LOW CARBON LIVING CRC

Transformation to Low Carbon Living - Social psychology of low carbon behavioural practice (RP3012)

Final Report

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The author(s) confirm(s) that this document has been reviewed and approved by the project's steering committee and by its program leader. These reviewers evaluated its:

- originality
- methodology
- rigour
- compliance with ethical guidelines
- conclusions against results
- conformity with the principles of the Australian Code for the Responsible Conduct of Research (NHMRC 2007),and provided constructive feedback which was considered and addressed by the author(s).

Contents

Executive summary

This document is the final report for a CRC Low Carbon Living project called “Transformation to Low Carbon Living: Social psychology of low carbon behavioural practice". As outlined in the introduction, the purpose of this project was to identify low carbon behaviours and then both (a) develop a short measure that could be used to measure psychological readiness in people for engaging in low carbon behaviour and (b) provide a social psychological foundation for understanding when and why people will engage in low carbon behaviour. The short measure developed is called the Low Carbon Readiness Index (LCRI) and this report both demonstrates and discusses the many ways it can be used to understand and aid in the promotion of transformation to low carbon living. We also highlight the value of also considering the role of interpersonal factors.

In chapter 2, we present behavioural practices theory, which provides a social psychological foundation for understanding low carbon behaviour. Specifically, we guide the reader through a series of theoretical ideas and provide notes on how these ideas can be used by practitioners to design better policy and interventions that promote low carbon living. The “Why-How-Who” analysis of behaviour discussed in this chapter also gives a theoretical basis for understanding the LCRI measure and the way it is related to low carbon living.

In chapter 3, we describe the methods used to measure low carbon living in Australia and the structure of the annual survey collected from the Australian population between 2015-2017. Low carbon motivation was measured using the LCRI and three interpersonal factors: low carbon household regulation, community support and a low carbon descriptive norm. Low carbon behaviour was measured in terms of multiple different low carbon daily routines and investment in several different pieces of low carbon infrastructure. In chapter 4, we report descriptive characteristics from the three survey waves collected. These showed that the level of low carbon motivation and behaviour in Australia was stable over the 2015-2017 period but that a substantial amount of low carbon behaviour was being performed, both in terms of infrastructure investment and performance of low carbon routines. In chapter 5, we show that the measured low carbon behaviour tended to occur in clusters and that the amount of behavior participants performed within these clusters could be predicted by their level of LCRI.

In chapter 6, we then investigated the role of interpersonal factors in predicting both LCRI and low carbon behaviour. We found that people with higher household regulation of low carbon behaviour and higher community support for this behaviour were higher in LCRI and that increases in these factors also predicted an increase in LCRI across time. We also found that interpersonal factors affected low carbon behaviour both directly and in interaction with LCRI. In chapter 7, we examined six subpopulations who were either high, middling or low in their low carbon investment and also either high or low in their low carbon routines. We found these populations differed particularly in terms of household regulation, low carbon descriptive norm, age and house ownership. In chapter 8, we conclude the report by discussing the main levers for promoting low carbon behaviour (household regulation, community support and house ownership) as well as directions for future research.

1. Introduction

The transformation to low carbon living project had three objectives:

(1) Compile a catalogue of low carbon behavioural practices.
(2) Establish a social psychological foundation for behavioural change and transformation to low carbon living.
(3) Develop a Low Carbon Readiness Index (LCRI), a psychometrically sound and practical measure of psychological readiness in people for societal transformation to low carbon living.

In the first phase of this project the research team investigated what low carbon behaviours were possible in the household and personal travel. A taxonomy of different behaviors was developed based on research on methods of carbon reduction (e.g. Wright, Osman, & Ashworth, 2009) and included as part of a literature review of psychological research on environmentally significant behaviour. A catalogue of low carbon behaviour was also compiled and has been included with this final report as an appendix.

The next phase focused on building and validating our LCRI measure, as detailed in our Year 2 and Year 3 reports. This final report builds on previous reports to provide a psychological framework for behavioural change that more fully explains the foundations of our LCRI measure. We then give a detailed picture of how the LCRI predicts transformation to low carbon living in the Australian population.

Since we do not go into detail here, it is worth noting at the outset that we are also currently using the LCRI to help monitor several living labs and this work is ongoing. The progress of RP2019 (Composting for Different Urban Forms) and RP3020 (SimplyCarbon) will be reported by the project leads of these projects, while the relationship between LCRI and actual energy usage will be investigated further once we receive already approved gas consumption data from companies supplying CSIRO Residential Building Study participants (see preliminary results in Year 3 report).

The LCRI itself is detailed in this report and is available to any practitioner or policy maker for use in their efforts to promote low carbon behaviour change. Because it is measured using only three items the LCRI places a negligible burden on the general public and it predicts a wide range of their low carbon behaviours. As figure 1 below shows, it can be used in designing, implementing, evaluating, and revising climate change policies and carbon reduction interventions.

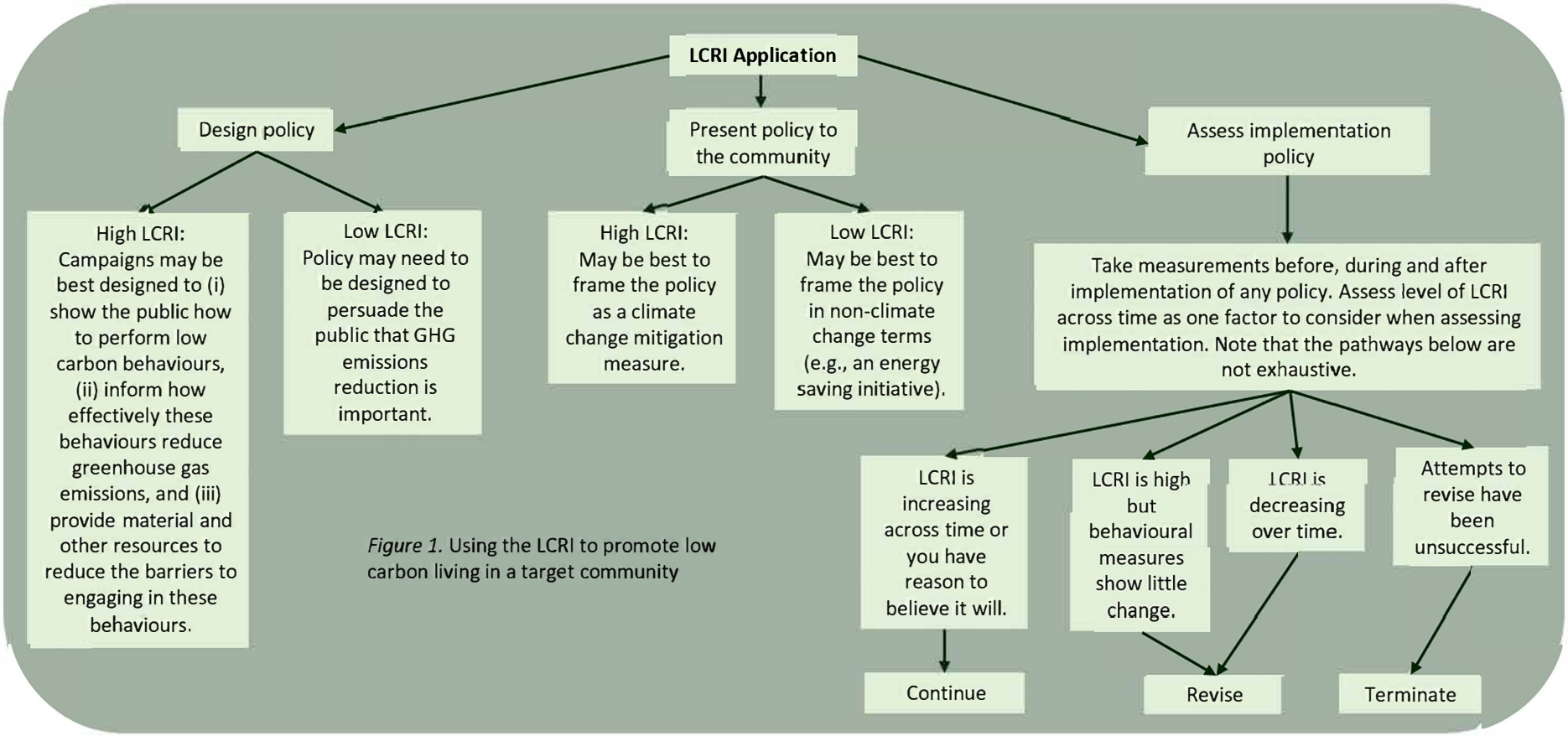


Figure 1. Using the LCRI to promote low carbon living in a target community

The research described in this report provides a guide for using the LCRI and associated measures in population surveys as well as giving a snapshot of low carbon living in Australia today. A particular emphasis in this final report is to bring in insights about the role of interpersonal factors, especially household regulation, in the operation of the LCRI.

In terms of reported results, levels of low carbon motivation and behaviour are first reported for the period 2015-2017. Then low carbon behaviour is shown to group into clusters and the LCRI is shown to predict behaviour within these clusters. Then interpersonal factors are shown to predict LCRI over time, and also to shape low carbon behaviour both directly and in interaction with the LCRI. Finally, we examine six different subpopulations that vary in terms of the extent and nature of their low carbon behaviour, showing that they are meaningfully different in terms of LCRI, interpersonal factors, and the key contextual factors of house ownership and age. We close the report with a discussion of the results and the insights they offer for promoting transformation to low carbon living in Australia.

2. Behavioural practices theory: A social psychological foundation for understanding low carbon behaviour

'Behavioural practices theory' is a social psychological perspective that our research group is developing to understand transformation to low carbon living. Transformation to low carbon living requires the adoption of multiple low carbon behaviours and, simply put, this change is hard because life is complicated. Our perspective is designed to help make sense of the complex web of thoughts, actions, and interactions underpinning a behaviour and the difficulties involved in changing it.

Briefly, we propose that one should think about what is happening for the actor in terms of 2 dimensions. First, the Why—How dimension spans thinking from 'why do I do it?' to 'how do I do it?' Second, the Intrapersonal—Interpersonal dimension spans thinking in purely individual terms to considerations and judgements that are shaped by various different kinds of social interaction. These dimensions provide the social psychological core of a behaviour, which can be termed as its *Why-How-Who*. Assessing behaviour in terms of these dimensions can give insight into behaviour change, so long as the greater complexity of the manifold networks of activity that each behaviour lies within is kept in mind. In other words, the final step for practitioners is always to consider how the Why-How-Who aspects of behaviour play out *in practice* for the people they wish to influence.

*Our recommendation to practitioners is that they use a "*Why-How-Who in Practice*" analysis to assess what a new behaviour will require and more broadly entail before and during any attempt to change existing behaviour.*

2.1 The Why-How dimension

The Why-How dimension can be used to better understand how our minds work. Let's use a metaphor to understand the Why-How dimension: Imagine the mind as a tramways system with two zones, regional and urban, and several overlapping tram lines that connect the two zones (see figure 2). In this metaphor, each station represents a description of an action (see also Vallacher & Wegner, 2012). The most far flung regional stations represent very abstract actions (e.g. stop climate change), and the stations become increasingly concrete as the line approaches the urban zone (e.g. personally reduce carbon emissions), finally forking into a series of different terminating stations in the urban zone that represent highly concrete behavioral options (e.g. install solar panels; cycle instead of driving; buy an efficient heater). In addition, while the more regional (i.e. abstract) stations lead to multiple urban stations (i.e. concrete actions), there is also overlap whereby multiple regional stations can lead to the same urban station. For example, you can travel to 'install solar panels' station from 'reduce carbon emissions' station, but you could also get there via a 'be secure from brown-outs' station.

Now suppose you are in a tram on the mental tramways, heading towards a terminating station in the urban zone. At any point in your route, the station you have just left can be understood as representing Why you are motivated to take an action, while any station you are headed towards can be understood as representing more concretely How you are going to turn that motivation into action. Hence, at one level, "stop climate change" is why you will act and "reducing carbon emissions" is how you will achieve that climate mitigation. But also, "reducing carbon emissions" is why you will act and "buying an efficient heater" is how you will reduce carbon emissions.

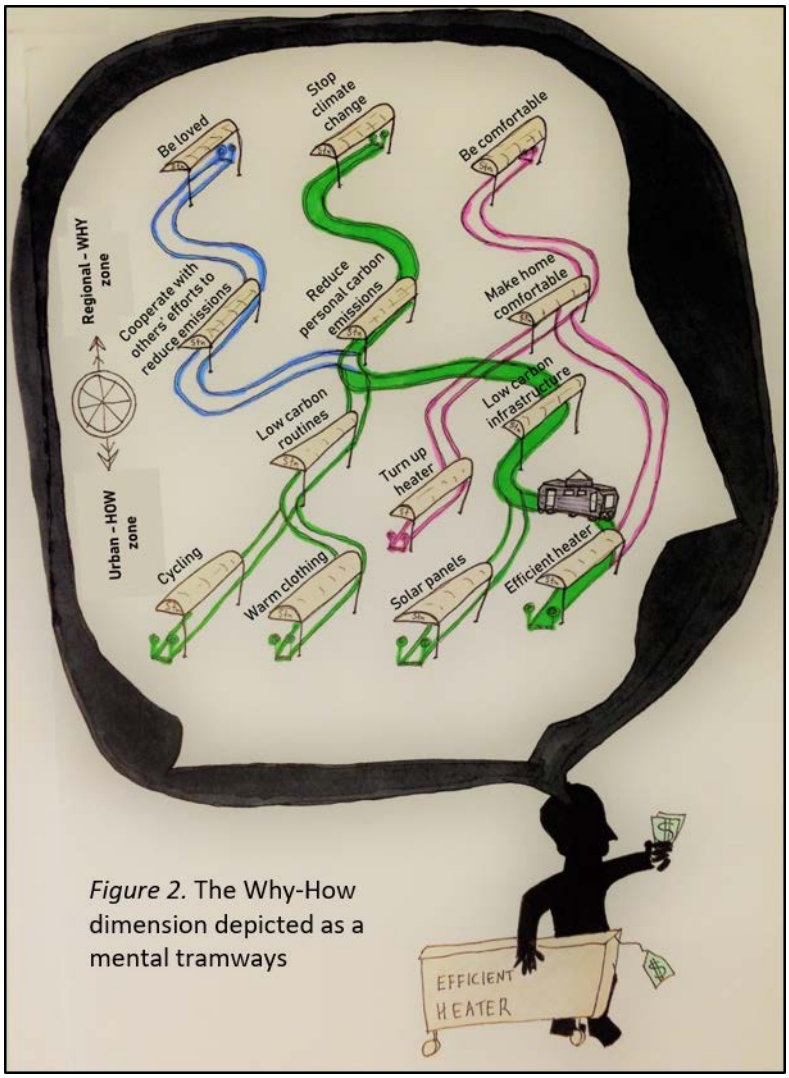


Figure 2. The Why-How dimension depicted as a mental tramways

As a passenger in the tram you might be focused on a particular station at a particular time. But the first thing people interested in behaviour change should keep in mind is that the whole route, the chains of Why-Hows leading from extremely abstract notions to extremely concrete actions, has implications for behaviour change.

⇨ ***Practitioner's note:*** Consider the Whys and Hows people already possess, including the multiple abstract Whys that may lead to the How you are trying to change.

The second thing to consider is that an existing behavioural route provides a way of serving multiple levels of Why's in a way that is satisfying for the actor. Introducing change in a way that leaves a Why unserved (i.e. by removing its How) will undermine willingness to follow through with the changed behaviour. For example, convincing someone to have their heater at a lower default setting will likely not be effective if the Why of creating a comfortable home then goes unserved. One common solution is to encourage people to preserve their comfort by wearing warmer clothing. But other less obvious Whys may need to be dealt with (like having a hospitable home and avoiding conflict with other householders) to achieve lasting behaviour change. Third, even if people are not seeking new Hows to satisfy particular Whys, they will often enjoy discovering that their existing Whys can be satisfied with better Hows. For example, once people are persuaded to shop and plan meals around seasonally available food they are often delighted by the experience of this food being cheaper and of higher quality compared to out-of-season alternatives.

⇨ ***Practitioner's note:*** Consider how any desired change might:
(i) leave an existing Why unsatisfied, or
(ii) improve satisfaction for an existing Why.

Knowing the above will set the basis for mapping out which Why-How connections need to be removed (e.g., 'use heater' connecting to 'be warm') and which connections need to be built (e.g., linking 'put on a sweater' with 'be warm' but also 'feel more freedom [to leave house without having to put extra clothes on and remembering to turn off heater]') in order to achieve successful behaviour change.

Fourth, even with everyone giving their best effort, complete mapping of existing Why-How relationships may be impossible to achieve before an intervention begins. People will not necessarily have perfect conscious insight into all the Why-Hows that underpin their behavioural choices. Habitual behaviours develop to serve specific Whys but these will not necessarily be conscious at the time of a behaviour change attempt. Even if a behaviour is not habitual, a person will not necessarily be reflective about their preferences.

⇨ ***Practitioner's note:*** Be ready for people to unthinkingly do things that are not in line with their stated priorities.

Daily life also involves careful sequencing of seemingly unrelated behaviours (e.g. going to work and doing the shopping) and this means that changes to apparently discrete behaviours can have unanticipated flow on effects (e.g. cycling to work stops you from doing the grocery

shopping on the way home). Hence, our fifth point; effective change is often iterative. Just as building new tram tracks and destroying old ones is effortful, establishing a new behavior is difficult and not sustainable unless the necessary planning and work is done to establish new routes.

> ⇨ ***Practitioner's note:*** Don't expect initial ways of accommodating a new behaviour to last. To truly incorporate a new way of thinking and acting, a person will often have to adjust many aspects of their life and worldview (see also the 'in practice' section below).

2.2 The Intrapersonal-Interpersonal dimension

Talk of mental machinery and corresponding behaviours can give the false impression that people enact their behaviours in a highly individualistic, autonomously empowered vacuum. In fact, the opposite is true. Interpersonal factors pervasively shape people's behaviours in multiple ways and three key ways are described here.

Negotiation between social partners equates, in our tramways metaphor, with people jointly working out a tram route that gets them all where they want to go. We regularly interact with people in the home and in our wider social circle and we also have many encounters with strangers in the course of our daily lives. These interactions feed into our sense of social norms, but more immediately they provide information that questions or reinforces the validity of our Whys, as well as experiences of social co-ordination that nuance our Hows with interpersonal addendums. For example, the means and extent of temperature curtailment in the home has to be negotiated with household members, and while you may be primarily motivated by a low carbon goal, you may have to consider and develop other Why-based arguments, like saving money, if you wish other householders to behave in the same way you do.

> ⇨ ***Practitioner's note:*** Consider the negotiations that may occur amongst people before the new behaviour can be implemented. The existing Why-Hows of all people involved will impact on how well any one person can adopt the new behaviour. Plan to directly or indirectly support any negotiations in favour of change.

Social partners are also a valuable source of **instruction.** They give informational and practical aid when people are learning what Hows are needed to achieve desired Whys. This might take the form of a friend explaining how to arrange the installation of solar panels, or a family member helping you plan a bike route so that you don't have to drive.

> ⇨ ***Practitioner's note:*** Consider who is available to give concentrated or incidental aid to the people whose behaviour you are targeting.

Finally, a **descriptive social norm** is like a tram route map with directions about how to get from A to B. The norms entail perceptions of why and how people behave the way they do. Often, we do not have a strong sense of where a norm has originated from; we are simply aware that it exists (like a standard issue tram map). The way descriptive social norms influence behaviour

is by people developing a sense of social pressure to do something because they see that "other people" do that thing (i.e. the Why is "other people do it"). People have a strong natural inclination to take their behavioural cues about how to behave from others, especially people with whom they feel connected. However, sometimes people are motivated to go "off-map", which creates an alternative Why, namely "do what others are not doing". In particular, research has shown that, when a person cares about an issue that most others are not acting on (i.e. little follow through on Hows), this general lack of action can be a motivating factor for that person initiating action and doing things because others are not (Mutz, 1995).

⇨ ***Practitioner's note:*** Ascertain what people think the existing social norms are, and whether they are motivated to act in line with these norms or to act in opposition to them.

2.3 Why-How-Who in Practice

Whether or not it is socially influenced, a mental 'How' developed for behaviour will not necessarily work in practice. A planned bike route may take you up too many hills. The solar panel company might charge more than you can afford. Despite extended negotiation, you might never agree with other householders about how much to heat your home. There are many ways that behaviour can fail in practice, even if there is a clear Why-How route and even with the support of multiple "Who"s.

As indicated above, some practical problems can only be identified and solved through trial and error. However, some considerations, first identified in social practice theory (Shove, Pantzar, & Watson, 2012), can provide a guide for troubleshooting planned for behaviour change. To establish a Why-How action representation and corresponding behaviour as an effective social practice, a person must have (a) the requisite resources, competences, and inter-personal relationships, but also (b) achieve a dynamic equilibrium between the new behaviour and other existing behaviours performed by both themselves and others. Section 2.3 in our Year 3 report gives further detail on the sorts of questions practitioners can ask to troubleshoot behaviour change plans.

⇨ ***Practitioner's note:*** Consider what resources, competences, and relationships are needed to perform the behaviour, keeping in mind that people have to manage many different competing demands in their daily lives (see Year 3 report, section 2.3). Plan for a problem-solving period during the establishment of a new behavioural pattern.

2.4 Using behavioural practice theory to measure transformation to low carbon living

Low carbon behaviour in the home and personal travel is highly diverse, but the concepts discussed in this chapter provide a theoretically grounded way to track overall progress towards low carbon living. First, the lowest-order Why that encompasses all of the diverse ways of

performing low carbon behaviour is simply the personal striving towards a low carbon goal (Kashima, Paladino, & Margetts, 2014). A low carbon goal is How to personally fight climate change and Why one would engage in low carbon behaviours of varying levels of specificity. Some barriers to behavioural performance may be insurmountable, but those who strive to reach a low carbon goal will be ready to create and take opportunities for low carbon living. We therefore call our low carbon goal measure the Low Carbon Readiness Index (LCRI) throughout this report.

Second, the many practical differences between daily routine behaviour and infrequent low carbon infrastructure investment make these two obvious lower-order Hows that offshoot from the pursuit of a low carbon goal and, at another layer of specificity, more concrete clusters of low carbon behaviour can be expected to offshoot from infrastructure and routine behaviour. Third, given the tendency for people to do similar things in similar ways (i.e. referencing the same How; Thøgersen & Ölander, 2003), once a person has sucessfully executed one specific behaviour in a low carbon way, they are more likely to choose the low carbon option for other behaviours that are similar in concrete ways. We would therefore expect low carbon behaviour to be concentrated into clusters, with the low carbon goal predicting when people will successively solve the different practical problems required for low cabon behaviour within and across different clusters of behaviour.

In addition, interpersonal factors can serve as additional Whys at multiple levels of abstraction. The forms of influence that interpersonal factors can have are many, but some simple expectations can be derived for low carbon behaviour within the home. First, household negotiations to regulate each other's behaviour can be expected to reinforce both the low carbon goal and low carbon behaviour itself (e.g. my householders' enthusiasm is Why I want to strive to be low carbon too; my householders remind me to put on a sweater instead of turning up the heating). Second, weaker social reinforcement such as the availbilty of support from friends and family, and the general sense of a national pursuit of low carbon living may also play a role in reinforcing both the low carbon goal and low carbon behaviour.

Finally, contextual factors can be expected to play a role in whether low carbon behaviour is practically possible. For example, solar panels require ownership of a house or other abode with a suitable roof for installation.

With these expectations, we measured the extent of low carbon living in Australia and examined how our Why motivational variables, as well as several contextual variables, predicted several concrete low carbon behaviours.

3. Measurement of low carbon living in Australia

3.1 Mechanism for measuring low carbon living

To examine low carbon living in Australia an annual population survey of Australians aged 18 years and over was conducted every September during the period 2015-2017. Participants were contacted by Swinburne University of Technology's telephone interviewing facility and completed a 15-minute telephone survey. The first survey conducted was used to finalise the question sets used to measure low carbon living in Australia and included many questions not repeated in later years. Superfluous measures were identified and removed as part of preliminary analysis and are not included in this report. To limit the length of the 2015 survey not all questions were asked of all participants and the paneled questions are identified with a superscript in table 1.

Participants were drawn from a pool of randomly sampled household and mobile telephone numbers provided by the company Sampleworx (response rate 19.42%). This sample pool of phone numbers was validated and weighted approximately to post-code level population statistics and the number of participants was stratified to be representative of Australia's State and Territory population levels. A sample size minimum of 700 participants was chosen to ensure a margin of error < 4, based on the Australian population (24,210,800; ABS, 2017) and a 95% confidence level. Sample weights for age and gender were used when calculating mean and regression estimates in Stata 12.

As shown in table 1 below, in addition to the new cross-sectional sample of the population taken each year, we also re-interviewed previous participants who consented to being re-contacted in following years. Unless otherwise stated, the values listed and tests conducted were generated using the total samples for each year. To control for the influence of selection bias, unless otherwise stated, regression models using the total samples included as a covariate a categorical marker for the number of waves a participant participated in.

Table 1: Survey data structure

Participants	2015	2016	2017
Total in year	716	1006	1355
New in year	716	702	770
Returned from previous year	-	304	585
Present in all years	206	206	206

3.2 Low carbon measures

To measure personal strivings for a low carbon goal we designed a three-item measure called the Low Carbon Readiness Index (LCRI; see table 2). As described in chapter 2, the LCRI was conceptualised both as a general "How to proceed" guide, informed by higher-order Whys regarding the danger of climate change, and as a "Why do this thing" guide for the decision to engage with low carbon infrastructure and routine behaviour in the home and personal travel. To capture some key aspects of the interpersonal dimension, we also included measures of low carbon support from three 'Who's: (i) a low carbon descriptive norm measuring perceptions of most people in general; (ii) community support for low carbon behaviour in the form of advice and support from friends and family; and (iii) household members' active regulation of each other's low carbon behaviour. As a comparison for these custom low carbon measures, we also included Leviston, Walker, and Morwinski's (2015) measure of climate change beliefs. An uneven distribution of responses (see table 7), meant this measure was dichotomized for analysis: belief in anthropogenic climate change was coded as 1, and all others as 0.

Table 2. Low carbon measures

Measure	Items	Cronbach's α		
		2015	2016	2017
LCRI	・I work hard to reduce my greenhouse gas emissions whenever possible ・I feel very good when I am successful in reducing my greenhouse gas emissions ・I would feel very bad if I failed to reduce my greenhouse gas emissions	.84	.83	.87
Descriptive norm present	・Most people work hard to reduce their greenhouse gas emissions whenever possible ・Most people think it is very important to reduce their greenhouse gas emissions	.69	.65	.68
Community support	・I have friends and family outside the home who can give me advice or support about doing things that reduce greenhouse gas emissions [Note. Advice and support listed in 2 separate items in 2015]	.89	–	–
Household regulation	・Members of my household keep track of what is happening in the household to make sure the goal is achieved ・Members of my household remind each other to behave in a way that helps achieve this goal	.79	.79	.84

3.3 Contextual measures

Participants reported their household size, age in years, gender, country of birth, whether a language was spoken other than English, and household income. Participants were also asked

whether they resided in a house and whether they owned their own home (for analysis coded as 1 for own house, else 0). To measure participants' perceptions of having surplus time, and finances, they were asked how often they had 'Time left over to just relax after meeting your responsibilities', with six response options (Never; Rarely; Sometimes; Often; Very Often; Always) and whether they agreed with the statement, 'Our household income is high enough to satisfy nearly all our important desires' (Strongly disagree; Disagree; Neutral; Agree; Strongly agree). Finally, for comparison with the 'Why-How' low carbon measures, we also included a quality of life goal: "living in a comfortable and attractive home" (2015 response: 1 (Not at all important) to 5 (Extremely important); 2016-2017 response: Strongly disagree, Disagree, Neutral, Agree, Strongly Agree).

3.4 Measures of low carbon infrastructure and routine behaviour

Participants were asked to report their current infrastructure and routine low carbon behaviour, using the items and response options listed in Table 3. For infrastructure items, only a small proportion of participants selected the 'don't know' option, and the LCRI was designed to predict the purposeful acquisition of low carbon infrastructure, so 'don't know' was collapsed with the 'no' responses for analysis (coded 0; 'yes' responses coded as 1). As discussed in Chapter 5, behavioural clusters were identified for solar technology, appliances, and green travel and payments. Summary measures were calculated for the infrastructure clusters by summing the comprising dichotomous items and for the routine cluster by taking the average of the three comprising items (Cronbach's α 2015 = .58; 2016 = .37; 2017 = .42, but note result of cluster analysis below). In addition, for the 2016 and 2017 surveys, a summary measure for total acquisition of low carbon infrastructure was calculated by summing all infrastructure items. Similarly, a summary measure for overall participation in daily low carbon routines was calculated by taking the average of all four routine items. Note that these measures could not be calculated for the 2015 survey due to paneling of some of the infrastructure and routine questions.

Table 3. Survey items used to construct behavioural cluster measures

Cluster	Comprising survey item
Infrastructure (Responses: I don't know; No; Yes)	
Solar	· Photovoltaic solar panels · High performance solar hot water system
Temp-erature system	· Reverse cycle heating/cooling system or energy efficient systems with 5-6-star energy ratings for all temperature control devices · Reverse cycle heating/cooling system · Heater or with a 5-6 star energy rating[a] · Cooler a 5-6 star energy rating[a]
Appliances	· Efficient washing machine (5-6 star energy rating) · Efficient fridge (5-6 star energy rating)
Car	· Energy-efficient car
Routine behaviour (Never; Rarely; Sometimes; Often; Very often; Always)	
Temp. curtailment	· Minimize how much heating or cooling is used
Green travel & payments	· Used the GreenPower option (i.e. paid a premium to support contribution of renewable energy to the grid) for some or all of the electricity bill[b] · Avoided driving a car for most travel (e.g. public transport, small motorbike, bike or walk) · Carbon off-set air trips[b]

[a]Only asked if response to 'Reverse cycle heating/cooling system' question was not 'Yes'.
[b]Additional option for GreenPower was 'I don't use energy from the grid' and for Carbon off-set was 'I don't use air travel'. These responses were not analysed.

4. The extent of low carbon living in Australia

An overall impression of low carbon living in Australia can be gained from figures 3-7, and full descriptive characteristics for all surveyed measures are presented in tables 4-7. Levels of low carbon motivation (LCRI, descriptive norm, household regulation, community support) remained static over the three-year time period we examined, except for a small change in household regulation that was likely due to measurement variation. Low carbon behaviour (routine behaviour, infrastructure possession) also remained fairly static. However, for each year measured, there was a substantial and stable level of low carbon motivation and amount of low carbon behaviour. These findings indicated that there was a subgroup, or set of subgroups, in the population who had transitioned, or begun transitioning, to low carbon living.

Cross-sectional analyses were conducted to check for any significant change in low carbon motivation and behaviour at the population level. These tests required the use of the 'new in

year' samples listed in table 1. Regression, ANOVA and t-tests were conducted with continuous variables (ANOVA and t-testing required unweighted unclustered data). Chi-square tests were conducted with categorical variables (which required unweighted unclustered data). These showed some small perturbation in levels of household regulation and routine behaviour, but did not suggest a trend of change over the measurement period.

As discussed in chapter 2, existing patterns of thought and behaviour are typically resistant to change. In addition, the life cycle of the standard household infrastructure measured (fridge, washing machine, temperature system and car) is much longer than the measurement period, so most participants would not have been prompted to invest in new infrastructure, and if they chose, upgrade to low carbon versions during this time. Consequently, the stable nature of low carbon motivation and behaviour was not surprising. However, it was striking that over 60% of Australians endorsed a low carbon goal (i.e., agreed with the LCRI questions) and over 20% strongly endorsed this goal. This low carbon motivation was paralleled by more than 30% of Australians investing in four or more pieces of low carbon infrastructure and a similar amount often-to-always performing low carbon routines. When level of infrastructure and routine behaviour were simultaneously considered six low carbon population subtypes could be identified (see figure 7). At nearly 40%, the most common subtype was people who had 2-3 of the 6 measured infrastructure pieces and who, on average, did not regularly engage in the measured low carbon routines. At around 30%, the second most common population was people who had 4-6 of the 6 measured infrastructure pieces and who, on average, did not regularly engage in the measured low carbon routines. It was notably rare for people to develop strong low carbon routines and also have low levels of low carbon infrastructure. While, not common, nearly 10% of the population had both 4-6 pieces of infrastructure and well developed low carbon routines.

Our next set of analyses examined how multiple low carbon behaviours tend to cluster together. These results are presented in chapter 5.

Figure 3. Low carbon readiness index: Percentage distribution of rounded values

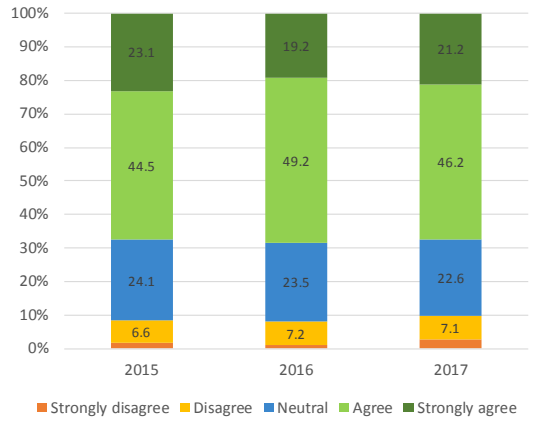


Figure 4. Climate change: Percentage distribution

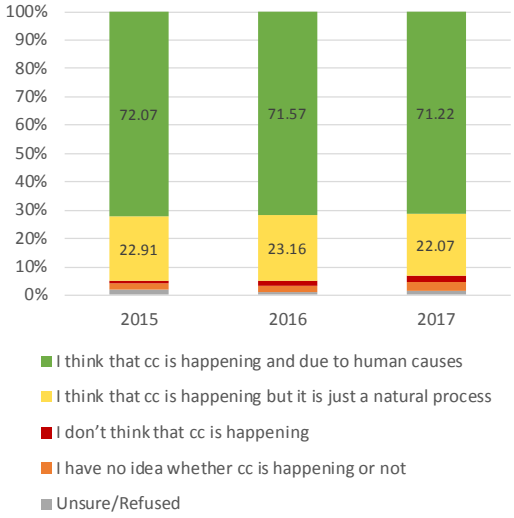


Figure 5. Possession of six types of low carbon infrastructure: Percentage distribution of sum total

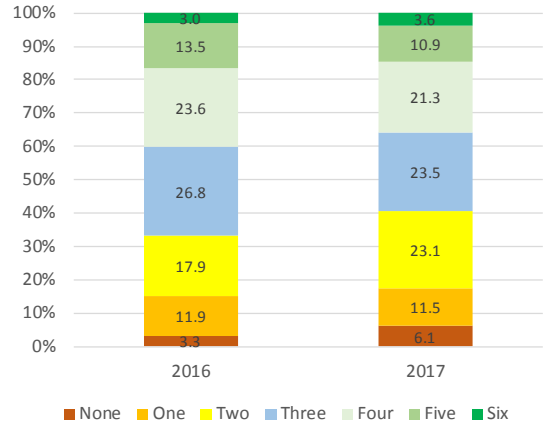


Figure 6. Performance of four low carbon routines: Percentage distribution of averaged and rounded values

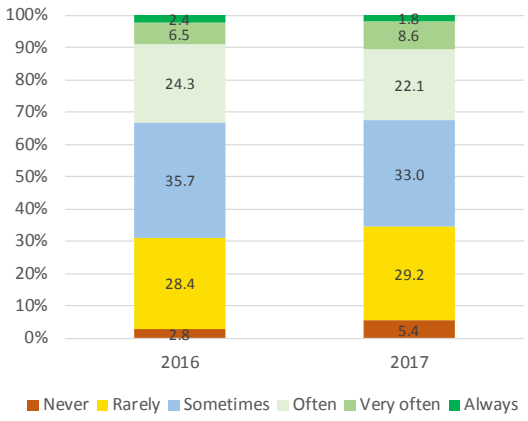


Figure 7. Distribution of six low carbon population types

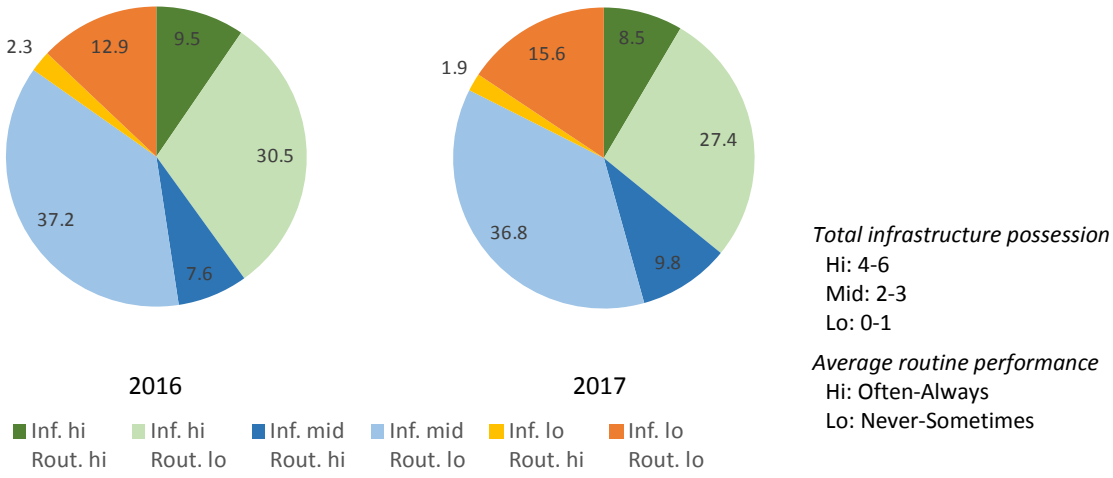


Table 4. Distribution of low carbon infrastructure

Infrastructure	2015 (N=717)	2016 (N=1006) %	2017 (N=1355)
Solar panels	29.47	31.51	32.55
Solar hot water	28.35	26.94	23.76
Solar cluster	–	–	–
1 element	30.45	32.41	29.30
2 elements	13.69	13.02	13.51
Fridge[e]	55.03	67.71	66.57
Washing machine	59.75	59.05	53.58
Appliance cluster	–	–	–
1 element	36.31	36.98	36.75
2 elements	39.25	44.93	41.70
Temp. system[d]	70.17	74.65	68.12
Car	43.85	48.01	45.17
Sum of LC infrastructure M (SE, N)	–	3.03 (0.06, 989)	2.85 (0.07, 1335)

[d]Asked in panel 2 n=237.

[e]A change in question format in 2016 relaxed the energy efficiency requirements for fridges ("5-6 star efficiency" versus simple "efficient"), due to the lack of 5 star energy efficient fridges, 2015 appliances are consequently not comparable with 2016 and 2017 data.

Note 1. The single participant who did the study online in 2015 completed both panels.

Note 2. Populations that have different superscripts are significantly different.

Table 5. Distribution of low carbon routines

Routine		Mean* (SE, N)	
1. Minimise heating and cooling[cd]	4.34[b] (0.09, 466)	4.59[a] (0.04, 984)	4.39[b] (0.08, 1330)
2. Used the GreenPower option for some or all of the electricity bill[d]	2.34 (0.18, 186)	2.25 (0.08, 831)	2.23 (0.11, 1088)
3. Avoided driving a car for most travel (e.g. public transport, small motorbike, bike or walk)[d]	3.09[a] (0.11, 235)	2.68[b] (0.05, 935)	2.75[ab] (0.04, 1246)
4. Carbon off-set air trips[d]	2.19[a] (0.24, 156)	1.90[b] (0.03, 736)	1.86[b] (0.08, 970)
Green travel & payments cluster	2.66[a] (0.14, 235)	2.33[b] (0.05, 984)	2.35[b] (0.05, 1327)
Average participation in routines	–	3.00[a] (0.04, 989)	2.97[b] (0.04, 1335)

*Weighted averages with clustering by State
[c]Asked in panel 1, n=239.
[d]Asked in panel 2 n=237.
Note 1. The single participant who did the study online in 2015 completed both panels.
Note 2. Populations that have different superscripts are significantly different.

Table 6. Descriptive characteristics: Continuous variables

	Mean (SE, N)*		
	2015	2016	2017
LCRI (1-5)	3.79 (0.02, 707)	3.77 (0.01, 986)	3.72 (0.02, 1329)
Living in a comfortable & attractive home goal (1-5)	3.95 (0.95, 707)	4.08 (0.03, 988)	4.08 (0.04, 1333)
Low carbon descriptive norm (1-5)	2.94 (0.05, 709)	2.96 (0.01, 988)	2.98 (0.02, 1335)
Low carbon household regulation (1-5)	3.25 (0.04, 571)[b]	3.38 (0.03, 830)[a]	3.31 (0.02, 1086)[b]
Low carbon community support (1-5)	3.07 (0.06, 698)	3.08 (0.04, 975)	3.14 (0.03,1323)
Time surplus (1-6)	2.88 (0.06, 646)	2.91 (0.02, 899)	2.86 (0.02,1189)
Financial surplus (1-5)	3.53 (.04, 704)	3.67 (.03, 976)	3.75 (.04, 1318)
Household size	2.99 (0.12, 709)	2.91 (0.06, 989)	2.83 (0.07, 1335)
Age	47.55 (1.27, 709)[b]	47.24 (1.51, 989)[b]	49.29 (1.26, 1335)[a]

*Weighted averages with clustering by State
Note. Populations that have different superscripts are significantly different.

Table 7. Categorical variables

Measure	2015	2016	2017
		% (N)	
Female	47.35 (716)	44.04 (1006)	45.31 (1355)
Born outside Australia	30.17 (716)	29.52 (1006)	27.82 (1355)
Speak a language other than English	16.90 (716)	18.99 (1006)	14.61 (1355)
Household income	(716)	(1006)	(1355)
Under $31,200	14.80	15.51	16.01
$31,200–$52,000	13.13	12.92	12.92
$52,000–$78, 000	15.78	14.02	15.57
$78,000–$130,000	20.53	22.96	19.63
130,000+	22.49	23.26	24.94
Unsure/Refused	13.27	11.33	10.92
Reside in house	79.19 (716)	78.13 (1006)	77.12 (1355)
Own home	69.69 (716)	67.99 (1006)	70.04 (1355)
Own house	60.47 (716)	60.24 (1006)	61.25 (1355)
Climate change (cc)	(716)	(1006)	(1355)
I don't think that cc is happening	0.98	1.89	2.14
I have no idea whether cc is happening or not	2.23	2.19	2.88
I think that cc is happening but it is just a natural process	22.91	23.16	22.07
I think that cc is happening and due to human causes	72.07	71.57	71.22
Unsure/Refused	1.82	1.19	1.69

5. Low carbon behaviour is clustered and predicted by LCRI

5.1 Cluster analyses show multiple behavioural clusters

As discussed in chapter 2, people will pursue the low carbon goal in diverse ways. However, we still expect low carbon behaviour to be concentrated into clusters, where there is a tendency for different behaviours to occur together, rather than being spread at random across the population.

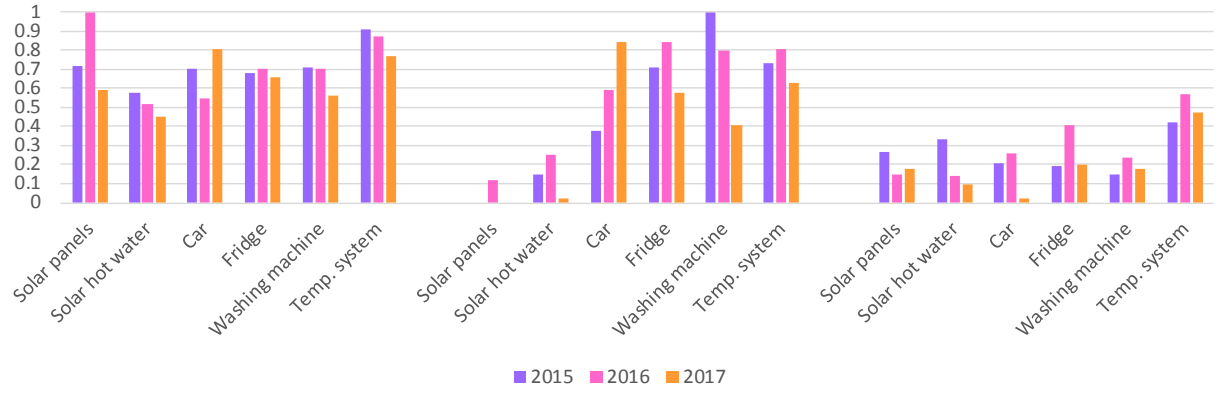
To show the presence of clustering we used SPSS 23's hierarchical clustering technique on infrastructure posession and routine behaviours (dichotomised at Never-Sometimes vs. Often-Always), using Ward's method and Squared Euclidian Distances (see figures 9-10). These replicated in the 2017 wave the clusters found in previous years and reported in previous reports. Two infrastructure clusters were identified: solar and appliances, while temperature system and efficient car were each examined by a single item. Two routine clusters were identified: temperature curtailment, and green travel and payments. Importantly, when

infrastructure and routine measures were considered simultaneously, coherent and consistent clusters did not emerge. This highlights the sytemic higher order differences between infrastructure investment and frequent routine behaviour.

In addition, replicating analyses in previous reports for the 2017 wave, latent class analysis in Mplus identified three classes of people participating in infrastructure clusters. The analyses used six items: efficient temperature system, efficient car, solar panels, solar hot water, efficient fridge and efficient washing machine. Some people tended to be completists, having all or many pieces of low carbon infrastructure, including solar technology. Some people tended to just have a few key pieces of efficient infrastructure, particularly appliances, and were not invested in solar. Finally, some people tended to not have any low carbon infrastructure, except perhaps an efficient heater. Figure 8 shows the probability that that each type of person will possess these different pieces of infrastructure.

In the next chapter we show how participation in these clusters can be predicted with our simple LCRI measure.

Figure 8. Latent class analysis probability estimates for possession of different types of infrastructure



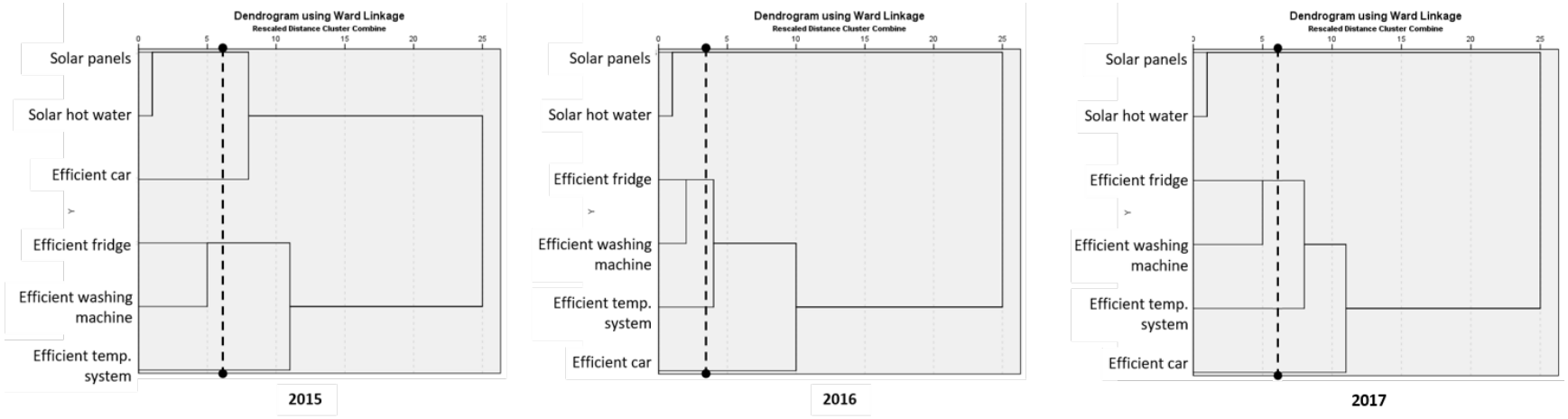


Figure 9. Dendrograms of low carbon infrastructure clusters

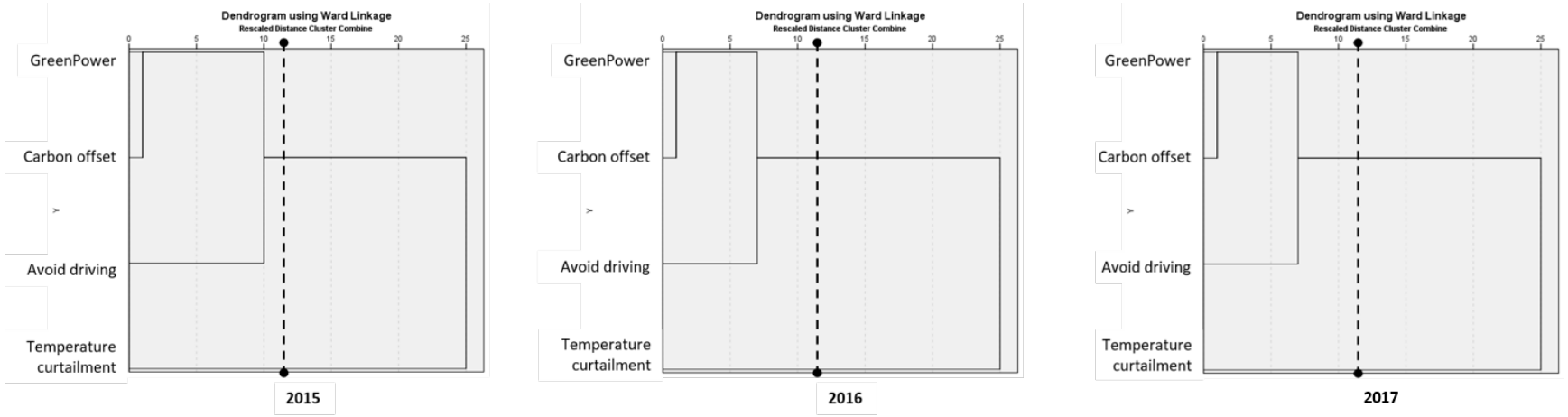


Figure 10. Dendrograms of low carbon routine clusters

5.2. LCRI consistently predicts participation in low carbon behavioural clusters

The Low Carbon Readiness Index (LCRI) measures a low carbon goal focused on personally reducing one's greenhouse gas emissions in the home and personal travel. As discussed in chapter 2, this goal provides a high listed -order How for the Why "Stop climate change", and a low-order Why for Hows like investing in solar, buying efficient appliances and performing regular low carbon routines. Diversity in people's experiences and life circumstances makes it difficult to predict what exact behaviours they will perform. However, a behavioural goal like the LCRI is abstract enough to predict multiple lower order behaviours. Here, we present the coefficients from a series of regression analyses where the LCRI is used to predict participation in the clusters identified in chapter 4 as well as overall low carbon infrastructure acquisition and average routine performance.

Ordinal logistic regression was used to compare LCRI differences between having zero, one or two elements of the solar and appliances clusters. Binomial logistic regression was used to compare LCRI differences between having or not having an efficient temperature system and having or not having an efficient car. Linear regression was conducted to analyse the payments & travel cluster, the single item temperature curtailment cluster and also the summary measures for summed possession of infrastructure and average routine behaviour. Coefficients from these analyses are presented in tables 8-9 and, to aid interpretation, relationships that were consistently significant across waves have been highlighted. These highlighted patterns show the LCRI consistently predicting all measured forms of participation in routine low carbon behaviour. The LCRI also consistently predicted all but one of the measured forms of participation in low carbon infrastructure behaviour. The exception was efficient temperature system, which was consistently predicted by the comfortable and attractive home goal. Although it was not significant for the separate clusters, the comfortable and attractive home goal also consistently predicted overall routine behaviour; however, in this case the relationship was negative. Hence, an emphasis on comfort is associated with getting a good efficient heater/cooler but also with *not* spending time on day-to-day low carbon behaviour. Owning a house consistently predicted investment in solar technology and total infrastructure investment while greater age predicted efficient car, efficient appliances and total infrastructure investment.

The results in this chapter confirm that the LCRI is a useful tool for predicting a range of low carbon behaviour. This is consistent with the theoretical basis for the LCRI, which locates it as How a person will help stop climate and Why they perform concrete actions within various low carbon behavioural clusters. Consequently, an obvious question for practitioners is how to promote people's personal striving towards a low carbon goal. This question is addressed in chapter 6.

Table 8. Summary results: LCRI predicts infrastructure low carbon behavioural clusters

	Solar			Appliances			Temp. system			Car			Inf. sum	
	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017	2016	2017
LCRI	0.21*	0.31*	0.21**	0.34***	0.29**	0.41***	-0.20	-0.21	-0.08	0.35***	0.29***	0.31***	0.18*	0.20***
CC belief	-0.39*	-0.07	0.11	-0.13	-0.02	-0.26	0.16	0.27	-0.18	0.09	0.16	0.10	-0.11	-0.09
Comf. home goal	0.02	0.06	-0.09*	0.06	0.03	-0.05	0.59**	0.18***	0.07*	0.08	0.14**	-0.16**	0.07	-0.04
Own house	0.99***	1.20***	0.93***	-0.08	0.55***	0.33***	0.58	0.64**	0.31*	0.24	0.08	0.14	0.31***	0.33***
Surplus finances	0.14*	0.13	0.05	0.08*	-0.12	-0.05	0.32	-0.01	0.01	0.04	0.15	0.00	0.08	0.01
Surplus time	0.05	0.01	0.04	0.16*	-0.06	-0.05	-0.24	-0.14	-0.09	-0.12	-0.04	-0.01	0.02	-0.02
Income (REF: Under $31,200)														
$31,200–$52,000	-0.15	0.09	0.05	0.30	0.22	0.23	0.16	-0.08	0.10	0.03	0.07	0.46	-0.01	0.20
$52,000–$78, 000	-0.10	0.25	-0.13	0.43	0.13	0.66*	0.66	0.38*	0.21	-0.01	-0.09	0.64*	0.01	0.31**
$78,000–$130,000	-0.03	-0.25*	0.15	0.78	0.22	0.73***	0.68	0.38	0.74***	0.24	0.12	0.55**	0.23	0.46***
130,000+	-0.38*	0.03	0.05	0.55	0.34	0.57***	0.59	0.37	0.89***	0.03	-0.05	0.78***	0.04	0.43***
Unsure/Refused	-0.36	0.27	0.13	0.36	0.27**	0.39*	0.81	0.11	0.51	0.04	-0.20	1.11***	0.02	0.44**
Age	0.14	0.18**	0.31**	0.27***	0.23***	0.19***	-0.14	0.29*	0.33**	0.40***	0.36***	0.43***	0.17**	0.25***
Hsehld size	0.08	0.07	0.09	-0.11	-0.07	-0.02	0.17	0.01	-0.04	-0.03	-0.10*	-0.13	-0.03	0.01
Female	-0.12	-0.07	-0.09	0.22	0.08	0.01	-0.11	-0.03	-0.02	0.05	-0.32*	0.17	0.02	-0.01
Immigrant	0.21	-0.13	0.14	0.03	-0.14	-0.09	0.39	-0.03	0.04	0.13	-0.12	0.19	0.14	0.03
Multi-lingual	-0.17	0.14	-0.11	0.24	0.29*	0.09	-0.16	0.19**	0.22	-0.15	0.34*	0.34	0.02	0.11
Multi-wave REF: 3														
1	-0.12	-0.12	0.04	0.09	0.00	-0.09	0.72	0.22	0.16	0.03	-0.08	0.08	0.08	0.00
2	0.30	0.32	0.23	-0.35	-0.27**	-0.27	0.50	-0.02	0.18	0.20	0.00	0.19	0.02	0.02

*p<.05, **p<.01, ***p<.001

Table 9. Summary results: LCRI predicts routine low carbon behavioural clusters

	Green travel & payments			Temperature curtailment			Routine	
	2015	2016	2017	2015	2016	2017	2016	2017
LCRI	0.33**	0.21***	0.29***	0.34***	0.22***	0.30***	0.29***	0.37***
CC belief	0.11	0.24	0.26***	-0.10	0.10	0.15*	0.26	0.31***
Comf. home goal	-0.09	-0.09*	-0.06*	-0.10*	-0.03	-0.05**	-0.09**	-0.07**
Own hse	-0.23*	-0.13	-0.09	0.06	0.02	0.08	-0.13	-0.07
Surplus finances	0.06	0.06	0.03	-0.09	0.00	0.00	0.04*	0.01
Surplus time	0.09	0.08**	0.00	-0.06	0.01	0.01	0.08*	0.01
Income (REF: Under $31,200)								
$31,200–$52,000	0.05	0.10	-0.03	0.06	-0.12	-0.01	-0.03	-0.06
$52,000–$78, 000	-0.31	0.11	0.03	0.01	0.09	0.01	0.02	-0.01
$78,000–$130,000	-0.31	0.12	-0.10	0.04	-0.06	0.07	-0.05	-0.11
130,000+	-0.08	0.18	0.06	0.16	-0.14	-0.04	-0.02	-0.03
Unsure/Refused	-0.31	0.19	0.08	-0.05	0.00	-0.02	0.11	0.09
Age	-0.04	-0.09*	-0.08**	-0.02	0.06	0.04	-0.08	-0.04
Hsehld size	-0.08	-0.06***	-0.02	-0.05	0.03	0.04	-0.03	0.03
Female	0.08	0.07	0.04	0.03	0.05	0.03	0.10	0.07
Immigrant	-0.10	0.02	0.00	-0.07	-0.09	0.05	-0.03	-0.01
Multi-lingual	0.30*	0.03	0.20	-0.24	-0.02	0.03	-0.02	0.16
Multi-wave								
	-0.33	-0.06	0.07	0.04	-0.03	0.13	-0.07	0.10
	-0.10	0.03	0.17	0.05	-0.11	0.23	-0.04	0.23

*p<.05, **p<.01, ***p<.001.

6. LCRI and low carbon behaviour are shaped by interpersonal factors

As we discussed in chapter 2, low carbon behavior in the household and personal travel occurs in a social context. The immediate social context for around 90% of the Australian population is other household members. All people also experience the wider social context of friends and family outside the household and have a general sense of how people behave in Australia. We expected that these social factors, especially household regulation, would influence individual levels of low carbon motivation and behaviour in our participants.

6.1 Interpersonal factors predict level of LCRI

Given the potential for social factors to reinforce personal goals, we expected that having higher levels of the low carbon interpersonal factors would predict also having higher LCRI. To investigate this idea, we conducted linear regression in each of the three cross-sectional waves of data. Coefficients from these analyses are presented in table 10 and, to aid interpretation, relationships that were consistently significant across waves have been highlighted. As expected, the results showed that people who were higher in LCRI were also consistently higher in household regulation and community support for reducing carbon emissions. Being higher in

LCRI was also associated with being higher in the descriptive norm that people are working hard to reduce their carbon emissions (but note the interaction effect discussed in section 6.4). Note also that the reported results do not include lone households because they have no household regulation. However, when this subsample (n_{2015}= 137; n_{2016}= 161; n_{2017}= 251) was examined separately there was again a significant and consistent association between the LCRI and community support. The effect for the descriptive norm in lone households was significant in the 2nd and 3rd waves but was marginal in the 2015 wave (p= .07). The only other effect that consistently predicted LCRI in our analyses was belief in human-caused climate change.

Table 10. Summary results: Interpersonal factors predict level of LCRI

	2015	2016	2017
Descriptive norm	0.10**	0.12**	0.13***
Household regulation	0.46***	0.39***	0.43***
Community support	0.11*	0.12**	0.12***
CC belief	0.30***	0.37**	0.45***
Comf. home goal	0.05	0.01	0.04
Own house	-0.03	-0.16**	-0.08
Surplus finances	0.04*	0.07*	-0.01
Surplus time	-0.01	0.00	0.00
Income (REF: Under $31,200)			
$31,200–$52,000	-0.34*	-0.01	0.07
$52,000–$78, 000	-0.13	0.02	0.02
$78,000–$130,000	-0.21*	0.01	0.01
130,000+	-0.39*	-0.06	-0.10
Unsure/Refused	-0.22*	0.10	0.14
Age	0.13	0.17**	0.12**
Household size	0.04	0.05*	0.04
Female	0.16	0.21**	0.21**
Immigrant	-0.01	0.14*	-0.05
Multi-lingual	0.22**	0.01	0.14*
Multi-wave REF: 3			
2	0.04	0.00	-0.06
3	-0.04	0.07	-0.14

6.2 Interpersonal factors predict change in LCRI over time

While a cross-sectional analysis can look at differences between people higher and lower in LCRI, a longitudinal analysis can look at whether becoming higher or lower in LCRI is directly associated with corresponding changes in the interpersonal factors. While overall mean level of

LCRI did not change in the longitudinal subpopulation collected across the three waves (n=206, M_{age_2017} = 55.80; SE= 2.25), people sometimes varied higher in LCRI level and sometimes varied lower. Consequently, a fixed effects model in Stata 12 could be used to identify what factors were associated with this variation (table 11).

The model showed that, when people in the longitudinal sample developed a stronger or weaker low carbon goal (i.e. LCRI level), this change was directly associated with corresponding changes in level of household low carbon regulation and community support. Household regulation was the stronger predictor and this may be because household regulation concerns repeated household interactions that reinforce LCRI-consistent behaviour. In contrast, the community support measure concerned the availability of help with LCRI-motivated behaviour, rather than the use of this help. Note that the reported results exclude lone householders so that the household variable can be examined, however the significant results for community support and comfortable home remained significant when the household regulation variable was dropped and the whole longitudinal sample was used. While the longitudinal sample was small and not nationally representative, the results demonstrated how the LCRI can be leveraged as a personal motivation for behaviour by using interpersonal factors, although they do not advise how to instigate or sustain that change.

Table 11. Interpersonal factors predict change in level of LCRI across time

Item	Coeff.
Descriptive norm	0.07
Household regulation	0.20**
Community support	0.12**
CC belief	0.26
Comf. home goal	0.09*
Own hse	0.00
Surplus finances	0.01
Surplus time	-0.07
Income (REF: Under $31,200)	
$31,200–$52,000	-0.11
$52,000–$78, 000	-0.36*
$78,000–$130,000	-0.35
130,000+	-0.21
Unsure/Refused	-0.17
Age	-0.07
Hsehld size	-0.05
Wave REF: 2015	
2016	0.03
2017	-0.08

R^2	Error
Within= .16	u= .71
Between= .41	e=.55
Overall= .34	Rho=.63

6.3 Household interactions are central to the pursuit of low carbon outcomes in the home

To gain a picture of low carbon behaviour in the household, we conducted a small qualitative study with 297 participants (68.70% female; mean age=31.20, SD = 16.23). Participants were asked a series of questions in an online Qualtrics survey, to which they responded using free response text entry boxes. Two researchers separately read responses and developed an impression of the themes that emerged in participant's answers. These are presented below with illustrative quotes for each theme.

6.2.1 Questions

1. "Describe the attitudes that each of the different people in your household have towards the environment. Try to use specific examples that show how you know each person has a particular attitude."
2. "How do you react when householders make comments about the things they have done or intend to do and express environmental reasons for the behaviour?"
3. "How do you react when householders make comments about the things they have done or intend to do, and comment on doing it even though they acknowledge that it is "not environmentally friendly"?"
4. Can you think of a specific situation where someone in your household did something small that supported your attitudes on the environment?
5. Can you think of a specific situation where someone in your household did something small that opposed your attitudes on the environment?
6. Tell us a little about how it works in your household when it comes to: Minimising the amount of artificial heating and cooling used in the home. Is there someone in charge of this? Does everyone agree about how much should be used? Is this ever a topic that causes friction?
7. Tell us a little about how it works in your household when it comes to: Buying appliances. Is there someone in charge of this? Does everyone agree about how much should be spent? Is this ever a topic that causes friction?
8. Do you have either solar panels or solar hot water in your home?
    i. Tell us a little about how you came to have solar power. Was there someone in charge of this? Did everyone agree about how much should be spent? Was it a topic that caused friction?
    ii. Would you ever consider installing more solar power (i.e. solar panels/solar hot water)? What would the different people in your household think? Would someone be charge of this? Would everyone agree about how much should be spent? Would this ever be a topic that causes friction?
9. Would you ever consider installing solar power (i.e. solar panels or solar hot water)? What would the different people in your household think? Would someone be charge of this? Would everyone agree about how much should be spent? Would this ever be a topic that causes friction?

6.2.2 Themes

Consensus. The majority of household members in our study were well aware of the attitudes that other household members had towards the environment, and in most cases these attitudes were said to be similar to those of the respondent.

> "In our family we all have the same attitude towards the environment. We care about the preservation of plants, animals and sea life. We work hard to try and reduce our environmental footprint..."

Regulation. In general, the findings suggest that within household regulation for low carbon behaviours is important, with several respondents reporting that they instructed and corrected other household member's daily routine behaviour. Sometimes attempts to change other member's behaviour to low carbon practice was successful, but sometimes it was not. Many parents reported feeling pride when their children engaged in environmentally friendly behaviours and said they sought to reinforce this behaviour with encouragement and praise. A small number of respondents reported feelings of frustration with other household members when they acted in ways that were not environmentally friendly, for example, not sorting recycling or wasting energy or water.

> "My mum would sometimes throw the wrong rubbish into the recycle bin. I have to explain to her that just a little bit of non-recyclable material mixed with recyclable material would make the whole lot non recyclable and goes to the landfill."

> "…sometimes when kids were very little they would throw rubbish on ground and so I had to try to explain to them not to do that."

In contrast, the majority of participants who mentioned purchasing low carbon infrastructure reported that it was a joint household decision and one that rarely caused friction within the household.

> "He was in charge of the solar panels installation project. We talked to friends with various panels to find a decent one within our budget. We agreed that they should be decent and not too cheap and shoddy. Rather to spend less to get lousy stuff, we opted to get a middle to higher range system of 6KW so that it would serve us well and also have the option to retro fit a battery when the technology becomes cheaper. No issue here as we both agreed."

Conflict. A little under half (47%) of all respondent reported occasions where members of their household would be in conflict over a behaviour. Of households reporting such conflict, the most common cause was a household member failing to recycle (39%), followed by wasting water (16%) and wasting energy (16%, e.g. lighting, heating, or cooling empty rooms). Reported conflict over the purchase of infrastructure was very rare. The most common conflicts occurred between partners, followed by between parents and their children.

> "I keep finding that my eldest daughter leaves her light on in her bedroom when she walks out of it. It does not matter how many times that I have told her not to, she just does not listen"

Daily waste reduction. When people were asked to generate their own examples of low carbon behaviour they provided a range of different answers. However, the focus was on limiting wastefulness in daily routine behaviour. The most commonly cited environmental behaviour was recycling, followed by minimizing water and energy use.

> "Parents (mum and dad) are pro environmental - recycling, gardening, waste treatment, etc They care a lot and are actively tiring to do more for the environment.Composting is also quite important."

> "About the only thing they ever do is recycle what everyone knows is recycleable…"

Money. When people were specifically asked about low carbon infrastructure, the financial benefits were most often cited, and this was often in terms of investing for future savings. Environmental benefits were regularly but less commonly mentioned, and comments regarding appliances often also listed assessments of price, quality, durability and star-energy ratings.

> "[Y]es i am in charge of solar power. yes everyone agreed about how much should be spent. no it was not a topic that caused friction because we knew in the long run it would be beneficial."

> "I buy appliances and yes I check the star ratings. Energy efficiency is two fold good- better for the environment and saves money to run."

Disengagement. Some respondents indicated that discussion of environmental behaviours was not something that occurred in their households, while others reported that they neither encouraged nor discouraged such behaviour when it occurred inside their households.

> "no one really pays attention at all to this kind of thing This does not interest anyone in the household It's not what we think about"

6.4 Interpersonal factors predict low carbon behaviour

The qualitative study highlighted that sometimes people with a high low carbon goal belong to a household where there is consensus about low carbon behaviour, but other times this consensus is lacking. A similar sense of consensus may be present (or not) in terms of one's personal community and Australian society in general. To examine how low carbon consensus, or lack thereof, affects low carbon behaviour we tested for interactions between the LCRI and our interpersonal variables when predicting overall infrastructure possession and average level of low carbon routines.

We found no evidence of interaction effects for total infrastructure investment. There was a trend for household regulation to predict total infrastructure investment as a main effect, but this pattern was not as strong as for the LCRI and house ownership. However, household regulation predicted average routine performance and there was a trend for both household regulation and descriptive norm to interact with LCRI for routine behaviour, with the effects significant in 2017 and marginal in 2016.

As shown in figure 11, household regulation had little effect if people were low in LCRI, but if people had high LCRI then higher household regulation tended to increase participation in low carbon routines. This effect shows how collective pursuit of low carbon living can amplify the behavioural enactment of a low carbon goal, helping to overcome the value-action gap.

As shown in figure 12, if people had higher LCRI then a perceived higher descriptive norm for low carbon living tended to reduce participation in low carbon routines, while a lower descriptive norm tended to increase participation in low carbon routines (note this effect was

still significant in the 2017 data if the whole sample was used rather than the subsample that also had household regulation). This effect shows that seeing low carbon behaviour as rare and novel can amplify pursuit of the low carbon goal, perhaps by invoking a sense of pioneering citizenship in a much-needed cultural change. Note that this interaction result in particular should be considered in conjunction with the results in the next chapter, which give more insight about when this sort of LCRI-descriptive norm interaction is likely to occur.

Table 12. Interpersonal factors and LCRI predict low carbon behaviour

Item	Total infrastructure		Average routine	
	2016	2017	2016	2017
LCRI	0.13*	0.13**	0.25***	0.29***
Descriptive norm	-0.03	0.004	-0.13	-0.07*
Household regulation	0.11†	0.12**	0.15*	0.19***
Community support	0.08*	0.07†	0.05	0.07
LCRI*Descriptive norm	-0.01	0.002	-0.02†	-0.06***
LCRI*Household regulation	0.01	0.02	0.07†	0.04***
LCRI*Community support	0.04	-0.03	-0.04	-0.01
CC belief	0.06	-0.17*	0.21	0.25**
Comfortable home goal	0.05	-0.05†	-0.09†	-0.09**
Own house	0.50**	0.32**	-0.15*	-0.09†
Surplus finances	0.01	-0.02	0.02	0.00
Surplus time	-0.03	-0.01	0.07*	0.02
Income (REF: Under $31,200)				
$31,200–$52,000	0.09	0.21	-0.02	-0.11
$52,000–$78, 000	0.05	0.24	0.08	-0.01
$78,000–$130,000	0.07	0.37*	0.01	-0.13
130,000+	0.13	0.40*	0.04	-0.02
Unsure/Refused	0.18	0.44**	0.11	0.10
Age	0.25***	0.27***	-0.08	-0.02
Hsehld size	-0.06	-0.03	0.00	0.04
Female	-0.07	-0.06	0.08	0.03
Immigrant	-0.07	0.08	0.07	0.05
Multi-lingual	0.19	0.11	-0.07	0.10
Multi-wave REF: 3				
2	-0.12	-0.03	-0.08	0.05
3	-0.12	-0.01	-0.03	0.21

†p <=.08

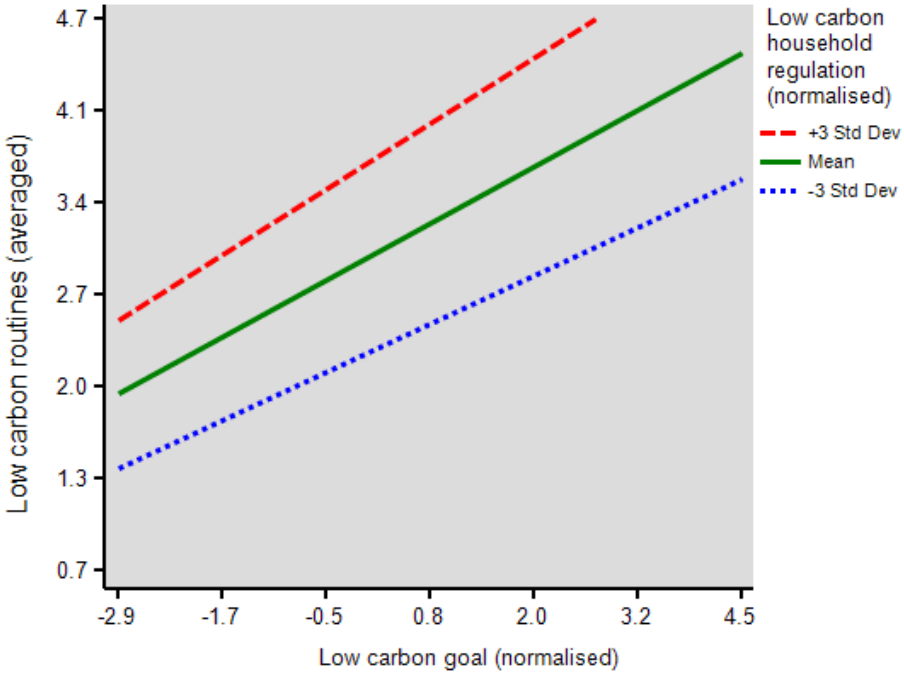


Figure 11. Interaction between LCRI and household regulation predicting low carbon routines

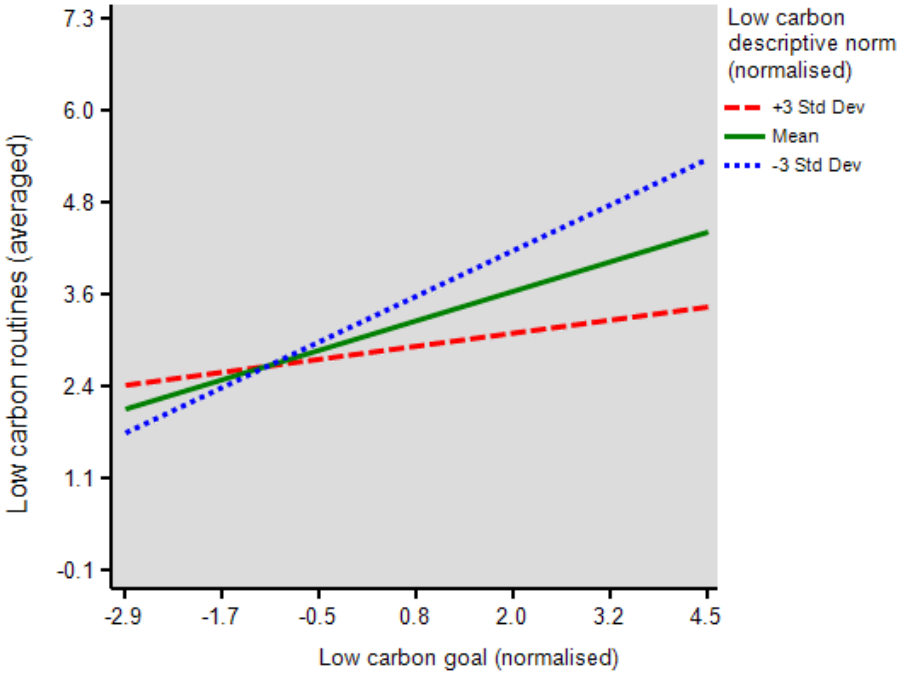
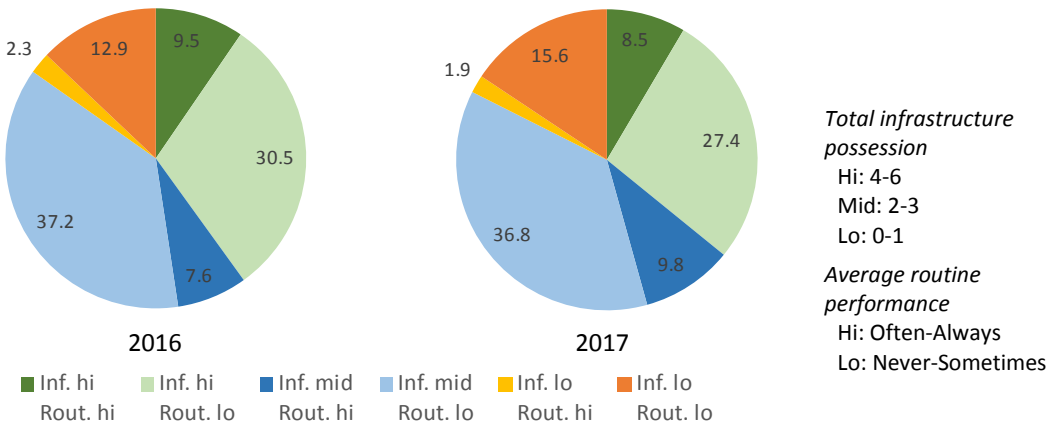


Figure 12. Interaction between LCRI and descriptive norm predicting low carbon routines

7. Low carbon subpopulations in Australia are different in motivation and context

Our final analysis examined the six different subpopulations identified in chapter 3 (see figure 7, reproduced below for convenience), which classified people in terms of both level of infrastructure possession and extent of routine behaviour. As discussed in chapter 2, the complete context of a person's life can have bearing upon whether they do or do not perform a behaviour. Examining membership in these low carbon subpopulations allowed us to consider how motivational and contextual variables might contribute to a measure of low carbon activity that gave a simultaneous overview of the extent of a person's low carbon participation in both infrastructure and routine behaviour. Multinomial regression was used to predict membership in the low carbon subpopulations (R^2= .10). Most categorical predictors were eschewed due to small cell sizes in one or more outcome categories; however, house ownership was included due to its importance as a predictor. The results shown below are from the multi-person household analysis and include household regulation, however the pattern of results was the same when household regulation was not included and the full sample was analysed. The discussion below highlights the different subpopulations with the colour used to identify each group in the pie charts of figure 7.

Figure 7 [repeated]. Distribution of six low carbon population types



Using the high-infrastructure-high-routine subpopulation as a reference point in the multinomial regression (table 13a) showed that people in this group had higher LCRI than groups who were low in low carbon routines. They also had better household regulation and community support compared to their extreme opposite subpopulation: low-infrastructure-low-routine. It was also notable that the high-infrastructure-high-routine group was different from the *low*-infrastructure-high-routine group in two consistent ways: having a house and being older. Thus, a suite of different factors was associated with being in the high-infrastructure-high-routine subpopulation. They have the motivation of a personal goal,

reinforced by household regulation, and community support and enabled by both house ownership and many years of life (or some other age-based driver) to develop a low carbon lifestyle.

When table 13a is compared to table 13e it is clear that the *mid*-infrastructure-high-routine subpopulation is similar to the high-infrastructure-high-routine subpopulation in terms of having a higher LCRI than subpopulations that do not engage in low carbon routines. However, the mid-infrastructure-high-routine subpopulation were also distinct from the mid-infrastructure-*low*-routine subpopulation by being less invested in a comfortable and attractive home goal and less convinced that people in general were working hard to reduce their carbon emissions (i.e. lower in the descriptive norm). Thus, when achieving a mid-level of low carbon infrastructure, it may be that rejecting comfort and having a sense of pioneering low carbon reduction are important for maintaining a focus on low carbon living, especially since you may not have contextual factors like age and house ownership to support low carbon choices.

A consistent difference between the low-infrastructure-high-routine subpopulation and all other groups was that the low-infrastructure-high-routine subpopulation was least likely to own a house. The only other significant difference for the low-infrastructure-high-routine subpopulation was that they were younger than the high-infrastructure-high-routine subpopulation; however, the low-infrastructure-high-routine group's sample size was small (2016: n=23; 2017: n=26), which likely limited the power to return other significant effects. What the returned effects do suggest is that the low-infrastructure-high-routine subpopulation are likely to transition into having more low carbon infrastructure if they achieve house ownership, which could potentially happen as they age. They represent quite a distinct population from the low-infrastructure-low-routine subpopulation, who are similarly young and lower in house ownership, but who are significantly less motivationally engaged when compared to several other subpopulations.

Finally, when the high-infrastructure-*low*-routine subpopulation was used as a reference point only the low-infrastructure-low-routine group had lower LCRI. The high-infrastructure-low-routine subpopulation was also distinguishable from mid-infrastructure and low-infrastructure subpopulations by being more likely to own a house. This result highlights the importance of having the control over space and the economic base afforded by house ownership when deciding whether to invest in low carbon infrastructure. It also raises the question of whether low-infrastructure-low-routine people might be persuaded to invest in low carbon infrastructure as part of the transition to comfortable house ownership (joining the mid-infrastructure-low-routine subpopulation) rather than as an ideological transition to low carbon living. But importantly, this kind of strategy is unlikely to be effective in encouraging the mid-infrastructure-high-routine subpopulation to transition into joining the high-infrastructure-high-routine subpopulation.

The multinomial regression showed that our six different subpopulations were meaningfully distinguishable from each other (note that their distribution was the same for lone households). Overall, the results indicated that the LCRI and household regulation are centrally important to low carbon living, and that other motivations like rejecting comfort and how "most people" do things can be an important part of choosing to pursue low carbon living in

terms of both infrastructure and daily routines. The results also showed the importance of the broader context in which low carbon living decisions are made because owning one's house and being in a later stage of life appeared to strongly support a complete transition to low carbon living.

Table 13a. High infrastructure-high routine as reference in multinomial regression

	2016					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	REF	-0.37***	0.04	-0.78***	-0.41	-0.66***
LC household regulation		-0.36	-0.15	-0.52	-0.45	-0.84*
LC community support		-0.29***	-0.48**	-0.27***	-0.18	-0.49***
LC Social norm		0.31	0.00	0.31	0.04	0.40
Own house		0.22	-0.86	-0.94**	-1.98***	-1.19*
Comfortable home goal		0.21	-0.17	0.03	-0.15	0.02
Financial surplus		0.12	0.19	0.17	0.09	0.13
Time surplus		-0.01	0.40**	-0.13	0.23	0.02
Age		0.01	-0.52	-0.25	-0.71*	-0.73**
Household size		0.01	0.20	-0.09	-0.14	0.22

	2017					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	REF	-0.76***	-0.20	-0.91***	-1.05***	-0.94***
LC household regulation		-0.33	0.02	-0.47***	-0.03	-0.69***
LC community support		-0.14	0.07	-0.18	0.51	-0.34*
LC Social norm		0.29***	-0.14	0.20*	0.31	0.15
Own house		0.39	-0.15	-0.26	-3.36***	-0.46*
Comfortable home goal		0.22**	0.19	0.37***	0.21	0.23*
Financial surplus		-0.10	-0.37*	-0.15*	-0.13	-0.19**
Time surplus		-0.16*	-0.09	-0.14	-0.02	0.04
Age		-0.05	-0.75***	-0.41***	-0.55**	-0.83***
Household size		-0.11	-0.18	-0.04	-0.01	-0.05

Table 13b. High infrastructure-low routine as reference in multinomial regression

	2016					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	0.37***	REF	0.41***	-0.41***	-0.05	-0.29*
LC household regulation	0.36		0.21	-0.16*	-0.09	-0.48***
LC community support	0.29***		-0.19	0.02	0.11	-0.20
LC Social norm	-0.31		-0.30	0.00	-0.27	0.09
Own house	-0.22		-1.08**	-1.16***	-2.20***	-1.42***
Comfortable home goal	-0.21		-0.38**	-0.18	-0.36	-0.19*
Financial surplus	-0.12		0.07	0.04	-0.03	0.01
Time surplus	0.01		0.41***	-0.13	0.23	0.02
Age	-0.01		-0.53***	-0.26**	-0.72**	-0.74***
Household size	-0.01		0.19*	-0.10	-0.15	0.21

	2017					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	0.76***	REF	0.56***	-0.15	-0.30*	-0.19*
LC household regulation	0.33		0.35*	-0.14	0.30	-0.36*
LC community support	0.14		0.21	-0.04	0.64*	-0.20
LC Social norm	-0.29***		-0.43***	-0.08	0.02	-0.14
Own house	-0.39		-0.54*	-0.65*	-3.75***	-0.85**
Comfortable home goal	-0.22**		-0.03	0.15	-0.01	0.01
Financial surplus	0.10		-0.27	-0.06	-0.03	-0.09
Time surplus	0.16*		0.07	0.02	0.14	0.20
Age	0.05		-0.69***	-0.36**	-0.49**	-0.77***
Household size	0.11		-0.07	0.07	0.10	0.06

Table 13c. Low infrastructure-high routine as reference in multinomial regression

	2016					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	0.41	0.05	0.46	-0.36	REF	-0.25
LC household regulation	0.45	0.09	0.30	-0.07		-0.39
LC community support	0.18	-0.11	-0.30	-0.09		-0.31
LC Social norm	-0.04	0.27	-0.03	0.27		0.36
Own house	1.98***	2.20***	1.12*	1.04***		0.79***
Comfortable home goal	0.15	0.36	-0.02	0.18		0.17
Financial surplus	-0.09	0.03	0.10	0.07		0.04
Time surplus	-0.23	-0.23	0.17	-0.36		-0.21
Age	0.71*	0.72**	0.19	0.46		-0.01
Household size	0.14	0.15	0.34	0.05		0.36

	2017					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	1.05***	0.30*	0.86***	0.14	REF	0.11
LC household regulation	0.03	-0.30	0.05	-0.44*		-0.66**
LC community support	-0.51	-0.64*	-0.44	-0.69*		-0.85*
LC Social norm	-0.31	-0.02	-0.45*	-0.11		-0.16
Own house	3.36***	3.75***	3.21***	3.10***		2.90***
Comfortable home goal	-0.21	0.01	-0.02	0.16		0.02
Financial surplus	0.13	0.03	-0.24	-0.03		-0.06
Time surplus	0.02	-0.14	-0.07	-0.12		0.06
Age	0.55**	0.49**	-0.20	0.13		-0.28***
Household size	0.01	-0.10	-0.17	-0.03		-0.05

Table 13d. Low infrastructure-low routine as reference in multinomial regression

	2016					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	0.66***	0.29*	0.71***	-0.11	0.25	REF
LC household regulation	0.84*	0.48***	0.69***	0.32**	0.39	
LC community support	0.49***	0.20	0.01	0.22*	0.31	
LC Social norm	-0.40	-0.09	-0.40*	-0.09	-0.36	
Own house	1.19*	1.42***	0.33	0.25	-0.79***	
Comfortable home goal	-0.02	0.19*	-0.19	0.01	-0.17	
Financial surplus	-0.13	-0.01	0.07	0.04	-0.04	
Time surplus	-0.02	-0.02	0.38*	-0.15	0.21	
Age	0.73**	0.74***	0.21*	0.48**	0.01	
Household size	-0.22	-0.21	-0.02	-0.31*	-0.36	

	2017					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	0.94***	0.19*	0.75***	0.03	-0.11	REF
LC household regulation	0.69***	0.36	0.71***	0.22**	0.66**	
LC community support	0.34*	0.20	0.41*	0.16	0.85***	
LC Social norm	-0.15	0.14	-0.29*	0.05	0.16	
Own house	0.46*	0.85**	0.31	0.20	-2.90***	
Comfortable home goal	-0.23*	-0.01	-0.04	0.14	-0.02	
Financial surplus	0.19**	0.09	-0.18	0.03	0.06	
Time surplus	-0.04	-0.20	-0.13	-0.18	-0.06	
Age	0.83***	0.77***	0.08	0.41***	0.28***	
Household size	0.05	-0.06	-0.12	0.02	0.05	

Table 13e. Mid infrastructure-high routine as reference in multinomial regression

	2016					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	-0.04	-0.41***	REF	-0.82***	-0.46	-0.71***
LC household regulation	0.15	-0.21		-0.37*	-0.30	-0.69***
LC community support	0.48*	0.19		0.21	0.30	-0.01
LC Social norm	0.00	0.30		0.31*	0.03	0.40*
Own house	0.86*	1.08**		-0.08	-1.12*	-0.33
Comfortable home goal	0.17	0.38**		0.20**	0.02	0.19
Financial surplus	-0.19	-0.07		-0.03	-0.10	-0.07
Time surplus	-0.40**	-0.41***		-0.53**	-0.17	-0.38*
Age	0.52	0.53***		0.27	-0.19	-0.21*
Household size	-0.20	-0.19*		-0.29*	-0.34	0.02

	2017					
Infrastructure	High (6-4)		Mid (3-2)		Low (1-0)	
Routine	Hi	Lo	Hi	Lo	Hi	Lo
Low carbon goal	0.20	-0.56***	REF	-0.71***	-0.86***	-0.75***
LC household regulation	-0.02	-0.35*		-0.49***	-0.05	-0.71***
LC community support	-0.07	-0.21		-0.25	0.44	-0.41*
LC Social norm	0.14	0.43***		0.34***	0.45*	0.29*
Own house	0.15	0.54*		-0.11	-3.21***	-0.31
Comfortable home goal	-0.19	0.03		0.18*	0.02	0.04
Financial surplus	0.37*	0.27		0.22	0.24	0.18
Time surplus	0.09	-0.07		-0.06	0.07	0.12
Age	0.75***	0.69***		0.33***	0.20	-0.08
Household size	0.18	0.07		0.14	0.17	0.12

8. Conclusions

This project developed the LCRI as a simple but powerful way of measuring low carbon readiness. In doing so we located low carbon readiness within a psychological framework for transformation to low carbon living and gained a picture of low carbon living in Australia today. Our research team plans to continue to use the LCRI and associated measures to research low carbon behaviour and behaviour change and we invite any interested researchers, practitioners and policy makers to make use of our work.

In terms of levers for moving the Australian population towards low carbon lifestyles, three factors are of particular note: household regulation, community support and house ownership. The interpersonal variables household regulation and community support concern relationships with other householders and with family and friends outside the household. This implies that interventions ought to focus on encouraging and motivating whole social networks of people at a time. The results of this report suggest that by using this approach there will be a virtuous cycle where people will not only work to achieve a low carbon goal, but also to enable others to achieve a low carbon goal. Past research is consistent with this conclusion as a meta-analysis by Abrahamse and Steg (2013) found that social network approaches are one of the most effective ways to achieve pro-environmental behaviour change.

Influencing a social network to engage in low carbon behaviour is a difficult proposition when moving from the abstract Why to the question of what concrete Hows are needed to promote behavioural change. Previous studies give the example of “block leaders” in neighborhoods who encourage their neighbors to recycle (Hopper & Nielson, 1991; Carrico & Riemer, 2011). In addition, the Low Carbon Living CRC-funded ClimateClever Initiative in schools uses each school as an organizational network of people and also as a focal point of a network that spreads out from the school and into students’ households. Other important social nodes are the local pub, local sports teams and competitions, libraries, gyms and local councils. the Low Carbon Living CRC-funded Livewell project shows that it is also possible to build new social networks around the explicit interest of reducing carbon emissions in the home and personal travel.

At the household level, people who are already motivated to transform to low carbon living could be supported to show leadership within their households, including being taught how to have difficult conversations without becoming confrontational. This would aid in effective negotiations with other householders about whether to pursue low carbon outcomes. Because households are nested within communities there is also the potential for community level promotion of low carbon living to flow through to the household context, creating a kind of low carbon lifestyle contagion effect.

Besides the interpersonal variables, house ownership was of particular importance in promoting the purchase of low carbon infrastructure. This result can be viewed pessimistically given that it is getting increasingly difficult for younger generations to buy a house. However, house ownership may also be seen as a proxy for “controllability” of infrastructure installation.

If non-house owners are given the power to demand/request an installation of low carbon infrastructure in their apartment complex or rental accommodation it may have the same effect as the one shown by house ownership in this project. The growing ability for apartment owners to cooperatively install solar panels is an example of how it is possible to increase low carbon efficacy without buying one's own house.

In terms of future research, the findings reported here also suggest several other avenues for further investigation with a view to understanding transformation to low carbon living more deeply. First, transitions from participating in one low carbon behavioural cluster to another is a key area of interest. In addition to considering lower level transitions, like moving from purchasing appliances to solar panels, it will be worth examining transitions from routine behaviour to infrastructure and vice versa. The qualitative study indicated that the general public tend to think about carbon reduction in terms of routine behaviour and this was also consistent with the results of the subpopulations analysis. Understanding different ways people may enter and transition between both routine and infrastructure behaviour is therefore worth addressing directly. The subpopulation analysis suggested multiple strategies will be needed for different kinds of people.

Relatedly, the absence of any consistent effects for income or financial surplus is worth investigating further. It is clear from our, and other, qualitative studies that people do reference financial concerns as a Why motivating low carbon behaviour. Yet our null results for a direct financial effect on low carbon behaviour join several others that have found the same (Gärling & Loukopoulos, 2007). What our results instead suggest is that financially related milestones, like house ownership will open the way for pursuit of a low carbon goal, particularly in combination with family consensus around the value of low carbon behaviour. However, more qualitative and quantitative work is needed to explore this idea.

We can also examine the operation of the LCRI in terms of a wider range of behaviours, particularly waste, which was a main area of focus for participants in the qualitative study. One extension to investigate here is how interpersonal factors might interact with the LCRI to shape willingness to engage in uncommon low carbon behaviours (like composting) as opposed to simply performing more standard low carbon behaviours (like recycling glass).

Finally, we are interested in continuing to survey the Australian population. This would allow further longitudinal work but would also further deepen our understanding of the nature of low carbon living in Australia today and how transformation to low carbon living can be further promoted.

9. References

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Appendix

Behavioural practices to reduce greenhouse gas emissions

This list of 39 energy-saving behaviours is based on the description of a 'green' Australian household provided by Pears (2011), combined with shortlists of behavioural practices recommended in the United Kingdom (DEEFRA, 2008) and the United States (Gardner & Stern, 2008). The description of the behaviors are also extensively informed by the CSIRO Home energy Saving Handbook (Wright, Osman, & Ashworth, 2009).

Infrastructure and equipment

- Use medium hybrid or small diesel car
- Use heavy draught-free curtains or secondary glazing on windows
- Use weather-strips or caulk to seal draughts in windows and doors
- Use efficient compact fluorescent bulbs instead of incandescent bulbs
- Buy and use a reverse cycle heating/cooling system (or separate systems with high energy efficiency star ratings)
- Buy and use a high star-rating fridge
- Buy and use an efficient front-loading clothes washing machine (high star rating)
- Buy and use an efficient dishwasher (high star rating)
- Buy and use an efficient LCD or LED TV instead of a plasma TV or cathode ray tube TV
- Buy and use small appliances that have high energy efficiency ratings
- Install high quality ceiling insulation
- Make your own electricity by installing photovoltaic solar panels, a wind turbine or a micro-hydro generator
- Buy and use a high performance solar-electric hot water system

Heating/cooling

- Wear seasonal clothing to keep warm/cool
- Open doors and windows to cool home
- Use curtains, awnings, shutters, blinds and/or plants for shade
- Adjust heater/cooler thermostat to minimum comfortable setting
- Only heat/cool the rooms of your home that are used
- Heat/cool for only part of the day

Energy use

- For clothes washing use the cold wash setting
- Only run dishwasher when it is fully loaded
- Keep showering time to around 4 minutes

- Switch off appliances at the powerpoint or powerboard instead of leaving them on standby
- Use the GreenPower option for some or all of your electricity bill

Food

- Avoid eating beef
- Avoid eating processed foods
- Eat more food that is locally in season

Waste

- Check and recycle all food packaging and other packaging that can be recycled
- Shop and plan meals to minimise food waste
- Compost food waste

Travel

- Avoid driving a car for most travel (e.g. public transport, small motorbike, bike or walk)
- Choose travel destinations that avoid air trips
- Carbon off-set air trips
- When driving, carpool with others
- When driving, use a "smooth" driving style that avoids sudden or surging acceleration and sudden stops
- When driving, combine multiple errand trips to one
- Get frequent car tune-ups, including air filter changes
- Check and correct car tire pressure
- Use low-rolling resistance car tires

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