ACIL ALLEN CONSULTING

A REPORT TO
THE AUSTRALIAN ENERGY REGULATOR

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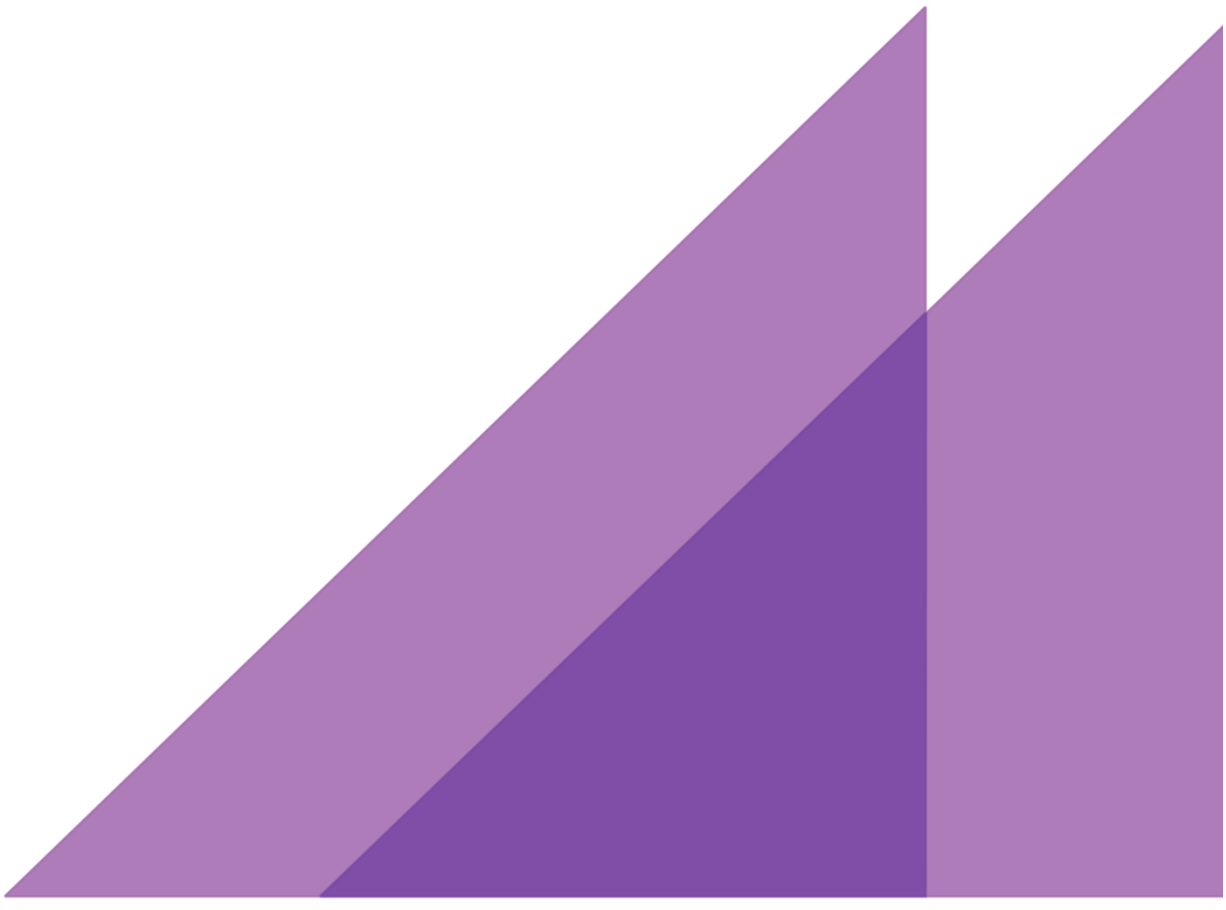
ELECTRICITY BILL BENCHMARKS

FOR RESIDENTIAL CUSTOMERS



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1.0	09 October 2014	Jeremy Tustin	▪ Initial release
1.1	20 March 2015	Alex Rose	▪ Reassignment of Victorian postcodes in Climate Zone 4 owing to insufficient sample size

Executive Summary

It is widely accepted that some retail customers often use more electricity than is necessary to achieve a desired standard of living, and are not as energy efficient as they could be. A significant amount of attention has been given over the years, to the so called 'energy efficiency gap' or the difference between actual energy efficiency and the level thought to be achievable and affordable.[1] As time passes, the level of energy efficiency that could technically be achieved increases, but the gap remains.

One possible reason for the gap is that if customers do not know what is possible, they will find it more difficult to improve their energy efficiency.

Australian Governments have taken various steps to improve energy efficiency in Australia. One such step was the requirement that electricity bill benchmark information should be displayed on electricity bills. Under section 169 of the National Energy Retail Rules (NERR), the benchmarks must be based on:

1. electricity consumption data provided to the Australian Energy Regulator (AER) by electricity distributors
2. localised zones as determined by Energy Ministers
3. the number of persons living in a dwelling (household size).

The AER is required to make the benchmarks available on a website, and is using the Energy Made Easy website for this purpose. It is also required to provide them to electricity retailers, who must publish them on bills.

Under the NERR, the AER must update the electricity benchmarks every three years. ACIL Allen developed the first set of benchmarks in 2011 and has now been engaged to update them.[2]

The bill benchmarks are not tailored to individual householders and the characteristics of their dwelling. This would be impractical on energy bills. To provide this information, the bill benchmarks will be accompanied by a web based tool on the AER's Energy Made Easy website. The analysis underpinning that tool is presented in this report as well.

ACIL Allen estimated the benchmarks based on a sample of Australian electricity customers from all jurisdictions. Those customers answered a series of questions about their homes and the way they use electricity. Those answers were used as explanatory variables in the benchmark and website models.

The customers sampled also gave consent for their electricity distributor to release their consumption data for analysis. Those data were used as the dependent (explained) variable in the models.

More than 4,000 Australian households participated in the benchmarking project as shown in Table ES1. As the table shows, the vast majority of those customers were matched to their consumption data.

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[1] See, for example, Productivity Commission, "Productivity Commission Inquiry Report no 36, The Cost Effectiveness of Improving Energy Efficiency", 2005, p. XXIV

[2] ACIL Allen (then ACIL Tasman), "Electricity bill benchmarks for residential customers", December 2011, available from http://www.aer.gov.au/node/9751

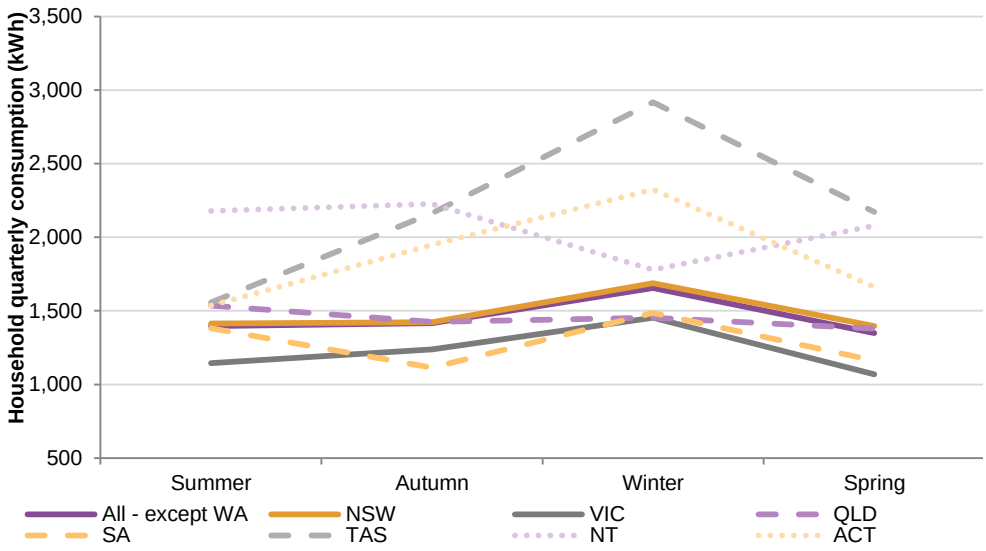
Table ES1 **Sample sizes for household survey and consumption data matching**

State	Sample target	Unmatched sample	Matched sample	'mismatch' (%)
New South Wales	1,000	1,016	851	16%
Victoria	1,000	1,026	685	33%
Queensland	1,000	1,007	901	11%
South Australia	500	511	463	9%
Tasmania	250	246	218	11%
Australian Capital Territory	250	189	145	23%
Northern Territory	250	47	39	17%
Total	**4,250**	**4,042**	**3,302**	**18%**

Source: ACIL Allen Consulting

The electricity consumption of the matched sample is shown in Figure ES 1. The seasonal pattern shown in that figure is consistent with expectations. The data also suggest that residential consumption has declined in Australia since 2011. The average electricity use of the households who participated in the project in 2014 was 12.5 per cent less than those who participated in 2011.

Figure ES 1 **Seasonal patterns in consumption**



Source: ACIL Allen Consulting

The project has produced two results.

The first result is a set of benchmark models for each state. These are relatively simple models that are intended to be used to produce the benchmarks that retailers will place on electricity bills. These are broadly consistent with the benchmark models produced in 2011, although on this occasion the models control for the presence of a mains gas connection. Therefore, these models summarise electricity consumption using three household variables, namely:

1. household size
2. presence of a swimming pool
3. presence of a mains gas connection.

As with the 2011 benchmarks, the models were calibrated separately for each season to produce seasonal benchmarks. The benchmarks were weighted to the zone level, using either climate zones or, in Queensland and South Australia, the same localised zones that were used in 2011.

The benchmarks themselves are numerous so they are not in this executive summary. The state level benchmarks are shown in the body of the report and the climate zone benchmarks are in an accompanying spreadsheet.

These models are inherently simple as they must produce benchmarks that can be placed on a retail bill in a simple graphical or tabular form.

The second result of this project is a more sophisticated set of models that allow the consumption benchmarks to be better tailored to the circumstances of individual households. These are referred to in the report as 'website models' as they are intended for use in an online tool such as the AER's 'Energy Made Easy' Website. The website models would allow consumers to produce more refined estimates of typical consumption by answering a series of questions about their household and the way they use electricity.

Website models were estimated separately for each state and each season. As with the benchmark models, the results from the website models are provided in the body of the report.

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1 Introduction

It is widely accepted that some retail customers often use more electricity than is necessary to achieve a desired standard of living, and are not as energy efficient as they could be. A significant amount of attention has been given over the years, to the so called 'energy efficiency gap' or the difference between actual energy efficiency and the level thought to be achievable and affordable.[3] As time passes, the level of energy efficiency that could technically be achieved increases, but the gap remains.

A number of reasons have been identified as to why energy efficiency persists below the level which could be achieved. One is that customers usually have less than perfect information on what is an efficient level of consumption. If customers do not know what is possible, they will find it more difficult to improve their energy efficiency.

Energy prices have risen in recent years, and they are expected to keep rising in the near future. Further, Australia's greenhouse gas emissions, and therefore its contribution to climate change, are more closely linked to energy use than most other countries because the electricity generation sector in Australia is substantially based on coal. For these reasons it is important for Australian households to improve their energy efficiency. Doing so will assist them to manage rising energy bills and reduce Australia's carbon footprint.

Australian Governments have taken various steps to improve energy efficiency in Australia. One such step was taken in December 2011 when the Australian Energy Regulator (AER) provided the first electricity bill benchmarks to retailers.

The electricity bill benchmarks are a requirement of part 11 of the National Energy Retail Rules (NERR). According to section 169 of the NERR, the benchmarks must be based on:

1. electricity consumption data provided to the AER by electricity distributors
2. localised zones as determined by Energy Ministers
3. the number of persons living in a dwelling (household size).

The AER is required to make the benchmarks available on a website, and is using the Energy Made Easy website for this purpose. It is also required to provide them to electricity retailers, who must publish them on bills.

To meet their objective, benchmarks must meet two key criteria:

- *accuracy* – meaning that they must provide an accurate representation of the electricity that real consumers actually use
- *simplicity* – meaning that they must be understandable and consumers must be able to accept that the variables are relevant.

Under the NERR, the AER must update the electricity benchmarks every three years. ACIL Allen developed the first set of benchmarks in 2011 and has now been engaged to update them.

[3] See, for example, Productivity Commission, "Productivity Commission Inquiry Report no 36, The Cost Effectiveness of Improving Energy Efficiency", 2005, p. XXIV

The benchmarks are part of a broader package of measures designed to meet objectives that include allowing households and businesses to achieve savings on their energy bills and to deliver significant low cost greenhouse gas abatement.[4] The bill benchmarks will not be tailored to individual householders and the characteristics of their dwelling. For consumers seeking more detail, the bill benchmarks will be accompanied by a web based tool on the AER's Energy Made Easy website. This tool allows consumers to enter data about their own circumstances and produce more specific benchmark information. The model, upon which the web based tool will be based, was developed from the same dataset as the bill benchmarks and is also presented in this report.

This report summarises the process ACIL Allen undertook to produce the updated benchmarks and presents the benchmarks that were produced. It is structured as follows.

Chapter 2 describes the methodology ACIL Allen used to estimate the benchmarks.

Chapter 3 describes the sample, as well as providing some preliminary descriptive statistics on key energy efficiency and consumption variables.

Chapter 4 presents results at the national and jurisdictional (state/territory) level. Benchmarks at the localised/climate zone level are in an accompanying spreadsheet.

Chapter 5 provides a conclusion.

[4] See for example the National Partnerships Agreement for Energy Efficiency, signed by the Council of Australian Governments in December 2009. Also the National Strategy on Energy Efficiency and its predecessor, the National Framework for Energy Efficiency.

2 Methodology

This chapter describes the methodology used to develop the benchmarks and the model for use as the web based tool. The methodology was very similar to that used in developing the original benchmarks in 2011. However, some modifications were made based on learnings from that project.

There are two broad stages to the methodology, each discussed in turn below:

1. data collection, consisting of:
    a) survey customers to collect information relevant to the way they use electricity as discussed in section 2.1.1
    b) obtain usage (consumption) data from electricity distributors for those customers as discussed in section 2.1.2
    c) 'matching' the two datasets and weighting the combined dataset as discussed in section 2.1.3
2. data analysis, using econometric techniques to estimate the benchmarks based on the matched dataset (section 2.2).

2.1 Data collection

2.1.1 Household data

The household data underpinning the electricity bill benchmarks were collected using an online survey of residential electricity customers in each jurisdiction.

The survey was administered online using a panel of people who had previously indicated their willingness to participate in surveys. Panel members were invited to participate in the survey by email. If they chose to complete the survey they clicked on a link and were connected to an online survey instrument. The questionnaire used is reproduced in Appendix A.

Obtaining consent to collect consumption data

The benchmarks are based on data relating to individual customers' actual electricity consumption. As such, it is important to obtain consent from the customer for the release of their data. Therefore, at the beginning of the survey, panel members were shown a plain language description of the process stating that:

1. if they answered the questionnaire, data relating to their electricity consumption would be collected from their electricity distributor and/or retailer
2. the data would be provided to ACIL Allen and the AER
3. ACIL Allen would use the data to develop updated bill benchmarks and the AER would use it (in de-identified form) to meet its regulatory requirements. It may also be used more broadly to inform energy policy.

Panel members who were willing to consent to the release of their data indicated this by clicking a 'yes' button.[5]

At this point, the panel members were asked whether they contribute to paying the electricity bill or to decisions about using electricity in their home. If they do not, they were not able to proceed with the survey.

Panel members who had consented to the release of their data and had identified themselves as responsible for paying the electricity bill were then asked to complete the questionnaire.

In summary, the following data were gathered:

1. household demographics (number of occupants by age, household income, whether premises rented or owned, composition of household)
2. dwelling size (number of bedrooms, bathrooms, floors; dwelling age; orientation)
3. dwelling construction material and insulation
4. equipment by fuel type (number and type of televisions; fridges; cook tops; ovens; hot water services; dryers; heating; lighting; air conditioners; pools and pool heaters; other appliances)
5. appliance usage
6. use of other fuels and alternative generation (solar panels etc)
7. seasonal behaviour
8. reported use behaviours
    a) amount of energy conservation effort over the last year
    b) do they think they are doing more/ less/ the same energy conservation as last year
    c) do they think they use more/ less/ the same amount of electricity than comparable households
9. postcode (to identify the appropriate localised zone).

Steps were taken as the survey was conducted to ensure that the sample remained representative of the broader Australian population. In some cases certain questions were used to 'screen out' responses from customers from demographics that were already sufficiently represented.

For example, this approach was used to ensure that the age distribution of the sample is similar to the age distribution of the Australian population. The same approach was used to ensure that customers with solar panels were not over represented in the sample. [6]

The following controls were applied during data collection to avoid demographic bias in the sample:

- no more than 30 per cent of respondents to have university qualifications
- approximately equal gender split
- no more than 5 per cent of respondents to be aged over 65 years
- approximately 50 per cent of responses to come from households with at least one child.

Other controls were applied:

[5] If a panel member was not prepared to give consent, they clicked 'no' and were not shown the remainder of the survey.

[6] Descriptive statistics are presented in chapter 3.

- approximately 50 per cent of the sample was from regional areas to ensure adequate depth of sample outside capital cities
- respondent must have lived at current address for 12 months or more to ensure the consumption data provided by distributors applied to their behaviours reported in the survey
- respondent must contribute to paying the electricity bill and/or make decisions about how electricity is used to ensure their knowledge about household use patterns.

Data collection was conducted by I-View, which is a member of the Australian Market and Social Research Society and, as such, administered the survey in accordance with the requirements of that organisation. I-View is also accredited to the International Market and Social Research Standard ISO 20252, which incorporates the principles of the AS4752 standard and International Quality Crown Award.

2.1.2 Electricity consumption data

To construct the benchmarks, electricity consumption datasets were collected from the survey respondents' electricity distributor.

The datasets supplied by electricity distributors were from the same source that underpins customers' billing so they are based on meter reads (actual and estimated) conducted by the electricity distributor.[7]

To obtain these datasets from the electricity distributors, ACIL Allen supplied each of them with a list of all the National Metering Identifier (NMI)'s provided by customers in their state or territory. Each electricity distributor then identified those NMI's which fell within their service area[8] and returned a file(s) containing:

- consumption data that could be matched to respondents
- identification of the presence of embedded generation and or dedicated circuit consumption, and separate reporting of each
- NMI's for which no data was available.

The formats of the data supplied by each electricity distributor varied depending on whether the electricity distributor was in Victoria or elsewhere.

The Victorian electricity distributors provided data collected by 'smart meters', which produce half hourly readings. In other jurisdictions, smart meters are not (widely) used so the datasets provided by electricity distributors were typically quarterly.

Consumption from each billing period was mapped to seasons, from summer 2011 to autumn 2014. The eight most recent quarters of data for each customer were requested from each electricity distributor, although the seasons these data were related to varied by customer depending on when individual customers' meters were read.

The fact that meters are not all read at the same time, coupled with the inability to 'separate' the quarterly reading data into smaller time periods puts some limits on the extent to which seasonality can be examined. This is due to a problem referred to as 'billing lag'.

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7 In the Northern Territory, both the retail and distribution functions are performed by the same organisation, Power and Water Corporation (PWC). As a result, PWC provided billing data for NT customers. This did not change the analytical approach for NT. PWC is referred to as an electricity distributor for simplicity within this report.

8 In South Australia, Tasmania, the Northern Territory and the Australian Capital Territory there is only one electricity distributor so this step was not necessary.

Based on ex perience in overcoming billing lag while estimating bill benchmarks in 2011, meter readings were assigned to seasons based on the middle of the billing period rather than the start or finish.

There were two exceptions to this. The first exception was when the period was the first reported period. For this period the season of the billing date was used to allocate consumption to a season. This was due to there often being insufficient information available to determine the length of this billing period (although some electricity distributors did report the number of days in each billing period).

The second exception was interval meter data, for which consumption dates were known with more precision. In this case no approximation was required. However, the last season for which interval data were provided (often Autumn, 2014) was not directly comparable with other seasons, as data corresponded to only one or two months.

To manage this in a way that maintained sample size, two approaches were taken:

- for two electricity distributors, the previous Autumn period was taken, as this was available for nearly all customers
- the longitudinal dimension of the data for the remaining three electricity distributors was much more variable. Hence, to preserve sample size for customers of these electricity distributors, interval consumption in each season was converted to a daily consumption figure, and multiplied by 90 days. This was done when:
  - there were fewer than 85 days of data available for the season
  - there were more than 21 days of data available for the season
- when there were fewer than 21 days of data available within the season, the season's data were discarded.

The result was that a consistent set of data was analysed for Victorian customers, though it was smaller than the sample that was originally targeted. The sample size could have been increased by having the electricity distributors provide more data in relation to each customer. However, ACIL Allen's judgement was that this would not improve the accuracy or simplicity of the benchmarks sufficiently to offset the additional effort that would be required of electricity distributors so this was not pursued. Simply put, there are sufficient observations in the dataset that was obtained to complete the analysis.

Completing this process required significant interaction between ACIL Allen's project team and the electricity distributors in some cases. ACIL Allen greatly appreciates the assistance that the electricity distributors provided with this project.

2.1.3 Sample matching and weighting

The raw sample was weighted so that key statistics reflected the population. Weights were applied across the following dimensions:

- household size
- location
- the presence (or absence) of solar photovoltaic (PV) systems.

The survey responses and consumption data were then matched to one another using the customer's NMI.[9] NMI's were then removed from the dataset and replaced with an index number to ensure that individual customers' consumption data cannot be identified.

2.2 Data analysis

When the datasets had been collected and matched the next step was data analysis.

Data analysis was in two stages. First, regression models were estimated using a combination of variables that were strongly correlated with household electricity consumption. Those models are intended for use on the AER's Energy Made Easy website (website models).

Second, a small number of variables were identified as critically important in determining electricity consumption, namely household size, and the presence of a swimming pool and a mains gas connection (separately). Regression models were estimated using only those variables and these were used to produce the bill benchmarks (benchmarks models).

The website and benchmarks models were estimated at the state/ territory level. The results were then weighted to reflect differences in average consumption in the zones specified by Energy Ministers. Those zones are summarised in Appendix B. The weights were the ratio of mean consumption in the zone to mean consumption in the jurisdiction.

2.2.1 Website models

The website models were constructed by calculating the coefficient of correlation between electricity consumption and all of the survey variables (separately). Variables for which this was greater than 0.25 were put into a stepwise regression model.

This was done at the national level. The explanatory variables that were 'identified' using this process were used in each of the jurisdictional models.

The exception was that neither the existence of a solar photovoltaic system on the household nor the capacity of that system was sufficiently correlated with electricity consumption to cross this threshold for inclusion in the model. Notwithstanding this, the presence of a solar panel was added to the models, though capacity was not.

The only other exception was that the existence of a gas connection was not included in the website model even though it is strongly correlated with electricity consumption. The reason is that gas is used to 'fuel' four key appliances, namely cooktops, ovens and space and water heaters. Since electricity consumption is of interest, the real question is which of these appliances a respondent has. When these appliances are accounted for in the website models, the mere existence of a gas connection was redundant and omitted.

The explanatory variables in the website model are (units are described in parentheses and more detail is shown in the questionnaire, which is at Appendix A):

- a constant (α)
- household size (*H2, H3, H4, H5)*[10]
- dichotomous variables (present=1, absent=0)

[9] The account number was used in the Northern Territory.

[10] These are set to 1 if they correspond with the number of people normally living in the house. For example H2 is 1 if the household in question is a two person household, 0 otherwise. A 1 person household is the omitted category. H5 relates to households of 5 people. Only a very small number of households larger than 5 responded to the survey. These were omitted from the analysis due to the lack of sample.

- electric hot water (*hot*)
- swimming pool (*pool*)
- Separate house (*separate*)
- Electric oven (*oven*)
- Electric cook top (*cook*)
- Solar powered electricity generation (*PV*)

— number of (count variables):

- operating TVs *(#TV*)
- refrigerators (#*fridge*)
- total rooms in house (#*rooms*)
- dishwasher - times used in week ($dish_{times}$)
- computers (#*PCs*)
- washing machine - times used in week ($wash_{times}$)
- clothes dryer - times used in week ($dryer_{times}$)

— usage variables (measured as percentage of time used):

- air conditioning (*%AC)*
- electric heating (*%heat*)
- appliances left on at wall (*%wall*)

— usage variables (measured as hours used per week)

- computer use - total time all computers (PC_{hours})
- hours TVs on during the week (TV_{hours}).

Therefore, each of the website models is in the form of equation (1) where β1 to β22 were estimated using ordinary least squares regression and the variables are as described above (except ε, which is a stochastic error term).

$$\begin{aligned} usage = {} & \alpha + \beta_1 H2 + \beta_2 H3 + \beta_3 H4 + \beta_4 H5 + \beta_5 \#rooms + \beta_6 hot \\ & + \beta_7 \%AC + \beta_8 \#TV + \beta_9 pool + \beta_{10} \%heat + \beta_{11} dish_{times} \\ & + \beta_{12} PV + \beta_{13} \#fridge + \beta_{14} \%wall + \beta_{15} cook + \beta_{16} \#PCs \\ & + \beta_{17} wash_{times} + \beta_{18} separate + \beta_{19} PC_{hours} \\ & + \beta_{20} dryer_{times} + \beta_{21} TV_{hours} + \beta_{22} oven + \varepsilon \end{aligned} \quad (1)$$

The coefficients of each of the jurisdictional website models are in chapter 4.

The coefficients in equation (1) can be interpreted as the average difference in the number of kWh that a household in the jurisdiction in question consumes as the characteristic in question (explanatory variable) changes.

As per the list above there are three types of explanatory variables in the website models, dichotomous, count and usage variables. The interpretations of the coefficients vary with the type of variable.

The coefficients on the dichotomous variables show the amount that typical consumption increases relative to the category that is withheld. For the household size variable the withheld category is a one person household, so the coefficients show how much more electricity a household with the applicable number of people uses than a one person household. The other dichotomous variables relate to the presence of a particular appliance. They can be interpreted as the amount of electricity that is added to typical consumption if that appliance is added.

The count variables also relate to appliances, with the exception of 'number of rooms in the house.' The interpretation of these coefficients is the amount of additional electricity used when the number of appliances (rooms) increases by one or when the number of times the appliance is used increases by one.

The usage should be interpreted as the increased electricity that occurs when the percentage of the time that the appliance is used increases by one percentage point (e.g. from 10 per cent of the time to 11 per cent of the time) or when the appliance is used for one more hour per week.

Therefore, using the Queensland website model as an example (see Table 1 in chapter 4 below):

- a three person household typically uses 242.6 kWh more electricity in summer than a one person household
- a household with electric water uses 363.7 kWh more electricity in Autumn than a household without electric hot water
- each operating television in a house adds 50.1 kWh to electricity consumption in winter.[11]

The tables also indicate the variables that were not found to be statistically significant at the 10 per cent level. This applies to only a few variables in each case and they vary from state to state and season to season. They are left in for consistency in modelling.

The nature of the model is that the impact of each variable is estimated with all other influences held constant. Therefore, for example, the quantity of electricity associated with an additional room does not account for appliances that might be in that room or what else may be on in the house. Modelling treats the house as a whole physical/behavioural system and allocates the coefficients accordingly. Therefore, some of the coefficients may seem counter intuitive if looked at in isolation. For example, the impact of each operating television in Queensland is lower in winter than summer. It is hard to know if Queenslanders spend more time inside watching TV in summer than winter or whether this variation relates to the way the whole house is used. It is most likely the latter as this finding also applies to Victoria, New South Wales and ACT but not South Australia and Tasmania.

An important technique for evaluating the accuracy of the models and therefore the benchmarks they produce is to evaluate the size and sign of the coefficients. This is done on an exceptions basis. That is, coefficients that have an unexpected sign or are unexpectedly large or small are identified in the sections below.

Another technique for evaluating the models is to consider the 'goodness of fit' (adjusted R-squared) for each model. This varies across the models, but is usually at or around 50 per cent. That is, most of the models explain about half of the variation in electricity consumption.

2.2.2 Benchmark models

The benchmark models are simpler than the website models because they are constrained by the amount of variation that can be included on electricity bills. They are based on the following three key variables:

- household size

[11] Note that this does not imply that the television itself uses this electricity. It may also be used to heat the additional room where the television is watched or in other ways associated with the additional television.

— presence (absence) of a swimming pool

— presence (absence) of a mains gas connection.

The models were estimated using the same methodology as the website models, but using only these three variables. The models are of the form shown in equation (2):

$$usage = \alpha + \beta_1 H2 + \beta_2 H3 + \beta_3 H4 + \beta_4 H5 + \beta_6 gas * H1 + \beta_7 gas * H2 + \beta_8 gas * H3 + \beta_9 gas * H4 + \beta_{10} gas * H5 + \beta_{11} pool + \varepsilon \quad (2)$$

Where the variables are as described above except *H1*, which is one for one person households, 0 otherwise and *gas*, which is 1 if the household has a mains gas connection, 0 otherwise.

As equation (2) shows, a refinement that has been made to the benchmark models since the 2011 benchmarks were estimated is that they now 'control for' a gas connection. That is, they allow for differences in the typical *electricity* consumption of two customers who are the same in respect of the variables in equation (2) other than that only one has a gas connection. The analysis of the data shows that this is an important factor in explaining electricity consumption. The exception to this was where mains gas is not available to retail customers.[12]

The models treat gas connection as an interaction term (with household size). This allows the impact that a gas connection has on electricity consumption to vary with household size.

The inclusion of the variable '*gas'* in the benchmarks models may seem to be contradictory with its omission from the website models. However, it is not. As noted above, the website models account explicitly for the appliances that would typically use gas (water heater, cooktop, oven, space heater). With these appliances accounted for separately the gas connection itself does not improve the model's ability to 'fit' the data.[13]

In effect, the benchmarks models break customers into four groups, namely customers with:

1. neither mains gas nor a pool
2. mains gas, but no pool
3. a pool, but no gas
4. both a pool and gas.

In the results in chapter 4, benchmarks are presented for each of these groups for each jurisdiction across a range of household sizes.

It is acknowledged that adding the gas variable may make it more difficult to present benchmarks on customers' bills. Ideally, the benchmarks that are presented on any given customer's bill would reflect that customer's circumstances. However, this would require retailers to identify which of four different groups each customer is in. Retailers might be able to determine whether their customers have gas connections, but they probably have no way to know whether they have a pool. This is discussed further in chapter 5.

For completeness, a simpler form of the benchmarks models was also estimated as shown in equation (3) which mirrors those provided in 2011. This model is less accurate than the models outlined above because it assumes that households have the state average gas

[12] Mains gas is not available in the Northern Territory, and various parts of (generally regional) Australia.

[13] This is the reverse of the logic as to why the mere presence of a gas connection is not included in the website models.

usage whereas the reality is either no gas or some level depending on the appliance configuration of the household.

$$usage = \alpha + \beta_1 H2 + \beta_2 H3 + \beta_3 H4 + \beta_4 H5 + \beta_5 pool + \varepsilon \quad (3)$$

In effect this model treats customers as belonging to one of two groups. They either have a pool or they do not. The results of this simpler model are also presented in chapter 4.

2.3 Computing the benchmarks

The proposed benchmark consumption levels are presented in this report as ACIL Allen's estimates of the typical electricity use of customers in one of the 'groups' identified in section 2.2.2 (i.e. neither gas nor pool, gas but no pool, pool but no gas, both gas and pool; OR pool, no pool).

The typical usage estimates were computed simply by setting the relevant variables to 1 and 0 as appropriate and computing the result of equation (2) (controlling for gas) or equation (3) (not controlling for gas).

In each case, benchmarks are provided across a range of household sizes and for each of the four seasons.

Benchmarks were computed in each of a number of zones that were nominated by Energy Ministers. The zones were either climate zones (New South Wales, Victoria, Australian Capital Territory, Tasmania and Northern Territory) or the same location based zones used for the 2011 benchmarks (Queensland and South Australia).[14] The zones that were used are broken down to postcode level in Appendix B.

The typical use benchmarks for each zone were computed by weighting the state or Territory level. The weights were computed from within the sample data whenever there were at least 50 responses from within a zone.

In Queensland and South Australia there were a number of zones with too few responses in the zone to develop a reasonable weight. In these cases the weight was assumed to be the same as it was in the 2011 project when a data set showing postcode level average electricity use was available.

In Victoria, there were too few responses from postcodes within climate zone 4 (covering the northwest of the state) to develop a reasonable weight. In this case, we have applied weights from elsewhere:

- for postcodes in the most north-westerly local government area (Rural City of Mildura), we have applied weights from the Murraylands and Riverland zone of South Australia (in climate zone 5), on the basis of their very similar climates
- for other postcodes in zone 4, we have applied weights from zone 6 postcodes in Victoria.

The results provided in chapter 4 are at the state/ territory level. The zone level results are in an accompanying spreadsheet.

[14] Note that NT, ACT and Tasmania each consist of only one zone.

3 The sample

This chapter provides a descriptive overview of the matched and weighted sample.

3.1 Sample size

The number of respondents in the surveyed sample is shown in Table 1 along with the number of responses that were matched to consumption data.

As the table shows, approximately 10 per cent of the sample was lost due to an inability to match the customer to their data. The reasons for this are not necessarily known but are likely due to errors in entering the NMI number in the survey.[15] The exception is Victoria, where approximately one third of the responses were lost. This is partly due to 'mismatch' but also due to the issue discussed in section 2.1.2 regarding the need to approximate a full four seasons of data for some customers with interval meters. Notwithstanding that the final sample is smaller than the target, there is sufficient data for robust analysis as confirmed by the model results in chapter 4.[16]

Finally, Table 1 does not include Western Australia, as the consumption dataset from Western Australia was not available at the time this report was compiled.

Table 1 also shows that, notwithstanding that significant efforts were made to collect survey responses in the Northern Territory, very few were received. Unfortunately there are insufficient data to produce benchmarks for the Northern Territory independently. To overcome this, the Northern Territory responses were pooled with responses from customers living in (north) Queensland climate zone 1. This is consistent with the view that climate is likely to have more influence on electricity consumption than a person's state of residence.[17] If this assumption is valid the benchmarks should be satisfactory. This increased the sample on which the Northern Territory benchmarks were estimated to 109, which enabled the models to be estimated.

[15] When the original benchmarks were estimated in 2011 a process of 'pickups' was implemented where customers who could not be matched to their data were asked to re-check and confirm their NMI. This reduced the mismatch on that occasion, but was time consuming and costly so the decision was made not to take that step this time.

[16] Note in particular that model fit and statistical significance is similar in Victoria to other jurisdictions.

[17] The data were pooled across areas without access to mains gas.

Table 1 **Sample sizes for household survey and consumption data matching**

State	Sample target	Unmatched sample	Matched sample	'Mismatch' (%)
New South Wales	1,000	1,016	851	16%
Victoria	1,000	1,026	685	33%
Queensland	1,000	1,007	901	11%
South Australia	500	511	463	9%
Tasmania	250	246	218	11%
Australian Capital Territory	250	189	145	23%
Northern Territory	250	47	39	17%
Total	**4,250**	**4,042**	**3,302**	**18%**

Source: ACIL Allen Consulting

3.2 Weighting the data

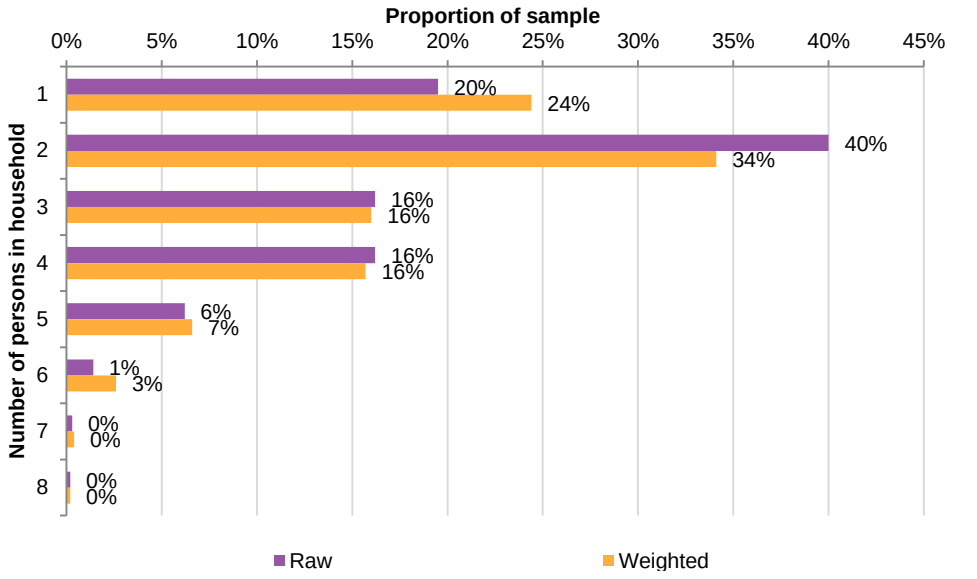
As described in section 2.1.3 the sample was weighted to ensure that it was reflective of the Australian population.

The following figures show the original sample, as well as the general Australian population, across these dimensions. The raw sample was weighted to ensure that it reflected the population in certain key demographics.

The weighting process was carried out state by state. Using population data relating to PV take-up rates and household size and location by state, the weights were calculated for each individual variable in order. The cycle was repeated until all were at the level of the population data. Ideally had population data been available that accounted for all four (including state) variables simultaneously, this would have been used to calculate the weighting, however no such source exists. In any event, while weighting is good practice, even large sample variations from the underlying population statistics usually only causes small percentage variations in the results, so the accuracy gained by having access to more refined population statistics is unlikely to have made much difference to the outcomes.

Figure 1 shows this for household size. It shows, for example, that single person households were under represented in the survey whereas households with two people were overrepresented. Households with more than two people were sampled roughly in proportion to the general population.

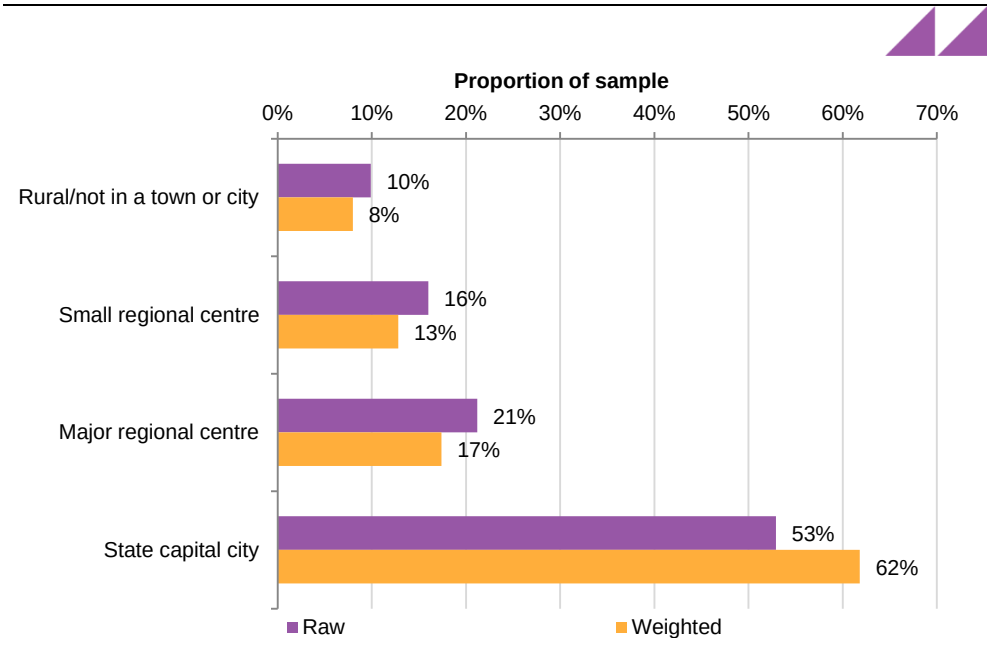
Figure 1 **Household size within the raw and weighted sample**



Source: ACIL Allen Consulting

Figure 2 shows that a substantial part of the sample lives outside a state capital city. Further, people living outside capital cities were over represented in the sample. This situation was brought about intentionally to ensure that differences in consumption between regional and non-regional customers are captured.[18]

Figure 2 **Household region within the raw and weighted sample**



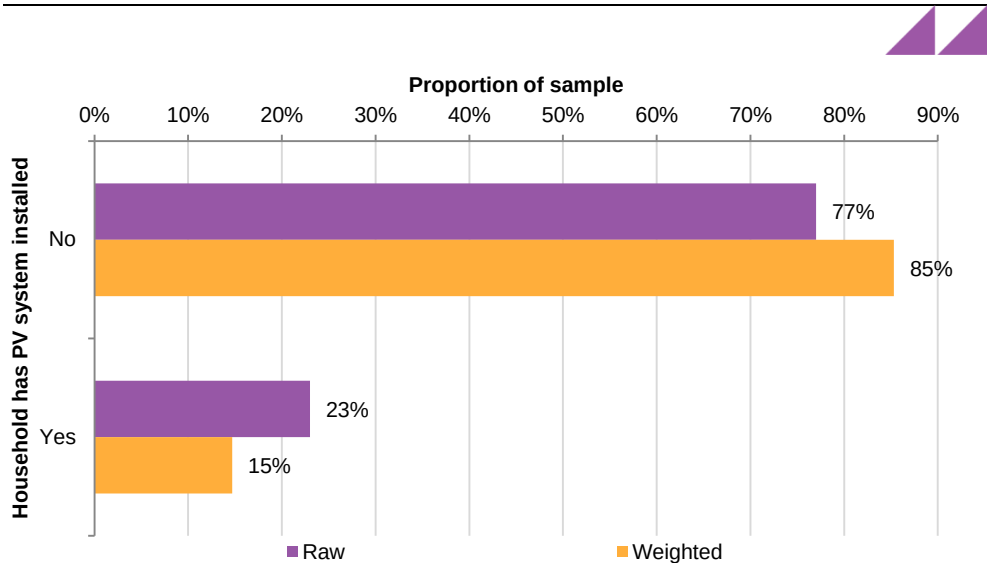
Source: ACIL Allen Consulting

All else being equal, adding a solar panel to a household does not change the amount of electricity that household will use. However, it will typically reduce the amount that the

[18] That is, to ensure a statistically significant sample outside the capital cities.

household purchases from the grid. The analysis in this project is based on data that relate to the amount of electricity purchased from the grid.[19] Therefore, all else being equal, the presence of a solar panel reduces the amount of electricity that the consumption data collected from the distributors suggest that a household uses. This makes it important to identify customers with solar panels in the sample. Figure 3 shows the penetration of solar panels in the raw sample and in the reweighted sample.

Figure 3 **PV usage within the raw and weighted sample**



Source: ACIL Allen Consulting

3.3 Descriptive statistics

Descriptive analysis of some of the key consumption and energy efficiency variables is shown in this section. Reported numbers are based on the weighted matched sample, unless otherwise indicated. Figure 4 shows average electricity consumption by state/territory. Victorian households exhibit the lowest consumption on average. This is in part due to widespread availability of gas for heating. In contrast, Tasmania, where gas is not as readily available and winters are cold, exhibits the highest level of average consumption.

The data obtained from the survey process are compared with a set of data provided by the AER. The second dataset, labelled 'AER electricity distributor data' is based on data collected by the AER using regulatory information notices. In response to those notices, which were issued in November 2013, each electricity distributor supplied total residential energy delivery and residential customer numbers. The former was divided by the latter to produce an average usage per customer plotted below.

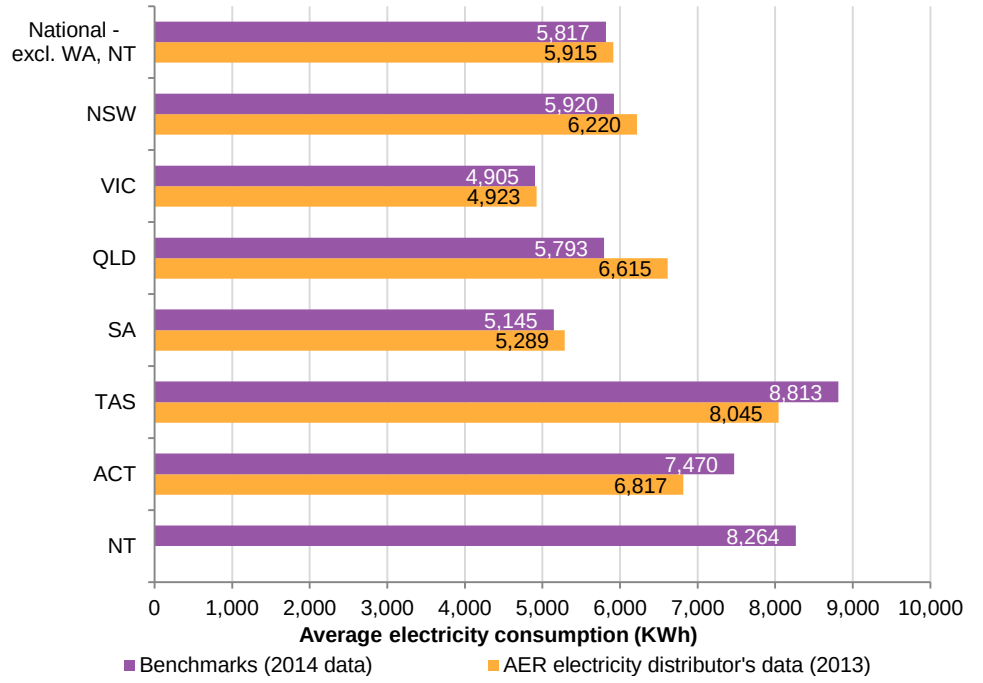
There are some residual discrepancies between the two datasets, most notably in Queensland, Tasmania and the Australian Capital Territory. It is not possible to be entirely sure of the source of these discrepancies. It may be due to differences in the way data are collected by distributors. For example, the distributors may consider all customers who are

[19] In other words, the benchmarks reflect the *net* consumption of customers with PV systems (with the portion of PV output that is consumed on site netted off rom total consumption). This is related to, but not the same as, the concept of net metering for PV systems.

not on a business tariff to be residential. In this study, users were excluded who nominated that more on premise electricity was used for business than residential.

In addition there may be errors in the averaging (which is based on a single estimate of customer numbers for the whole period) or due to distortions in the weighted sample.

Figure 4 **Average consumption by location – Benchmarks sample (2014), and AER data from electricity distributors (2013)**



Source: ACIL Allen Consulting, AER electricity distributor's data

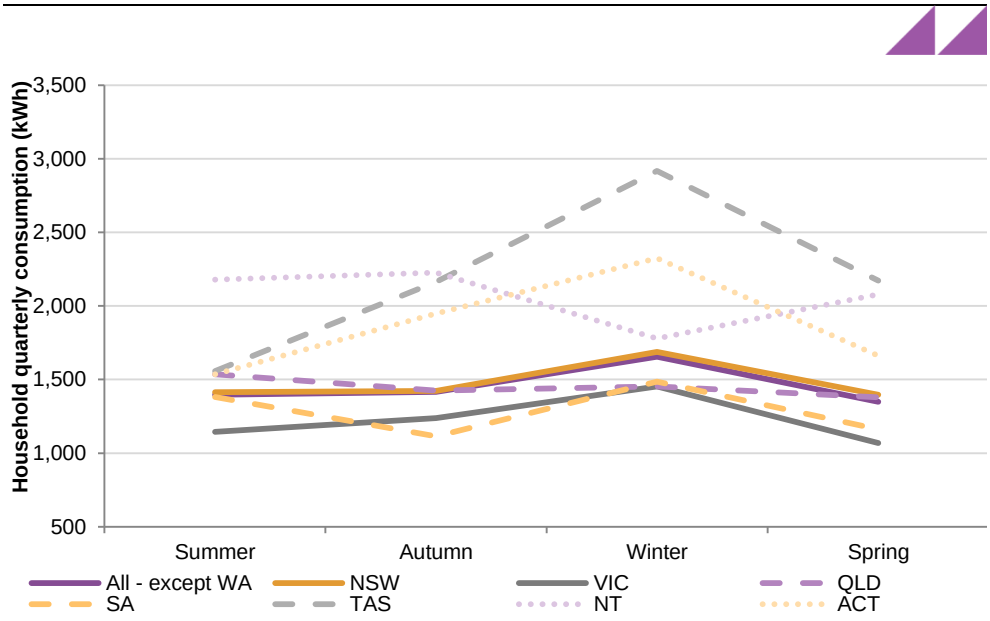
Seasonal consumption patterns

There is a strong relationship between weather and electricity use. Particularly in colder climates, consumption is usually higher in winter than in other seasons, largely due to electricity used for space heating. This is in contrast to seasonal changes in maximum demand, which typically peak during summer.

In warmer climates, winters tend not to be as cold, but summers are often more intense. Hence electricity consumption is more influenced by cooling load in summer in these regions, rather than by heating load in winter. However, the amount of electricity used for cooling is usually less than the amount used for heating.

Figure 5 shows the average consumption of survey respondents by season and by state. It shows the expected pattern in seasonal energy use. That is, energy use is higher in winter than in summer, consistent with the increased heating load. The difference is greatest in states where winters are coldest and gas availability is lowest.

Figure 5 **Seasonal patterns in consumption**

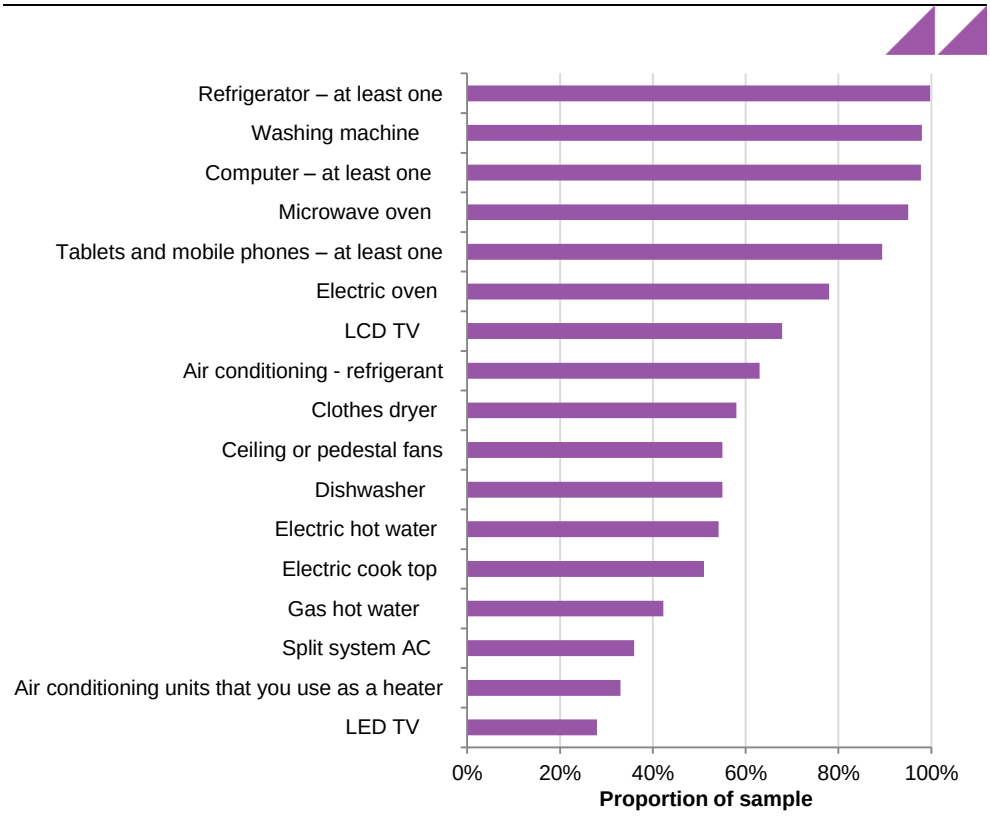


Source: ACIL Allen Consulting

Appliance ownership and household characteristics

Ownership of particular appliances is likely to impact on household electricity consumption. As the number of different appliances owned by households increases, this will tend to increase consumption of electricity. However, substitution between some types of appliances (for example, electric to gas space or water heating) can reduce consumption. In addition, appliance energy efficiency tends to increase over time, thus reducing consumption. Figure 6 shows the proportion of households with selected appliances.

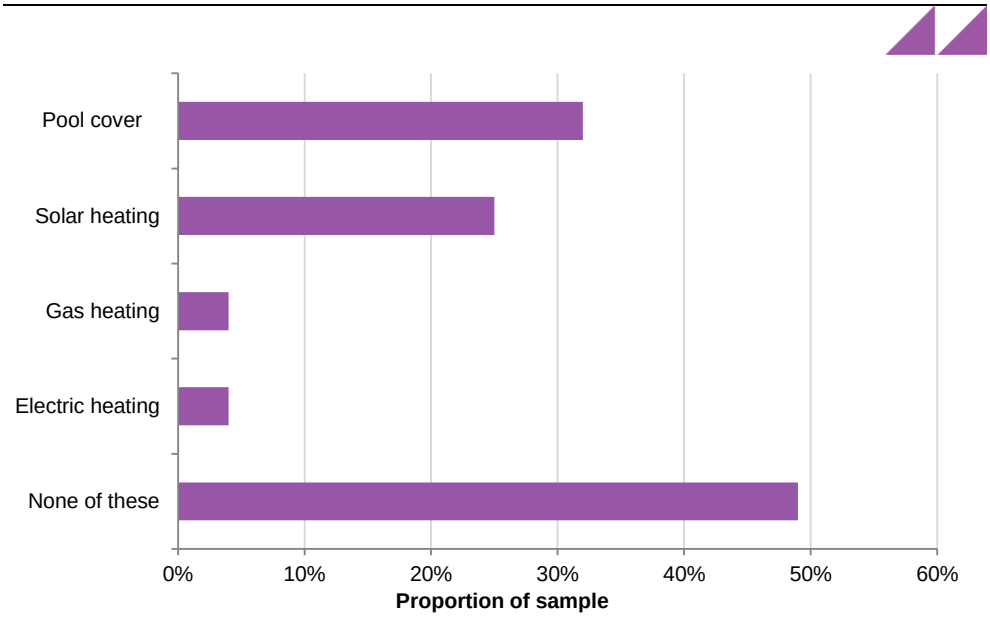
Figure 6 **Proportions of households by appliance ownership/household characteristics**



Source: ACIL Allen Consulting

11 per cent of the sample reported that they own a pool. Figure 7 shows ownership of items that affect the energy use associated with a pool.[20]

Figure 7 **Pool-related appliance ownership among pool owners**

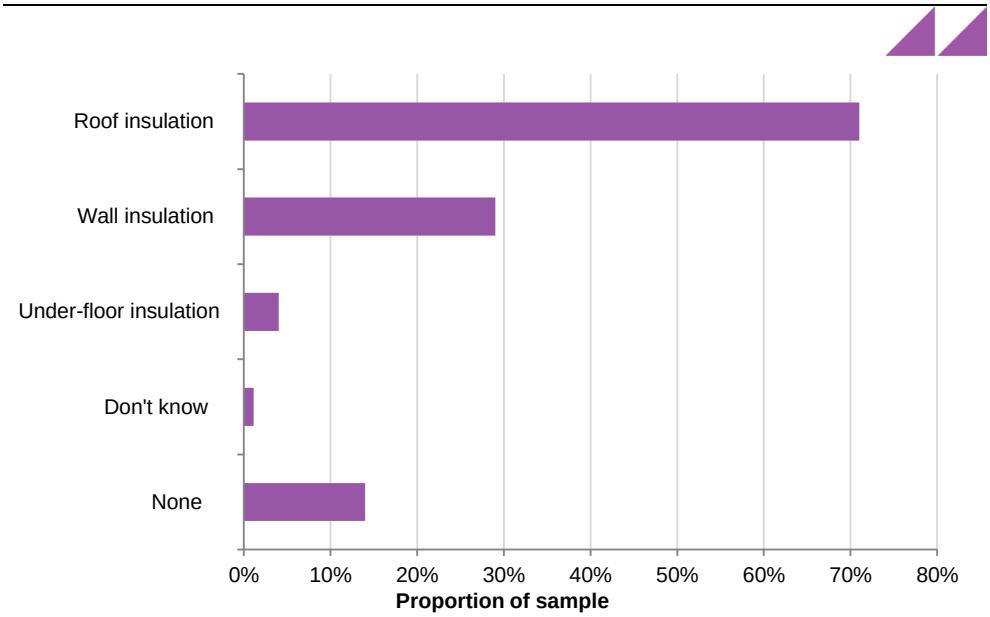


Source: ACIL Allen Consulting

[20] This is shown as a percentage of pool owning households.

Figure 8 shows the uptake of housing efficiency measures reported by survey respondents. Roof insulation exhibited the highest penetration rates. Just over a quarter of households reported having wall insulation, while only four per cent reported under-floor insulation. Thirteen per cent of households said that their home is uninsulated.

Figure 8 **Proportions of households with housing efficiency measures**



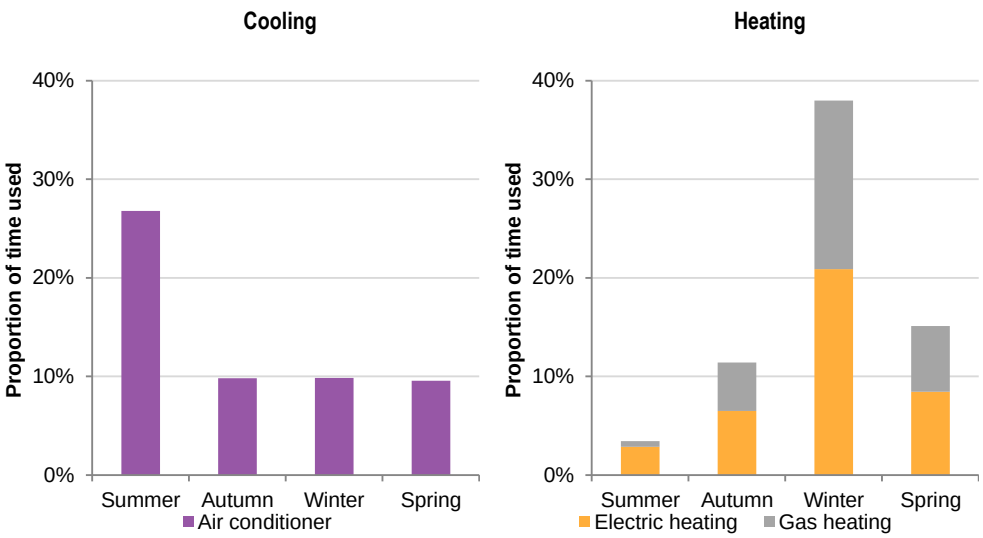
Source: ACIL Allen Consulting

Appliance use

In addition to information on appliance ownership, data on the use of particular appliances and housing features was collected. Figure 9 shows the proportion of time air conditioning was used in addition to the proportion of time that gas or electric heating was used (for customers with the relevant equipment). Figure 9 indicates on average customers with air conditioners use them for approximately 10 per cent of the time in the cooler seasons. This is likely to include the use of reverse cycle units as heaters.[21]

[21] Customers without air conditioners are coded as using it zero times because not having one is equivalent in use terms to having one and not using it, thus the average of those customers with air conditioners is higher. A similar coding was used for use estimates other equipment such as dishwashers, clothes dryers and so on.

Figure 9 **Proportion of time air conditioning, electric heating, and gas heating are used, by season**



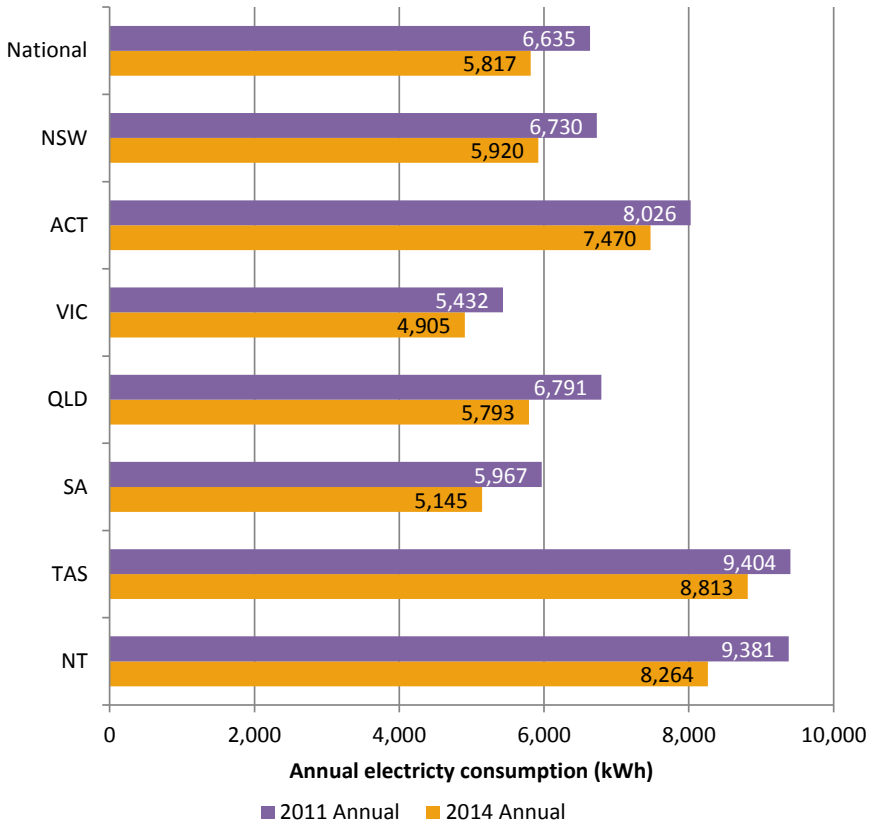
Source: ACIL Allen Consulting

3.4 Comparison with 2011

Reported annual consumption has fallen 12.3 per cent on average between the 2011 survey and the current project as shown in Figure 10. It fell most in Queensland and South Australia where the penetration of PV systems is highest. The penetration of PV panels has increased three fold nationally since the first set of benchmarks was estimated.

As noted earlier, the presence of PVs is ambiguous for while it is associated with decreased electricity consumption and is used in the models, paradoxically it is not directly correlated to metered electricity consumption.

Figure 10 **Annual electricity consumption original (2011) benchmarks survey and current survey (2014)**



Source: ACIL Allen Consulting

Additional analysis of the configuration of houses between surveys showed a range of small but persistent changes. These include increases in the penetration of gas hot water and solar hot water. Customers in the survey turn appliances off at the wall more than they did in 2011 and use electrical heating less. They have more energy saving lights (15 per cent) and more conventional halogen lights (8 per cent).

Dishwasher ownership increased by 4 per cent. There was also a small increase in air conditioner use.

The qualitative factors that correlate most strongly with lower electricity consumption and whose importance increased between surveys are the following:

1. I am concerned about the cost of electricity (87 per cent compared to 73 per cent)
2. I closely monitor and manage my electricity use (69 per cent compared to 66 per cent)
3. I know how much electricity our household uses compared to similar households (55 per cent compared to 44 per cent).

4 Results

This chapter provides an overview of the results. It is presented on a jurisdiction by jurisdiction basis. Therefore:

- section 4.1 provides results for Queensland
- section 4.2 provides results for New South Wales
- section 4.3 provides results for the Australian Capital Territory
- section 4.4 provides results for Victoria
- section 4.5 provides results for Tasmania
- section 4.6 provides results for South Australia
- section 4.7 provides results for the Northern Territory.

Each section provides a summary of both the 'website' and 'benchmarks' models described in section 2.1.3 above. The benchmarks provided in this chapter are applicable at the state/ territory level. Zone level benchmarks were supplied to the AER in a spreadsheet accompanying this report.

Each of the following sections contains three tables, providing:

- the website model
- the benchmarks models, controlling for gas and then without controlling for gas
- typical electricity use for customers with and without gas connections and swimming pools.

Generally, the website and benchmark models are as expected. In particular:

1. The variables are specified so that positive coefficients would be expected for all variables except the presence of a solar panel. In most cases the coefficients have the expected sign, though there are some exceptions
2. Most coefficients are statistically significant. Coefficients that are not significant at the ten per cent level are marked in the tables below, though they are kept in the model for consistency
3. The explanatory power of the models is broadly as expected. The details vary between models, but generally:
    a) The benchmark models account for approximately one third of the variation in household electricity consumption when household size, the presence of gas and the presence of a swimming pool is taken into account
    b) The website models account for around half of the variation in electricity use.

The presentation of the models in each section has the same structure with only the actual results changing. The methodology and interpretation of each model is summarised in section 2.2.

The coefficients on the household size variables are not linear in either the website or benchmark models.

In general, we would expect electricity consumption to rise with the number of people in a household, though not necessarily in a linear fashion.

The most obvious non-linearity occurs between single person households and others. Single person households differ from multi- person households in a number of ways but in

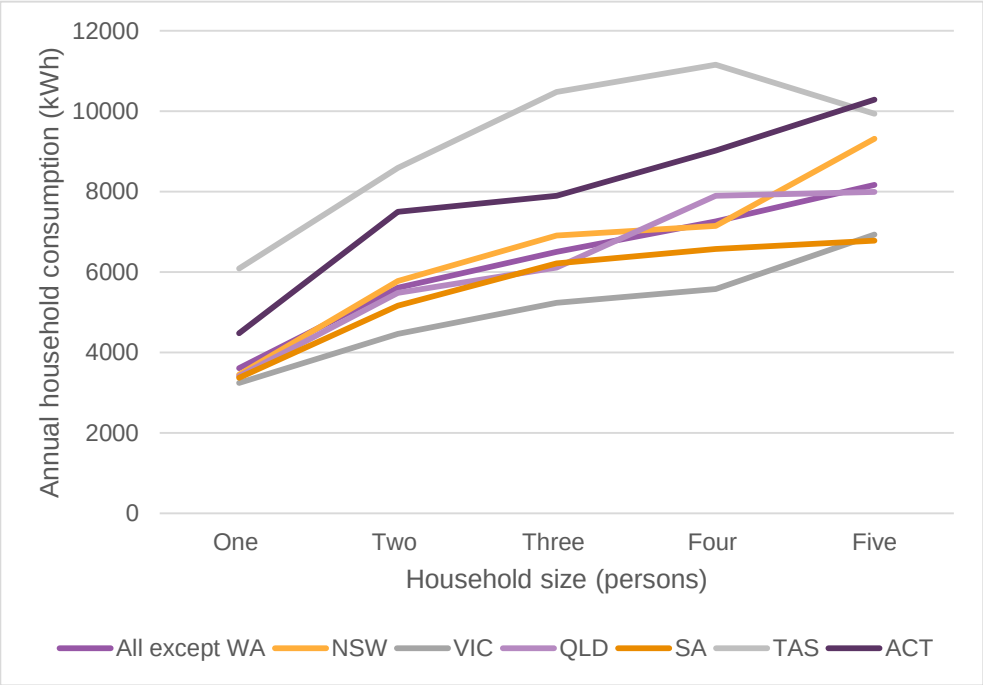
particular, they are less likely to have swimming pools and equipment such as dishwashers and tablets.

Beyond that, at the national level average consumption is more or less linear from two to five person households.

However, the pattern is more complex at the state level, where sample sizes are smaller and there are some non-linearities in consumption as household size changes.

This can be seen in the low rise of consumption in Queensland between two and three person households and a jump to four. Similarly, average consumption in the New South Wales and Victorian samples show a small increase between three and four person households and a jump to five person households. In Tasmania's case, there is a very big jump to four person households and then a *fall* to five person households. To some extent these will be due to sampling issues as while the total sample is large, the number of households of a particular size, in particular the larger sizes, in the smaller jurisdictions is limited.

Figure 11 **Household electricity consumption at different household sizes**



Source: ACIL Allen Consulting

4.1 Queensland

Table 1 **Website model - Queensland**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-382.8	-292.9	-193.6	-256.2
Household size N=2	133.2	215.1	300.0	228.4
Household size N=3	242.6	350.0	438.3	354.9
Household size N=4	426.6	603.1	750.2	592.3
Household size N=5	421.1	660.0	731.2	588.5
Total rooms in house	17.6*	12.2*	7.6*	18.6*
Electric hot water	273.8	363.7	439.0	336.9
AC use % time	10.4	4.1	2.4	6.6
Operating TVs	105.4	100.8	50.1	90.1
Swimming pool	557.2	442.3	369.1	438.4
Electric heating use % time	-4.1	-2*	-1.5*	-4.6
Dishwasher - times used in week	22.5	6.9*	22.9	7.7*
Solar powered electricity generation	-484.4	-292.0	-245.0	-399.9
Refrigerators - number	197.5	128.0	91.2	135.2
% of time appliances left on at wall	1.3	0.8*	1*	1.2
Electric cook top	80.1*	-42.6*	63.7*	12.3*
Computers - number	72.2	34.3*	39*	24.5*
Washing machine - times used in week	-9.7*	0.7*	-2.1*	-5*
Separate house	293.5	250.6	250.6	197.7
Computer use - total time all computers	1.8	1.5	0.9*	1.1
Clothes dryer - times used in week	51.5	43.5	32.0	43.9
Hours TVs on during the week	0.9*	1.1*	1.3*	2.1
Electric oven	-52.3*	128.5	57.7*	-33.1*
Adjusted R-squared	0.55	0.473	0.435	0.486

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 3 **Queensland benchmarks model – controlling for gas**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	884.1	825.7	855.0	783.9
2 person household	447.6	436.6	480.5	459.5
3 person household	590.5	619.4	637.2	600.5
4 person household	963.2	995.9	1076.4	961.1
5 person household	1101.1	1168.3	1153.8	1084.0
Mains gas connected & 1 person	-279.2*	-348.8	-361.5	-264.7*
Mains gas connected & 2 person	-201.3*	-253.4	-398.8	-334.5
Mains gas connected & 3 person	36.5*	-217.6*	-235.8*	17.3*
Mains gas connected & 4 person	323.8*	-21.8*	-214.5*	186.7*
Mains gas connected & 5 person	-600.8	-852.9	-884.3	-668.8
Swimming pool	727.5	557.4	454.6	535.6
Adjusted R-squared	0.271	0.32	0.317	0.287

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 4 **Queensland benchmarks model – not controlling for gas**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	858.1	793.1	820.8	758.8
2 person household	447.9	436.5	464.0	442.4
3 person household	619.4	620.1	636.0	625.0
4 person household	1030.6	1021.6	1076.0	1007.6
5 person household	1046.0	1085.9	1067.4	1017.9
Swimming pool	739.6	574.3	478.1	553.5
Adjusted R-squared	0.267	0.307	0.295	0.277

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 5 **Typical electricity use of Queensland households by size, swimming pool and gas connection – kWh per annum**

Season	Household size (persons)				
	1	2	3	4	5
	kWh	kWh	kWh	kWh	kWh
Neither gas nor pool					
Summer	884	1332	1475	1847	1985
Autumn	826	1262	1445	1822	1994
Winter	855	1336	1492	1931	2009
Spring	784	1243	1384	1745	1868
Gas but no pool					
Summer	605	1130	1511	2171	1384
Autumn	477	1009	1227	1800	1141
Winter	494	937	1256	1717	1125
Spring	519	909	1402	1932	1199
Pool but no gas					
Summer	1612	2059	2202	2575	2713
Autumn	1383	1820	2002	2379	2551
Winter	1310	1790	1947	2386	2463
Spring	1319	1779	1920	2281	2403
Both pool and gas					
Summer	1332	1858	2239	2899	2112
Autumn	1034	1566	1785	2357	1698
Winter	948	1391	1711	2172	1579
Spring	1055	1444	1937	2467	1735
No pool and no control for gas					
Summer	858	1306	1477	1889	1904
Autumn	793	1230	1413	1815	1879
Winter	821	1285	1457	1897	1888
Spring	759	1201	1384	1766	1777
Pool and no control for gas					
Summer	1598	2046	2217	2628	2644
Autumn	1367	1804	1988	2389	2453
Winter	1299	1763	1935	2375	2366
Spring	1312	1755	1937	2320	2330

Source: ACIL Allen Consulting

4.2 New South Wales

Table 6 **Website model - New South Wales**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-573.4	-493.8	-648.1	-486.8
Household size N=2	152.7	243.1	320.3	208.0
Household size N=3	294.2	443.9	566.6	418.0
Household size N=4	319.7	472.5	717.4	503.4
Household size N=5	607.1	773.2	1108.5	864.8
Total rooms in house	50.3	47.2	62.0	37.8
Electric hot water	353.6	405.1	459.7	399.3
AC use % time	6.9	2.3	3.4	2.5
Operating TVs	115.1	65.0	51.8*	107.5
Swimming pool	572.0	398.2	440.3	475.1
Electric heating use % time	-0.8*	-1.7*	0.9*	-0.2*
Dishwasher - times used in week	10.5*	22.7	42.1	16.6*
Solar powered electricity generation	-253.0	-250.5	-229.9	-298.4
Refrigerators - number	152.2	158.0	96.5*	144.3
% of time appliances left on at wall	2.2	2.7	2.7	2.1
Electric cook top	33.2*	153.9	185.6	107.6
Computers - number	7.3*	-27.7*	40.7*	15.2*
Washing machine - times used in week	30.4	5.3*	-7.5*	5.9*
Separate house	156.5	223.3	180.0	197.4
Computer use - total time all computers	0.8*	1.6	0.8*	1.9
Clothes dryer - times used in week	-21.5	4.5*	26.3*	6*
Hours TVs on during the week	0.3*	-0.2*	1.3*	-0.2*
Electric oven	136.6	99.5*	230.5	90.4*
Adjusted R-squared	0.546	0.464	0.42	0.475

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 7 **New South Wales benchmarks model – controlling for gas**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	806.2	883.3	955.9	817.0
2 person household	570.0	604.9	736.6	562.8
3 person household	890.0	894.3	1179.1	893.6
4 person household	977.0	925.4	1366.3	1005.6
5 person household	1515.5	1426.0	1925.3	1575.3
Mains gas connected & 1 person	5*	-138.5*	-76.6*	-76.7*
Mains gas connected & 2 person	-281.9	-471.2	-424.5	-356.8
Mains gas connected & 3 person	-360.5	-516.1	-719.3	-412.2
Mains gas connected & 4 person	-481.4	-489.6	-699.3	-437.9
Mains gas connected & 5 person	-522.6	-560.9	-665.5	-492.1
Swimming pool	801.8	621.7	721.8	683.8
Adjusted R-squared	0.331	0.306	0.298	0.322

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 8 **New South Wales benchmarks model – not controlling for gas**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	808.8	827.0	925.2	786.0
2 person household	461.8	483.2	608.0	459.3
3 person household	746.2	747.6	926.9	762.6
4 person household	727.6	730.6	1038.4	812.1
5 person household	1275.6	1227.4	1654.1	1382.8
Swimming pool	788.2	607.6	702.1	671.3
Adjusted R-squared	0.299	0.247	0.249	0.286

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 9 **Typical electricity use of New South Wales households by size, swimming pool and gas connection – kWh per annum**

Season	Household size (persons)				
	1	2	3	4	5
	kWh	kWh	kWh	kWh	kWh
			Neither gas nor pool		
Summer	806	1376	1696	1783	2322
Autumn	883	1488	1778	1809	2309
Winter	956	1692	2135	2322	2881
Spring	817	1380	1711	1823	2392
			Gas but no pool		
Summer	811	1094	1336	1302	1799
Autumn	745	1017	1261	1319	1748
Winter	879	1268	1416	1623	2216
Spring	740	1023	1298	1385	1900
			Pool but no gas		
Summer	1608	2178	2498	2585	3124
Autumn	1505	2110	2399	2430	2931
Winter	1678	2414	2857	3044	3603
Spring	1501	2064	2394	2506	3076
			Both pool and gas		
Summer	1613	1896	2138	2104	2601
Autumn	1366	1639	1883	1941	2370
Winter	1601	1990	2137	2345	2937
Spring	1424	1707	1982	2068	2584
			No pool and no control for gas		
Summer	809	1271	1555	1536	2084
Autumn	827	1310	1575	1558	2054
Winter	925	1533	1852	1964	2579
Spring	786	1245	1549	1598	2169
			Pool and no control for gas		
Summer	1597	2059	2343	2325	2873
Autumn	1435	1918	2182	2165	2662
Winter	1627	2235	2554	2666	3281
Spring	1457	1917	2220	2269	2840

Source: ACIL Allen Consulting

4.3 Australian Capital Territory

Table 10 **Website model - Australian Capital Territory**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-1410.8	-1434.9	-928.3*	-1582.8
Household size N=2	156.4*	632.5*	252.5*	97.7*
Household size N=3	226.1*	524.9*	400.1*	211.3*
Household size N=4	477.5	1043.3	438.3*	415.9*
Household size N=5	342.8*	1001.9*	940.3*	79.1*
Total rooms in house	25.3*	167.4	134.6	65.9*
Electric hot water	409.9	882.5	1070.3	690.2
AC use % time	5.8	-1.3*	-3.3*	4.3*
Operating TVs	125.5*	39.9*	52.5*	108.1*
Swimming pool	410.8*	139.9*	-39.2*	68.2*
Electric heating use % time	1*	7.5*	9.5*	0.9*
Dishwasher - times used in week	34.5*	-13.6*	-18.7*	16*
Solar powered electricity generation	-2.9*	-26.5*	703.1	279.6*
Refrigerators - number	371.4	383.1*	360.6*	307.8
% of time appliances left on at wall	5.0	2.5*	3.1*	5.6
Electric cook top	-93.1*	264.3*	-201.7*	-127.9*
Computers - number	169.5	65.8*	215.9*	192.9
Washing machine - times used in week	58.5	77.1*	55.6*	95.8
Separate house	26.1*	-149*	11.7*	-78.8*
Computer use - total time all computers	0.7*	-3.1*	-2.4*	2*
Clothes dryer - times used in week	-12.7*	6.6*	71.8*	6.3*
Hours TVs on during the week	2*	5.6*	3.8*	-0.5*
Electric oven	355.6	-306.4*	-128.9*	310*
Adjusted R-squared	0.431	0.201	0.269	0.350

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 11 **Benchmarks model - Australian Capital Territory**

Variable	Summer	Autumn	Winter	Spring
Constant	890.7	1078.3	1757.3	1111.3
2 person household	470.4*	588.7*	301.1*	185.7*
3 person household	840.3	1435.4	1146.6	1055.8
4 person household	1208.8	3425.7	2167.7	1503.5
5 person household	1568.3	2671.7	2256.0	1912.7
Mains gas connected & 1 person	-91.5*	-125.6*	-621.9*	-311.7*
Mains gas connected & 2 person	101.1*	256.5*	252.8*	317.6*
Mains gas connected & 3 person	-180.4*	-995.3	-774.4*	-632.6*
Mains gas connected & 4 person	-310.6*	-2690.0	-1915.1	-786.8*
Mains gas connected & 5 person	-440.5*	-1562.3*	-981.6*	-1123.6*
Swimming pool	646.0	826.4	601.3*	489.7*
Adjusted R-squared	0.133	0.186	0.131	0.114

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 12 **Benchmarks model - Australian Capital Territory**

Variable	Summer	Autumn	Winter	Spring
Constant	848.9	1029.6	1468.6	967.6
2 person household	600.1	873.3	810.0	603.8
3 person household	780.0	922.0	996.7	841.2
4 person household	1018.2	1461.5	1019.6	1058.0
5 person household	1267.6	1514.1	1782.2	1182.3
Swimming pool	630.3	684.5*	558.8*	453.7*
Adjusted R-squared	0.157	0.09	0.08	0.098

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 13 **Typical electricity use of Australian Capital Territory households by size, swimming pool and gas connection – kWh per annum**

Season	Household size (persons)				
	1	2	3	4	5
	kWh	kWh	kWh	kWh	kWh
Neither gas nor pool					
Summer	891	1361	1731	2100	2459
Autumn	1078	1667	2514	4504	3750
Winter	1757	2058	2904	3925	4013
Spring	1111	1297	2167	2615	3024
Gas but no pool					
Summer	799	1462	1551	1789	2019
Autumn	953	1924	1518	1814	2188
Winter	1135	2311	2130	2010	3032
Spring	800	1615	1535	1828	1900
Pool but no gas					
Summer	1537	2007	2377	2745	3105
Autumn	1905	2493	3340	5330	4576
Winter	2359	2660	3505	4526	4615
Spring	1601	1787	2657	3104	3514
Both pool and gas					
Summer	1445	2108	2197	2435	2665
Autumn	1779	2750	2345	2640	3014
Winter	1737	2912	2731	2611	3633
Spring	1289	2104	2024	2318	2390
No pool and no control for gas					
Summer	849	1449	1629	1867	2117
Autumn	1030	1903	1952	2491	2544
Winter	1469	2279	2465	2488	3251
Spring	968	1571	1809	2026	2150
Pool and no control for gas					
Summer	1479	2079	2259	2497	2747
Autumn	1714	2587	2636	3176	3228
Winter	2027	2837	3024	3047	3810
Spring	1421	2025	2263	2479	2604

Source: ACIL Allen Consulting

4.4 Victoria

Table 14 **Website model - Victoria**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-404.3	-311.0	-324.6	-205.3
Household size N=2	73.2*	84*	8.6*	21.1*
Household size N=3	-8.8*	84.5*	126.8*	29.7*
Household size N=4	38.8*	201.4	71.2*	53.8*
Household size N=5	126.7*	346.9	215.7*	220.4
Total rooms in house	56.0	47.3	73.9	43.5
Electric hot water	222.8	309.3	554.9	347.0
AC use % time	3.9	2.0	1.7*	1.4
Operating TVs	57.0	85.2	17.9*	37.9
Swimming pool	531.5	394.0	172.7*	403.5
Electric heating use % time	0.2*	2.6*	5.1*	2.8*
Dishwasher - times used in week	48.5	48.9	55.4	47.8
Solar powered electricity generation	-256.7	-123.7	-94.8*	-160.0
Refrigerators - number	182.9	186.2	162.0	124.5
% of time appliances left on at wall	0.9	0.6*	0.8*	0.7*
Electric cook top	298.3	357.9	462.2	309.6
Computers - number	89.8	65.2	110.5	72.3
Washing machine - times used in week	-0.6*	9.5*	10.4*	5.5*
Separate house	103.3	31.1*	72.9*	93.1
Computer use - total time all computers	1.5	1.5	2.3	1.4
Clothes dryer - times used in week	34.4	29.3	28.2*	35.0
Hours TVs on during the week	-0.8*	-0.8*	-1.1*	-0.2*
Electric oven	-18*	44.1*	33*	0.3*
Adjusted R-squared	0.554	0.433	0.292	0.454

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 15 **Victorian benchmarks model – controlling for gas**

Variable	Summer	Autumn	Winter	Spring
Constant	841.4	1065.8	1493.9	1053.9
2 person household	522.4	350.2	334.3*	227.1
3 person household	668.1	686.8	1014.2	555.6
4 person household	244*	535.9	166.7*	224.2*
5 person household	1055.1	1419.4	907.6*	1923.2
Mains gas connected & 1 person	-170.3*	-364.2	-636.0	-419.1
Mains gas connected & 2 person	-376.5	-375.0	-670.2	-388.4
Mains gas connected & 3 person	-532.9	-669.3	-1215.3	-668.5
Mains gas connected & 4 person	145.3*	-219.2*	-152.4*	-138.4*
Mains gas connected & 5 person	-448*	-793.7	-625.1*	-1599.5
Swimming pool	950.8	812.4	641.5	764.9
Adjusted R-squared	0.249	0.226	0.15	0.249

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 16 **Victorian benchmarks model – not controlling for gas**

Variable	Summer	Autumn	Winter	Spring
Constant	702.2	767.2	972.5	710.5
2 person household	342.3	330.7	287.1	241.3
3 person household	395.4	467.6	595.1	382.6
4 person household	520.0	633.5	550.5	442.4
5 person household	769.5	962.6	837.5	742.2
Swimming pool	927.5	788.5	601.2	731.6
Adjusted R-squared	0.22	0.189	0.083	0.177

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 17 **Typical electricity use of Victoria households by size, swimming pool and gas connection – kWh per annum**

Season	Household size (persons)				
	1	2	3	4	5
	kWh	kWh	kWh	kWh	kWh
Neither gas nor pool					
Summer	841	1364	1509	1085	1897
Autumn	1066	1416	1753	1602	2485
Winter	1494	1828	2508	1661	2402
Spring	1054	1281	1609	1278	2977
Gas but no pool					
Summer	671	987	977	1231	1449
Autumn	477	989	840	866	1103
Winter	858	1158	1293	1508	1776
Spring	635	892	941	1140	1378
Pool but no gas					
Summer	1792	2315	2460	2036	2847
Autumn	1878	2228	2565	2414	3298
Winter	2135	2470	3150	2302	3043
Spring	1819	2046	2374	2043	3742
Both pool and gas					
Summer	1622	1938	1927	2182	2399
Autumn	1290	1801	1653	1679	1915
Winter	1499	1799	1934	2150	2418
Spring	1400	1657	1706	1905	2143
No pool and no control for gas					
Summer	702	1045	1098	1222	1472
Autumn	767	1098	1235	1401	1730
Winter	973	1260	1568	1523	1810
Spring	710	952	1093	1153	1453
Pool and no control for gas					
Summer	1630	1972	2025	2150	2399
Autumn	1556	1886	2023	2189	2518
Winter	1574	1861	2169	2124	2411
Spring	1442	1683	1825	1884	2184

Source: ACIL Allen Consulting

4.5 Tasmania

Table 18 **Website model - Tasmania**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-716.4*	-1607.7	-776.5*	-886.5*
Household size N=2	208.9*	307.7*	143.1*	94.5*
Household size N=3	173.6*	612.6	470*	304.9*
Household size N=4	673.6	713.6	841.2	964.7
Household size N=5	399.5	656.8	583.2*	429.2*
Total rooms in house	25.6*	12.1*	-1.5*	15.3*
Electric hot water	393.5	454.9	937.4	636.7
AC use % time	7.8	10.4	10.4*	12.5
Operating TVs	55.7*	133.2*	180.1	65.8*
Swimming pool	858.6	2497.6	1512.4	643.2*
Electric heating use % time	0.3*	17.4	13.3*	4*
Dishwasher - times used in week	2.8*	75.3	68.7	30.8*
Solar powered electricity generation	-357.0	-136.4*	-120.9*	-497.1
Refrigerators - number	266.1	150.4*	213.6*	255.3
% of time appliances left on at wall	3.5	4.2*	6.5	6.1
Electric cook top	43.8*	-193*	-333.3*	58.7*
Computers - number	145.9	274.7	127.5*	80.5*
Washing machine - times used in week	13.2*	-41.3*	26.6*	28.1*
Separate house	316.0	-39.3*	315.2*	398*
Computer use - total time all computers	-0.5*	1*	-2.1*	-1.1*
Clothes dryer - times used in week	70.9	137.5	56.6*	68.9*
Hours TVs on during the week	-0.1*	-1.4*	4*	4.1*
Electric oven	59*	1563.9	735.2*	245.1*
Adjusted R-squared	0.405	0.447	0.273	0.261

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 19 **Tasmanian benchmarks model – controlling for gas**

Variable	Summer	Autumn	Winter	Spring
Constant	1045.5	1374.9	2175.1	1586.8
2 person household	494.7	807.2	624.6	440.8
3 person household	616.6	1130.8	1152.0	858.5
4 person household	1128.8	1307.6	1667.2	1487.6
5 person household	888.6	1350.4	1347.9	1065.7
Mains gas connected & 1 person	-629.5*	-917.9*	-1683.1*	-1097.8*
Mains gas connected & 2 person	-675*	-1835.7	-1344.0	-843.1*
Mains gas connected & 3 person	-280.8*	-747.3*	-718.5*	-112.8*
Mains gas connected & 4 person	-996.0	-1446.6	-2072.5	-1497.7
Mains gas connected & 5 person	-1218.1	-1609.3	-1752*	-1562.5
Swimming pool	1532.4	3835.2	2499.0	1462.0
Adjusted R-squared	0.244	0.311	0.188	0.153

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 20 **Tasmanian benchmarks model – not controlling for gas**

Variable	Summer	Autumn	Winter	Spring
Constant	1031.4	1354.4	2137.5	1562.2
2 person household	479.3	748.3	603.4	428.8
3 person household	612.9	1105.8	1139.9	881.5
4 person household	1013.8	1142.9	1435.9	1317.8
5 person household	725.5	1136.9	1130.7	863.0
Swimming pool	1451.5	3593.5	2346.3	1354.8
Adjusted R-squared	0.207	0.263	0.145	0.126

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 21 **Typical electricity use of Tasmania households by size, swimming pool and gas connection – kWh per annum**

Season	Household size (persons)				
	1	2	3	4	5
	kWh	kWh	kWh	kWh	kWh
Neither gas nor pool					
Summer	1046	1540	1662	2174	1934
Autumn	1375	2182	2506	2682	2725
Winter	2175	2800	3327	3842	3523
Spring	1587	2028	2445	3074	2653
Gas but no pool					
Summer	416	865	1381	1178	716
Autumn	457	346	1758	1236	1116
Winter	492	1456	2609	1770	1771
Spring	489	1184	2333	1577	1090
Pool but no gas					
Summer	2578	3073	3195	3707	3467
Autumn	5210	6017	6341	6518	6561
Winter	4674	5299	5826	6341	6022
Spring	3049	3490	3907	4536	4115
Both pool and gas					
Summer	1948	2398	2914	2711	2248
Autumn	4292	4182	5594	5071	4951
Winter	2991	3955	5108	4269	4270
Spring	1951	2646	3795	3039	2552
No pool and no control for gas					
Summer	1031	1511	1644	2045	1757
Autumn	1354	2103	2460	2497	2491
Winter	2137	2741	3277	3573	3268
Spring	1562	1991	2444	2880	2425
Pool and no control for gas					
Summer	2483	2962	3096	3497	3208
Autumn	4948	5696	6054	6091	6085
Winter	4484	5087	5624	5920	5614
Spring	2917	3346	3799	4235	3780

Source: ACIL Allen Consulting

4.6 South Australia

Table 22 **Website model - South Australia**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-409.0	-199.3*	-441.1	-333.4
Household size N=2	173.3	116*	129.4*	88.2*
Household size N=3	241.0	184.3*	311.8	246.0
Household size N=4	163.5*	163.3*	175.7*	273.8
Household size N=5	-104.8*	-549.0	121.1*	177.3*
Total rooms in house	78.8	59.3	75.9	53.4
Electric hot water	189.0	53.5*	322.7	283.3
AC use % time	4.5	1.4*	0.9*	0.6*
Operating TVs	46.8*	20.6*	41.9*	33.1*
Swimming pool	747.2	682.1	633.0	534.1
Electric heating use % time	3.2*	6.2	5.9	2.7*
Dishwasher - times used in week	29.6	35.2	45.1	32.9
Solar powered electricity generation	-464.2	-270.4	-219.2	-338.7
Refrigerators - number	109.8	92.5	139.2	166.3
% of time appliances left on at wall	1.1*	0.5*	1.1*	0.8*
Electric cook top	54.6*	113.3*	146.7*	117.4*
Computers - number	142.0	84.4	135.0	75.5
Washing machine - times used in week	-3*	-7.7*	14.1*	-3.4*
Separate house	104*	143.8	101*	123*
Computer use - total time all computers	0.4*	2.0	1.5*	0.9*
Clothes dryer - times used in week	57.0	54.4	78.2	62.0
Hours TVs on during the week	1.1*	1*	0*	1.2*
Electric oven	93.8*	38*	143.8*	131.3
Adjusted R-squared	0.442	0.327	0.387	0.439

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 23 **South Australian benchmarks model – controlling for gas**

Variable	Summer	Autumn	Winter	Spring
Constant	1000.0	874.0	1246.7	1016.1
2 person household	582.0	423.0	664.5	432.3
3 person household	597.2	410.6	727.4	454.0
4 person household	667.3	496.9	678.7	744.7
5 person household	2076.7	23.8*	1366.6	1274.1
Mains gas connected & 1 person	-227.8	-221.6	-530.4	-477.8
Mains gas connected & 2 person	-420.6	-331.0	-794.3	-602.9
Mains gas connected & 3 person	56*	23.4*	-281.8*	-142*
Mains gas connected & 4 person	-109.9*	-87.5*	-356.9	-543.4
Mains gas connected & 5 person	-1761.2	-175.6*	-873.7*	-961.4
Swimming pool	890.7	778.3	775.7	640.7
Adjusted R-squared	0.266	0.188	0.265	0.309

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 24 **South Australian benchmarks model – not controlling for gas**

Variable	Summer	Autumn	Winter	Spring
Constant	873.9	750.5	951.4	750.1
2 person household	449.9	340.0	465.5	323.4
3 person household	761.7	549.6	841.1	629.0
4 person household	735.6	567.9	760.8	682.8
5 person household	627.7	-9.4*	881.3	678.3
Swimming pool	835.4	771.8	746.2	615.2
Adjusted R-squared	0.227	0.173	0.182	0.204

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 25 **Typical electricity use of South Australia households by size, swimming pool and gas connection – kWh per annum**

Season	Household size (persons)				
	1	2	3	4	5
	kWh	kWh	kWh	kWh	kWh
Neither gas nor pool					
Summer	1000	1582	1597	1667	3077
Autumn	874	1297	1285	1371	898
Winter	1247	1911	1974	1925	2613
Spring	1016	1448	1470	1761	2290
Gas but no pool					
Summer	772	1161	1653	1558	1315
Autumn	652	966	1308	1283	722
Winter	716	1117	1692	1569	1740
Spring	538	845	1328	1217	1329
Pool but no gas					
Summer	1891	2473	2488	2558	3967
Autumn	1652	2075	2063	2149	1676
Winter	2022	2687	2750	2701	3389
Spring	1657	2089	2111	2402	2931
Both pool and gas					
Summer	1663	2052	2544	2448	2206
Autumn	1431	1744	2086	2062	1501
Winter	1492	1893	2468	2344	2515
Spring	1179	1486	1969	1858	1969
No pool and no control for gas					
Summer	874	1324	1636	1609	1502
Autumn	751	1090	1300	1318	741
Winter	951	1417	1793	1712	1833
Spring	750	1073	1379	1433	1428
Pool and no control for gas					
Summer	1709	2159	2471	2445	2337
Autumn	1522	1862	2072	2090	1513
Winter	1698	2163	2539	2458	2579
Spring	1365	1689	1994	2048	2044

Source: ACIL Allen Consulting

4.7 Northern Territory

Table 26 **Website model - Northern Territory**

Variable	Summer	Autumn	Winter	Spring
	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-351.3*	-411.9*	-63.2*	-354.9*
Household size N=2	61*	722.4	471.2	285.8*
Household size N=3	44.8*	615.9*	196*	179.4*
Household size N=4	-172*	106.3*	311.7*	67.7*
Household size N=5	230.9*	1616.8	608.8*	644.1*
Total rooms in house	11.1*	11*	-10.5*	8.5*
Electric hot water	254.1*	449.4	419.9	364.2
AC use % time	12.4	11.2	6.8	10.8
Operating TVs	-19.2*	41.9*	59.9*	-43.6*
Swimming pool	433.7	906.7	628.2	685.0
Electric heating use % time	-6.5*	21.2*	0.6*	8.4*
Dishwasher - times used in week	47.7*	-52.4*	7*	-5.7*
Solar powered electricity generation	-522.5	-434.3*	-496.8	-535.0
Refrigerators - number	294.1	392.5	199.0	361.9
% of time appliances left on at wall	4.6	2.5*	-0.1*	3.1*
Electric cook top	107.2*	-105.8*	-121.8*	-25.1*
Computers - number	72.2*	-78.1*	86.6*	-13.6*
Washing machine - times used in week	43.3*	30.8*	20.3*	29.1*
Separate house	438.3	-116.1*	197.4*	277.5*
Computer use - total time all computers	-1.7*	-0.6*	-0.4*	-0.1*
Clothes dryer - times used in week	134.9	48.9*	43.7*	44.6*
Hours TVs on during the week	9.1	2.9*	1.4*	10.6
Electric oven	-461.0	-124.1*	-42.5*	-309.3*
Adjusted R-squared	0.533	0.437	0.443	0.491

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 27 **Northern Territory (pooled data) benchmarks model – not controlling for gas**

Variable	Summer	Autumn	Winter	Spring
Constant	949.8	793.1	800.0	969.4
2 person household	812.8	960.2	724.4	781.0
3 person household	1106.5	813.3	565.4	756.0
4 person household	1265.5	824.7	887.9	981.1
5 person household	2207.4	2350.0	1517.5	1833.2
Swimming pool	427.9	710.7	591.7	507.5
Adjusted R-squared	0.533	0.437	0.443	0.491

Note: Coefficients marked with * were not statistically significant at the 10% level.
Source: ACIL Allen Consulting

Table 28 **Typical electricity use of Northern Territory households by size, swimming pool and gas connection – kWh per annum**

Season	Household size (persons)				
	1	2	3	4	5
	kWh	kWh	kWh	kWh	kWh
			No pool		
Summer	950	1763	2056	2215	3157
Autumn	793	1753	1606	1618	3143
Winter	800	1524	1365	1688	2318
Spring	969	1750	1725	1951	2803
			Pool		
Summer	1378	2191	2484	2643	3585
Autumn	1504	2464	2317	2328	3854
Winter	1392	2116	1957	2280	2909
Spring	1477	2258	2233	2458	3310

Source: ACIL Allen Consulting

5 Conclusion

For benchmarks to be effective in reducing customers' electricity use they must be accurate and simple.

The explanatory power of the benchmarks is improved by adopting different benchmarks each season. This introduces the problem of 'billing lag' because electricity meters are read progressively and thus do not align to seasons neatly.

Further, as more factors are added to a benchmark, or as a customer's 'group' is defined more precisely, the benchmark becomes more accurate but less simple. Choosing the appropriate number of factors is a trade-off between these two competing objectives.

The benchmarks we have estimated are the average consumption for households in 'groups' where the groups are defined by reference to:

- household size
- connection to mains gas
- presence of a swimming pool.

In all cases we recommend that benchmarks be calculated, and presented on bills, based on the assumption that the householder does not have a swimming pool. Swimming pools are associated with substantially increased electricity use, but only a small proportion of households have them. If the benchmarks were calculated without controlling for swimming pools, householders with swimming pools would be set benchmarks that are well below what they use on average. On the other hand, the benchmarks would give households without swimming pools unnecessary 'head room' in the benchmarks.

The ideal approach in relation to a gas connection is less clear as more people have gas connected than have swimming pools. Ideally customers would have access to a benchmark that corresponds with whether or not they have gas connected. This could be achieved by printing both the 'gas' and 'no gas' benchmarks on the bills. It could also be achieved by ensuring that bills sent to individual customers with gas show the 'gas' benchmarks and bills sent to customers without gas show the 'no gas' benchmark.

Both approaches have drawbacks. The first approach would double the space required to print benchmarks on the retail bills and the second would add complexity for the retailers, who must already choose the correct benchmark for the customer's localised zone (postcode) and would then also need to determine whether each customer has a gas connection. This would be especially problematic for customers who have different retailers for electricity and gas.

Appendix A Household Questionnaire

S1

How long have you lived at your current address?

- ❍ Less than a year (1) – screen out
- ❍ 1 year but less than 2 years (2)
- ❍ 2 to 5 years (3)
- ❍ More than 5 years (4)

S1b

Has this house been occupied by you for most of the year – normal vacations etc excepted?

- ❍ No – screen out
- ❍ Yes

S2

Do you contribute to paying the electricity bill and/or decisions about using electricity?

- ❍ Yes (1)
- ❍ No (2) – screen out

S3

Do you have your last electricity bill in front of you? We need to ask you a couple of questions about your bill. This should be the bill for the place you live. Please answer all questions about the place you live.

If you do not have your bill handy, please close your browser. Once you have your bill you will be able to click on the survey link and return to the survey.

Selecting "No" below will terminate the survey.

- ❍ Yes (1)
- ❍ No (2) – screen out

S3b

To make sure we survey a good cross-section of Australian households, we need to ask a few questions about you. In which state do you live?

- ❍ NSW (1)
- ❍ VIC (2)
- ❍ QLD (3)
- ❍ SA (4)
- ❍ WA (5)
- ❍ TAS (6)
- ❍ ACT (7)
- ❍ NT (8)

D1

What best describes where you live?

- ❍ Rural/not in a town or city (1)
- ❍ Small regional centre (2)
- ❍ Major regional centre (3)
- ❍ State capital city (4)

D2

What is your gender?

- ❍ Male (1)
- ❍ Female (2)

D3

Into which of these age groups do you fall?

- ❍ 18-19 years (1)
- ❍ 20-29 years (2)
- ❍ 30-39 years (3)
- ❍ 40-44 years (4)
- ❍ 45-54 years (5)
- ❍ 55-64 years (6)
- ❍ 65-79 years (7)
- ❍ 80+ years (8)

B38

How many people live in the house (Total number including you. Include all adults, children, infants irrespective of relationships) (1)

D4

What is the highest level of education that you have completed?

- ❍ Did not attend highest level of secondary school available (1)
- ❍ Attended highest level of secondary school available (2)
- ❍ Trade certificate or apprenticeship (3)
- ❍ Other certificate or diploma (4)
- ❍ Other post school qualification (5)
- ❍ Bachelor's degree (6)
- ❍ Post graduate degree (7)
- ❍ Other (specify) (8)_____

S4 - S4

Do you have solar panels that generate electricity that you use in your house?

- ❍ Yes
- ❍ No

S5 – S5

Do you get a rebate or discount on your electricity bill?

❍ Yes
❍ No

If yes, what is it?

This survey will be used to better understand household energy use and to develop electricity use benchmarks to be used by Australian Governments in their efforts to help Australian electricity customers become more energy efficient. The benchmarks are being prepared by consultants ACIL Allen Consulting.

[NT intro] In order to do this, your consent is required to get your energy consumption data for 12 to 36 months from Power and Water Corporation by matching to your meter number.

[NSW, VIC, ACT, SA, QLD, TAS, WA intro] In order to do this, your consent is required to get your energy consumption data for 12 to 36 months from your distributor and/or retailer by matching to your meter.

-[ALL] Your energy consumption data will then be matched to your responses by the research team to analyse energy use by households and develop National Energy Use Benchmarks.

[ALL] The information will be de-identified to protect your privacy, and used by the Australian Energy Regulator to finalise the benchmarks as well as inform energy policy.

Do you give your consent for your electricity consumption data to be provided by energy distributor and/or retailer to ACIL Allen and the Australian Energy Regulator understanding that you will not be identifiable?

❍ Yes (1)
❍ No (2) – screen out if No

S6 - S6

[For Northern Territory] Please enter the Customer ID from your electricity bill. The Customer ID is a 9-digit number with a dash on your bill (may include some zeros at the start).

[Tasmania] Please enter your NMI number from your electricity bill (this is not your account number)- The NMI number is a 10-digit number on your bill (some may include letters). This number is also referred to as a National Meter Identifier or Meter Number.

[NSW, ACT, VIC, QLD, SA] Please enter your NMI number from your electricity bill -(this is not your account number). The NMI number is an 11-digit number on your bill (some may include letters). This number is also referred to as a National Meter Identifier or Meter Number."

[WA] Please enter your account number from your electricity bill. Your number is a 9-digit number on your bill (some may include letters).

Please take care entering the "Customer ID":"NMI". It is very important for the study that this is accurate.

S8 - S8

Do you have mains gas connected to your house?

❍ Yes (1)
❍ No (2)
❍ Don't Know (9)

A10 - A10

How much of the power you currently BUY is GreenPower?

- None (1)
- Some but less than a quarter (2)
- About a quarter (3)
- About half (4)
- About three quarters (5)
- Almost all (6)
- All (7)
- Don't Know (9)

A11

Please rate your agreement to the following statement:

"I know how much electricity our household uses compared to similar households".

- Strongly disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Strongly agree (5)

A12

Please rate your agreement to the following statement:

"Compared to households like ours, the amount of electricity we use is ..."

- Much more (1)
- A bit more (2)
- About the same (3)
- A bit less (4)
- A lot less (5)

A13

Is there someone in your house that actively monitors electricity use through such means as telephone apps, computer programs, remote access or frequent readings?

- Yes (1)
- No (2)

B1 - B1

Which of the following do you have in your home?

(Check all that apply)

- ❍ Electric cook top (i.e. not gas) (1)
- ❍ Electric oven (i.e. not gas) (2)
- ❍ Gas oven (3)
- ❍ Microwave oven (4)
- ❍ Electric outdoor BBQ (5)
- ❍ A dishwasher (6)
- ❍ A clothes dryer (7)
- ❍ A household water supply that needs electricity (e.g. for pumping) (8)
- ❍ Solar powered electricity generation (9) [AUTO FILL FROM SCREENER ABOVE]
- ❍ An irrigation pump that needs electricity (10)
- ❍ Commercial sized refrigeration (11)
- ❍ Industrial power tools and equipment (these are heavy duty drills & grinders, welders – not handy man tools) (12)
- ❍ Medical equipment or life support equipment needing electricity (13)
- ❍ Washing machine (14)

B1b

Over the past 12 months have you changed any cooking, heating or water heating appliances from gas to electricity or electricity to gas?

- ❍ Yes (1)
- ❍ No (2)

B1c [IF B1b YES] Which changes have you made (Check all that apply)

- ❍ Any cooking appliance (gas to electricity)
- ❍ Any cooking appliance (electricity to gas)
- ❍ Space heating (gas to electricity)
- ❍ Space heating (electricity to gas)
- ❍ Hot water (gas to electricity)
- ❍ Hot water (electricity to gas)
- ❍ Other (please specify)

B1d [IF B1b YES] What was the reason for the change (Check all that apply)?

- ❍ Costs of energy source
- ❍ Equipment requiring replacement due to faults or reaching its end of life
- ❍ Functionality
- ❍ Environmental decision
- ❍ Other (please specify)

B2 - B2

What is your primary heating method for your hot water?

- ❍ Electricity (1)
- ❍ Electricity and solar (2)
- ❍ Gas storage – this has a cylinder to heat and store the hot water(3)
- ❍ Gas instantaneous - this does not have a cylinder(4)
- ❍ Gas and solar (5)
- ❍ Solar alone (6)
- ❍ Wood (7)
- ❍ Other (specify) (8)_____

B5 - B5

Which of the following heating do you use?

(Check all that apply)

- ❍ Electric central ducted (1)
- ❍ Air conditioning units that you use as a heater (2)
- ❍ Electric under floor heating (3)
- ❍ Individual electric room heaters (4)
- ❍ Gas central heating (5)
- ❍ Gas room heating (6)
- ❍ Gas underfloor heating (7)
- ❍ Coal or wood fires (8)
- ❍ Slow combustion stove (9)
- ❍ Other (specify) (10)_____
- ❍ None of these (11)

B6 - B6

(if B5=1 or 2 or 3 or 5 or 7) Which statement best describes how your household manages the temperature of your central heating for normal use (including AIR CONDITIONING if you use it for heating)?

- ❍ We turn it on and leave it at a constant temperature (1)
- ❍ We manually turn it on and off and/or adjust the temperature at least once a day (2)
- ❍ We programme it to automatically turn on and off and/or adjust the temperature at least once a day (3)
- ❍ Don't know (9)

[IF B5 = 1 or 2 or 3 or 5 or 7]

B6b

What temperature do you normally set your central heating at (in degrees C) (including AIR CONDITIONING if you use it for heating)?

- ❍ Less than 17
- ❍ 17 to19
- ❍ 20 to 21
- ❍ 22 to 23
- ❍ 24 to 25
- ❍ More than 25

[ALL]

B6c

When the room temperature begins to fall from a comfortable temperature, how often do you or a member of your household turn the heating on or to a higher temperature before putting on more clothes, reducing drafts etc. ?

- ❍ Never (1)
- ❍ Less than a quarter of the time (2)
- ❍ About a quarter of the time (3)
- ❍ About half the time (4)
- ❍ About three quarters of the time (5)
- ❍ Almost all the time (6)
- ❍ All the time (7)
- ❍ Don't Know (8)

B7 - B7

Are you connected to an off-peak tariff? (see on the bill)

- ❍ Yes (1)
- ❍ No (2)
- ❍ Don't know (9)

B8 - B8

What type of cooling do you have?

(Check all that apply)

- ❍ Air conditioning (refrigerant, you don't need to add water to it) (1)
- ❍ Evaporative cooling – you need to keep adding water (2)
- ❍ Ceiling or pedestal fans (3)
- ❍ None (4)

B12 - B12

(if B8 = 1 or 2) Which statement best describes how your household manages the temperature of your air conditioning for normal use?

- ❍ We turn it on and leave it at a constant temperature (1)
- ❍ We manually turn it on and off and/or adjust the temperature at least once a day (2)
- ❍ We programme it to automatically turn on and off and/or adjust the temperature at least once a day (3)
- ❍ Don't know (9)

B13 - B13

[if B8 = 1 or 2] Is your air conditioner:

- ❍ Gas (1)
- ❍ Electric (2)
- ❍ Don't Know (9)

B14 - B14

[if B8 = 1 or 2] What sort of air conditioner do you have (you may have more than one)?

(Check all that apply)

- ❍ Room air conditioner - (Cooling unit is mounted on the wall or in a window) (1)
- ❍ Split system - (Cooling unit is mounted outside and outlet(s) is/are mounted in the wall) (2)
- ❍ Ducted - (Multiple rooms are cooled by air blown through ducts) (3)
- ❍ Portable (4)
- ❍ Other (5) Please specify
- ❍ Don't know (9)

B15 - B15

if B8 = 1

Is your air conditioning reverse cycle? (the system can be used to heat or cool)

- ❍ Yes (1)
- ❍ Partially (2)
- ❍ No (3)
- ❍ Don't know (9)

[if B8 = 1 or 2]

B15b

What temperature do you normally set your air conditioner at (in degrees C)?

- ❍ Less than 17
- ❍ 17 to19
- ❍ 20 to 21
- ❍ 22 to 23
- ❍ 24 to 25
- ❍ More than 25

[if B8 = 1 or 2]

B15c

When the room temperature begins to rise from a comfortable temperature how often do you or your household turn the air conditioning on or to a lower temperature before removing clothes, turning on fans and/or increasing ventilation etc.?

- ❍ Never (1)
- ❍ Less than a quarter of the time (2)
- ❍ About a quarter of the time (3)
- ❍ About half the time (4)
- ❍ About three quarters of the time (5)
- ❍ Almost all the time (6)
- ❍ All the time (7)
- ❍ Don't Know (8)

B18 - B18

Do you expect to install any (or more) air conditioning units in the next year?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Don't know (9)

B19 - B19

Do you have a swimming pool?

- ❍ Yes (1)
- ❍ No (2)

B20 - B20

[if B19 = 1]

Does your pool have?

(Check all that apply)

- ❍ Electric heating (1)
- ❍ Gas heating (2)
- ❍ Solar heating (3)
- ❍ A pool cover (4)
- ❍ None of these (9)

B23 - B23

How many operating televisions are in the house?

(1) _____

[if B23 >0]

B24a - B24a

How many of those televisions are flat screen LCD or Plasma

(You must enter a number or zero in each box)

Plasma (1) _____

LCD (2) _____

LED (latest technology) (3) _____

B24c - B24c

[if B23 >0]

Please estimate how many hours in total your household TVs were turned on last week whether the TVs were being watched or not? Make an estimate of the time an average TV was in use and multiply by the number of TVs.

- ❍ None (0)
- ❍ One (1)
- ❍ 2 to 3 (2)
- ❍ 4 to 5 (3)
- ❍ 6 to 7 (4)
- ❍ 8 to 10 (5)
- ❍ 11 to 15 (6)
- ❍ 16 to 30 (7)
- ❍ 31 to 60 (8)
- ❍ 61 to 120 (9)
- ❍ More than 120 (10)

B25 - B25

How many of the following do you have in the household?

(You must enter a number or zero in each box)

Refrigerators in constant operation (1) _____

Computers including laptops in regular use (2) _____

Tablets and mobile phones in regular use (3) _____

B26 - B26 [if B25(2) >0]

Please estimate how many hours in total your household computers were on last week whether they were being used or not? – make an estimate of the time an average computer was in use and multiply by the number of computers

- None (0)
- One (1)
- 2 to 3 (2)
- 4 to 5 (3)
- 6 to 7 (4)
- 8 to 10 (5)
- 11 to 15 (6)
- 16 to 30 (7)
- 31 to 60 (8)
- 61 to 120 (9)
- More than 120 (10)

B26b - B26b

Some equipment, particularly computers, TVs and anything with a remote control or external transformer (phone, iPod, iPad and other chargers, portable telephones) will use power unless turned off at the wall. Thinking of all this type of equipment in your house on average how much of the time are they turned off at or disconnected from the wall?

- None (1)
- Some but less than a quarter (2)
- About a quarter (3)
- About half (4)
- About three quarters (5)
- All (6)
- Don't know (9)

B26c

Please select the number of energy saving devices such as energy monitors, standby energy saving power boards, small solar powered battery and device chargers, dryer balls etc. in regular use in your household?

- None (0)
- 1 (1)
- 2-3 (2)
- 4-5 (3)
- 6-7 (4)
- 8 or more (5)

B27 - B27

[ASK ONLY THOSE THAT APPLY]

In the last week, how many times did you use…?

	None (0)	One (1)	2 - 3 (2)	4 - 5 (3)	6 - 7 (4)	8 - 10 (5)	11 - 15 (6)	16 -30 (7)	More than 30 (8)
B1=6 Dishwasher (1)									
B1=14 Washing machine (2)									
B1=7 Clothes dryer (3)									

B28 - B28

What proportion of the lights in your house are the following:

	None (1)	Some but less than a quarter (2)	About a quarter (3)	About half (4)	About three quarters (5)	Almost all (6)	All (7)	Don't know (9)
Conventional halogen down lights (flush with ceiling) (1)								
Compact (energy saving) LED fluorescent lights (globes and down lights) (2)								

B29 - B29

Which of the following do you have?

(Check all that apply)

- ❍ Roof insulation (1)
- ❍ Under-floor insulation (2)
- ❍ Wall insulation (3)
- ❍ None (8)
- ❍ Don't know (9)

B32 - B32

What proportions of the external walls are…?

(Note: Indications of proportions is all that is required and need not sum to exactly 100%)

	None (1)	Some but less than a quarter (2)	About a quarter (3)	About half (4)	About three quarters (5)	All (6)	Don't know (9)
Glass (1)							
Double brick (2)							
Brick veneer (3)							
Weather board (4)							
Fibro cement (5)							
Other (6)							

B33 - B33

What proportions of the following are protected by...?

	None (1)	Some but less than a quarter (2)	About a quarter (3)	About half (4)	About three quarters (5)	All (6)	Don't know (9)
Windows - double glazed, thermally insulated, tinted and/or solar guarded							
Windows - shaded with awnings or shutter, have curtains and/or blinds							
External doors - with draft protectors							

B35 - B35

What proportion of the time is anyone at home?

	None (1)	Some but less than a quarter (2)	About a quarter (3)	About half (4)	About three quarters (5)	Almost all (6)	All (7)	Don't know (9)
During a typical working day (1)								
During week nights (2)								
During the weekend (3)								

B36 - B36

What type of dwelling do you live in?

- ❍ Separate house (1)
- ❍ Semi-detached townhouse, row, terrace house, townhouse, villa etc (2)
- ❍ Flat, apartment, unit (3)
- ❍ Other (specify) (4)_____

B37 - B37

How many of the following are in the house?

Bed rooms (1) _____

Bath rooms (2) _____

Other rooms (living rooms, dining rooms, kitchens but exclude separate toilets etc) (3) _____

Floors (that you occupy – exclude basements and rooftop terraces) (4) _____

B40 - B40

How would you describe your household?

- ❍ Family members only (1)
- ❍ Family and others who are not family (2)
- ❍ Shared household (not related to each other) (3)
- ❍ Other (specify) (4)_____

B42

[if B8 = 1 or 2]

What proportion of the time did you use AIR CONDITIONING during the following months of last year? Please take into account seasonal variations and the length of time it is off because you are away and the extent that you switch it on or off during the day. (Note, your best estimate will be sufficient)

	None (1)	Some but less than a quarter (2)	About a quarter (3)	About half (4)	About three quarters (5)	Almost all (6)	All (7)	Don't know (9)
1 December to 28 February (1)								
1 March to 31 May (2)								
1 June to 31 August (3)								
1 September to 30 November (4)								

B42b - B42b

[IF B5 = 1 or 2 or 3 or 4] What proportion of the time did you use ELECTRIC HEATING during the following months of last year? INCLUDE THE TIME AIR CONDITIONERS WERE USED FOR HEATING. Please take into account seasonal variations and the length of time it is off because you are away and the extent that you switch it on or off during the day.

	None (1)	Some but less than a quarter (2)	About a quarter (3)	About half (4)	About three quarters (5)	Almost all (6)	All (7)	Don't know (9)
1 December to 28 February (1)								
1 March to 31 May (2)								
1 June to 31 August (3)								
1 September to 30 November (4)								

B42C - B42C

[IF B5 = 5 or 6 or 7] What proportion of the time did you use GAS HEATING during the following months of last year? INCLUDE THE TIME GAS AIR CONDITIONERS WERE USED FOR HEATING. Please take into account seasonal variations and the length of time it is off because you are away and the extent that you switch it on or off during the day.

	None (1)	Some but less than a quarter (2)	About a quarter (3)	About half (4)	About three quarters (5)	Almost all (6)	All (7)	Don't know (9)
1 December to 28 February (1)								
1 March to 31 May (2)								
1 June to 31 August (3)								
1 September to 30 November (4)								

TIME OF USE QUESTIONS

B42cc

On a typical summer week day (non-holiday), how many people are at home during the nominated times. Count people who arrive or leave during that time as being there the whole time. Include all family members (children, friends and any others).

	None (1)	1 (2)	2 (3)	3-4(4)	5-6(5)	7-9(6)	10 or more (7)	Don't know (9)
7 am to 9 am								
9 am to 12 pm								
12 pm to 3 pm								
3 pm to 6 pm								
6 pm to 9 pm								
9 pm to 11 pm								
11 pm to 7 am								

B43a

On a typical summer weekend (non-holiday), how many people are at home during the nominated times. Count people who arrive or leave during that time as being there the whole time. Include all family members (children, friends and any others).

	None (1)	1 (2)	2 (3)	3-4 (4)	5-6 (5)	7-9 (6)	10 or more (7)	Don't know (9)
7 am to 9 am								
9 am to 12 pm								
12 pm to 3 pm								
3 pm to 6 pm								
6 pm to 9 pm								
9 pm to 11 pm								
11pm to 7am								

B43c

Are times and numbers of people home DIFFERENT for a typical winter's week day than a typical summer week day?

1 Yes
2 No

9 Don't know

[If YES OR DON'T KNOW]

B43cc

On a typical winter week day (non-holiday), how many people are at home during the nominated times. Count people who arrive or leave during that time as being there the whole time. Include all family members (children, friends and any others).

	None (1)	1 (2)	2 (3)	3-4 (4)	5-6 (5)	7-9 (6)	10 or more (7)	Don't know (9)
7 am to 9 am								
9 am to 12 pm								
12 pm to 3 pm								
3 pm to 6 pm								
6 pm to 9 pm								
9 pm to 11 pm								
11 pm to 7 am								

B43d

Are times and numbers of people home DIFFERENT for a typical winter's weekend than a typical summer week end?

1 Yes
2 No

9 Don't know

[If YES OR DON'T KNOW]

B43dd

On a typical winter weekend (non-holiday), how many people are at home during the nominated times. Count people who arrive or leave during that time as being there the whole time. Include all family members (children, friends and any others).

	None (1)	1 (2)	2 (3)	3-4(4)	5-6(5)	7-9(6)	10 or more (7)	Don't know (9)
7 am to 9 am								
9 am to 12 pm								
12 pm to 3 pm								
3 pm to 6 pm								
6 pm to 9 pm								
9 pm to 11 pm								
11 pm to 7 am								

B44

On a week day when would you typically start your…?

[ASK ONLY THOSE THAT APPLY]

	7 am to 9 am	9 am to 12 pm	12 pm to 3 pm	3 pm to 6 pm	6 pm to 9 pm	9 pm to 11 pm	11 pm to 7 am	Anytime
[B1=6]Dishwasher (1)								
[B1=14] Washing machine (2)								
[B1=7] Clothes dryer (3)								
[B19=1] Swimming pool pump (4)								

B45

On a weekend when would you typically start your…?

[ASK ONLY THOSE THAT APPLY]

	7 am to 9 am	9 am to 12 pm	12 pm to 3 pm	3 pm to 6 pm	6 pm to 9 pm	9 pm to 11 pm	11 pm to 7 am	Anytime
[B1=6] Dishwasher (1)								
[B1=14] Washing machine (2)								
[B1=7] Clothes dryer (3)								
[B19=1] Swimming pool pump (4)								

D2_1

What is the post-code of the residence the bill applies to?

_____

B39 - B39

(if B38 >1) How many, including you, are

(Note: leave no blank fields - enter 0 if none)

(if B38=1 Auto fill the fields with Adult=1 else= 0)

Adults (1)	_____
Adult offspring (2)	_____
Children 13 to 17 years (3)	_____
Children 5 to 12 years (4)	_____
Children 0 to 4 years (5)	_____

D6 - D6

Do you receive a government pension or benefit (other than family benefit)?

- ❍ Yes (1)
- ❍ No (2)

D8 - D8

What is your current work status?

- ❍ Work full time (for money) (1)
- ❍ Work part time (for money) (2)
- ❍ Unemployed (3)
- ❍ Household duties only (4)
- ❍ Retired (self-supporting) (5)
- ❍ Full time student (6)
- ❍ Other pensioner (7)
- ❍ Other (specify) (8)_____

D10 - D10

What is the gross (before tax) annual family income? If you live with a partner, it will be the joint income, otherwise your income alone

- ❍ Negative/nil income (1)
- ❍ $1 to $10,499 (2)
- ❍ $10,500 to $15,499 (3)
- ❍ $15,500 to $20,499 (4)
- ❍ $20,500 to $25,999 (5)
- ❍ $26,000 to $30,999 (6)
- ❍ $31,000 to $36,499 (7)
- ❍ $36,500 to $41,499 (8)
- ❍ $41,500 to $51,999 (9)
- ❍ $52,000 to $62,499 (10)
- ❍ $62,500 to $77,999 (11)
- ❍ $78,000 to $103,999 (12)
- ❍ $104,000 to $129,999 (13)
- ❍ $130,000 to $155,999 (14)
- ❍ $156,000 or more (15)
- ❍ Don’t know / Prefer not to say (98)

D11 - D11

How far do you live from a harbour or the sea?

- ❍ Less than 5km (1)
- ❍ 5km to 20 km (2)
- ❍ 20km to 50 km (3)
- ❍ 50km to 100 km (4)
- ❍ Greater than 100 km (5)

THANK YOU FOR ANSWERING THESE QUESTIONS. PLEASE CLICK THE 'NEXT' BUTTON BELOW TO FINISH THE SURVEY.

Appendix B Benchmark zones

The following sections summarise the zones in which benchmarks were calculated. The zones were determined by jurisdictional Energy Ministers. The lists are at the postcode level, which reflects the way data were collected. However, in some cases postcodes overlap zones (i.e. one postcode can be in more than on zone). In this respondents from affected postcodes were assigned to climate zones randomly.

B.1 Queensland

Queensland chose to continue with the localised zones used in the first benchmarking exercise.

Table B1 **Queensland localised zones**

Postcode	Localised Zone Name	Postcode	Localised Zone Name
4000	Brisbane	4064	Brisbane
4005	Brisbane	4065	Brisbane
4006	Brisbane	4066	Brisbane
4007	Brisbane	4067	Brisbane
4008	Brisbane	4068	Brisbane
4009	Brisbane	4069	Brisbane
4010	Brisbane	4070	Brisbane
4011	Brisbane	4073	Brisbane
4012	Brisbane	4074	Brisbane
4013	Brisbane	4075	Brisbane
4014	Brisbane	4076	Brisbane
4017	Brisbane	4077	Brisbane
4018	Brisbane	4078	Brisbane
4019	Brisbane	4101	Brisbane
4020	Brisbane	4102	Brisbane
4021	Brisbane	4103	Brisbane
4022	Brisbane	4104	Brisbane
4030	Brisbane	4105	Brisbane
4031	Brisbane	4106	Brisbane
4032	Brisbane	4107	Brisbane
4034	Brisbane	4108	Brisbane
4035	Brisbane	4109	Brisbane
4036	Brisbane	4110	Brisbane
4037	Brisbane	4111	Brisbane
4051	Brisbane	4112	Brisbane
4053	Brisbane	4113	Brisbane
4054	Brisbane	4114	Brisbane
4055	Brisbane	4115	Brisbane
4059	Brisbane	4116	Brisbane
4060	Brisbane	4117	Brisbane
4061	Brisbane	4118	Brisbane

Postcode	Localised Zone Name
4119	Brisbane
4120	Brisbane
4121	Brisbane
4122	Brisbane
4123	Brisbane
4124	Brisbane
4125	Brisbane
4127	Brisbane
4128	Brisbane
4129	Brisbane
4130	Brisbane
4131	Brisbane
4132	Brisbane
4133	Brisbane
4151	Brisbane
4152	Brisbane
4153	Brisbane
4154	Brisbane
4155	Brisbane
4156	Brisbane
4157	Brisbane
4158	Brisbane
4159	Brisbane
4160	Brisbane
4161	Brisbane
4163	Brisbane
4164	Brisbane
4165	Brisbane
4169	Brisbane
4170	Brisbane
4171	Brisbane
4172	Brisbane
4173	Brisbane
4174	Brisbane
4178	Brisbane
4179	Brisbane
4183	Brisbane
4184	Brisbane
4205	Gold Coast
4207	Gold Coast
4208	Gold Coast
4209	Gold Coast
4210	Gold Coast

Postcode	Localised Zone Name
4211	Gold Coast
4212	Gold Coast
4213	Gold Coast
4214	Gold Coast
4215	Gold Coast
4216	Gold Coast
4217	Gold Coast
4218	Gold Coast
4220	Gold Coast
4221	Gold Coast
4223	Gold Coast
4224	Gold Coast
4225	Gold Coast
4226	Gold Coast
4227	Gold Coast
4228	Gold Coast
4270	Gold Coast
4271	Gold Coast
4272	Gold Coast
4275	Gold Coast
4280	Brisbane
4285	Western (SE QLD)
4287	Western (SE QLD)
4300	Brisbane
4301	Brisbane
4303	Brisbane
4304	Brisbane
4305	Western (SE QLD)
4306	Western (SE QLD)
4306	Wide Bay Burnett
4307	Western (SE QLD)
4309	Western (SE QLD)
4310	Darling Downs
4310	Western (SE QLD)
4311	Western (SE QLD)
4312	Western (SE QLD)
4312	Wide Bay Burnett
4313	Western (SE QLD)
4340	Western (SE QLD)
4341	Western (SE QLD)
4342	Western (SE QLD)
4343	Western (SE QLD)
4344	Western (SE QLD)

Postcode	Localised Zone Name
4346	Western (SE QLD)
4347	Western (SE QLD)
4350	Darling Downs
4350	Western (SE QLD)
4352	Darling Downs
4352	Darling Downs
4352	Western (SE QLD)
4353	Darling Downs
4354	Darling Downs
4355	Darling Downs
4356	Darling Downs
4357	Darling Downs
4358	Darling Downs
4359	Darling Downs
4359	Western (SE QLD)
4360	Darling Downs
4361	Darling Downs
4362	Darling Downs
4363	Darling Downs
4364	Darling Downs
4365	Darling Downs
4370	Darling Downs
4371	Darling Downs
4372	Darling Downs
4373	Darling Downs
4374	Darling Downs
4375	Darling Downs
4376	Darling Downs
4377	Darling Downs
4378	Darling Downs
4380	Darling Downs
4381	Darling Downs
4382	Darling Downs
4385	Darling Downs
4387	Darling Downs
4388	Darling Downs
4390	Darling Downs
4400	Darling Downs
4401	Darling Downs
4402	Darling Downs
4403	Darling Downs
4404	Darling Downs
4405	Darling Downs

Postcode	Localised Zone Name
4406	Darling Downs
4407	Darling Downs
4408	Darling Downs
4410	Darling Downs
4411	Darling Downs
4412	Darling Downs
4413	Darling Downs
4415	Darling Downs
4416	Darling Downs
4417	Central West
4418	Central West
4419	Central West
4420	Central West
4421	Darling Downs
4422	Darling Downs
4423	Darling Downs
4424	Darling Downs
4425	Darling Downs
4426	Central West
4427	Central West
4428	Central West
4454	Central West
4455	Central West
4461	Central West
4462	Central West
4465	Central West
4467	Central West
4468	Central West
4470	Central West
4472	Central West
4474	Central West
4475	Central West
4477	Central West
4478	Central West
4479	Central West
4480	Central West
4481	Central West
4482	Central West
4486	Central West
4487	Central West
4488	Central West
4489	Central West
4490	Central West

Postcode	Localised Zone Name
4491	Central West
4492	Central West
4493	Central West
4494	Darling Downs
4496	Darling Downs
4497	Darling Downs
4498	Darling Downs
4500	Brisbane
4501	Brisbane
4502	Brisbane
4503	Brisbane
4504	Brisbane
4505	Brisbane
4506	Brisbane
4507	Brisbane
4508	Brisbane
4509	Brisbane
4510	Brisbane
4511	Brisbane
4512	Brisbane
4514	Western (SE QLD)
4515	Western (SE QLD)
4516	Brisbane
4517	Sunshine Coast
4518	Sunshine Coast
4519	Sunshine Coast
4520	Brisbane
4521	Western (SE QLD)
4550	Sunshine Coast
4551	Sunshine Coast
4552	Sunshine Coast
4553	Sunshine Coast
4554	Sunshine Coast
4555	Sunshine Coast
4556	Sunshine Coast
4557	Sunshine Coast
4558	Sunshine Coast
4559	Sunshine Coast
4560	Sunshine Coast
4561	Sunshine Coast
4562	Sunshine Coast
4563	Sunshine Coast
4564	Sunshine Coast

Postcode	Localised Zone Name
4565	Sunshine Coast
4566	Sunshine Coast
4567	Sunshine Coast
4568	Sunshine Coast
4569	Sunshine Coast
4570	Sunshine Coast
4570	Wide Bay Burnett
4571	Sunshine Coast
4572	Sunshine Coast
4573	Sunshine Coast
4574	Sunshine Coast
4575	Sunshine Coast
4580	Sunshine Coast
4581	Sunshine Coast
4600	Wide Bay Burnett
4601	Wide Bay Burnett
4605	Wide Bay Burnett
4606	Wide Bay Burnett
4608	Wide Bay Burnett
4610	Wide Bay Burnett
4611	Wide Bay Burnett
4612	Wide Bay Burnett
4613	Wide Bay Burnett
4614	Wide Bay Burnett
4615	Wide Bay Burnett
4620	Wide Bay Burnett
4621	Wide Bay Burnett
4625	Wide Bay Burnett
4626	Wide Bay Burnett
4627	Wide Bay Burnett
4630	Wide Bay Burnett
4650	Wide Bay Burnett
4655	Wide Bay Burnett
4659	Wide Bay Burnett
4660	Wide Bay Burnett
4662	Wide Bay Burnett
4670	Wide Bay Burnett
4671	Wide Bay Burnett
4673	Wide Bay Burnett
4674	Wide Bay Burnett
4676	Wide Bay Burnett
4677	Wide Bay Burnett
4678	Wide Bay Burnett

Postcode	Localised Zone Name
4680	Capricornia
4694	Capricornia
4695	Capricornia
4697	Capricornia
4699	Capricornia
4700	Capricornia
4701	Capricornia
4702	Capricornia
4703	Capricornia
4704	Capricornia
4705	Capricornia
4706	Capricornia
4707	Capricornia
4709	Central West
4710	Capricornia
4711	Capricornia
4712	Central West
4713	Central West
4714	Capricornia
4715	Capricornia
4716	Capricornia
4717	Central West
4718	Capricornia
4719	Capricornia
4720	Central West
4721	Central West
4722	Central West
4723	Central West
4724	Central West
4725	Central West
4726	Central West
4727	Central West
4728	Central West
4730	Central West
4731	Central West
4732	Central West
4733	Central West
4735	Central West
4736	Central West
4737	Central Coast
4738	Central Coast
4739	Capricornia
4740	Central Coast

Postcode	Localised Zone Name
4741	Capricornia
4742	Capricornia
4743	Central West
4744	Central West
4745	Central West
4746	Central West
4750	Central Coast
4751	Central Coast
4753	Central Coast
4754	Central Coast
4756	Central Coast
4757	Central Coast
4798	Central Coast
4799	Central Coast
4800	Central Coast
4802	Central Coast
4804	Central Coast
4805	Central Coast
4806	Lower Burdekin
4807	Lower Burdekin
4808	Lower Burdekin
4809	Lower Burdekin
4810	Lower Burdekin
4811	Lower Burdekin
4812	Lower Burdekin
4814	Lower Burdekin
4815	Lower Burdekin
4816	Lower Burdekin
4817	Lower Burdekin
4818	Lower Burdekin
4819	Lower Burdekin
4820	North West
4821	North West
4822	North West
4823	North West
4824	North West
4825	North West
4828	North West
4829	Central West
4830	North West
4849	Tablelands
4850	Lower Burdekin
4852	Tablelands

Postcode	Localised Zone Name
4854	Tablelands
4855	Tablelands
4856	Tablelands
4857	Tablelands
4858	Tablelands
4859	Tablelands
4860	Tablelands
4861	Tablelands
4865	Tablelands
4868	Tablelands
4869	Tablelands
4870	Tablelands
4871	North West
4872	Tablelands
4873	Tablelands
4874	North West
4875	North West

Postcode	Localised Zone Name
4876	North West
4877	Tablelands
4878	Tablelands
4879	Tablelands
4880	Tablelands
4881	Tablelands
4882	Tablelands
4883	Tablelands
4884	Tablelands
4885	Tablelands
4886	Tablelands
4887	Tablelands
4888	Tablelands
4890	North West
4891	North West
4895	Tablelands

B.2 New South Wales

New South Wales chose to adopt the climate zones.

Table B2 **New South Wales climate zones**

Postcode	Climate zone
2000	5
2006	5
2007	5
2008	5
2009	5
2010	5
2011	5
2015	5
2016	5
2017	5
2018	5
2019	5
2020	4
2020	5
2021	5
2022	5
2023	5
2024	5
2025	5
2026	5

Postcode	Climate zone
2027	5
2028	5
2029	5
2030	5
2031	5
2032	5
2033	5
2034	5
2035	5
2036	5
2037	5
2038	5
2039	5
2040	5
2041	5
2042	5
2043	5
2044	5
2045	5
2046	5

Postcode	Climate zone
2047	5
2048	5
2049	5
2050	5
2052	5
2060	5
2061	5
2062	5
2063	5
2064	5
2065	5
2066	5
2067	5
2068	5
2069	5
2070	5
2071	5
2072	5
2073	5
2074	5
2075	5
2076	5
2077	5
2079	5
2080	5
2081	5
2082	5
2083	5
2084	5
2085	5
2086	5
2087	5
2088	5
2089	5
2090	5
2092	5
2093	5
2094	5
2095	5
2096	5
2097	5
2099	5
2100	5

Postcode	Climate zone
2101	5
2102	5
2103	5
2104	5
2105	5
2106	5
2107	5
2108	5
2109	5
2110	5
2111	5
2112	5
2113	5
2114	5
2114	6
2115	6
2116	6
2117	6
2118	6
2119	5
2119	6
2120	5
2121	5
2121	6
2122	5
2122	6
2123	6
2125	5
2125	6
2126	5
2127	6
2128	6
2129	5
2130	5
2131	5
2132	5
2133	5
2134	5
2135	5
2136	5
2137	5
2138	5
2139	5

Postcode	Climate zone
2140	5
2141	6
2142	6
2143	6
2144	6
2145	6
2146	6
2147	6
2148	6
2150	6
2151	6
2152	6
2153	6
2154	5
2154	6
2155	6
2156	6
2157	5
2157	6
2158	6
2159	5
2159	6
2160	6
2161	6
2162	6
2163	6
2164	6
2165	6
2166	6
2167	6
2168	6
2170	6
2171	6
2172	6
2173	6
2174	6
2175	6
2176	6
2177	6
2178	6
2179	6
2190	6
2191	5

Postcode	Climate zone
2192	5
2193	5
2194	5
2195	5
2196	5
2196	6
2197	6
2198	6
2199	6
2200	5
2200	6
2203	5
2204	5
2205	5
2206	5
2207	5
2208	5
2209	5
2210	5
2211	6
2212	6
2213	6
2214	6
2216	5
2217	5
2218	5
2219	5
2220	5
2221	5
2222	5
2223	5
2224	5
2225	5
2226	5
2227	5
2228	5
2229	5
2230	5
2231	5
2232	5
2233	5
2234	5
2250	5

Postcode	Climate zone
2251	5
2256	5
2257	5
2258	5
2259	5
2260	5
2261	5
2262	5
2263	5
2264	5
2265	5
2267	5
2278	5
2280	5
2281	5
2282	5
2283	5
2284	5
2285	5
2286	5
2287	5
2289	5
2290	5
2291	5
2292	5
2293	5
2294	5
2295	5
2296	5
2297	5
2298	5
2299	5
2300	5
2302	5
2303	5
2304	5
2305	5
2306	5
2307	5
2308	5
2311	5
2311	6
2312	5

Postcode	Climate zone
2314	5
2315	5
2316	5
2317	5
2318	5
2319	5
2320	5
2321	5
2322	5
2323	5
2324	5
2325	5
2325	6
2326	5
2327	5
2328	6
2329	6
2330	6
2331	6
2333	6
2334	5
2335	5
2335	6
2336	6
2337	6
2338	4
2338	6
2339	4
2340	4
2341	4
2342	4
2343	4
2344	4
2345	4
2346	4
2347	4
2350	6
2350	7
2351	7
2352	4
2353	4
2354	6
2355	4

Postcode	Climate zone
2355	6
2356	4
2357	4
2358	6
2359	4
2359	6
2360	4
2361	4
2365	4
2365	6
2365	7
2369	4
2370	2
2370	4
2370	6
2371	4
2371	6
2372	6
2379	4
2380	4
2381	4
2382	4
2386	4
2387	4
2388	4
2390	4
2395	4
2396	4
2397	4
2398	4
2399	4
2400	4
2401	4
2402	4
2403	4
2404	4
2405	4
2406	4
2408	4
2409	4
2410	4
2411	4
2415	5

Postcode	Climate zone
2420	5
2421	5
2422	5
2422	6
2423	5
2424	5
2424	6
2425	5
2426	5
2427	5
2428	5
2429	5
2430	5
2431	2
2439	5
2440	2
2441	2
2441	5
2443	5
2444	5
2445	5
2446	5
2447	2
2448	2
2449	2
2450	2
2452	2
2453	2
2453	7
2454	2
2455	2
2456	2
2460	2
2462	2
2463	2
2464	2
2465	2
2466	2
2469	2
2469	6
2470	2
2471	2
2472	2

Postcode	Climate zone
2473	2
2474	2
2475	2
2475	6
2476	2
2476	6
2477	2
2478	2
2479	2
2480	2
2481	2
2482	2
2483	2
2484	2
2485	2
2486	2
2487	2
2488	2
2489	2
2490	2
2500	5
2502	5
2505	5
2506	5
2508	5
2515	5
2516	5
2517	5
2518	5
2519	5
2522	5
2525	5
2526	5
2527	5
2528	5
2529	5
2530	5
2533	5
2533	6
2534	5
2535	5
2535	6
2536	6

Postcode	Climate zone
2537	6
2538	6
2539	6
2540	6
2541	6
2545	6
2546	6
2548	6
2549	6
2550	6
2551	6
2555	6
2556	6
2557	6
2558	6
2559	6
2560	6
2563	6
2564	6
2565	6
2566	6
2567	6
2568	6
2569	6
2570	6
2571	6
2572	6
2573	6
2574	6
2575	6
2576	6
2577	5
2577	6
2578	6
2579	6
2579	7
2580	7
2581	6
2581	7
2582	6
2583	4
2583	7
2584	6

Postcode	Climate zone
2585	4
2586	4
2586	6
2587	4
2588	4
2590	4
2594	4
2611	6
2611	7
2618	6
2619	7
2620	6
2620	7
2621	6
2621	7
2622	6
2622	7
2623	7
2624	7
2625	7
2626	7
2627	7
2628	7
2629	7
2630	7
2631	7
2632	6
2632	7
2633	7
2640	4
2640	7
2641	4
2642	4
2642	7
2643	4
2644	4
2644	7
2645	4
2646	4
2647	4
2648	4
2649	7
2650	4

Postcode	Climate zone
2651	4
2652	4
2652	7
2653	7
2655	4
2656	4
2658	4
2659	4
2660	4
2661	4
2663	4
2665	4
2666	4
2668	4
2669	4
2671	4
2672	4
2675	4
2678	4
2680	4
2681	4
2700	4
2701	4
2702	4
2703	4
2705	4
2706	4
2707	4
2710	4
2711	4
2712	4
2713	4
2714	4
2715	4
2716	4
2717	4
2720	7
2721	4
2722	4
2722	7
2725	4
2726	6
2727	4

Postcode	Climate zone
2729	4
2729	7
2730	7
2731	4
2732	4
2733	4
2734	4
2735	4
2736	4
2737	4
2738	4
2739	4
2745	6
2747	6
2748	6
2749	6
2750	6
2752	6
2753	6
2754	6
2755	6
2756	6
2757	6
2758	6
2759	6
2760	6
2761	6
2762	6
2763	6
2765	6
2766	6
2767	6
2768	6
2769	6
2770	6
2773	6
2774	6
2775	5
2775	6
2776	6
2777	6
2778	6
2779	6

Postcode	Climate zone
2780	6
2782	6
2783	6
2784	6
2785	6
2785	7
2786	6
2786	7
2787	6
2787	7
2790	6
2790	7
2791	7
2792	4
2792	7
2793	4
2794	4
2795	4
2795	6
2795	7
2797	7
2798	4
2798	7
2799	4
2799	7
2800	4
2800	7
2803	4
2804	4
2805	4
2806	4
2807	4
2808	4
2808	7
2809	4
2810	4
2820	4
2821	4
2823	4
2824	4
2825	4
2827	4
2828	4

Postcode	Climate zone
2829	4
2830	4
2831	4
2832	4
2833	4
2834	4
2835	4
2836	4
2839	4
2840	4
2842	4
2843	4
2844	6
2845	7
2846	6
2846	7
2847	7
2848	6
2849	6
2849	7
2850	4
2850	6
2850	7
2852	4
2852	6
2864	4
2865	4
2866	4
2867	4
2868	4
2869	4

Postcode	Climate zone
2870	4
2871	4
2873	4
2874	4
2875	4
2876	4
2877	4
2878	4
2879	4
2880	4
2898	5
2900	7
3490	4
3494	4
3498	4
3501	4
3505	4
3549	4
3564	4
3579	4
3585	4
3586	4
3639	4
3644	4
3691	4
3694	4
3709	4
4383	6
4385	4
4493	4

B.3 Australian Capital Territory

The Australian Capital Territory is entirely in climate zone 7.

B.4 Victoria

Victoria chose to adopt the climate zones.

Note: as discussed in section 2.3, we have reassigned Victorian postcodes from climate zone 4 to zones 5 and 6, owing to insufficient sample size from these postcodes.

Table B3 **Victoria climate zones**

Postcode	Climate zone	Postcode	Climate zone
3000	6	3043	6
3002	6	3044	6
3003	6	3045	6
3004	6	3046	6
3005	6	3047	6
3006	6	3048	6
3008	6	3049	6
3010	6	3050	6
3011	6	3051	6
3012	6	3052	6
3013	6	3053	6
3015	6	3054	6
3016	6	3055	6
3018	6	3056	6
3019	6	3057	6
3020	6	3058	6
3021	6	3059	6
3022	6	3060	6
3023	6	3061	6
3024	6	3062	6
3025	6	3063	6
3026	6	3064	6
3027	6	3065	6
3028	6	3066	6
3029	6	3067	6
3030	6	3068	6
3031	6	3070	6
3032	6	3071	6
3033	6	3072	6
3034	6	3073	6
3036	6	3074	6
3037	6	3075	6
3038	6	3076	6
3039	6	3078	6
3040	6	3079	6
3041	6	3081	6
3042	6	3082	6

Postcode	Climate zone
3083	6
3084	6
3085	6
3086	6
3087	6
3088	6
3089	6
3090	6
3091	6
3093	6
3094	6
3095	6
3096	6
3097	6
3099	6
3101	6
3102	6
3103	6
3103	6
3104	6
3105	6
3106	6
3107	6
3108	6
3109	6
3111	6
3113	6
3114	6
3115	6
3116	6
3116	7
3121	6
3122	6
3123	6
3124	6
3125	6
3126	6
3127	6
3128	6
3129	6
3130	6
3131	6
3132	6

Postcode	Climate zone
3133	6
3134	6
3135	6
3136	6
3137	6
3137	7
3138	7
3139	6
3139	7
3140	7
3141	6
3142	6
3143	6
3144	6
3145	6
3146	6
3147	6
3148	6
3149	6
3150	6
3151	6
3152	6
3153	6
3154	6
3155	6
3155	6
3156	6
3156	7
3158	7
3159	7
3160	7
3161	6
3162	6
3163	6
3165	6
3166	6
3167	6
3168	6
3169	6
3170	6
3171	6
3172	6
3173	6

Postcode	Climate zone
3174	6
3175	6
3177	6
3178	6
3179	6
3180	6
3181	6
3182	6
3183	6
3184	6
3185	6
3186	6
3187	6
3188	6
3189	6
3190	6
3191	6
3192	6
3193	6
3194	6
3195	6
3196	6
3197	6
3198	6
3199	6
3200	6
3201	6
3202	6
3204	6
3205	6
3206	6
3207	6
3211	6
3212	6
3214	6
3215	6
3216	6
3217	6
3218	6
3219	6
3220	6
3221	6
3222	6

Postcode	Climate zone
3223	6
3224	6
3225	6
3226	6
3227	6
3228	6
3230	6
3231	6
3232	6
3233	6
3235	6
3236	6
3237	6
3238	6
3239	6
3240	6
3241	6
3242	6
3243	6
3249	6
3250	6
3251	6
3254	6
3260	6
3264	6
3265	6
3266	6
3267	6
3268	6
3269	6
3270	6
3271	6
3271	7
3272	6
3272	7
3273	6
3274	6
3275	6
3276	6
3277	6
3278	6
3279	6
3280	6

Postcode	Climate zone
3281	6
3282	6
3283	6
3284	6
3285	6
3286	6
3287	6
3289	6
3289	7
3292	6
3293	6
3293	7
3294	7
3300	7
3301	6
3301	7
3302	6
3302	7
3303	6
3304	6
3305	6
3309	6
3310	6
3311	6
3312	6
3312	7
3314	7
3315	6
3315	7
3317	6
3317	7
3318	6
3319	6
3321	6
3322	6
3323	6
3324	6
3325	6
3325	7
3328	6
3329	6
3330	6
3331	6

Postcode	Climate zone
3332	6
3333	6
3334	6
3335	6
3337	6
3337	7
3338	6
3340	6
3341	6
3342	6
3345	6
3350	7
3351	6
3351	7
3352	6
3352	7
3355	7
3356	7
3357	7
3360	6
3360	7
3361	6
3361	7
3363	7
3364	6
3364	7
3370	6
3370	7
3371	6
3371	7
3373	7
3374	6
3374	7
3375	7
3377	6
3377	7
3378	7
3379	6
3379	7
3380	6
3381	6
3381	7
3384	6

Postcode	Climate zone
3384	7
3385	6
3385	6
3387	6
3388	6
3388	6
3390	6
3390	6
3391	6
3392	6
3393	6
3395	6
3396	6
3400	6
3401	6
3401	6
3401	7
3407	7
3409	6
3412	6
3413	6
3414	6
3415	6
3418	6
3419	6
3420	6
3423	6
3424	6
3427	6
3428	6
3429	6
3429	7
3430	6
3430	7
3431	6
3431	7
3432	7
3433	7
3434	7
3435	6
3435	7
3437	7
3438	7

Postcode	Climate zone
3440	7
3441	7
3442	7
3444	6
3444	7
3446	7
3447	7
3448	7
3450	7
3451	7
3453	6
3453	7
3458	6
3458	7
3460	7
3461	6
3461	7
3462	7
3463	6
3463	7
3464	6
3465	6
3465	7
3467	7
3468	7
3469	7
3472	6
3472	7
3475	6
3477	6
3477	6
3477	7
3478	6
3478	6
3478	7
3480	6
3480	6
3482	6
3483	6
3485	6
3487	6
3488	6
3489	6

Postcode	Climate zone
3490	6
3491	6
3494	5
3496	5
3498	5
3500	5
3501	5
3505	5
3506	6
3507	5
3509	6
3512	5
3515	6
3516	6
3517	6
3518	6
3518	6
3520	6
3521	6
3522	6
3523	6
3523	6
3525	6
3525	6
3527	6
3527	6
3529	6
3530	6
3531	6
3533	6
3537	6
3540	6
3542	6
3544	6
3546	6
3549	6
3550	6
3551	6
3551	6
3555	6
3556	6
3557	6
3557	6

Postcode	Climate zone
3558	6
3558	6
3559	6
3559	6
3561	6
3562	6
3563	6
3564	6
3565	6
3566	6
3567	6
3567	6
3568	6
3570	6
3571	6
3572	6
3572	6
3573	6
3573	6
3575	6
3576	6
3579	6
3579	6
3580	6
3581	6
3583	6
3584	6
3585	6
3586	6
3588	6
3589	6
3590	6
3591	6
3594	6
3595	6
3596	6
3597	6
3599	6
3607	6
3608	6
3608	6
3610	6
3610	6

Postcode	Climate zone
3612	6
3612	6
3614	6
3616	6
3617	6
3618	6
3620	6
3621	6
3622	6
3623	6
3624	6
3629	6
3630	6
3631	6
3631	6
3633	6
3634	6
3635	6
3636	6
3637	6
3638	6
3639	6
3640	6
3641	6
3644	6
3646	6
3646	6
3647	6
3649	6
3658	6
3658	7
3659	6
3660	6
3660	7
3662	6
3663	6
3664	6
3665	6
3666	6
3669	6
3669	6
3669	7
3670	6

Postcode	Climate zone
3672	6
3673	6
3673	7
3675	6
3675	6
3675	7
3677	7
3678	6
3678	7
3682	6
3682	7
3683	6
3685	6
3685	6
3685	7
3687	6
3688	6
3690	6
3691	6
3691	7
3694	6
3695	6
3697	7
3698	7
3699	7
3700	6
3700	7
3701	6
3701	7
3704	7
3705	7
3707	7
3708	7
3709	7
3711	7
3712	7
3713	7
3714	7
3715	7
3717	7
3718	7
3719	7
3720	7

Postcode	Climate zone
3722	7
3723	6
3723	7
3725	6
3726	6
3727	6
3728	6
3730	6
3732	7
3733	7
3735	7
3737	6
3737	7
3738	7
3739	7
3740	7
3741	7
3744	7
3746	7
3747	6
3747	7
3749	6
3750	6
3751	6
3752	6
3753	6
3754	6
3755	6
3756	6
3756	7
3757	6
3757	7
3758	6
3759	6
3760	6
3761	6
3762	6
3762	7
3763	6
3763	7
3764	6
3764	7
3765	7

Postcode	Climate zone
3766	7
3767	7
3770	7
3775	6
3775	7
3777	7
3778	7
3779	7
3781	6
3782	6
3782	7
3783	6
3785	7
3786	7
3787	6
3787	7
3788	7
3789	7
3791	7
3792	7
3793	7
3795	7
3796	7
3797	7
3799	7
3800	6
3802	6
3803	6
3804	6
3804	7
3805	6
3806	6
3807	6
3807	6
3808	6
3809	6
3810	6
3812	6
3813	6
3814	6
3815	6
3816	6
3816	7

Postcode	Climate zone
3818	7
3820	7
3821	7
3822	7
3823	7
3824	7
3825	6
3825	7
3831	7
3832	7
3833	7
3835	6
3835	7
3840	6
3842	6
3844	6
3847	6
3850	6
3851	6
3852	6
3854	6
3856	6
3857	6
3858	6
3858	7
3859	6
3860	6
3862	6
3862	7
3864	6
3865	6
3869	6
3870	6
3871	6
3871	7
3873	6
3874	6
3875	6
3878	6
3880	6
3882	6
3885	6
3886	6

Postcode	Climate zone
3887	6
3888	6
3889	6
3890	6
3891	6
3892	6
3893	6
3895	6
3896	6
3898	6
3898	7
3900	6
3902	6
3903	6
3904	6
3909	6
3910	6
3911	6
3912	6
3913	6
3915	6
3916	6
3918	6
3919	6
3920	6
3921	6
3922	6
3923	6
3925	6
3926	6
3927	6
3928	6
3929	6
3930	6
3931	6
3933	6
3934	6
3936	6
3937	6
3938	6
3939	6
3940	6
3941	6

Postcode	Climate zone
3942	6
3943	6
3944	6
3945	6
3946	6
3950	6
3951	6
3953	6
3953	7
3954	6
3956	6
3960	6
3962	6
3966	6
3967	6
3971	6
3975	6
3976	6
3977	6
3978	6
3979	6
3980	6
3981	6
3981	7
3984	6
3987	6
3988	6
3988	7
3990	6
3991	6
3992	6
3995	6
3996	6

B.5 Tasmania

Tasmania is located entirely within climate zone 7.

B.6 South Australia

South Australia chose to continue with the localised zones for which benchmarks were estimated in 2011.

Table B4 **South Australia localised zones**

Postcode	Localised Zone Name	Postcode	Localised Zone Name
5000	Adelaide & Environs	5044	Adelaide & Environs
5005	Adelaide & Environs	5045	Adelaide & Environs
5006	Adelaide & Environs	5046	Adelaide & Environs
5007	Adelaide & Environs	5047	Adelaide & Environs
5008	Adelaide & Environs	5048	Adelaide & Environs
5009	Adelaide & Environs	5049	Adelaide & Environs
5010	Adelaide & Environs	5050	Adelaide & Environs
5011	Adelaide & Environs	5051	Adelaide & Environs
5012	Adelaide & Environs	5052	Adelaide & Environs
5013	Adelaide & Environs	5061	Adelaide & Environs
5014	Adelaide & Environs	5062	Adelaide & Environs
5015	Adelaide & Environs	5063	Adelaide & Environs
5016	Adelaide & Environs	5064	Adelaide & Environs
5017	Adelaide & Environs	5065	Adelaide & Environs
5018	Adelaide & Environs	5066	Adelaide & Environs
5019	Adelaide & Environs	5067	Adelaide & Environs
5020	Adelaide & Environs	5068	Adelaide & Environs
5021	Adelaide & Environs	5069	Adelaide & Environs
5022	Adelaide & Environs	5070	Adelaide & Environs
5023	Adelaide & Environs	5072	Adelaide & Environs
5024	Adelaide & Environs	5073	Adelaide & Environs
5025	Adelaide & Environs	5074	Adelaide & Environs
5031	Adelaide & Environs	5075	Adelaide & Environs
5032	Adelaide & Environs	5076	Adelaide & Environs
5033	Adelaide & Environs	5081	Adelaide & Environs
5034	Adelaide & Environs	5082	Adelaide & Environs
5035	Adelaide & Environs	5083	Adelaide & Environs
5037	Adelaide & Environs	5084	Adelaide & Environs
5038	Adelaide & Environs	5085	Adelaide & Environs
5039	Adelaide & Environs	5086	Adelaide & Environs
5040	Adelaide & Environs	5087	Adelaide & Environs
5041	Adelaide & Environs	5088	Adelaide & Environs
5042	Adelaide & Environs	5089	Adelaide & Environs
5043	Adelaide & Environs	5090	Adelaide & Environs

Postcode	Localised Zone Name
5091	Adelaide & Environs
5092	Adelaide & Environs
5093	Adelaide & Environs
5094	Adelaide & Environs
5095	Adelaide & Environs
5096	Adelaide & Environs
5097	Adelaide & Environs
5098	Adelaide & Environs
5106	Adelaide & Environs
5107	Adelaide & Environs
5108	Adelaide & Environs
5109	Adelaide & Environs
5110	Adelaide & Environs
5111	Adelaide & Environs
5112	Adelaide & Environs
5113	Adelaide & Environs
5114	Adelaide & Environs
5115	Adelaide & Environs
5116	Adelaide & Environs
5117	Adelaide & Environs
5118	Adelaide & Environs
5120	Adelaide & Environs
5121	Adelaide & Environs
5125	Adelaide & Environs
5126	Adelaide & Environs
5127	Adelaide & Environs
5131	Adelaide & Environs
5132	Adelaide & Environs
5133	Adelaide & Environs
5134	Adelaide & Environs
5136	Adelaide & Environs
5137	Mt Lofty Ranges
5138	Mt Lofty Ranges
5139	Mt Lofty Ranges
5140	Mt Lofty Ranges
5141	Mt Lofty Ranges
5142	Mt Lofty Ranges
5144	Mt Lofty Ranges
5150	Mt Lofty Ranges
5151	Mt Lofty Ranges
5152	Mt Lofty Ranges
5153	Mt Lofty Ranges
5154	Mt Lofty Ranges
5155	Mt Lofty Ranges
5156	Mt Lofty Ranges
5157	Adelaide & Environs

Postcode	Localised Zone Name
5158	Adelaide & Environs
5159	Adelaide & Environs
5160	Adelaide & Environs
5161	Adelaide & Environs
5162	Adelaide & Environs
5163	Adelaide & Environs
5164	Adelaide & Environs
5165	Adelaide & Environs
5166	Adelaide & Environs
5167	Adelaide & Environs
5168	Adelaide & Environs
5169	Adelaide & Environs
5170	Adelaide & Environs
5171	Adelaide & Environs
5172	Adelaide & Environs
5173	Adelaide & Environs
5174	Adelaide & Environs
5201	Adelaide & Environs
5202	Adelaide & Environs
5203	Adelaide & Environs
5204	Adelaide & Environs
5210	Adelaide & Environs
5211	Adelaide & Environs
5212	Adelaide & Environs
5213	Adelaide & Environs
5214	Adelaide & Environs
5220	Yorke Peninsula & Kangaroo Island
5221	Yorke Peninsula & Kangaroo Island
5222	Yorke Peninsula & Kangaroo Island
5223	Yorke Peninsula & Kangaroo Island
5231	Adelaide & Environs
5232	Adelaide & Environs
5233	Mt Lofty Ranges
5234	Mt Lofty Ranges
5235	Mt Lofty Ranges
5236	Mt Lofty Ranges
5237	Mt Lofty Ranges
5238	Murraylands & Riverland
5240	Mt Lofty Ranges
5241	Mt Lofty Ranges
5242	Mt Lofty Ranges
5243	Mt Lofty Ranges
5244	Mt Lofty Ranges
5245	Mt Lofty Ranges

Postcode	Localised Zone Name
5250	Mt Lofty Ranges
5251	Mt Lofty Ranges
5252	Mt Lofty Ranges
5253	Adelaide & Environs
5254	Adelaide & Environs
5255	Mt Lofty Ranges
5256	Mt Lofty Ranges
5259	Murraylands & Riverland
5260	Murraylands & Riverland
5261	South East
5262	South East
5263	South East
5264	South East
5265	South East
5266	South East
5267	South East
5268	South East
5269	South East
5270	South East
5271	South East
5272	South East
5273	South East
5275	South East
5276	South East
5277	South East
5278	South East
5279	South East
5280	South East
5290	South East
5291	South East
5301	Murraylands & Riverland
5302	Murraylands & Riverland
5303	Murraylands & Riverland
5304	Murraylands & Riverland
5306	Murraylands & Riverland
5307	Murraylands & Riverland
5308	Murraylands & Riverland
5309	Murraylands & Riverland
5310	Murraylands & Riverland
5311	Murraylands & Riverland
5312	Murraylands & Riverland
5320	Murraylands & Riverland
5321	Murraylands & Riverland
5322	Murraylands & Riverland
5330	Murraylands & Riverland
5331	Murraylands & Riverland

Postcode	Localised Zone Name
5332	Murraylands & Riverland
5333	Murraylands & Riverland
5340	Murraylands & Riverland
5341	Murraylands & Riverland
5342	Murraylands & Riverland
5343	Murraylands & Riverland
5344	Murraylands & Riverland
5345	Murraylands & Riverland
5346	Murraylands & Riverland
5350	Adelaide & Environs
5351	Adelaide & Environs
5352	Adelaide & Environs
5353	Mt Lofty Ranges
5354	Murraylands & Riverland
5355	Mt Lofty Ranges
5356	Mt Lofty Ranges
5357	Murraylands & Riverland
5360	Adelaide & Environs
5371	Adelaide & Environs
5372	Adelaide & Environs
5373	Mid North
5374	Mid North
5381	Central North
5400	Adelaide & Environs
5401	Mid North
5410	Mid North
5411	Mid North
5412	Mid North
5413	Mid North
5414	Mid North
5415	Mid North
5416	Mid North
5417	Mid North
5418	Central North
5419	Central North
5420	Central North
5421	Central North
5422	Port Augusta & Pastoral
5431	Mid North
5432	Mid North
5433	Port Augusta & Pastoral
5434	Port Augusta & Pastoral
5440	Port Augusta & Pastoral
5451	Mid North
5452	Mid North
5453	Mid North

Postcode	Localised Zone Name
5454	Mid North
5455	Mid North
5460	Mid North
5461	Mid North
5462	Mid North
5464	Mid North
5470	Mid North
5471	Mid North
5472	Mid North
5473	Mid North
5480	Central North
5481	Central North
5482	Central North
5483	Central North
5485	Central North
5490	Central North
5491	Central North
5493	Central North
5495	Central North
5501	Central North
5502	Central North
5510	Central North
5520	Central North
5521	Central North
5522	Central North
5523	Central North
5540	Central North
5550	Central North
5552	Central North
5554	Yorke Peninsula & Kangaroo Island
5555	Central North
5556	Yorke Peninsula & Kangaroo Island
5558	Yorke Peninsula & Kangaroo Island
5560	Central North
5570	Yorke Peninsula & Kangaroo Island
5571	Yorke Peninsula & Kangaroo Island
5572	Yorke Peninsula & Kangaroo Island
5573	Yorke Peninsula & Kangaroo Island
5575	Yorke Peninsula & Kangaroo Island
5576	Yorke Peninsula & Kangaroo Island

Postcode	Localised Zone Name
5577	Yorke Peninsula & Kangaroo Island
5580	Yorke Peninsula & Kangaroo Island
5581	Yorke Peninsula & Kangaroo Island
5582	Yorke Peninsula & Kangaroo Island
5583	Yorke Peninsula & Kangaroo Island
5600	Eastern Eyre
5601	Eastern Eyre
5602	Eastern Eyre
5603	Eastern Eyre
5604	Eastern Eyre
5605	Eastern Eyre
5606	Eastern Eyre
5607	Eastern Eyre
5608	Eastern Eyre
5609	Eastern Eyre
5630	West Coast
5631	West Coast
5632	West Coast
5633	West Coast
5640	West Coast
5641	West Coast
5642	West Coast
5650	Port Augusta & Pastoral
5651	Port Augusta & Pastoral
5652	Port Augusta & Pastoral
5653	Port Augusta & Pastoral
5654	Port Augusta & Pastoral
5655	Port Augusta & Pastoral
5660	Port Augusta & Pastoral
5661	West Coast
5670	West Coast
5671	West Coast
5680	West Coast
5690	West Coast
5700	Port Augusta & Pastoral
5710	Port Augusta & Pastoral
5720	Port Augusta & Pastoral
5722	Port Augusta & Pastoral
5725	Port Augusta & Pastoral
5950	Adelaide & Environs

B.7 Northern Territory

The number of responses received from Northern Territory customers was insufficient to estimate benchmarks for different zones.

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