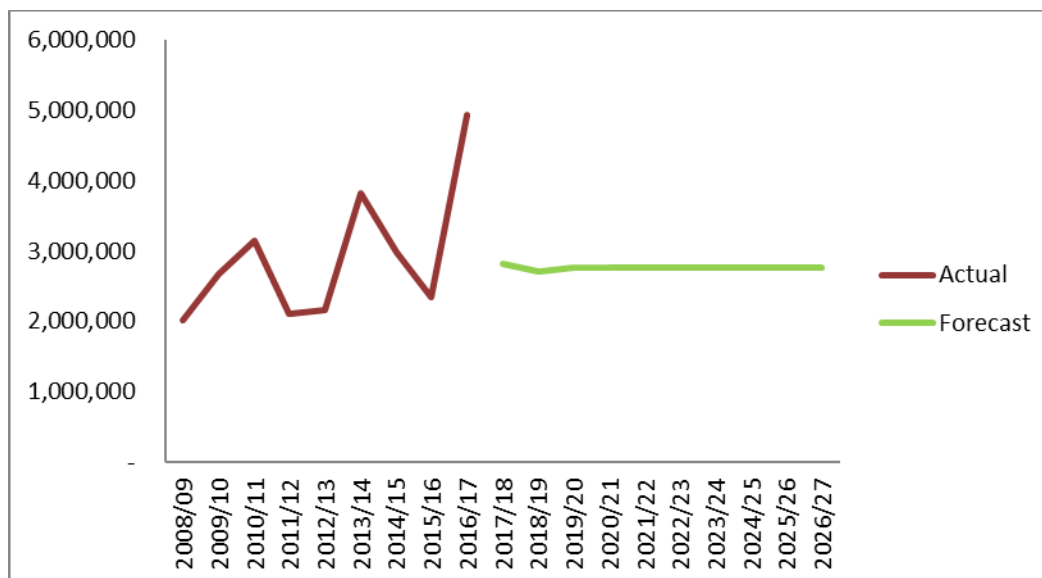
**Figure 12. New meters**



The Power of Choice regulatory reforms were implemented from 1 Dec 2017. As part of these reforms the CIW category of New Meters is no longer the responsibility of the electricity distributor. From 1 Dec 2017 the forecast has been set to \$0



**Figure 13. Relocations and replacements expenditure**



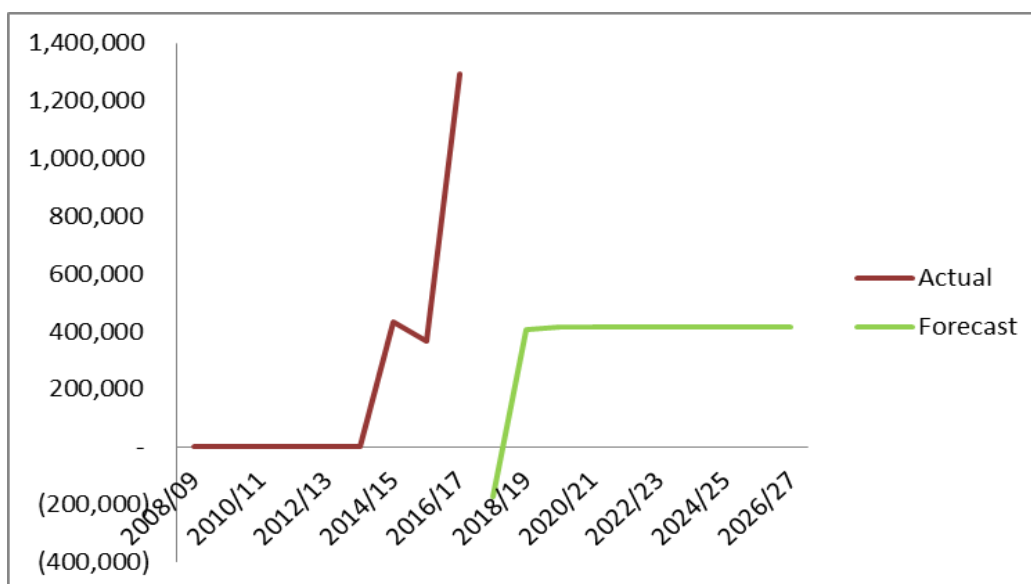
This category of capex relates to projects where the customer requested the relocation of existing electricity network infrastructure where the “relocation” is achieved through removal of the existing infrastructure and installation of new replacement infrastructure to achieve a generally equivalent network arrangement.

The forecast to 2026/27 indicates a slight reduction to the longer term average of around \$2.9 million to an average of around \$2.8 million per annum. There is no clear market indicator by which to forecast future relocations activity levels. As such, expenditure forecast tends to be of provisional nature.

The primary contributor to the increase in 2016/17 is the asset relocation costs for Canberra Light Rail project. These are not expected to continue into the forecast period. A stage 2 is currently being planned for the Canberra Light Rail project – this has not been included in the forecast due to it currently being in the concept planning stages with the ACT government.

The customer initiated asset replacement classification was established to allow separation of asset replacement works initiated by a customer from asset replacement plans developed by Evoenergy. There have been no projects delivered under the Replacements expenditure category, and no planned Replacement expenditure in the forecast period. There is no capex allowance included for the Replacement expenditure category.

**Figure 14. Embedded generation expenditure**



The forecast to 2026/27 indicates a reduction from the peak in 2016/17 of \$1.3m to the average of \$415,000. There is no clear market indicator by which to forecast future expenditure activity levels. As such, expenditure forecast tends to be of provisional nature.

The peak expenditure in 2015/16 and in 2016/17 occurred as a result of the network connection works associated with 3 large solar farms:

- Mugga Lane Solar Farm
- Williamsdale Solar Farm
- Royalla Solar Farm

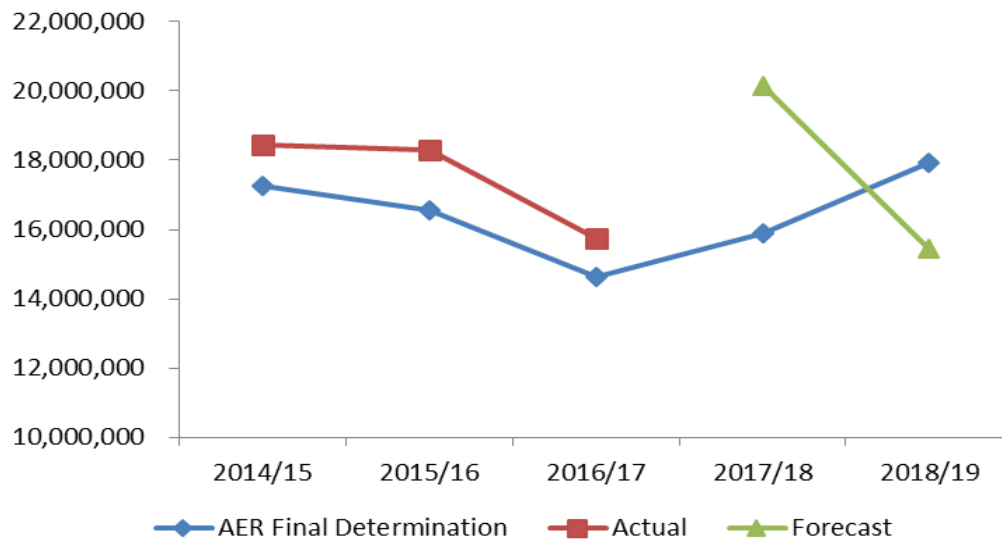
The ACT government currently has no solar auctions planned in the coming regulatory period albeit they plan to achieve 100% renewables by 2020. We have assumed there will be no large solar farms requiring connection to the Evoenergy network from 2018/19.

The negative value in 2017/18 is due to a return of materials which generated a credit.

## 4 Standard Control Expenditure Analysis 2014/15 to 2018/19<sup>5</sup>

### 4.1 Graphs and Commentary

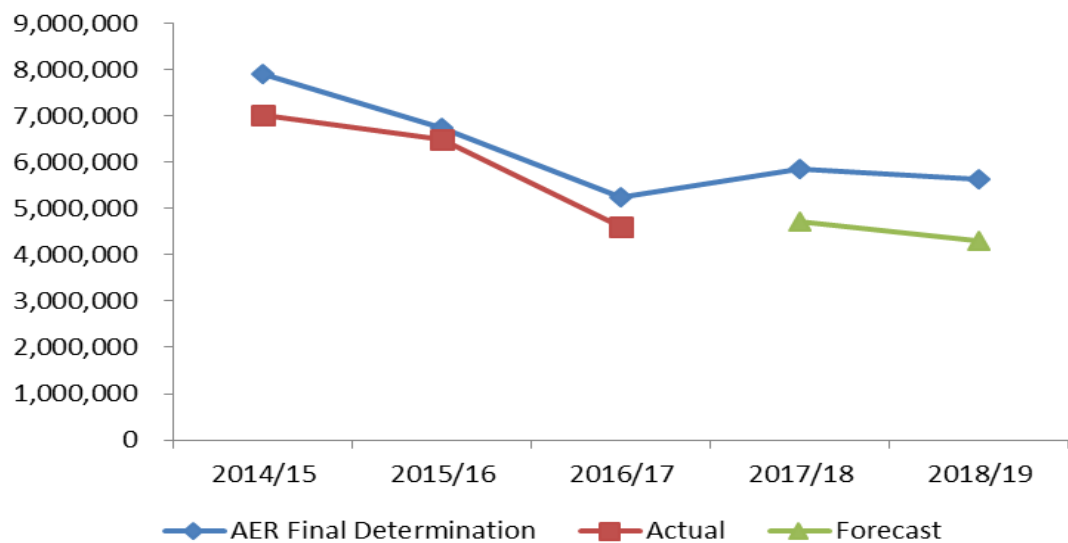
**Figure 15.** Total CIW standard control historical expenditure analysis



The Standard Control categories actual expenditure is forecast to be an annual average of ~\$18.1 million over the current regulatory period, which is about 6% higher than the average AER Final Determination allowance of about \$17.1 million. Refer the following charts and associated commentaries for information around the comparison of actual expenditure to the AER's Final Determination.

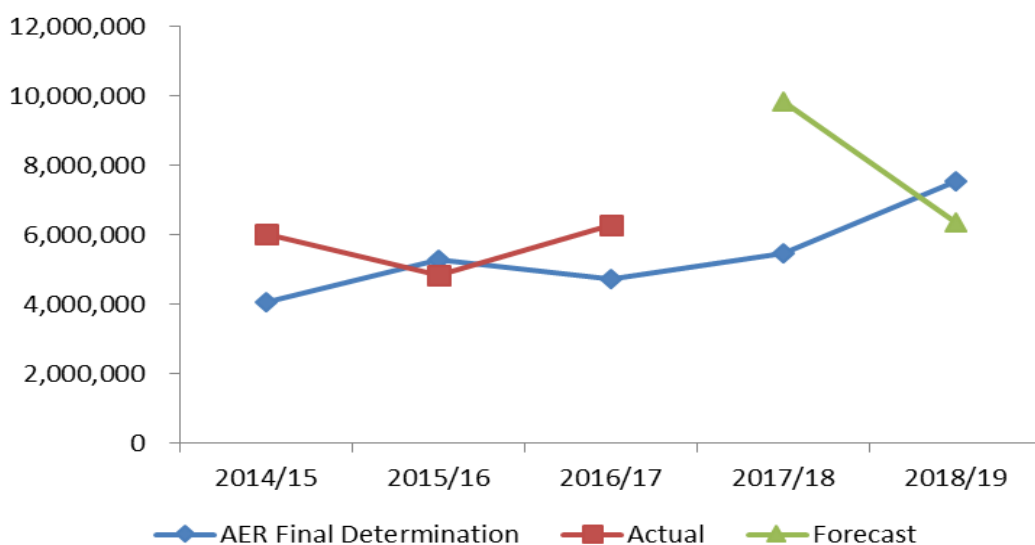
<sup>5</sup> Embedded Generation Expenditure, Relocations and Replacements, New Meters are not represented in this section because these are not "Standard Control"

**Figure 16.** New urban development standard control historical expenditure analysis



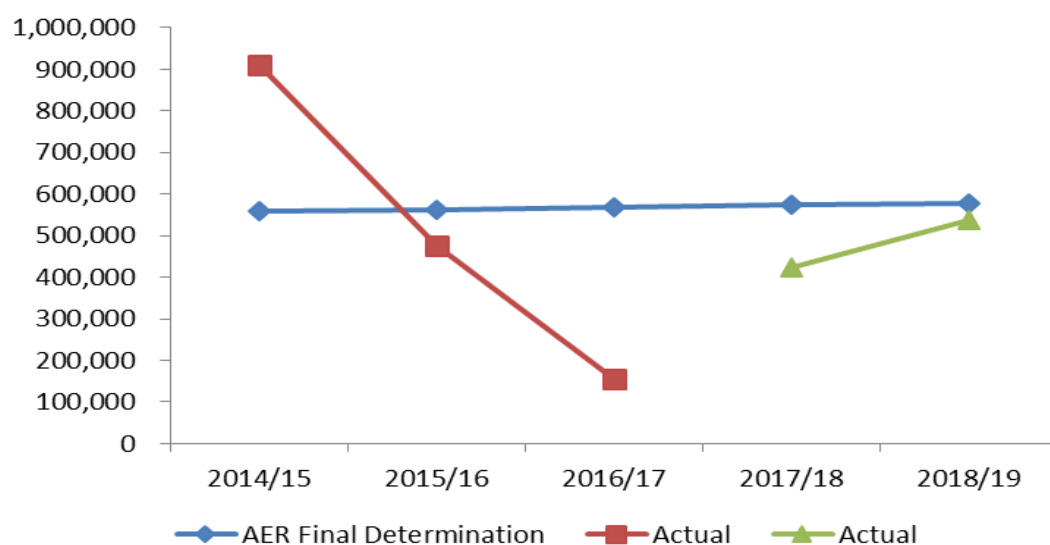
The first 3 years of the current regulatory period generally matched the AER Final Determination before a drop of about \$2 million. This reduction is largely driven by a reduction in land the LDA is developing, a significant drop in the number of private land developers active in the ACT, and efficiency gains in the delivery of the NUD by Evoenergy.

**Figure 17. Commercial industrial historical expenditure analysis**



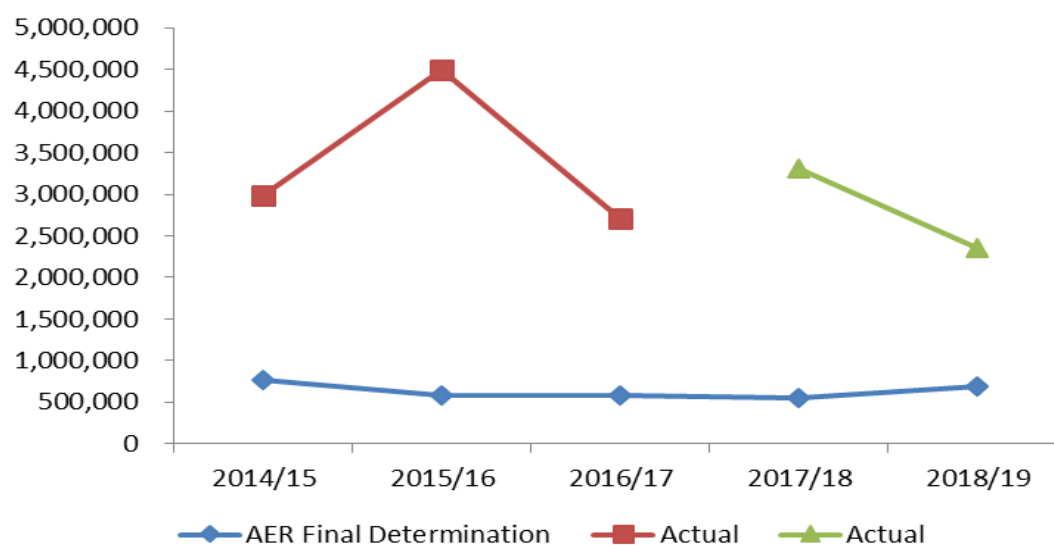
The average AER Final Determination expenditure over the current regulatory period is \$5.4 million. Evoenergy is forecasting an actual average expenditure of \$6.7 million for the same period. This increase in expenditure of around 24% is largely due to the current increase in commercial and industrial developments within the ACT, however with the sustained high commercial vacancy rate, this is predicted to decrease, somewhat softening the total overspend.

**Figure 18.** Special customer requests historical expenditure analysis



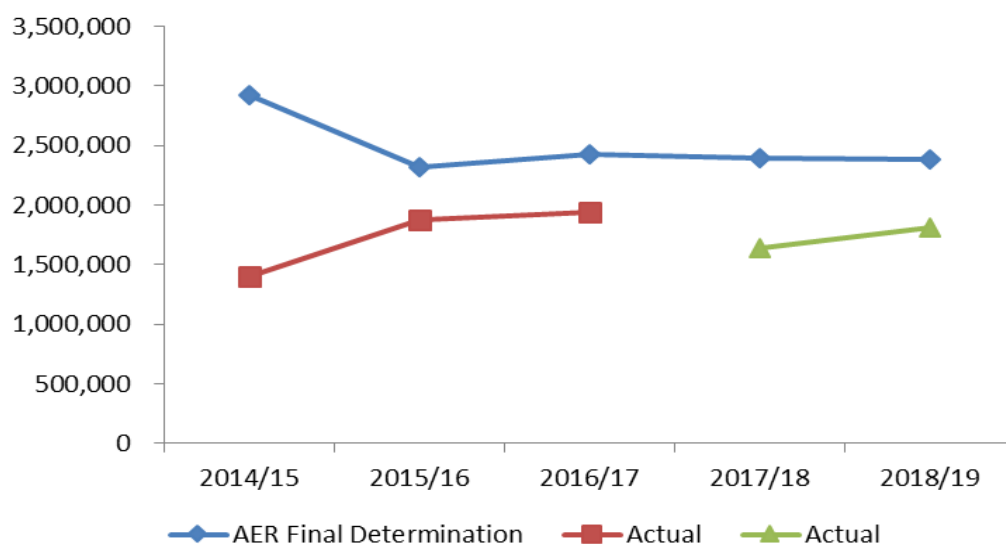
The average AER Final Determination expenditure over the current regulatory period is \$570,000. Evoenergy is forecasting an actual average expenditure of \$500,000. This 12% downward variation is typical for this category due to the unknown and variable nature of projects that will be delivered.

**Figure 19. Urban infill historical expenditure analysis**



The average AER Final Determination expenditure over the current regulatory period is \$634,000. Evoenergy is forecasting an actual average expenditure of \$3.2 million for the same period. This increase in expenditure of around 405% is largely due to the increase in multi-unit developments due to the reduced availability of single dwelling blocks. This is contributed to the multi-unit/single dwelling ratio increasing in new estates, and the lack of new estates resulting in brown-field development.

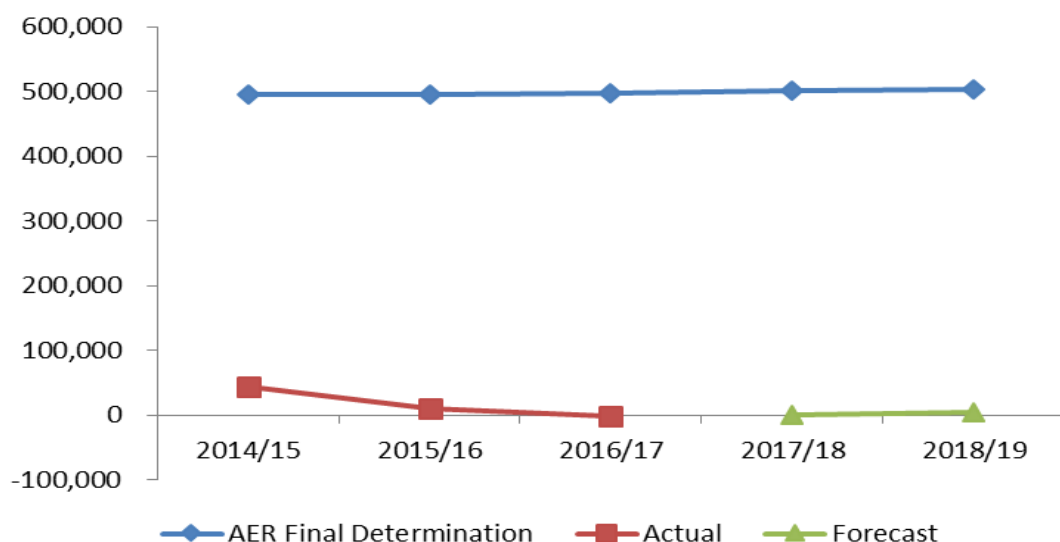
**Figure 20. New services historical expenditure analysis**



The average AER Final Determination expenditure over the current regulatory period is \$2.5 million. Evoenergy is forecasting an actual average expenditure of \$1.7 million for the same period. This decrease in expenditure of around 32% is largely due to the reduction in single dwelling blocks that will be available for development due to a reduction in the ACT government's land release program.

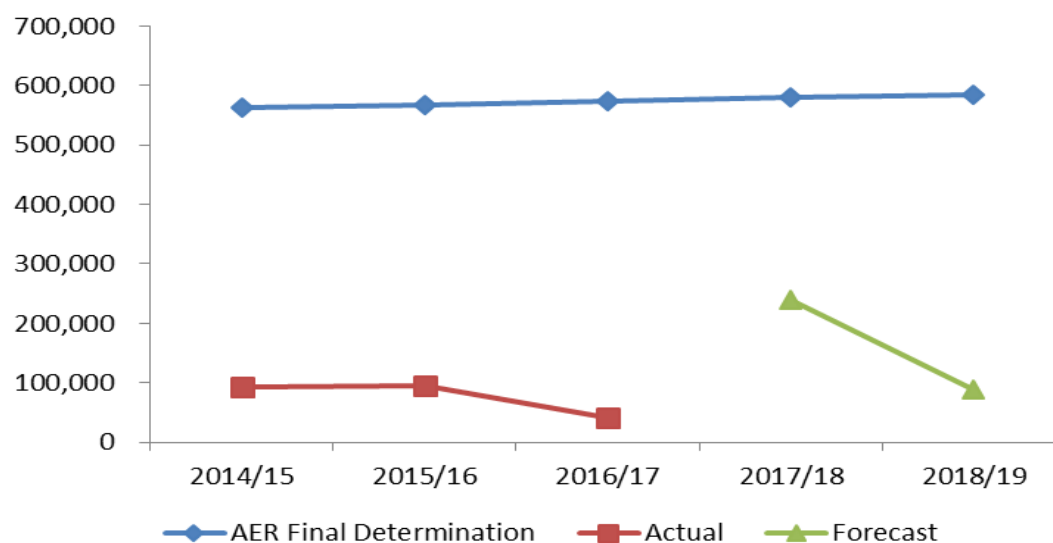


**Figure 21. Community and associated developments historical expenditure analysis**



The average AER Final Determination expenditure over the current regulatory period is \$500,000. Evoenergy is forecasting an actual average expenditure of \$12,000 for the same period. This decrease in expenditure of around 98% is largely due to better classification of Commercial and Industrial projects, in that historically projects that were technically C&I projects were incorrectly classified as Community and Associated Developments.

**Figure 22. Rural developments historical expenditure analysis**



The average AER Final Determination expenditure over the current regulatory period is \$574,000. Evoenergy is forecasting an actual average expenditure of \$112,000 for the same period. This decrease in expenditure of around 80% is largely due to a significant reduction in rural developments within the ACT, largely due to the urban sprawl removing property suitable for rural development.

## Appendix A – Short and Long Term Forecast Methodology

**Table 1. Short term forecast methodology 2016/17 and 2017/18 – Standard Control**

<i>Expenditure Type</i>	<i>Methodology</i>
Commercial and Industrial	The time frames given by customers have been considered and only projects which will be completed in 2017-2018 have been included. The projects fall into one of these statuses: 'PNA in progress', 'PNA complete', 'Application in progress'. At PNA stage, Evoenergy Assessed Max Demand (KVA) is known but estimates are not available. To obtain estimates, \$/KVA has been used. \$/KVA has been calculated by using the Evoenergy assessed max demand and CWA estimates of previous projects where both these parameters were available. The \$/KVA has been calculated as \$321.43. A probability of 0.4 has been used for PNAs in progress & complete, 0.8 for applications in progress. (Probability from individual project engineers is used in special cases)
Community and Associated Developments	NA
Rural Developments	A historical average from 2011/12 to 2016/17 has been applied.
New Services	<ol style="list-style-type: none"> <li>1. Total number of Greenfield services has been calculated by taking the average of dwellings from FY17 and FY18 (probabilities for services' installation have been considered for individual greenfield estates).</li> <li>2. Total number of brownfield services has been calculated by considering an average of the previous years' brownfield services.</li> <li>3. Total number of "New Services" is the sum of greenfield and brownfield services. The total number of services has been multiplied by \$ per service to get an estimate for FY 2017-2018.</li> <li>4. Service data and costs are derived from actual information</li> </ol>
Special Customer Requests	Projects currently in progress will finish in FY17. There are no known future projects. Historical trends have been used. A notional 5% decrease has been applied for Customer Requests for FY18 in recognition of the 'unknown' nature of this category.

<i>Expenditure Type</i>	<i>Methodology</i>
Urban Infill	Refer comments for “Commercial and Industrial”
New Urban Development	<p>The time frames given by customers have been considered:</p> <ol style="list-style-type: none"> <li>1. projects planned for completion in FY17 have been included.</li> <li>2. projects which have commenced include expenditure for FY17 and FY18.</li> </ol> <p>projects where an approved estimate is not available use the \$/block rate (\$6,000) multiplied by the number of blocks and the probability of the projects' likelihood.</p>

**Table 2. Short term forecast methodology 2016/17 and 2017/18 – Alternate Control**

<i>Expenditure Types</i>	<i>Methodology</i>
New Meters	Historical trends along with a 2.3% increase in the meter cost have been used. Only 5 months of FY18 has been forecast as the Power of Choice introduces contestability from 1 Dec 2017.
Relocations and Replacements	<p>Relocations: Historical trends as well as potential projects have been considered here as most of the projects will finish in 2016-2017.</p> <p>Replacements: \$0 expenditure in this category</p>
Embedded Generation	All projects planned for completion FY18 have been considered. Their indicative estimates based on similar completed projects have been included. The estimates have been multiplied by a probability of the projects' likelihood.

**Table 3. Long term forecast methodology 2018/19 onwards – Standard Control**

<i>Expenditure Types</i>	<i>Methodology</i>
Commercial and Industrial	<p>Time series Regression Analysis: <i>Finding strong and acceptable correlation between Yearly C&amp;I Expenditure and Value of Non-Residential Building Commenced by Sector in ACT for the same year.</i></p> <p>1) Model selection by R package "glmulti" - generate all possible models and then rank them by AICc choose model with lowest AICc plus other measures such as sign of coefficient and reasonableness of independent variable.</p> <p>2) Combine with selected model and Non-Residential Building predictions from BIS Shrapnel to generate long term forecasts via R package "forecast".</p>
Community and Associated Developments	Historical average from 2014/15 to 2015/16
Rural Developments	Historical average from 2011/12 to 2017/18
New Services	<p>Forecast Formula:  <u><i>Yearly Forecast Expenditure = Predicted Yearly Total Detached Houses × \$ per service</i></u></p> <p>1) Predicted Yearly Total Detached Houses is sourced from BIS Shrapnel Forecast;</p> <p>2) \$ per service estimate is consistent with <i>Short Term Forecast</i></p>
Special Customer Requests	Historical average from 2009/10 to 2016/17
Urban Infill	See New Urban Development
New Urban Development	<p><i>Time series Regression Analysis: Finding strong and acceptable correlation between Yearly Residential Expenditure and Number of Dwellings Approved by Type in ACT for the same year</i> choose model with lowest AICc plus other measures such as sign of coefficient and reasonableness of independent variable</p> <p>2) Combine with selected model and Approved Dwellings predictions from BIS Shrapnel to generate long term forecasts via R package "forecast". See Residential Working for Details;</p> <p>3) Split Residential Expenditure Forecast from Step 2 into greenfield and brownfield by 65%/35% rate.</p>

**Table 4. Long term forecast methodology 2018/19 onwards – Alternate Control**

<i>Expenditure Types</i>	<i>Methodology</i>
New Meters	Due to its contestable nature from 1 Dec 2017, \$0 has been assigned to all future years.
Relocations and Replacements	Relocations: Historical average from 2008/09 to 2015/16 Replacements: No allowance has been included from 2019/20.
Embedded Generation	Historical average from 2014/15 to 2015/16