The **CIE**

DRAFT REPORT

United Energy customer number forecasts

Prepared for
United Energy

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THE CENTRE FOR INTERNATIONAL ECONOMICS
www.TheCIE.com.au

Customer number forecasts

The CIE has been requested to undertake customer number projections for United Energy. The projections are prepared at the network level for the following customer categories:

- residential
- non-residential
- low voltage
- high voltage
- unmetered
- other.

In any forecasting exercise there will be forecast errors and these forecasts are subject to some uncertainty. Forecast errors arise because:[1]

- of errors in the data used to build the historical model
- of errors in the model used
- the relationship between a driver of demand and demand may change over time
- of errors in forecasts of drivers (such as population growth).

This report sets out the methodology used to estimate each of these customer categories and summarises the forecast results.

Methodology

We have adopted the same approach used to prepare customer number forecasts for Powercor and CitiPower in 2019.[2] Table 1 shows our forecasting approach for customer numbers of each category of tariffs.

Residential customer numbers are the only category that is forecast using a driver variable. Industrial customers are assumed to remain at current levels, while non-residential and low voltage customers are forecast using a time trend. Unmetered customers are expected to grow by a fixed amount due to technological change. Customer numbers are forecast 'off-the-point', meaning that projected growth rates are applied to the number of customers in the most recent year of data.

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[1] See Hendry, D. and M. Clements 2001, "Economic forecasting: some lessons from recent research", *Economic modelling*, vol. 20(2), pages 301-329, March for a full taxonomy of forecast errors.

[2] The CIE 2019, Powercor and CitiPower customer number forecasts, prepared for CitiPower and Powercor.

1 Forecasting approach for customer numbers

Tariff category	Forecast approach
Residential	Forecast using projected dwelling growth, adjusted in 2019 to reflect historically lower growth of customers than dwellings due to embedded networks.
	An adjustment is made in 2020 for the Government policy to ban new residential embedded networks
Non-residential	Continuation of historical time trend observed from 2006 through 2016, from most recent data point (2018)
	The final two years of historical data were excluded from the trend calculation because small commercial customers using more than 60MWh and less that 120MWh have been reclassified from non-residential customers not on demand tariff to low voltage demand tariff, resulting in a structural break in 2017
Low voltage	Continuation of historical time trend observed from 2006 through 2016, from most recent data point (2018)
	The final two years of historical data were excluded from the trend calculation because small commercial customers using more than 60MWh and less that 120MWh have been reclassified from non-residential customers not on demand tariff to low voltage demand tariff, resulting in a structural break in 2017
	An adjustment is made in 2020 for the Government policy to ban new residential embedded networks
High voltage	Zero growth from most recent data point
Un-metered	Assumed to increase by 375 per year due to the installation of telecommunication infrastructure (e.g. roll out of the NBN the expected future transition from 4G to 5G network)
Other customers	Assumed to remain at zero

Source: CIE.

Residential customer projections

The main driver of residential customers is the number of dwellings in the network area and has been forecast by relating customer growth to projected dwelling growth.

Residential customer projections for each network area were formulated as follows:

- Population for Victoria was taken from ABS population projections.[3] This is an assumption-based projection which outlines three scenarios representing a range of possible population driver outcomes (e.g. fertility rates and net overseas migration). The analysis uses scenario B which is based on medium level assumptions for population drivers. ABS projections were used in favour of Victorian Government projections (Victoria in the Future), as growth rates implied by the state government projections have been significantly below population actuals since 2016 (chart 2).[4]

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[3] ABS 2018, 3222.0 - Population Projections, Australia, 2017 (base) – 2066.

[4] The projection model includes a switch, which allows projections to be based on VIF 2016.

2 Actual population growth compared to population projections
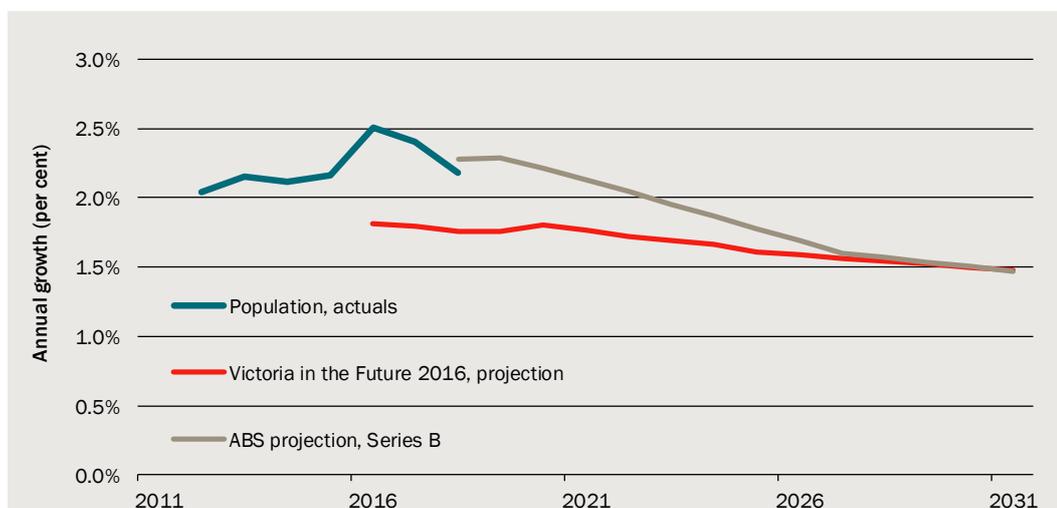
Note: The difference between the growth rate of population

Data source: Victoria in the future 2016, ABS 3222.0 - Population Projections, Australia, 2017 (base) - 2066, ABS 3101.0 - Australian Demographic Statistics, Jun 2018, CIE

- Population is disaggregated into Victorian Local Government Areas (LGAs), based on the share of the population in each LGA for each future year, calculated from Victorian Government population projections.[5]

- Population is mapped to the number of dwellings, based on the average household size by LGA from Victorian Government dwelling forecasts.[6]

- Data LGA level to the United Energy distribution area using the following LGAs; Mornington Peninsula, Frankston, Kingston, Bayside, Whitehorse, Monash, Greater Dandenong, Port Phillip, Glen Eira, Stonnington, Boroondara, Manningham, Knox and Casey.

  The borders of the LGAs were assessed to determine whether the LGA or a large share of the LGA lies within the United Energy distribution area. For LGAs which partially overlap with the distribution areas we have generally used the total dwelling number for the LGA as the measures of dwellings are only used to determine a growth rate (in percentage terms), so the number of dwellings or level of the data is less important where growth is evenly distributed across the LGA. We have, however, made one adjustment for Casey. Casey overlaps slightly with the distribution area, but is expected to experience very strong dwelling growth, concentrated in 16 growth precincts.[7] As only part of one of the growth area precincts is in the United Energy distribution area we have only attributed 25 per cent of Casey dwellings to the United Energy distribution area.

- Dwelling growth rates are used to forecast the residential customer growth.

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5 Victorian Department of Environment, Land, Water and Planning 2016, Victoria in Future 2016 – Population and Household projections to 2051

6 Victorian Department of Environment, Land, Water and Planning 2016, Victoria in Future 2016 – Population and Household projections to 2051

7 See <https://www.casey.vic.gov.au/growth-areas-precincts-casey> for the growth area precincts in Casey.

- ■ Finally, adjustments are made for embedded networks in 2019 and 2020:
  - – Between 2006 and 2018 the number of residential customers grew by 12.6 per cent compared to a 15.8 per cent growth in the number of dwellings (using Census data). This is due to new higher-density dwellings in the distribution area, of which some are embedded networks and are treated as a single customer. To determine the growth rate of residential customers in 2019, we apply the ratio of average customer growth between 2006 and 2018 to average dwelling growth between 2006 and 2018 to forecast dwelling growth. Based the historical data, this means that a 1 per cent increase in the number of dwellings results in a 0.80 per cent increase in residential customers in the United Energy distribution area. The adjustment is not applied for later years, as new residential embedded generators are expected to be banned from 2020, and customer numbers are expected to grow in line with the number of dwellings.
  - – In 2020, an adjustment is made to the level of customer number forecasts to allow for the ban in new embedded networks for high density residential developments. This adjustment is discussed below.

Adjustment for embedded networks

The Victorian Government has announced that they will ban new embedded networks, with exceptions for building using renewable energy micro grids. Embedded networks are private electricity networks which service multiple premises which are treated as a single customer, although the connection may service several dwellings. Embedded networks have caused the change in dwellings to overstate the change in residential customers, particularly over recent years.

The forecast methodology applies the projected dwelling growth rate to the stock of residential customers. In the year embedded networks are banned, customer numbers will be understated for residential customers and overstated for low voltage customers (which embedded networks are recorded. To account for this, we add the number of new residential customers in 2020, which would otherwise have connected via an embedded network, to our customer number forecast. Similarly, we subtract the number of low voltage connections which would have been related to embedded residential networks. This adjustment is made only in 2020, as in subsequent years, we expect customer numbers to grow at the same rate as the number of dwellings. Adjustments are summarised in table 3.

3   Adjustments for embedded generators customers

	Low	Medium	High
	Number	Number	Number
Increase in UE residential customers in 2020	2 666	3 228	3 789
Reduction in UE low voltage customers in 2020	50	50	50

Note: The medium estimate is the average of the low and high estimates.

Source: AEMC 2017, "Review of regulatory arrangements for embedded networks", p15, CIE.

The excel model allows users to select a low, medium or high estimate for embedded generator customers reflecting the uncertainty in these estimates; we recommend using the medium estimate.

The adjustments are calculated as follows:

- The number of new residential embedded networks in Victoria, 145 in 2016 as reported by AEMC[8], is multiplied by the estimated average number of customers per embedded network and the share of Victorian dwellings in the United Energy area calculated from Census data. This gives the number of embedded network residential customers in the United Energy area in 2016, which is extrapolated to 2019 using the dwelling growth rate for the distribution area. Note we do not make an allowance for embedded networks associated with renewable micro grids, as few higher density buildings use distributed generation technology, based on our experience.
  - The average number of customers is based on the total number of embedded networks and customers in Australia estimated by AEMC (table 4), which include both residential and non-residential customers. The actual number of residential customers per network in Victoria may be higher or lower, however this is the best estimate given the data available.

4   Number of embedded networks and customers

	Low	High
	Number	Number
Estimated number of embedded networks (Australia)	3 000	4 000
Estimated number of embedded customers (Australia)	213 000	227 000
Average number of customers per embedded network (estimate)	53	76

Source: AEMC 2017, "Review of regulatory arrangements for embedded networks", p15, CIE.

- The adjustment for low voltage customers, is calculated by taking the number of new residential embedded networks in Victoria in 2016, multiplying it by the share of Victorian dwellings in the United Energy area and extrapolating it to 2019 using the dwelling growth rate for the distribution area.

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[8] AEMC 2017, Review of regulatory arrangements for embedded networks, p14 – 15.

Results

Charts 5 shows the actual and forecast number of dwellings and customers for United Energy.

5   United Energy dwellings and residential customer numbers
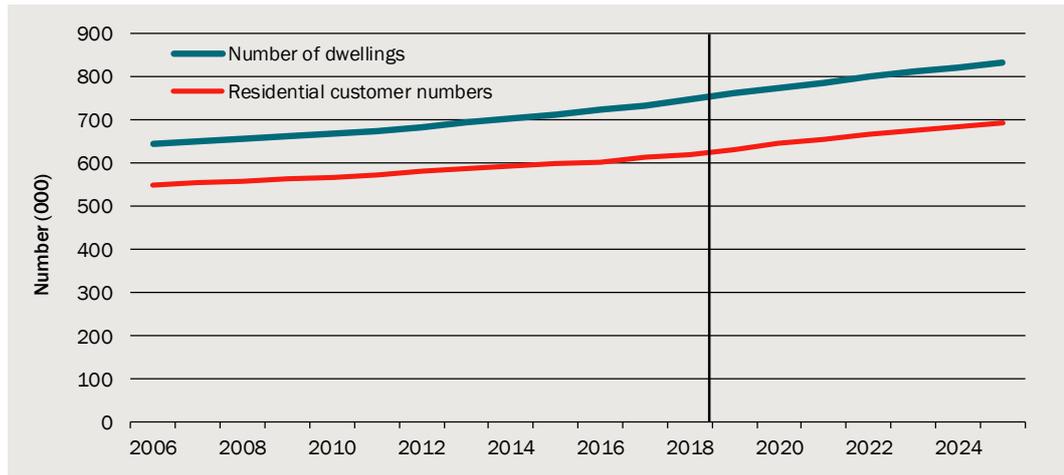
Note: The difference between then number of dwellings and customers is due to the mapping of LGA dwellings to network areas, as well as some apartment blocks being are treated as a single customer (embedded networks).
Data source: CIE.

A summary of customer growth over the next 6 years is set out in in table 6.

6   Summary of projected growth in customer numbers – United Energy

	2019	2020	2021	2022	2023	2024
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Residential	1.53	2.27	1.64	1.56	1.44	1.38
Non-residential	0.12	0.12	0.12	0.12	0.12	0.12
Low voltage	1.38	0.92	1.35	1.33	1.32	1.30
High voltage	0.00	0.00	0.00	0.00	0.00	0.00
Unmetered	4.20	4.03	3.88	3.73	3.60	3.47
Other	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1.47**	**2.13**	**1.56**	**1.49**	**1.39**	**1.33**

Source: CIE.