Methodology for the estimation of the value of customer reliability for AEMO

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1. Aims and Objectives

This paper presents a proposed methodology for estimating the value of customer reliability (henceforth abbreviated to VCR, but also known elsewhere in the literature as Cost of Unserved Energy and more frequently as Value of Lost Load). In as much as possible it follows the directions outlined in the Value Of Customer Reliability Directions Paper (31st May 2013) by the Corporate Development of AEMO (2013) and subsequent decisions made during meetings with the working party. The referred directions paper incorporates numerous feedback and recommendations from a variety of stake holders and it calls for the development of a survey-based data collection method to achieve estimates of VCR by means of choice modeling and contingent valuation techniques. In such document attention is called for VCR estimates to have the required granularity and representativeness as well as to ensure a coverage at the state level. The aim is to achieve adequate regional or sector-specific VCRs estimates for the objective of using such estimates for the economic evaluation of proposed network investment and for informing network regulation. Estimates of the VCR is a necessary step in the estimation of economically optimal outage levels, which are still quite often derived on the basis of engineering parameters rather than on socially optimal benefit-cost analysis (Munasinghe and Gellerson, 1979).

Because of the expected increased relevance to decision making in the National Electricity Market (NEM) of high impact low probability events (henceforth HILPs) the directions paper also demands the inclusion of the estimation of VCRs for such events. This category of estimates is also to be provided with a reasonable degree of granularity.

2. Contents organization

The present paper is organized as follows. The literature review section provides some background in terms of the international and national sources for similar studies, with focus on the lessons learned, terminology adopted and their relevance for the proposed method in the current study. The section on the economics of the VCR of electricity supply outlines the economic principles behind the sources of values and the rationale to employ survey based methods. The various sections on the proposed survey method describe the stages of survey development, survey testing, sampling methods, experimental design and survey administration. The sections on the statistical data analysis of the survey responses provide an outline of the methods of analysis of both the choice modeling and contingent valuation survey data. Particular attention is paid on conditioning the estimates of value on the determinants of salient “granularity”, such as differences from the national estimates of samples from sub-regions within states and categories of businesses across economic sectors. The estimates for VCRs of different duration, severity and time of day/year will be obtained from choice modeling data. The contingent valuation data will explore high impact low frequency events. The details of the pilot testing, which precedes the full survey data collection and is necessary to evaluate the survey instrument, are discussed in section 10, while section 11 concludes by providing the timeline of the project. An appendix with some approximate requirements on sample size is appended at the end of the document, after the list of references which collects previous published works in this area as well as publications cited in the text.

3. Literature review

Stated preference studies on the economic value of the lost load (henceforth VoLL) of electricity (VoLL is a synonym for VCR) or the Unserved Electricity (USE is also a synonym for VCR) have been conducted in several countries. Several literature surveys of the different methods of estimation exists (e.g. Concept Economics, 2008). This literature review concerns mostly papers that have undergone the peer-review process and been published in academic journals, although it includes also technical reports when these were found to be adequately documented.

One of the first studies on VoLL was conducted by Sanghvi in 1982. This early study identifies the factors determining cost to customers as

> "Consequently, from the consumer's perspective, key outage descriptors include: time-of-occurrence, duration, magnitude, warning time, frequency, persistence, and coverage." Page 181.

And in table 5 it reports the use of survey studies to investigate VoLL as early as 1973 in Sweden and in 198-79 in Finland. Talking about the advantages of the survey approach for residential customers in page 194 Sanghvi states:

> "More specifically, the survey approach indisputably provides reliable information about the electricity using opportunity appliance stock, usage patterns and life-styles, demographic and socioeconomic characteristics and the likely impact of an outage on a household's activity schedule."

The use of survey techniques for the valuation of the lost load appears to be the dominant approach in the literature. Amongst the various survey methods the most dominant one is choice modeling (e.g. Blass, Lask and Manski, 2010 report results for Israel; Bliem 2009 reports results for Austria, Karlsson and Martinsson 2008 report results for Sweden; Accent 2008; London Economics 2013). Although alternatives exist. For example, Baarsma and Hop, 2009 in their Dutch study, used a stated preference method similar to choice modeling, i.e. conjoint analysis and argued in its favour. De Noij et al. (2007) used the value of lost production and lost leisure time rather than a willingness to pay approach. Other earlier examples that used survey methods different from choice modeling and based on cost of outages at the household level include Doane et al (1988a) and Wacker et al (1985) and Charles River Associates (2008) for Victoria electricity supply, which used a cost based survey approach. Some studies use a variety of approaches (e.g. Bose et al 2006 report results for a region in India which were obtained in a variety of ways), to mostly cross-validate results across methods.

4. The economics of the VCR of electricity supply

Any investigation of value must be predicated on sound theoretical principles. In general the value of a reliable supply of electricity to users has an indirect value. Electricity customers, households and firms, derive value from the role that electrical power has in the production function that such power is designated to serve. For example, in a residential household a power cut might stop household members from being able to enjoy a TV program or from obtaining washed clothes by a certain time. This will generate a decrease in the utility of the household. The household welfare is diminished by the maximum amount of money that the household is willing to pay to be indifferent between two states. State A is identified as having a given type of power outage available by paying a given amount. State B is identified as paying a different amount and suffering a different type of outage. The types of outages may differ across states in terms of length, severity, presence of notice, time of the day, etc.

Note that in both cases it is not the lost electricity load (in terms of kW/h) that has value, but what is valued is the intended use of this load to generate utility via the household production function. In most commercial customers, such as firms, the value generated by the reliability of electricity supply is similar. For such firms electricity will in most cases represent a factor input in the production process of the firm, which turns this input in some form of output with an expected revenue. It is the unit cost increase or the loss of revenue associated with the electricity outage that determines value to commercial customers.

In both cases the value is a latent entity, which is difficult to approximate by means of approaches based on substitution costs or surrogates. This because the value of such substitutes or surrogates do not necessarily correlated well with the value of lost utility to the household or the unit cost increase to the firm. And even if they do, the information necessary to determine such substitutes is costly to obtain given the large variability of uses to which the electricity load can be put.

For this reason most applications aiming to estimate such values are based on the principle of latent variable estimation. With this principle it is accepted that the best source of knowledge of value is the agent itself (the customer, be it a household or a firm). Preference variation with respect to the determinants of value, such as outage duration, its frequency and severity, can be elicited by the systematic observation of choices between sets of alternative outage scenarios. In other words, by systematically varying the determinants of value across scenarios and observing which alternatives are preferred it is possible to implicitly estimate VCRs for different agents. Furthermore, the negative consequences of outages are suffered by customers while both in and outside the premises subject to electricity supply contract. A residential customer might have a supply contract for electricity at home, but suffer disutility also for outages experiences while traveling to work or while at work. Similarly, prevention of outages at one location might require technical changes and hence investment in the grid very far away from the location experiencing the outage. This diffuse nature of both the cost of outage prevention and their benefits make grid improvements for outage prevention and reliability increase a quasi-public good, the benefits of which are shared across space and time by all those relying on electricity delivery.

5. Survey method

In line with the predominant approach, it is proposed to conduct a survey based on choice modeling and validated using contingent valuation questions. Contingent valuation questions will also be used to evaluate the VCR for high impact low probability events, such as outages of one day and one week duration.

The outage attributes (descriptors) and levels we propose to investigate are the following:

1. Severity (in terms of how widespread the outage is)
2. Duration (1h, 3h, 6h, 12h) [note most other studies use shorter intervals in the long segments]
3. Peak/off peak (Peak 7-10am 3-6pm)
4. Weekday/weekend
5. Summer/winter
6. Frequency of occurrence (1, 2 or 3 times a year)
7. Bill increase (3 levels expressed as (i) $ 3, $7 and $15 for residential survey and (ii) as percentages of the average monthly bill, 1, 2 and 3 percent for businesses). It is assumed that operators can trace down the bill amounts paid by respondents, or that respondents can give an adequate estimate of their yearly average bill.

The full factorial of the profiles is of dimensions $2\times4\times2\times2\times2\times3\times3=576$. When paired it gives $(576^2-576)/2=165{,}600$ different pairs. This is clearly too large a combination to be explored in the study. So, we derived a D-error minimizing (an hence efficient design) from a search over the full factorial to use in the pilot. This design to be used in the pilot, is composed of 48 choice tasks blocked orthogonally in 6 blocks of 8 choice tasks each and allows for identification of interaction effects. It is also envisaged that further experimental design techniques are to be implemented after the pilot results to extract an efficient design. The term "efficient" refers to the fact that more accurate estimates can be delivered by such design, thereby reducing the required sample size. The design to be used in the final survey will be obtain by using a sequential Bayesian approach based on the pilot results. It will enable the identification of interaction effects of interest. For example, there might be scope to test for severity and duration interactions, or duration and peak interaction effects. There is also scope for mixing designs and updating designs at some intermediate stage of the survey. This will enable the use of data collected to be used towards the improvement of the efficiency of the design by using better priors for the unknown coefficients.

The survey will investigate preferences for a common set of attributes across customer categories (residential, small, medium and large business), although each categories will have specific sections to investigate category-specific issues.

Adequate historical data on outages were collected (e.g. historical issuing of outage notices, duration of outages, time of day occurrence etc.) to calibrate the experimental design to some degree of realism.

It is envisaged that respondents can deal with 8 choice situations in choice tasks comparing the reference outage and two outage alternatives. This will give rise to a panel data which is amenable to random parameter estimation, and will enable us to derive respondent-specific estimates of willingness to accept (WTA) compensation for experiencing the outage.

The scenario for payment requires a justification. Initially, for the WTP, the intention was to follow the approach used by Karlsson and Martinsson (2008) in their hypothetical scenario who proposed a connection fee to a back-up electricity board which intervenes in case the main networks fails. The wording used by these authors was:

“Imagine that there is a possibility of choosing between different contracts with your electricity supplier and that a backup electricity board exists that can be used in the case of a power outage. By connecting to this backup electricity board you can affect the number of power outages that your household will experience. For connection to this service you have to pay a connection fee to the owner of the network.”

However, this approach was abandoned following a series of feedback from the retailers in the draft survey. It was hence decided to focus on a WTA approach combined with a benchmarking of value estimation for the reference outage to be obtained by a WTP contingent valuation question.

The scenario for willingness to accept (WTA) will be defined as a reduction in the bill as a consequence of the outage suffered. The reference outage is defined as a minimum inconvenience outage of 1 hour duration, during weekdays, off-peak time, in winter, localized and providing no compensation occurring with a frequency of twice a year.

The following page illustrates a variety of high profile peer-reviewed studies that have explored attributes 4, 5 and 6 above. Because of the strong evidence of relevance for value of these attributes in the extant literature we recommend their inclusion in the survey despite the fact they were not mentioned in AEMO’s directions paper.

	Day of the week (weekday or weekend).	Season (summer or winter).	The issuing of notices before the outage.
Abdullah & Mariel 2010			x (# of planned outages)
Accent 2008			x
Baarsma & Hop, 2009	x	x	x
Beenstock, Goldin & Haitovsky 1998	x	x	x
Blass, 2010	x	x	x
Bliem, 2009			x
Bose et al, 2006	x	x	
Carlsson & Martinsson 2008	x		
Carlsson & Martinsson 2011			x
AAG & Train, 2000	x	x	
Hartman, Doane & Woo, 1991	x	x	x
Kjolle , Knut & Kvistein 2008	x	x	
London Economics, 2013	x	x	
McNair, Bennett & Hensher 2011			x (# of planned outages)
Moeltner & Layton 2002	x		
Pepermans 2011		x	x
Soderberg & Magnus 2007			x (# of planned outages)
Willis & Garrod 1997			x (notice period)
Bertazzi, Fumagalli & Shiavo 2005	x		
Kariuki & Allan 1996		x	x

Table 1. Use of outage determinants in previous survey studies.

6. Survey mode

It is proposed that the survey be administered prevalently on-line, with a potential supplement of face-to-face computer aided personal interviews (CAPI) surveys. The CAPI and the on-line surveys will guarantee adaptability of survey context to the type and location of respondent. It will also secure automatic data capture. Finally, it will enable the automatic update of the survey experimental design, should the design need to be updated during the period of data administration. Experimental design updates while the survey is in the field have been shown to be valuable in increasing the overall efficiency of the estimates from the final sample. This is achieved thanks to the development of sequentially better Bayesian priors (Scarpa et al. 2007) and verification of the quality of initial priors.

Respondents will be given unique identifiers linked to their IP numbers or to cookies, so that repeat survey administration from the same respondent is prevented. Respondents may also be asked if they are willing to repeat the survey at a later stage and hence provide an e-mail address for subsequent contact or if they can forward the survey link to acquaintances of theirs living locally to produce a snow-ball sub-sample to be treated separately. A second survey may be mailed out to those available with an improved design using better Bayesian priors for the utility coefficients. Such design would be specific to the segment to which the respondent belongs. This second survey might not be necessary, but it might improve the definition of the granularity we seek to characterize.

Snow-balling is the practice of asking respondents recruited in a representative sample to forward by email invitations to participate in the survey to other people. This is a practice that might be of use if the density of the sample is thin in certain nodes as respondents will probably know of neighbors that might be induced to take part. In the on-line survey provision can be made for respondents to receive instructions on how to forward the invitation to others to increase the sample size. Snow-balled respondents will be identified as such by specific identifiers so as to test the sensitivity of the results to their inclusion/exclusion in the active sample.

It is acknowledged that by employing exclusively web-based surveys some groups might be systematically under-represented because they have no access to the web. If evidence of unrepresentativeness of sample-selection will emerge in the final sample then face to face surveys may be needed to supplement the final sample with a representation of customers who lack web-access. So, it is important to make provision for a fraction of surveys to be conducted in person, possibly via CAPI (computer aided personal interviews) with the market research firm in charge of survey administration. To be viable the average survey length should be contained below the 20-25' duration at most. Duration will be tested during the pilot survey.

7. Hypothetical bias prevention

As in all survey research designed to elicit value from hypothetical statements or intention to act, this research is vulnerable to some degree of hypothetical bias. This bias is the difference between the estimated values from stated survey data and the real values that underlie human action. Despite best intentions people are well known for experiencing differences between intentions and actions, and even large differences between statements and actions.

A large amount of research has been conducted to use entreaties to decrease this source of bias in hypothetical surveys. Various approaches have been proposed in the past (Brown et al, 2003) such as budget constraint reminders (Loomis et al 1994, Loomis et al 1996), cheap talk scripts (Cummings and Taylor 1999; List 2001; Aadland and Caplan 2002, Carlsson et al. 2005; Bosworth & Taylor, 2012) and more recently promising and honesty priming (Jacquemet et al. 2011; Jacquemet et al. 2013; Pashler et al. 2013), which are based on concepts developed in social psychology and work at an unconscious level on respondents. The survey will use a set of these approaches so as to ensure and also test in this context the effect of using such approaches.

Budget constraint reminders simply remind respondents that money that is hypothetically destined to purchasing a lower impact outage contract is not available for other uses or expenditure. Cheap talk scripts are scripts that are written to alert respondents to the frequently observed difference between statement on hypothetical behavior and real behavior. Honesty primers are more subtle approaches and are implemented by asking respondents to engage with grammatical tasks (such as composing a sentence or identifying the word with closest meaning to another word) that expose them to words such a honesty, truth, genuine, real, correct, etc. that “prime” the subject to be truthful. The effectiveness of these will be tested in the pilot by including them in one out of five pilot respondents.

8. Granularity Estimates and Sampling Plans

The direction paper (section 3.2) explicitly states that “All stakeholders supported more granular VCRs, such as sector-specific and location-specific VCRs.” And that: “disaggregated information by location—including CBD, metro, rural long, and rural short—has been used in setting the targets for the distribution Service Targets Performance Incentive Scheme (STPIS)”. Finally: “… that more granular VCRs—ones that distinguished between different types of outages (timing or duration)—would better reflect consumer needs.”

Because of the paucity of previous studies, it is impossible to say ahead of time whether VCR estimates are going to be different between each `granule’ and the VCR estimate at the state level, and if so by how much. In statistical terms the development of a sampling scheme requires the definition of the expected magnitude of the difference since the statistical significance of difference estimates will depend on its size as well as other factors determining VCR values across sub-populations subject to sampling. In the absence of any previous study looking at differences in VCR estimates across states, sub-regions and transmissions nodes, it is difficult to develop a specific sampling scheme. So, it is accepted that this first study will constitute a first step in uncharted territory.

The task is therefore that of establishing a sampling plan that is adequate to detect differences between each sub-region within the six Australian Commonwealth states under investigation (Queensland, New South Wales, South Australia, Tasmania, ACT and Victoria) for two categories of customers, residential and businesses. The business category is further divided into 3 energy consumption categories (small, medium and large) and three economic sectors (primary, secondary and services). Sub-regions are clusters of geographically contiguous transmission nodes, grouped using various criteria, including the types of development (CBD, urban and rural). So, the sampling is based on two levels of geographical stratifications, one at the state level, which is necessary to ensure the derivation of good state level estimates of VCR; the other at the sub-region level, which ensures the coverage of the necessary rural, urban and CBD strata. It is also based on two categories of customers, residential and business, the latter of which is further segregated by size and economic sector. In the appendix we report the suggested sampling plan for each of the sub-regions.

The sampling plan is mostly determined by the degree of accuracy expected for the granularity of the location-specific estimates on the grid. While a node-level coverage is ultimately desirable, it resulted too expensive to achieve in the absence of previous information because of the need of an extremely large sample. In some nodes with low density of NMIs it is simply impossible to sample. So, it is proposed that estimates of VCR be obtained by spreading the sampling at the sub-region level across a sufficiently large number of nodes, but with a density of observations of at least 30 per node in residential samples and 20 per node in the business sample. A 10% sample size is to be withheld and allocated, if needed, at the end to those nodes that require higher density. This node-level coverage should be sufficient to ensure that sufficient variability exists to develop a VCR transfer function at the node level with which to predict VCR values for those nodes that will not be covered in the survey, but for which the determinants of VCR levels are known.

9. Statistical analysis of the choice modeling survey data and VCR computation

The choice data analysis will use conditional logit and panel mixed logit panel models (Train 2003). Conditional logit modeling is the classic/basic approach to choice data analysis, but many reports do not go much further (e.g. London Economics 2013). The mixed logit panel models will enable us to identify individual specific estimates, which are useful for the description of the granularity of interest using posterior estimates.

Socio-economic covariates will be used to identify node-specific and customer-category effects. With adequate sample recruitment, if difference exists across such categories, they should be tested for in the structural model of random utility choice probability. For example, Customer type (residential, and small/medium/ commercial); customer location (connection point and CBD, urban and rural) and customer specific peak/off peak hours will be tested for. Ancillary information on household composition and commercial activity will also be used to condition estimates on meaningful observable variables.

Models can also be estimated for sub-samples of respondents living in clusters of nodes and in specific states or regions. Alternatively, the significance of dummy variables for these sub-samples can be tested in structural probability models.

In terms of the derivation of VCR estimates, a full specification search will be conducted over a range of models to identify the best fitting one to the data. The models will be estimated on the choice data collected. Estimates of value are derived by hypothesizing a utility function based on the factors of the outage.

Let’s use the following acronyms:

DUR = 1, 3, 6 and 12 hours duration;
PEA = 1 → peak time;
WEA = 1 → week-end;
SEA = 1 → winter;
SEV = 1 → localized;
PRI = $3, $7, $15 /month (compensation in terms of reduction of bill);
FREQ = 1, 2, 3 times a year.

The utility function of an outage may be defined as:

$$U = \beta_1 DUR + \beta_2 PEA + \beta_3 WEA + \beta_4 SEA + \beta_5 SEV + \beta_6 PRI + \beta_7 FREQ + \varepsilon$$

In fact, it can be more complex than this since the design allows for interaction effects at the single level. But this should suffice for an example.

The value of the reference outage will be determined by a contingent valuation question, and any other outage can be derived from this reference (which is present in all choice tasks made by respondents) by using the estimates of the betas, which will be obtained from the observed choices of the experimental design.

This will produce 2×4×2×2×2×3 = 192 variants of profiles.

The marginal value of each factor is to be found by a ratio. At the numerator of the ratio we have the first derivative of utility over any factor, at the denominator the derivative over the proposed monetary compensation:

$$W_{DUR} = \frac{-\partial \mathrm{U}/\partial DUR}{\partial \mathrm{U}/\partial PRI} = \frac{-\beta_1}{\beta_6}$$

From the derivation of these values, each of which can be used to derive a specific outage in terms of the outage factors, the implicit value of the loss of the load of each outage can be derived. This will require assumptions on the loss of load to be associated with the specific outage which AEMO should be able to make on the basis of the knowledge of the data obtained from the survey and other data.

For example, assume we want to find the value of an outage happening in winter weekday, in peak hours and lasting 3 hours. The estimated value from the CVM data will give us the value assigned to the reference outage, which lasts 1 hour, takes place off peak at winter in weekdays. The outage of interest is probably valued more than the reference because of being in peak time and lasting 2 hours longer. The estimate can of this new outage is to be found by using the CVM estimate for the reference outage and the betas for hours and peak time:

$$W = CVM + \frac{-\beta_1}{\beta_6} + \frac{-\beta_2}{\beta_6}$$

Similarly, any other combination can be constructed from this. In as much as AEMO is capable of defining the loss of load for such an outage at the household level in kWh the computation can be conducted to retrieve the VCR in $/MWh.

This is a simple example, but much more sophisticated VCR estimates can be allowed by this data collection. For example, the data allow the derivation of this at the individual respondent level, using the panel nature of the choice responses.

10. Statistical analysis of the contingent valuation survey data

It is proposed to use a probabilistic payment card to elicit maximum WTP values for high impact low probability outages, such as one day and one week duration outages with very low frequency of occurrence (once every 3 years or once every ten years, or whatever deemed adequate). Probabilistic payment cards show a range a values each is associated with a range of probabilistic statements concerning payment.

For example, consider the percentages of the average yearly bill of 1, 2, 3, 4 and 5% and the statements: Certainly yes, Probably yes, undecided, Probably not, certainly no. The proposed payment table would be:

Percent increased of average yearly bill	I would certainly pay it	I would probably pay it	I am undecided	I would probably NOT pay it	I would certainly NOT pay it
1%	x				
2%		x			
3%					x
4%					x
5%					x

Table 2. Example of probabilistic responses in contingent valuation studies.

Respondents will be asked to cross the adequate cells, an instance of which is shown above. The above approach has the advantage of allowing degrees of uncertainty to respondents, and support a variety of sensitivity tests in the analysis of responses.

The identification of what constitutes a credible HILP outage event should be defined in terms of its frequency and duration for different nodes and part of the network on the basis of historical data.

11. Pilot testing

The pilot testing has the objective of making sure that the survey is actionable in the field, the design is adequate and the average response time within the target limit of 15’. The results from this should enable us to adjust the experimental design, fix any problem with the software and measure the duration of the survey, as well as give an idea of the expected response rate in the final survey. An early execution of the pilot may also alert us to any serious oversight and give us the time to modify the survey instrument accordingly.

The idea has been suggested of using the pilot as a first proper survey for the broad estimates of a basic set of outage types (restricted set of attributes), to meet some of the broad objectives and derive some priors to use in the efficient design to implement in the proper survey. Piloting should take place at the state level with adequate sub-samples for the different customers groups.

The respondents needed to conduct the pilot at the state level. For each state are: (1) 50 residential customers; (2) 20 Business medium customers and (3) 20 Business low customers and (4) 5 large customers for each sector (agriculture, primary production, health provision, etc.).

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APPENDIX

Sampling plan – completed surveys by customer category and sub-region

	Residential	Business Small			Business Medium		
		Services	Primary	Secondary	Services	Primary	Secondary
Tropical QLD	150	45	27	27	27	18	18
Tropical QLD – Urban	200	45	27	27	27	18	18
Central QLD	150	45	27	27	27	18	18
Central QLD – Urban	200	45	27	27	27	18	18
Inland QLD	150	45	27	27	27	18	18
SEQ – Urban	200	45	27	27	27	18	18
SEQ – CBD	200	45	27	27	27	18	18
SWQ – Urban	150	45	27	27	27	18	18
SWQ – Rural	150	45	27	27	27	18	18
North East NSW	150	54	32	32	36	23	23
North East NSW urban	180	54	32	32	36	23	23
Inland NSW	150	54	32	32	36	23	23
Inland NSW urban	180	54	32	32	36	23	23
Mid-south NSW	150	54	32	32	36	23	23
Sydney/Wollongong	150	54	32	32	36	23	23
Sydney CBD	200	54	32	32	36	23	23
ACT/Canberra	200	54	32	32	36	23	23
South-mid Victoria	150	54	32	32	36	23	23
South-mid Victoria - urban	200	54	32	32	36	23	23
Inland Victoria	150	54	32	32	36	23	23
Inland Victoria - urban	200	54	32	32	36	23	23
Melbourne	150	54	32	32	36	23	23
Melbourne CBD	200	54	32	32	36	23	23
South-east SA	300	90	59	59	59	36	36
Northern SA	300	90	59	59	59	36	36
Adelaide	400	90	59	59	59	36	36
Adelaide CBD	200	90	59	59	59	36	36
Tasmania	600	135	90	90	90	68	68
Tasmania - urban	400	135	90	90	90	68	68
Sub totals		1791	1107	1107	1163	764	764
Total survey 1	6160			4005			2691
10% Hold back	616			401			269
Total to contract	6776			4406			2960

Large Business: n=35 per state