CLIMATE CHANGE AND REGIONAL COMMUNITIES: TOWARDS SUSTAINABLE COMMUNITY BEHAVIOUR IN BALLARAT

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ABSTRACT: This paper presents the findings of two surveys conducted on behalf of BREAZE, a Renewable Energy and Zero Emissions community group in the Ballarat region.   The research presented in this study was designed to identify the group's effectiveness in supporting its members to achieve zero emissions.   Another objective of the research was to identify the knowledge and information needs of the broader Ballarat community in relation to climate change and sustainable behaviours.   Survey findings indicate that both BREAZE and wider Ballarat community members are looking for means to reduce their barriers to adoption of pro-environmental choices.   Key results also indicate that the Ballarat community has some desire and intention to change their behaviour.   There was considerable interest and demand for high quality, clear, in-depth information and working examples on which individuals can base their choices and purchase decisions.   The paper concludes with a discussion on future actions to engage the wider community towards more sustainable behaviour.

1. INTRODUCTION

The study of change in pro-environmental behaviour took on prominence in the early 1970s with the emergence of the energy crisis, and the increased concern in environmental impacts of human behaviour. This paper starts with a literature review which focuses on the area of energy use, which forms the core of the research undertaken on behalf of the Ballarat Renewable Energy and Zero Emissions (BREAZE) community group in the Ballarat region.[1]   Related literatures on pro-environmental behaviour are also considered.

Following an outline of the methodology employed, the paper presents the findings of two surveys conducted on behalf of BREAZE with households of BREAZE members and Ballarat residents, with a focus on individual behaviour

within a wider community context. The paper concludes with a discussion on the findings and suggested approaches for future community engagement.

2. LITERATURE REVIEW

The energy crisis in the United States led to an increased interest in understanding means through which households could reduce their energy consumption to cope with the rapid increase in energy costs (Stern 2002), in programs often funded by the US Department of Energy and the National Academy of Sciences under the direction of Paul Stern. A number of recent literature reviews summarise the studies conducted in this area (cf. Lutzenheiser, 1993; Abrahamse et al., 2005; Wilson and Dowlatabadi, 2007).

In general, these reviews of the literature have tended to distinguish the different determinants of household energy consumption, and thus the potential bases for behavioural change, at different levels: that of the individual, the household and the community (or context). Stern in particular suggests that there is a need to analyse environmentally significant behaviour as a joint function of psychology, social structures, economic, technology and other variables (Stern, 1992). Similarly, Wilson and Dowlatabadi (2007) make the distinction between the personal and the contextual in their review of energy use behaviour, drawing on Guagnano, Stern and Dietz's (1995) "attitude-behaviour-context" model of pro-environmental behaviours. Thus there is a need to understand individuals (or households) as well as the context in which these individuals (or households) live in order to understand their behaviour, and how it might be changed.

2.1 Patterns of Environmental Behaviour

There have been a large number of studies profiling the patterns of pro-environmental behaviour in a variety of different populations. The purpose of such studies is often to explore the relationship between pro-environmental behaviours and various demographic and contextual determinants. The Victorian Department of Sustainability and Environment's Green Light Report (2008) is one example in this regard. The Green Light Report examined concern for the environment, attitudes towards the environment, pro-environmental behaviours, including a number of demographic differences such as age, gender, urbanisation and income.

In addition, there have been attempts to assess the more complex inter-relationship of behaviours. Gilg and Barr (2005), for example, use cluster analysis of environmental behaviours and demographics to identify differentiated environmental types. Their intent is to seek to identify particular types of sustainable lifestyles. Gilg and Barr (2005) outline four basic types of households: committed environmentalists, mainstream environmentalists, occasional environmentalists and non-environmentalists – based on their pattern of adoption of different combinations of behaviours. The authors also distinguish the demographic and social characteristics of the different clusters, and particularly the different value bases of the four clusters, with committed environmentalists tending to exhibit higher levels of altruistic values.

Researchers have also recently had an increased focus on understanding the environmental impact of behaviours. Gatersleben et al (2002), for example, highlight two possible approaches that can be take in the measurement of environmentally significant behaviour: intent oriented measures, which assess what people do or why people act; and impact oriented measures, which a outcomes, identify target behaviours that significantly influence the environment.

While typologies of consumers and their behaviours are useful for examining distinctions between types, they are problematic where an individual or organisation (such as BREAZE) is interested in facilitating changes in behaviour. This is because such studies can say little about the causes of such behaviour, as they are largely correlational in nature. This is where behavioural change models provide a greater contribution.

2.2 Individual Models of Behavioural Change

The study of individual behavioural change has long been of interest across a variety of fields interested in influencing the decisions of individuals. Marketers are interested in influencing product choices, public health practitioners in influencing health-related behaviours, and, in the case of this paper, environmentalists in influencing choices of pro-environmental behaviours. By far the most common model used as the basis for assessing the effectiveness of such interventions is the Theory of Reasoned Action (TRA) (Fishbein and Azjen, 1976) and it's extension, the Theory of Planned Behaviour (TPB) (Azjen, 1992).

The theory of reasoned action posits that certain individual behaviours can be seen as the result of a reasoned decision-making process based on the development of an intent to act in a particular way, and the subsequent fulfilment of that intention. As such, the theory focuses on the prediction of behavioural intentions, particularly behavioural norms (the belief that engaging in the behaviour will fulfil normative expectations of the individual) and attitudes towards the behaviour. The extension of the model, the theory of planned behaviour (Azjen, 1992), also incorporates perceived control over the completion of the behaviour as an additional predictor, to account for those situations where the individual's capacity to engage in the behaviour may not be entirely within their control.

There are numerous studies which have used the TRA/TPB model to examine pro-environmental behaviours, although a recent meta-analysis of TPB results did not identify any specific studies of residential energy use is less common (Wilson and Dowlatabadi, 2007). In this meta-analysis, the TPB was found to explain 27 percent of the variance in behaviour, and 39 percent of the variance in behavioural intentions, suggesting an important role for the study of psychological determinants of behaviours.

More recently however, there have been efforts to extend the study of individual influences. The most notable of these is the Value-Belief-Norm theory (Stern, Dietz, Abel, Guagnano and Kalof, 1999; Stern, 2000), which ties elements of the TPB to underlying value bases for environmental action, such as Schwartz's norm activation model (Schwarz, 1994), as well as beliefs about the environment. Thogersen and Olander (2006), in a study of 1100 residents in

Denmark, also found that an underlying set of environmental values and concerns "account for the significant partial correlations between behaviours after controlling for background characteristics"

Steg and Vlek (2009) note that the VBN model has been useful in explaining "low cost" environmental behaviours, those behaviours which require only a small effort by the individual. By comparison, they suggest that the TPB is a more useful means for explaining higher cost behaviours, particularly due to the explicit recognition of perceived behavioural control over actions.

The inclusion of environmental attitudes has largely been based on the New Environmental Paradigm (Dunlap and Reilly, 1978) and its revised version, the New Ecological Paradigm (Dunlap et al, 2000), known generally as the NEP. The NEP examines environmental attitudes with a combination of 15 items, and show that these items correlate to form a uni-dimensional scale which has been used extensively in the literature for further analysis.

2.3 Contextual Models

The studies above have highlighted the importance of understanding individual and household decisions in context. The question for researchers in considering the context is the relevant contextual elements impacting on an environmentally relevant decision. Here again there are two models which have achieved a degree of prominence within the literature, largely originating in the distinct United States and European research activities in the field.

The prominent model within the United States literature is the Attitude-Behaviour-Context (ABC) model. This model, developed by Stern and colleagues as part of the National Academy of Sciences program, is intended to position the individual level approaches discussed above in the situational context in which decisions are made. As Stern points out, "the attitude-behaviour relationship is strongest when contextual factors are neutral and approaches zero when contextual factors are strongly positive or negative, effectively compelling or prohibiting the behaviour in question (Stern, 2000, p.415). While the ABC model is not explicit as to the particular environmental conditions relevant to the situation, due to the variability in "cost" of different types of behaviour discussed earlier, they do suggest possible influences such as interpersonal influences and social norms, economic incentives and costs, technology and its' availability, public policy, and broader social and economic trends.

By comparison, the "European" approach, exemplified by the work of Steg, Vlek and colleagues, is more explicit in its treatment of contextual environmental variables. Vlek (2000) presents a framework of five environmental forces - technology, economy, demography, institutions and culture (TEDIC) – which he argues set the context under which environmental actions are performed. For Vlek and colleagues (Vlek, Jager and Steg 1997; Vlek, 2000), individual action is then framed in terms of a 'needs-opportunities-abilities' (NOA) model, each of which is influenced by the TEDIC forces. In terms of structure, the NOA model incorporates similar elements to the theory of planned behaviour discussed earlier, but does incorporate additional elements such as the motivation to

perform environmental actions.

2.4 Related Empirical Findings

The preceding discussion has outlined the basic framework of individual and contextual models that have been used in the literature to explain household energy use behaviour. The above models are generally grounded in psychological decision-making models for understanding the motivations behind pro-environmental behaviours, but these decisions are also grounded in a decision context. Findings from psychological studies are presented above, but the major individual and contextual characteristics found to be related to energy consumption in findings from other fields are considered further here.

Engineering and environmental science approaches to energy use have generally concentrated on the objective characteristics of the residence as the basis of study, rather than of the residents within the house. These studies focussing on characteristics of the house such as the type of house (whether it is a house, flat or apartment), the structural characteristics of the house (e.g. brick or timber), the physical condition of the house, and the presence of high-demand appliances and structures, such as air conditioners and space heaters (Energy Efficient Strategies, 2008). In terms of interventions, policies designed to improve energy efficiency are often focussed on structural interventions, such as weatherising doors and windows, insulation, and subsidies for new technologies (see Abrahamse, et al., 2005, for a review of the effectiveness of different policy interventions).

In economic studies, the concentration has more often been on the demographic and economic (rather than psychological) characteristics of the householder. These have included variables such as demographics, employment, income and expenditure patterns, and family structures or household composition. Of these, the most consistent findings are in terms of income. Higher income households have generally been shown to demonstrate higher levels of energy consumption, which is attributed to the higher levels of disposable income and the lower relative cost of energy as a proportion of total household expenditure (O'Neill and Chen 2002). Energy use also increases as the number of residents in the household increases, although at a declining rate. Larger numbers of individuals in a household increase overall demand, but there are economies of scale achieved through the sharing of common resources such as appliances (O'Neill and Chen 2002; Gatersleben, Steg and Vlek 2002), and the lower energy demands of children.

3. METHODOLOGY

As can be seen, the study of environmental behaviour, and particularly behavioural change, is highly complex, incorporating psychological, demographic and economic factors at multiple levels of influence. The research questions of immediate interest in this work were focused on the BREAZE membership, and understanding their current behaviours and attitudes with regard to environmentally sustainable behaviour. For this reason, the BREAZE survey incorporates a wide variety of factors, focusing particularly on attitudinal

and behavioural factors, but taking into account household structural and demographic characteristics.

The methodology adopted for this research was a combination of two surveys - one of members of the BREAZE organisation, and the other of a random sample of households in the Central Highlands region of Victoria, which was approximately consistent with the geographical distribution of BREAZE members. The surveys were conducted for the purposes of gathering information on the current environmental behaviour and attitudes of the Ballarat community, and to compare the characteristics of BREAZE members with that of the broader geographic community to which they belong. The research was designed in consultation with BREAZE representatives and the project steering committee prior to commencement of data collection.

The BREAZE member survey was conducted via the web, using the LimeSurvey data collection software. Notification of the BREAZE member survey was distributed through the BREAZE mailing list, the primary communication mechanism used by the organisation, as well as through a link on the BREAZE website. Two follow-up emails to provide reminders to complete the survey were also distributed, as part of BREAZE's regular email newsletter. The online survey was made available for a period of three weeks from mid November into early December 2008. This generated a total of 92 completed responses.

The community survey was conducted by telephone during the same period of time. Random digit dialling sampling techniques were used to draw a random sample of households in Ballarat and surrounding areas. A total of 538 households were contacted as part of the community survey, with 150 households consenting to participate in the survey, a response rate of 27.8 percent.

4. KEY RESULTS

Salient findings of the two surveys are presented below and where available, any significant comparisons between the samples are highlighted.

4.1 BREAZE Membership

BREAZE members were first asked about the type of membership that they held with BREAZE, as some members are non-financial members and participate only through the BREAZE email list. 88 percent of respondents (81 out of 92) were financial members. Both financial and non-financial members had a broadly similar length of membership, although a slightly higher proportion of financial members had joined in the last six months.

4.2 Demographics

There was a significantly higher proportion of respondents (64 percent) in the member group aged 55-64 (z-test, $p<0.05$); only 4 percent was younger adults between 18-34 years old. By comparison, the phone survey had a significantly higher proportion of respondents in the 25-34 year old and 65 plus age groups. While age and gender profiles were consistent between the two groups, Figure 1

highlights the significantly greater level of education (generally at a tertiary level) among BREAZE members. BREAZE members were also more likely to report lower levels of income.
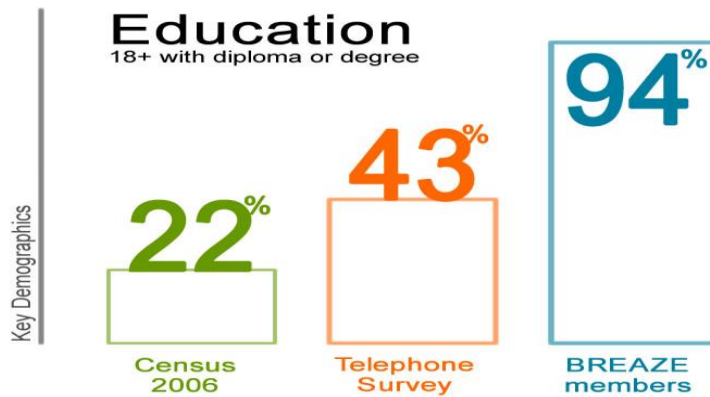

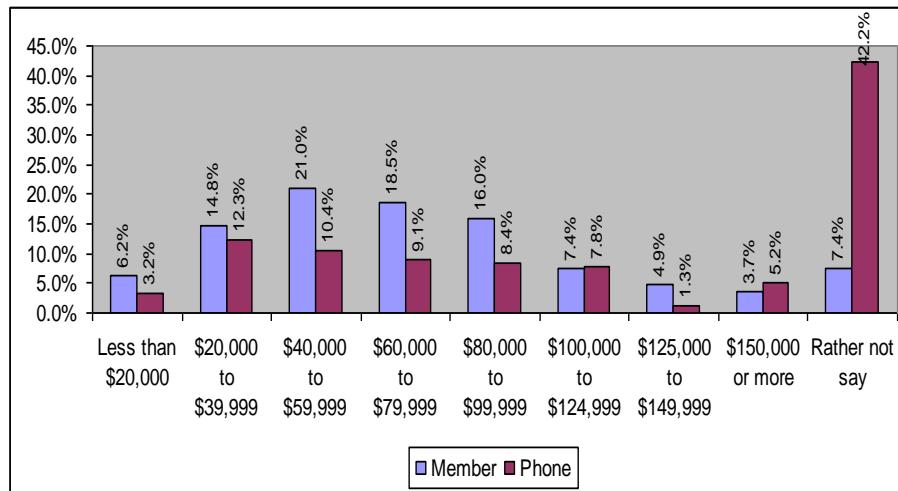**Figure 1.** Education Levels of Different Sample Groups

Figure 2. Income Levels of Different Sample Groups

4.3 Knowledge of environmental issues

In order to understand the determinants of respondent attitudes towards the environment, respondents were asked about their knowledge in regard to environmental issues. The level of self-reported knowledge was generally higher among BREAZE members than among the telephone survey group. See Figure 3. BREAZE members were significantly more likely to report a "very good"

level of knowledge in all five of the areas identified – water conservation; energy conservation; recycling and waste reduction; bio-diversity and natural resource management; and climate change.   By comparison, telephone respondents reported significantly lower levels of knowledge, particularly on issues of biodiversity and climate change.
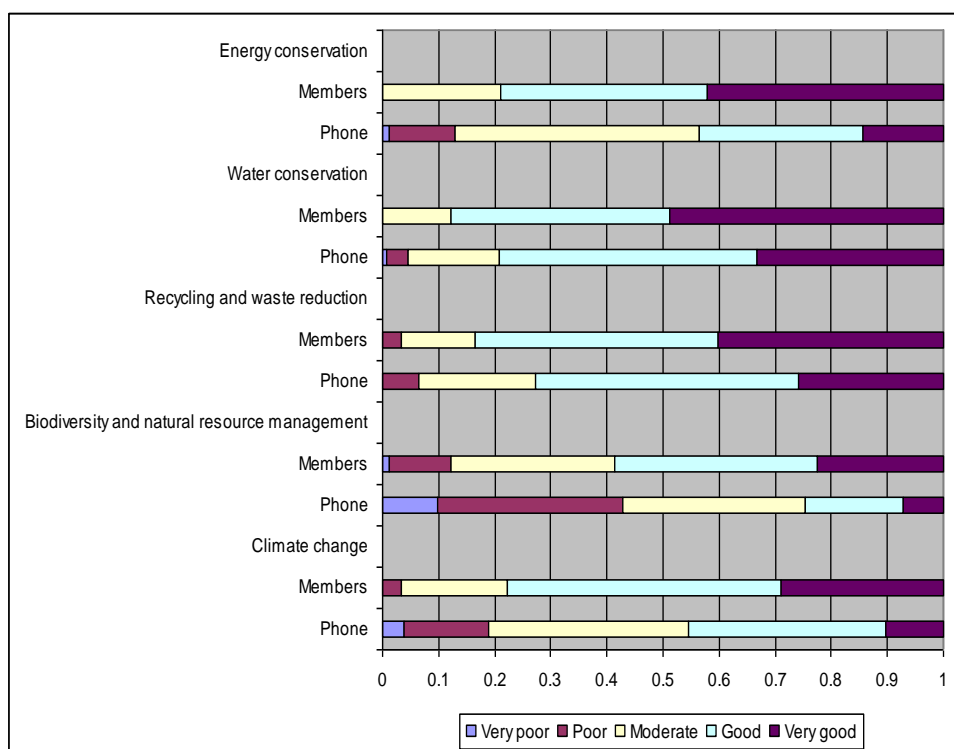

Figure 3. Knowledge of Environmental Issues by Different Sample Groups

    Respondents were then asked to rank the organisations that they used for information in order of frequency of use. The proportion of respondents from each survey group ranking each of seven different organisations as their first, second or third most used were analysed. There were statistically significant differences in the use of all of the organisations other than the local council (z-test, $p < 0.05$). BREAZE members ranked BREAZE as the organisation they were most likely to use as a source of information (30.6 percent of respondents), followed by media organisations. By comparison, telephone respondents were most likely to report the media and their family and friends as their most frequently used source, followed by the local council. Notably, BREAZE members were likely to report family and friends as their second or third most used organisational source.

4.4 Environmental Attitudes

Having established the respondent's level of self-reported knowledge, they were then asked a series of 13 questions to elicit their attitudes to various environmental and climate change issues. Respondents were asked to indicate whether they agreed or disagreed with each of the statements, using a scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Four questions were worded in negative terms to reflect attitudes more antagonistic to the environment.

The pattern of pro-environmental attitudes was largely consistent between BREAZE members and the wider community. Around three-quarters of respondents in both groups had pro-environmental attitudes, agreeing with the positively worded statements about the environment, and disagreed with the negatively worded statements. See Figure 4.
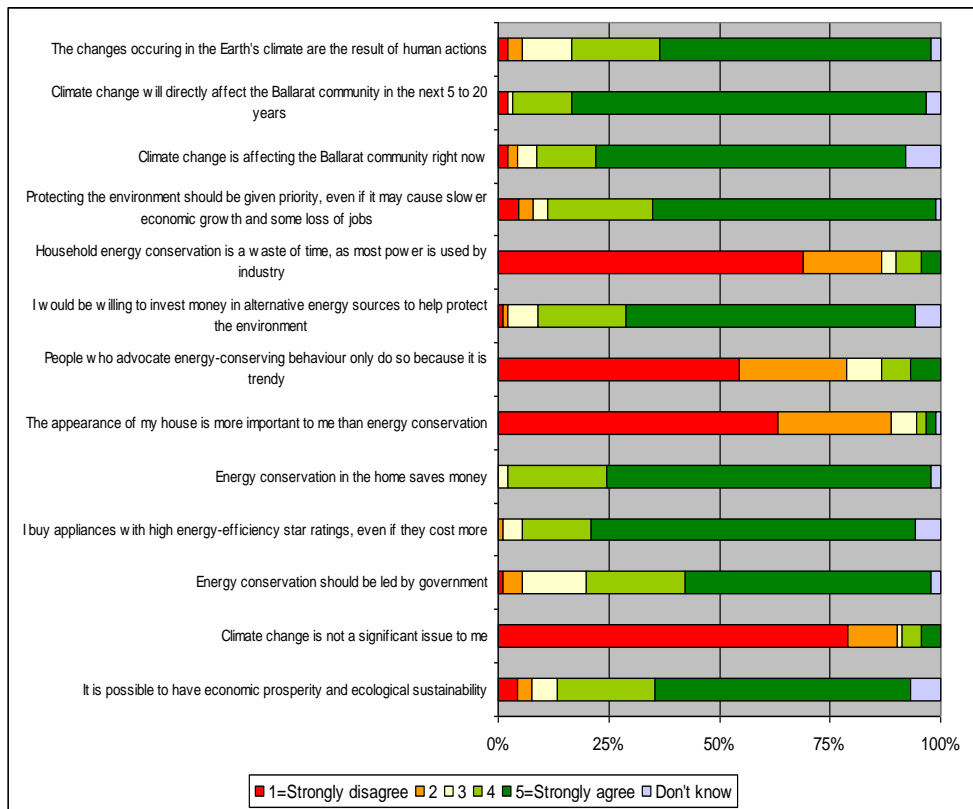

Figure 4. Environmental Attitudes among Different Sample Groups

A second pattern was the difference between the groups in terms of the strength of agreement with the statements. BREAZE members generally held stronger views than telephone participants and more likely to report strong

agreement (or strong disagreement) on 10 of the 13 statements, such as Climate change is affecting the Ballarat community right now' (see Figure 5), the exceptions being: "Climate change is not a significant issue to me", "The appearance of my house is more important to me than energy conservation"; and "Household energy conservation is a waste of time, as most power is used by industry".
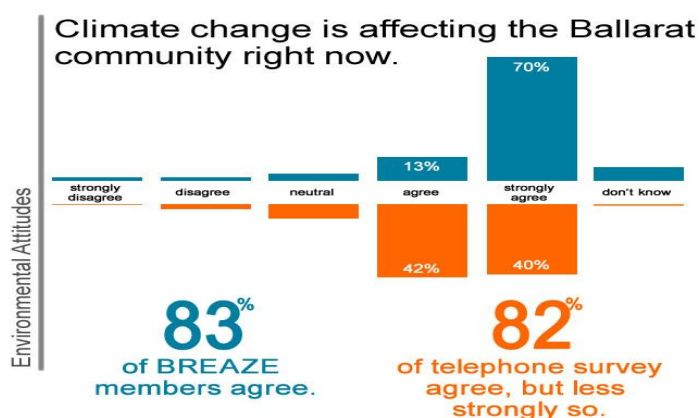

Figure 5. Strength of Agreement Differences between Sample Groups

A third pattern was the lower level of support among telephone respondents for environmental action that may undermine either their own or general economic prosperity. See Figure 6. Telephone respondents were significantly less likely to agree with three particular statements: "It is possible to have economic prosperity and ecological sustainability"; "I would be willing to invest money in alternative energy sources to help protect the environment"; and "Protecting the environment should be given priority, even if it may cause slower economic growth and some loss of jobs". This suggests that telephone respondents were more likely to consider the economic consequences of any environmental action that might be under consideration.
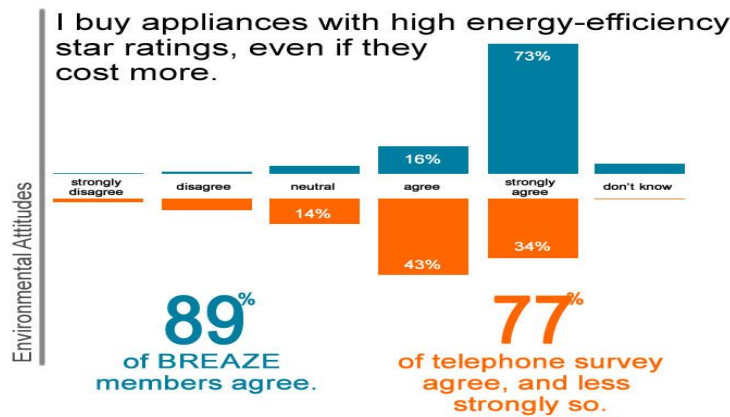
Figure 6. Differences in Actions Taken on Environment based on Cost

4.5 New Ecological Paradigm

To further understand the basis of respondent attitudes, BREAZE members were also asked to complete the "New Ecological Paradigm" (NEP) scale, a series of 15 questions forming a validated scale commonly used in environmental attitude research. An additional 2 questions were also included in discussions with the BREAZE project team.

Responses show a similar pattern of response to the previous environmental attitude questions, with strong positive support for pro-environmental statements by both groups. There was, however, more equivocal response by BREAZE members to statements regarding the availability of resources and the capacity for humans to act to avoid changes that makes the planet unliveable. See Figure 7.

4.6 Causes of climate change

The BREAZE project group were also interested in understanding the extent to which the general population of Ballarat believed in anthropogenic climate change, and to what they attributed the causes. To this end, a further series of questions were asked of telephone respondents who agreed with either the statement that climate change was affecting Ballarat "right now" or would affect Ballarat "in the next 5-20 years".

Respondents to this question were given a list of six possible sources of human-induced climate change, and asked "Which of the following do you believe to be a cause of climate change?" Responses were given three options, either "Major Cause", "Minor Cause" or "Not at all". Telephone respondents attributed cause primarily to coal and transport fuel use, and deforestation. Only 22.9 percent of respondents indicated that they felt agriculture and animals were a major cause of climate change. See Figure 8.
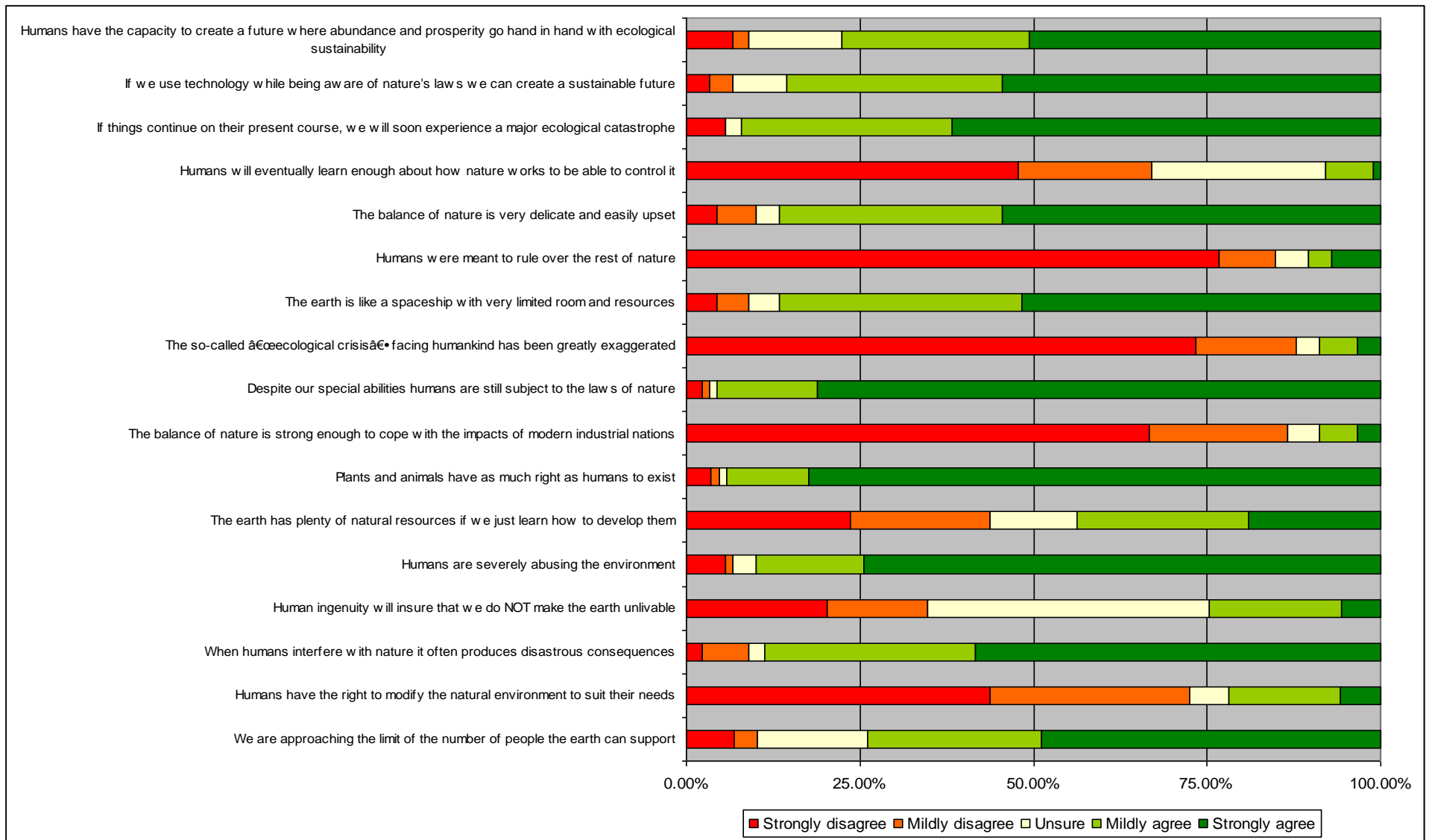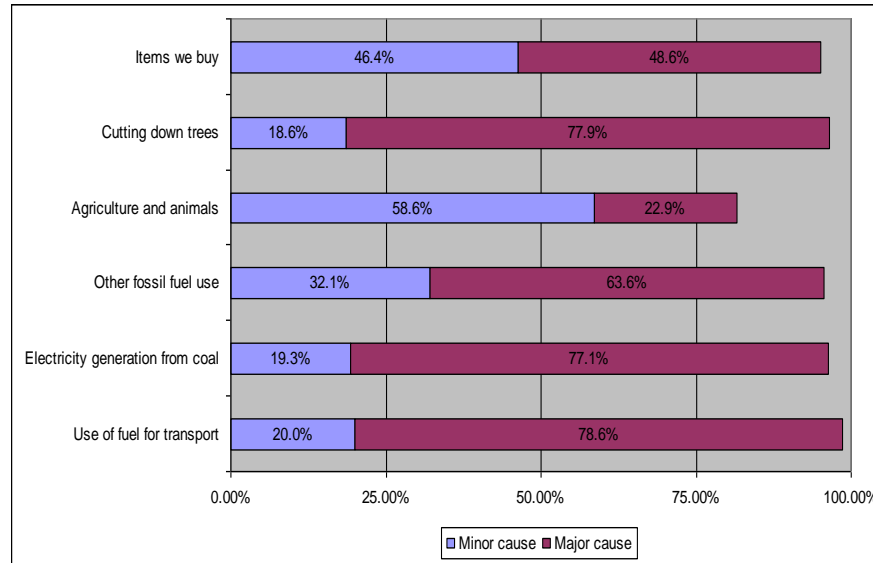
Figure 7. BREAZE Members' Attitudes on NEP scale

Figure 8. Community Members Perceived Causes of Climate Change

4.7 Responsibility for action on climate change

The subset of telephone respondents who showed concern over the impact of climate change on Ballarat were also asked about taking action on climate change. These respondents were asked "Which of the following organisations do you think has the primary responsibility for taking action on environment and sustainability issues?" They were asked to indicate either yes or no to this question for a series of six organisations or individuals.

Figure 9 shows that telephone respondents who are concerned about the impact of climate change believe the primary responsibility for taking action on climate change falls either to themselves (94.3 percent) or to government agencies, either Sustainability Victoria (84.3 percent), the local council (82.1 percent) or other government agencies (88.6 percent). A lower percentage felt that responsibility was with BREAZE (67.9 percent) or other community groups (71.4 percent), while almost no respondents felt that it was no-one's responsibility.
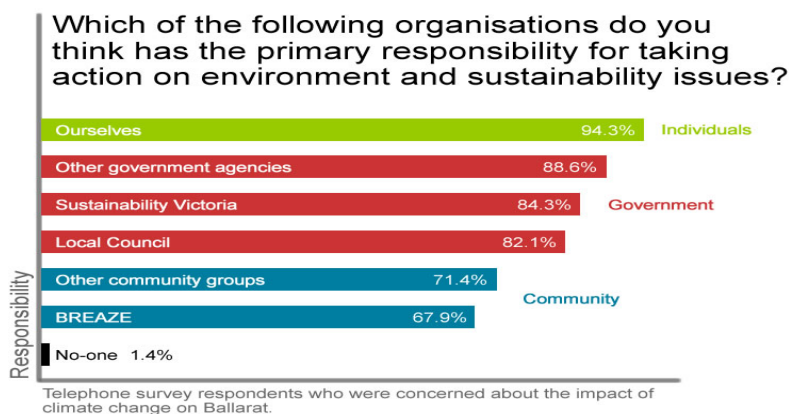

Figure 9. Perceptions of Responsibility for Action on Climate Change

4.8 Qualitative responses

Both groups showed a high demand for high quality, 'information rich' or in-depth information on which individuals can base purchase decisions. Both BREAZE members and the wider community also showed a great interest in working examples and practices showing the benefits and costs associated with sustainable purchases/ behaviour. In particular, clear, credible and detailed information such as 'how to' guides on recycling, water conservation, tree planting; tracking of water use and greenhouse gases emissions; product information and local research on best systems to purchase as well as Legislation, Regulation, policy, rebate and advocacy information.

5. FURTHER DISCUSSION AND KEY IMPLICATIONS

The notable finding from the demographics was the difference in education of the two groups. While age and gender profiles were consistent between the two groups, there was a significant greater level of education (generally at a tertiary level) among BREAZE members. It should be recognised that those with higher levels of education often exhibit higher levels of interest in environmental issues and are more aware/engaged in environmental action. BREAZE members were also more likely to report their income at lower levels of income. This may be the result of the greater anonymity provided in self-completion data collection methods such as web surveys, relative to interviewer-based telephone surveys.

Among both members and the broader populace, there is an apparent demand for high quality, in depth information on which individuals can base purchase decisions. For example, members were most interested in support mechanisms that provided information and examples, while telephone respondents were interested in similar types of support for assisting them in changing their behaviour. Members also rated more highly those activities which had higher levels of information content, such as workshops and bulk purchasing information sessions.

The results show that there is a major difference in the sources utilised by each group. For BREAZE members, the Internet was the most likely to be their primary source of information, and was also commonly ranked as a second or third ranked source, with BREAZE the most commonly used organisation to gather information. By comparison, telephone respondents ranked television as their most commonly used source, closely followed by the use of pamphlets and newspapers. Both groups also relied on friends and family for environmental information, suggesting that environmental information may be transmitted through social networks.

Drawing these issues together, it appears that one of the primary functions of BREAZE has been as an information intermediary, with a capacity to review and present complex information to support member decision-making. The higher level of (self-reported) action taken after "high-information" events (not depicted in this paper) suggests that BREAZE events help to reduce the barriers to action among those participating.

While both the BREAZE members and telephone survey group indicated that they engaged in pro-environmental behaviours, those behaviours were much more frequent among BREAZE members than the general population. BREAZE members also reported higher levels of "high-effort" and "high cost" behaviours (although low-effort behaviour patterns were relatively similar).

A similar response pattern was also present in the various attitudinal questions asked of respondents. While members of both groups were likely to exhibit pro-environmental attitudes, those attitudes were generally more strongly held among BREAZE members – for example, they were more likely to report strong agreement with pro-environmental statements, while respondents to the telephone survey tended to report simple agreement.

The survey questions examining technology adoption highlight a key function of BREAZE in reducing the barriers to adopting more sustainable behaviours. The level of adoption of sustainable technologies (not depicted in this paper) among the responding BREAZE members was fundamentally different from adoption in the general population, particularly for the two solar technologies that have been part of BREAZE bulk-purchase programs. The findings on support mechanisms also suggest that both groups are looking for means to reduce their barriers to adoption, and have some desire and intention to change their behaviour. This is also apparently an intermediary function that BREAZE provides in the minds of members, and may be able to build upon to expand participation in the broader Ballarat population.

6. CONCLUSION

This paper has presented the findings of two surveys conducted on behalf of BREAZE, a Renewable Energy and Zero Emissions community group in the Ballarat region. The research presented in this study was designed to identify the group's effectiveness in supporting its members to achieve zero emissions. Another objective of the research was to identify knowledge and information needs of the broader Ballarat community in relation to climate change and sustainable behaviours. Survey findings indicate that both BREAZE and wider Ballarat community members are looking for means to reduce their barriers to adoption of pro-environmental choices. Key results also indicate that the Ballarat community has some desire and intention to change their behaviour.

There was considerable interest and demand for high quality, clear, in depth information and working examples on which individuals can base their choices and purchase decisions. The study of individual behavioural change vis-à-vis environmental behaviour and climate change is in many ways in its infancy, despite the fact that behavioural change has long been of interest across a variety of fields interested in influencing the decisions of individuals. This study has used is the Theory of Planned Behaviour (TPB) (Azjen, 1992) and the New Ecological Paradigm (NEP) (Dunlap et al, 2000), as the basis for assessing the effectiveness of a climate change group. To implement behaviour change we not only need enabling policies and technologies, we also need to identify the behaviour that needs to be changed, examine the main factors underlying this behaviour, design interventions to change behaviour to reduce environmental impact, and evaluate the effects of such interventions (Steg & Vleg, 2009).

This research has confirmed that information and knowledge transfer are key intervention tools in environmental behaviour change (Stern, 2000). The feedback on the usefulness of current BREAZE activities and the desired support requested from both members and the telephone group, suggest that the greatest benefit is derived from those activities which are information rich and contain significant content. Education programs that focus on modelling exemplary behaviours, enabling individuals to see the benefits as well as the costs associated with such behaviours may be an effective means of increasing the frequency of their occurrence. In addition, collecting data on the uptake of bulk purchase programs in areas such as solar hot water systems, photovoltaics and

energy efficient whitegoods will help increase our understanding of the drivers for behavioural change.

The results of the survey also indicate that family and friends are an important means through which individuals gather information. Use of social networks in behaviour change is still poorly understood and provides future research opportunities in terms of exploring network links more carefully and how they may fit into a behavioural change framework.

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