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The University of Queensland Surat Deep Aquifer Appraisal Project (UQ-SDAAP)

Scoping study for material carbon abatement via carbon capture and storage

Supplementary Detailed Report

Effects of message framing on the support for carbon capture and storage (CCS) and alternative energy technologies

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Authors

Ms Michele Ferguson, The University of Queensland
Dr Katherine Witt, The University of Queensland
Dr Claudia Nisa, The University of Queensland
Prof Peta Ashworth, The University of Queensland

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1. Executive summary

This report is part of a larger study on the *Energy Technology Preferences Survey*, which explored the Australian population's attitudes towards energy sources and technologies in Australia, with a particular emphasis on carbon capture and storage (CCS). CCS is one technology that has been proposed to play a major role in mitigating climate change (e.g. IEA 2013). However, discussions about CCS have not been without controversy. Several CCS projects have been put on hold or cancelled due to public opposition, either failing to gain or sustain support from political actors (Wallquist et al. 2012; Hammond & Shackley 2010); or proved difficult to implement at the community level (Ashworth et al. 2012). Therefore, understanding public perceptions and evaluation of CCS technology is acknowledged as a critical determinant in the commercial development of CCS (L'Orange Seigo et al. 2014). An important aim of this survey has been to identify which factors are more strongly associated with support for CCS, and to differentiate socio-economic and demographic groups regarding their views on this topic.

The study presented in this report examined the impact of increasing the salience of related topics on participants' reported levels of support for energy technologies. This increase in salience was manipulated by varying the first group of questions participants were presented with in a survey about energy sources and technologies.

The motivation behind testing variations in the first topic presented is based on *question order effects*. Survey questionnaire design research has demonstrated that the order in which questions are asked can alter the context, or *frame*, in which subsequent questions are interpreted, and can influence how participants respond to subsequent questions, thus producing different results (Bruine de Bruin 2011; Oldendick 2008).

In social science experiments, questions can be purposefully ordered to increase the salience and mental accessibility of particular topics or information, and thus act as prompts/cues, 'in line with literature showing that people base survey responses on whatever information most easily comes to mind' (Druckman 2015; Kahneman & Frederick 2002). It was hypothesised that this experimental manipulation would allow us to better understand how the salience of different information may lead to shifts in individuals' preferences. The key outcome measure was the relative frame effect of different questions on the support for different energy technologies, and more specifically CCS.

We examined data from 594 individuals from the general Australian population. Data was collected between June and August 2017 from a nationally representative Australian sample of individuals aged 18 years of age and older (95% confidence level and +/-1.76% confidence interval). The sample included individuals from the general public main survey (n=2383), and data collected from an additional 469 individuals. The additional individuals were randomly allocated into one of four groups (approximately 125 individuals per group) to be exposed at the beginning of the questionnaire to different topics about energy sources and technologies, as described below:

a. <u>Knowledge</u>: including questions both on objective knowledge about energy topics and perceived knowledge about different energy sources and technologies

b. <u>Cost & Reliability</u>: including questions about financial implications of using just renewable energy, attitudes about energy reliability standards and perceptions of energy security

c. <u>Climate Change</u>: including questions about beliefs in global warming, causes of global warming, perceived severity of a variety of environmental problems and environmental attitudes

d. <u>Energy Behaviours</u>: including questions about the frequency with which people perform a variety of pro-environmental behaviours such as e.g. saving water, recycling, reducing air conditioning usage, washing clothes with full loads only, and subscription to Green Power

Our findings demonstrate that using different frames impacts on the reported levels of support for energy technologies in sometimes surprising ways. These preliminary results will help to inform future research in this area, as well as policy recommendations and community engagement activities.

Key results

- Participants in the ‘knowledge’ group reported higher levels of support for fossil fuel-related energy technologies such as coal, gas and nuclear, and lower levels of support for renewable energy technologies
- The results for the ‘climate change’ group followed a similar pattern to the ‘knowledge’ group, regardless of whether participants did or did not believe that global warming is happening. Surprisingly, for participants who believe that global warming is mostly caused by human activity, this condition had the unexpected effect of raising support for all energy technologies, including fossil fuel-related energy technologies, significantly so for CCS
- In contrast, the ‘energy behaviours’ condition reported an increase the overall support for nearly all energy technologies, significantly so for nuclear, biomass, CCS and gas. It was the only frame that significantly increased overall levels of support for CCS
- Of all the experimental conditions, the ‘cost and reliability’ condition demonstrated the least effect, and there were no significant differences in the support reported for different energy technologies compared to the ‘no information’ group. This suggests that economic issues, energy costs and reliability are baseline factors used by people when considering trade-offs and support for energy technologies

2. Introduction

The United Nations Framework Convention on Climate Change (UNFCC) Paris Agreement set the ambitious goal to limit average global temperature increase to 2°C relative to pre-industrial levels by the end of the century (Rogelj 2016). However, many suggest this goal is unachievable in the face of rapidly increasing global energy demand, growing population and goals to move billions of people out of poverty. This is particularly so if high carbon intensive fossil fuels continue to dominate the world's energy generation.

Carbon capture and storage (CCS) is one technology that has been proposed to play a major role in potential ways to mitigate global warming (IEA 2013). CCS is the process of capturing carbon dioxide (CO_2) from large point sources, such as fossil fuel power plants or industrial processes, transporting it to a storage site, and storing it in underground geological formations. The aim is to prevent the release of large quantities of CO_2 into the atmosphere. CCS is considered by many experts to be an integral component of attempts to lower global CO_2 levels and mitigate global warming – particularly given its potential to significantly reduce emissions from the current fossil fuelled power generation fleet and emission intensive industries. For more than two decades, CCS has been considered a medium-term option for reducing carbon dioxide (CO_2) emissions and transitioning to a more sustainable energy future, particularly for those countries reliant on fossil fuels (Boot-Handford et al. 2014). CCS is also relevant to a number of fast developing countries including India, China and South Africa whose future CO_2 emissions are expected to continue to rise (Dütschke et al. 2016).

However, discussions about CCS have not been without controversy. Opponents argue that it promotes 'dirty energy' (Marshall 2016) and as a technological option, if deployed, its impact may be a 'double-edged sword', leading to a technological lock-in that hinders the development of more renewable energy options (idem). In addition, several CCS projects have been put on hold or cancelled due to public opposition, either failing to gain, or sustain, support from political actors (Wallquist et al. 2012; Hammond & Shackley 2010). Moreover, some consider CCS technology as still in a developmental stage, and the full commercial scale projects that were originally mooted to test CCS have proven difficult to implement (Ashworth et al. 2012).

Whilst CCS project developers primarily focus on the technical and geological specifications associated with a project during its planning and implementation phases, the social science literature indicates there is benefit in also taking into account the social characteristics of a potential host site and developing effective and appropriate stakeholder communication. Understanding the key cognitive and emotional factors associated with attitude formation, judgment and decision making about CCS technology which may hinder or facilitate the understanding and deployment of this technology, whether from the general population, political actors or other key parties, is critical to developing effective and appropriate stakeholder communication activities (Ashworth et al. 2015; Bruine de Bruin et al 2015).

A growing body of social science research has examined the attitudes and perceptions of the general public and affected communities regarding CCS and other energy technologies using observational and correlational research designs, i.e. case studies based on interviews and small-scale surveys or larger-scale national representative surveys (for a comprehensive review, see Ashworth et al. 2015). Taken together, this research has demonstrated that individuals' knowledge about, familiarity with, and perceptions of energy sources and technologies are associated with support for their development and deployment, as are individuals' personal beliefs, values and norms.

A key issue for the social acceptance of any energy technology is the trade-off involved in the decision making to enable its deployment, including trade-offs between different criteria, risks and benefits at the economic, social and environmental levels (e.g. Huijts et al. 2014; de Best-Waldhober et al. 2009). Often, these trade-offs are considered not only about one technology but in comparative terms for several technologies, posing a complex multi-criteria decision problem. The issue then is how to clearly communicate information in a clear and non-biased way that will help individuals to make informed decisions. Previous experimental research examining the effects of communication on informing public opinion to increase public acceptance of CCS has reported mixed findings (Ashworth et al 2015). There is some evidence supporting the use of valid and balanced information such as the Information-Choice Questionnaire (ICQ) that presents both potential risk and benefits about CCS in a non-biased way (de Best-Waldhober et al. 2009; ter Mors et al. 2013).

There is sustained interest in examining the relative effectiveness of message framing, that is, different ways to present or frame information about energy technologies in order to promote better understanding and informed decision-making. Research about framing effects on public opinions on a wide range of topics is well-established in psychology, sociology, political science and economics. While a growing body of research has explored framing effects and prompts/cues on perceptions of climate change and support for climate policy (Bernauer & McGrath 2016; Bolsen & Druckman 2018), there are fewer published studies in the area of energy sources and technologies (see Bolsen, Druckman & Lomax Cook 2014; Bruine de Bruin et al. 2014). Albeit limited in number, the findings of these recent studies suggest possible directions for tailoring information when designing messages to inform the general public about CCS and other low carbon technologies.

To inform the development of such messages, this study examined the impact of increasing the salience of related topics on participants' reported levels of support for energy technologies. This increase in salience was manipulated by varying the first group of questions participants were presented with in a survey about energy sources and technologies.

The motivation behind testing variations in the first topic presented is based on *question order effects*. Survey questionnaire design research has demonstrated that the order in which questions are asked can alter the context, or *frame*, in which subsequent questions are interpreted, and can influence how participants respond to subsequent questions, thus producing different results (Bruine de Bruin 2011; Oldendick 2008). Much of the literature on order effects in survey questionnaire design is aimed at reducing unintentional bias and statistical noise. However, in social science experiments, questions can also be purposefully ordered to increase the salience and mental accessibility of particular topics or information, and thus act as prompts/cues, 'in line with literature showing that people base survey responses on whatever information most easily comes to mind' (Druckman 2015; Kahneman & Frederick 2002).

It was hypothesised that this experimental manipulation will allow us to better understand how the salience of different information may lead to shifts in individuals' preferences.

Therefore, this project aimed to examine the specific research question:

What is the salience of the following related topics on levels of support for CCS and alternative energy technologies?

- *Objective and perceived knowledge about energy technologies*
- *Economic trade-offs – cost and reliability of energy technologies*
- *Beliefs about climate change – occurrence and causes*
- *Energy efficiency behaviours and pro-environmental actions*

3. Method

3.1. Questionnaire versions

The questionnaire used was designed to include a broad variety of questions to provide a solid contextualisation of the factors that are associated with public understanding and support for different energy sources and technologies (refer to the Appendix for the Survey Questionnaire). We aimed to maintain a level of replicability with other surveys previously conducted to monitor changes in the evolution of preferences for different energy technologies in Australia (for example: Ashworth et al. 2009a; 2009b; 2011; 2013). The questionnaire was broadly divided into seven sections; the following sequence of sections outlines the structure of the main survey (Version A).

Respondents first answered several screening questions (age, gender, and postcode). The first section of the questionnaire focused on objective and perceived knowledge about energy sources and technologies. The next section about the level of technology support, factors for support and funding priorities was also based on the Jeanneret et al. 2014 survey. Before expressing their level of support and funding priorities, participants were presented with definitions for each of the energy sources and technologies under evaluation consistent with previous surveys.

Additional questions were included to enable international longitudinal comparability including comparisons with previous environmental and energy-related surveys such as the World Values Survey (WVS) and the OECD Household Consumption (EPIC) surveys. Three sections included key questions about trade-offs between economic growth, environmental protection and climate change; as well as individual and household energy behaviours. Most questions were adapted from the WVS, which has included similar questions since 1995. This enables both temporal pattern analysis and the comparison of Australians' attitudes with the rest of the world.

The sixth section of the questionnaire aimed to analyse attitudes and perceptions of CCS compared to renewable energy. Questions in this section were preceded by a video presenting CCS as one of several technologies that when combined with energy efficiency and renewable energy technologies can reduce global emissions and thus prevent climate change. Questions following this video were adapted from Huijts et al. 2012, 2014 framework for understanding technology acceptance. This framework incorporates questions about perceived risks and benefits for each energy technology and perceived fairness, transparency and trust of government and industry to regulate, support and deliver CCS or renewable energy projects. The final section collected data on standard sociodemographic information to enable UQ-SDAAP to characterise the sample and understand different trends between groups.

The details of the questions are described in Table 1 below:

Table 1 Survey structure – main version (A)

Section	**Topic**	**Example Questions**	**Source**
1	**Knowledge**	Objective knowledge e.g., "*How is most electricity in Australia generated?"* and perceived knowledge e.g. "*Please indicate your current level of knowledge about the following energy sources and technologies*" (scale from 1=no knowledge to 7=expert knowledge)	Adapted from Jeanneret et al. 2014
2	**Support for energy technologies and public funding preferences**	Stated support e.g. "*Please indicate how strongly you agree or disagree with the following options as potential ways of generating Australia's future energy needs*" (scale from 1=strongly disagree to 7=strongly agree)	Adapted from Jeanneret et al. 2014
3	**Economic trade-offs and reliability concerns**	Willingness to pay e.g. "*I would give part of my income if I were certain that the money would be used to prevent environmental pollution*" (scale from 1=strongly disagree	Adapted from OECD EPIC survey; WVS

		to 7=strongly agree); *Please indicate below how concerned you are that in the next 10-20 years electricity will become unaffordable for you?* (scale from 1=not at all concerned to 7=extremely concerned)	
4	**Climate Change**	Perceptions about global warming e.g. "*Do you believe global warming is happening now or will happen in the next 30 years?; How serious do you think are the environmental problems facing the world?* (1=not at all serious to 7=extremely serious)	Adapted from OECD EPIC survey; WVS
5	**Energy efficiency behaviours**	E.g. How often do you perform the following in your daily life? e.g. *washing clothes using cold water instead of warm/hot water; switch off standby mode of appliances* (1=never to 5=always)	Adapted from OECD EPIC survey; WVS
6	**CCS versus renewable energy perceptions**	E.g. How likely do you think the following consequences are as a result of using CCS technology? e.g. *An increase in the risk of a major accident involving the public occurring* (1=very unlikely to 7=very likely); *With regard to renewable energy projects to what extent do you trust renewable energy industries to e.g. act in the best interest of society?* (1=not at all to 5=trust a lot)	Adapted from Huijts et al. 2012, 2014
7	Socio-demographic Information	E.g. Educational level, income level, household composition, political preferences	Adapted from Jeanneret et al. 2014

In addition to the main survey (Version A), four different versions of the survey were each presented to a random sample of around 125 individuals. All versions began with screening questions (age, gender and postcode). The initial questions preceding the support questions for each version are outlined below and in Table 2.

Version A – *Knowledge* – Salience: Objective and perceived knowledge (KN)

The first questions presented were about objective knowledge about energy topics and perceived knowledge about different energy sources and technologies. As described above, this was the format used in our larger Australian nationally representative data collection. This group of participants was randomly selected from the larger project described above (subsample n=125, randomly selected from n=2383). This version allowed us to identify the effect of participants' knowledge on individuals' preferences and support for different energies.

Version B – *No information* – No questions presented before stated preferences (control group) (NI)

No questions were presented before asking participants to rate their support for the various energy sources and technologies under analysis. This version allowed us to identify individuals' baseline preferences and support for different energies without having considered any preceding information.

Version C – *Cost and reliability* – Salience: Economic trade-offs and reliability concerns (CR)

The first questions presented were related to the financial implications of using just renewable energy, attitudes about energy reliability standards and perceptions of energy security. This version allowed us to identify individuals' preferences and support for different energies after having considered the multiple economic and financial implications of different energies, as well as individuals' concerns for future energy reliability.

Version D – *Climate change* – Salience: Beliefs about occurrence and causes of global warming (CC)

The first questions presented were about beliefs about whether global warming is occurring, the causes of global warming, the perceived severity of a variety of environmental problems, and environmental attitudes. This version allowed us to identify individuals' preferences and support for different energies after having considered their beliefs in climate change and global warming, as well as their concerns for the various environmental problems we face as a society.

Version E – *Energy behaviours* – Salience: Energy efficiency behaviours (EB)

The first questions presented were about the frequency with which people perform a variety of pro-environmental behaviours, e.g. saving water, recycling, reducing air conditioning usage, and washing clothes with full loads only, as well as subscription to Green Power. This version allowed us to identify individuals' preferences and support for different energies after having considered their own individual and household contribution and their daily behaviours in terms of energy consumption and energy resources use.

Table 2 Questionnaire order - five versions

Section order	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Version A	**KN**	Support	CR	CC	EB	CCS versus renewable energy perceptions	Socio-demographic information
Version B (control)	**Support**	KN	CR	CC	EB		
Version C	**CR**	Support	CC	EB	KN		
Version D	**CC**	Support	CR	EB	KN		
Version E	**EB**	Support	KN	CC	CR		

3.2. Sample

A market research company (Q & A Research) was engaged to collect data via an online survey. Data was collected between June and August 2017 from a nationally representative Australian randomised sample of 3040 individuals aged 18 years of age and older (95% confidence level and +/-1.76% confidence interval). The sample included individuals from the general public. The analysis of this data is presented in the UQ Report *Australian Energy Preferences and the place of Carbon Capture and Storage (CCS) within the energy mix* (Nisa et al. 2018).

We collected data from an additional 500 individuals, who were randomly allocated to one of four groups (approximately 125 individuals per group) to be exposed at the beginning of the questionnaire to different topics about energy sources and technologies, as described in the section above.

3.3. Sample characteristics and analysis

A total of 2540 surveys in the main version were completed, and of these 2383 were included in the final data set. The geographical distribution of participants per state follows a representative random sampling, corresponding to state population size. A total of 500 additional surveys were completed for the four experimental groups, and a total of 469 of these surveys were retained. Although these participants were shown a questionnaire with a variation in the order of questions, these participants were equally included in the national randomisation process. This means that these participants were not selected from a particular area, but randomly collected across Australia.

Data was cleaned and analysed using Stata/MP v.15.1 (StataCorp LLC). Completed surveys were discarded from the dataset if: completion time was more than six hours (average completion time was 30 minutes); or participants had responded in a biased way. From the main version, 125 surveys were randomly selected using the – *sample* – command, which draws observations without replacement. Bivariate analyses (cross tabulations, one-way ANOVA, t-tests and correlations) explored relationships between the topics of interest in each survey version, and levels of and factors underlying support for energy technologies.

Table 3 below presents the characteristics of these participants. The sample of participants between the conditions was balanced in terms of age (mean age 46-49), gender and state location.

Table 3 Sociodemographic characteristics of participants exposed to experimental conditions

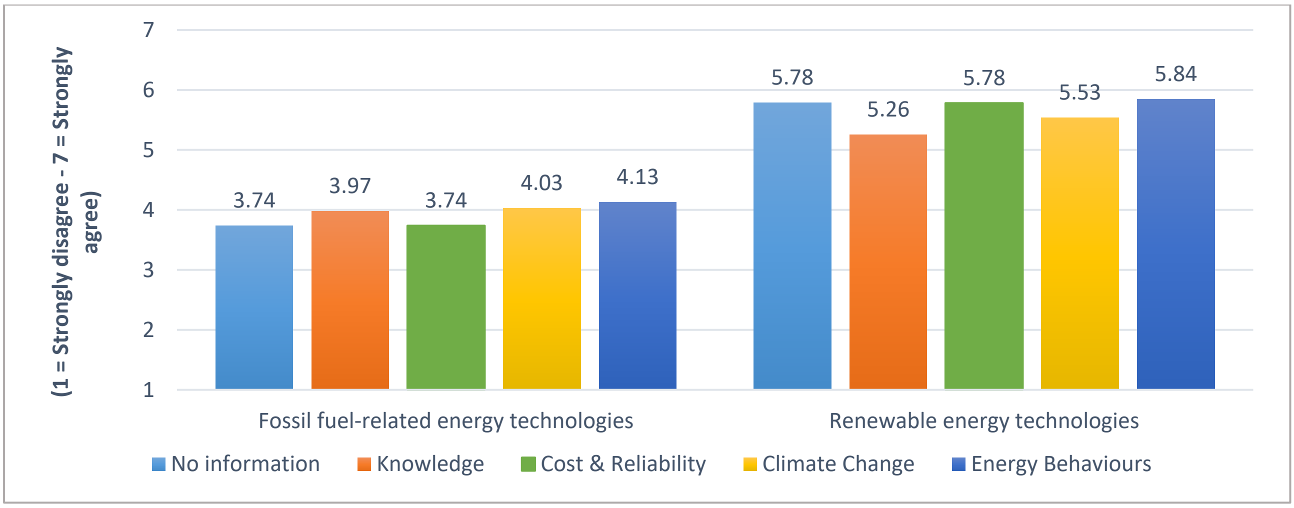
SAMPLE		No information	Knowledge	Cost & reliability	Climate change	Energy behaviours	Total
Gender	Male	50.8%	51.2%	51.3%	45.9%	42.9%	288
	Female	49.2%	48.8%	48.7%	54.1%	57.1%	306
State	NSW	27.9%	28.0%	28.6%	29.4%	35.3%	177
	VIC	29.5%	27.2%	33.6%	27.5%	23.5%	168
	QLD	21.3%	16.0%	16.0%	16.5%	18.5%	105
	SA	6.6%	7.2%	8.4%	8.3%	4.2%	41
	WA	7.4%	14.4%	8.4%	13.8%	12.6%	67
	TAS	3.3%	2.4%	2.5%	1.8%	3.4%	16
	NT	0.8%	0.0%	0.8%	0.0%	0.8%	3
	ACT	3.3%	4.8%	1.7%	2.8%	1.7%	17
Age	Mean	48.7	47.8	49.9	47.5	50.6	48.9
	(SD)	(17.4)	(16.7)	(16.0)	(17.4)	(17.4)	(17.0)
Total		**122**	**125**	**119**	**109**	**119**	**594**

4. Results

We start by examining the differences between the conditions in terms of support for energy technologies. The support for the energy technologies can be examined by individual technology, or by grouped measures. Factor analysis with promax rotation[1] showed that eight of the support items loaded on two factors of four items each (only items with factor loadings above 0.7 and communalities above 0.5 were retained). Two indices were created: fossil fuel-related energy technology items (coal, coal seam gas (CSG), gas and CCS) loaded on the first factor (Cronbach's alpha .86), and four renewable energy technology items (solar (thermal), solar (PV), wave and wind) loaded on the second factor (Cronbach's alpha .91). Such measures may be used as a proxy of public support for energy sources and technologies funding and investment.

Results show that support for renewable energy technologies was higher across all conditions (Figure 1). There were no significant differences in mean scores between conditions for fossil-fuel related energy technologies. However, compared to the control group – the no information (NI) group (i.e. no questions presented before rating support for energy technologies) – the knowledge (KN) group (i.e. main survey - first presented with questions about their own knowledge about energy) reported a significantly lower level of support for renewable energies (5.78 vs 5.26). The KN group scores were also significantly lower than the cost & reliability (CR) group (5.78) and the energy behaviours (EB) group, which had the highest level of support for renewable energy technologies (5.84).

Figure 1 Average support for types of energy technologies, by condition



Note: NI sample n=122; KN sample n=125; CR sample n=119; CC sample n=109; EB sample n=119.

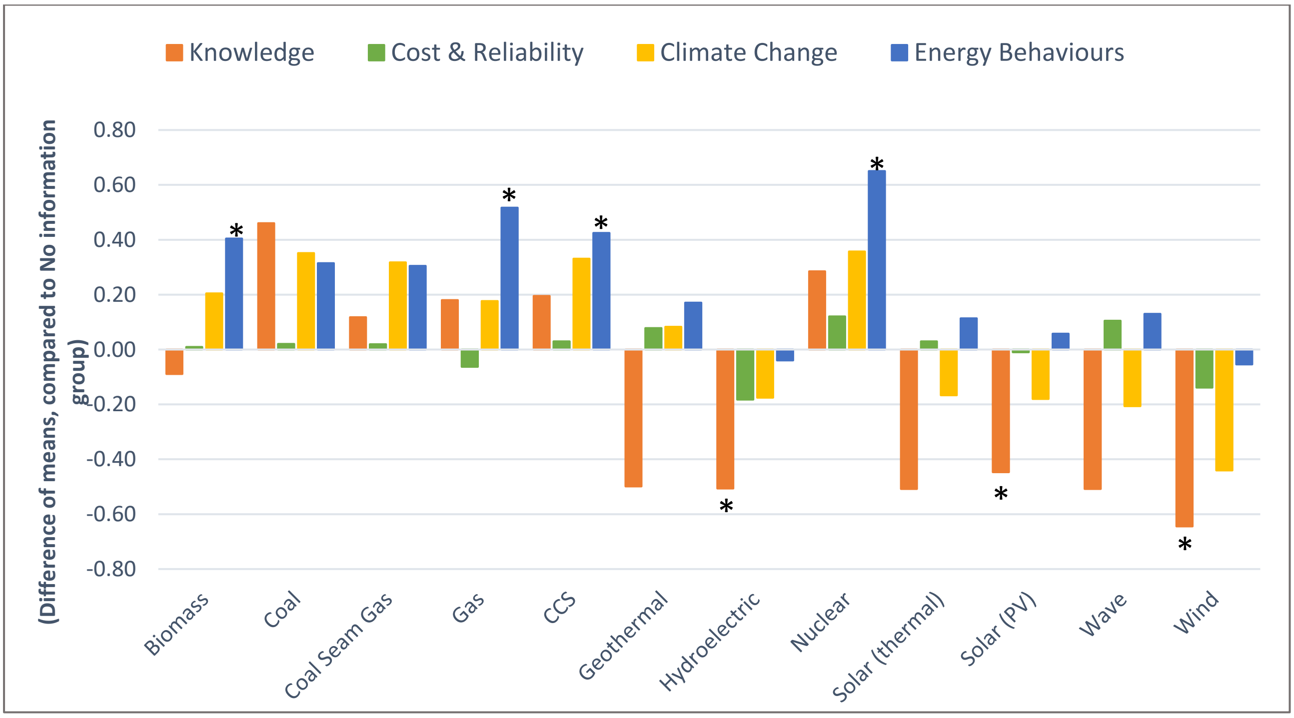
Exploring gender differences, males reported higher mean support for fossil fuel-related energy technologies across all conditions, and significantly higher than females in the KN group (4.26 vs 3.68). There were no significant differences in gender for either males or females when comparing the groups. Turning to renewable energy technology support, there was no clear pattern of difference between genders. Males in the NI group recorded the highest mean score (6.0), significantly higher than males in the KN group (5.23). Females in the CR group recorded the highest mean score (6.01), both compared to males in the CR group (5.56) and compared to females in the KN group (5.28).

[1] Promax rotation is a non-orthogonal (oblique) rotation method used in factor analysis. It first conducts an orthogonal rotation (such as Varimax) and then allows correlations between the factors in an attempt to improve the fit to simple structure. Promax rotation will reveal if the factors are uncorrelated with one another. For more information, see: https://stats.idre.ucla.edu/stata/output/factor-analysis/

With respect to age, there was a marginally significant difference in mean support between the age groups for fossil fuel-related energy technologies in the NI group (4.08 for 55 years and older vs 3.36 for 18-34 years). There was also a significant difference for participants aged 18-34 years in the NI group (3.36) recording lower levels of support compared to the climate change (CC) group (4.39) and EB group (4.33). There was no significant difference between age groups for support for renewable energy technologies. However, within the 35-44 years age group, participants in the KN group recorded significantly lower levels of support (5.07) compared to the NI and EB groups (5.95 and 5.96 respectively).

Looking at differences per individual energy technologies according to the experimental conditions, we see an interesting difference between the technologies involved (Figure 2).

Figure 2 Support for each energy technologies per condition, compared to 'no information' condition



Note: KN sample n=125; CR sample n=119; CC sample n=1907; EB sample n=119. ** P-value<.05*

Compared to the NI group, the KN group recorded significantly lower support for renewable energy technologies wind, solar (PV), and hydroelectric. In contrast, participants in the EB group had higher support for all energy technologies except for hydroelectric and wind, and significantly higher support for gas, nuclear, CCS and biomass – a group of technologies that typically receive the lowest support.

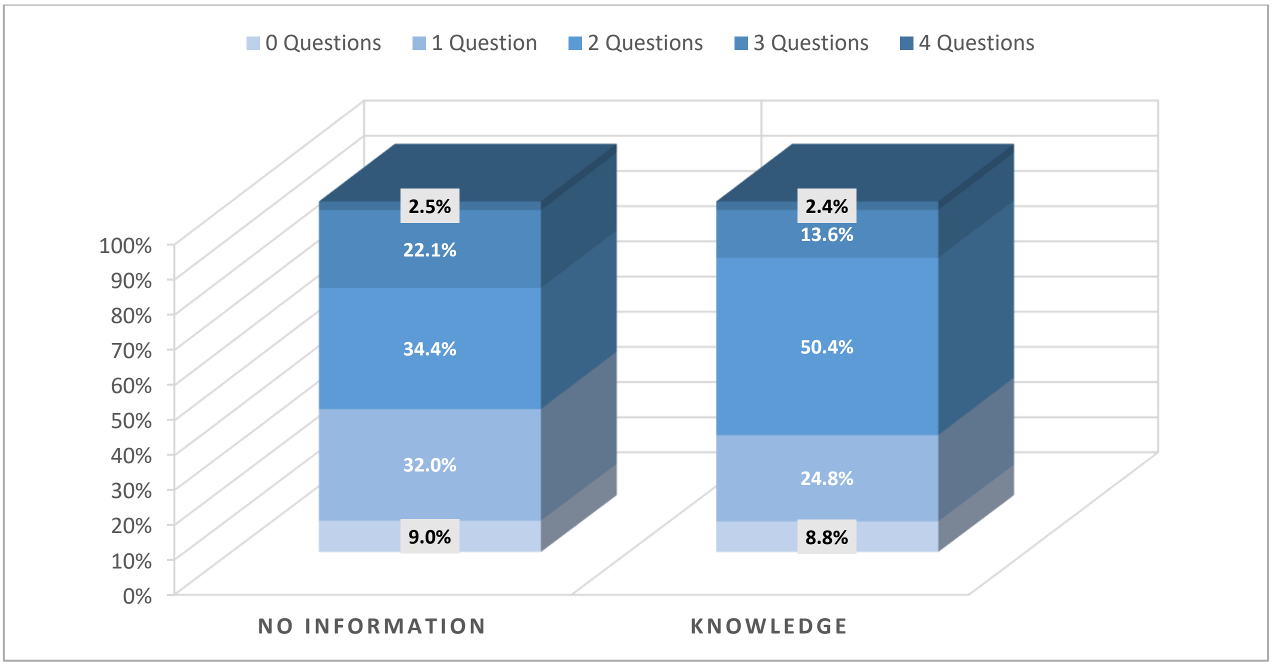
The following sections present more detailed results for each of the question frame conditions in an attempt to understand how the attitudes and preferences of participants may have been influenced by order effects. Given that participants were randomly allocated to the different conditions, any differences found can be attributed to the order effects and not to different characteristics of the participants in each group.

4.1. Frame: Knowledge

The set of questions about knowledge included both questions about objective knowledge about energy topics as well as perceived knowledge in relation to the variety of energy technologies under analysis.

As shown in Figure 3 below, there were generally low levels of objective knowledge about energy, with the largest proportion of participants across the groups answering one to two out of four questions correctly. Interestingly, a higher proportion of participants in the NI condition (25%) answered three or more knowledge questions correctly compared to 16% in the KN condition. Only 2.5% of individuals in each group answered all questions correctly. There was no significant difference in the mean number of questions answered correctly between conditions (NI 1.77 vs KN 1.76).

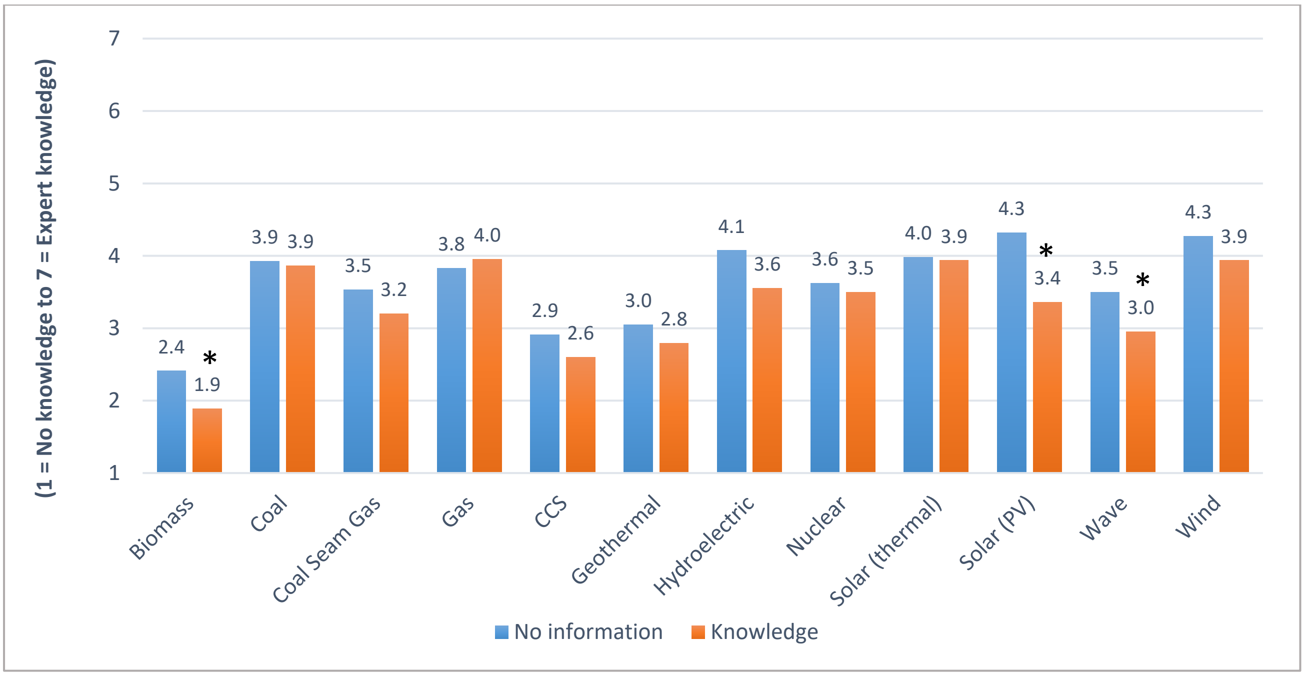
Figure 3 Number of correct answers to objective knowledge questions, by 'no information' and 'knowledge' conditions



Note: NI sample n=122; KN sample n=125. *Pearson chi2 (4) = 7.35; Pr = 0.118.*

On average, participants also reported low levels of self-rated (perceived) knowledge (that is, a mean below 4 on a 7-point scale) about energy sources and technologies. An overall index of perceived knowledge (i.e. composite average) was highly statistically reliable (Cronbach's alpha=.956). Participants in the KN condition self-reported knowing less about energy technologies on average than those in the NI condition (3.29 vs 3.62 respectively, $p<0.05$). Examining individual energy technologies (Figure 4), KN participants reported lower levels of perceived knowledge for all energy technologies except gas compared to the NI group; and significantly lower levels of knowledge about biomass, solar (PV) and wave energies ($p<0.01$). Positioning the knowledge questions first means that participants would be more likely to have self-rated their knowledge in a way that is not influenced by the effects of other questions, and thus rather a more accurate indication of baseline levels of knowledge. It appears by asking objective knowledge questions at the start of a survey participants are made aware of their lack of knowledge on the topic and therefore rated their subsequent knowledge questions lower than those in other groups.

Figure 4 Perceived knowledge, by 'no information' and 'knowledge' conditions



Note: NI sample n=122; KN sample n=125. ** P-value<.01*

We then examined possible framing effects on levels of support for energy technologies by comparing the KN group to the NI group. Table 4 below presents these differences for each energy technology. Results demonstrate that when a series of questions about how much participants know about energy technologies precedes questions about levels of support (KN group), the average support ratings were higher for fossil fuel-related energy technologies such as coal, gas and nuclear energy when compared to the NI group. However, support for renewable and geothermal energy technologies was significantly lower.

Table 4 Mean energy support, by 'no information' and 'knowledge' conditions

	NO INFORMATION (n=122)	KNOWLEDGE (n=125)	Difference	P value
Biomass	3.71	3.62	-0.09	0.665
Coal	3.48	3.94	0.46	0.045
Coal seam gas	3.43	3.55	0.12	0.612
Gas	4.17	4.35	0.18	0.363
CCS	3.85	4.05	0.20	0.347
Geothermal	4.77	4.27	-0.50	0.014
Hydroelectric	5.76	5.26	-0.51	0.005
Nuclear	3.46	3.74	0.28	0.283
Solar (thermal)	5.84	5.33	-0.51	0.008
Solar (PV)	5.95	5.50	-0.45	0.017
Wave	5.50	4.99	-0.51	0.014
Wind	5.84	5.20	-0.64	0.002

Note: Mean score on 7-point scale: 1=Strongly disagree to 7=Strongly agree. Red indicates significant results.

This difference in energy support between the conditions does not seem to be explained by differences in levels of objective or perceived knowledge. Regression models tested the differences between the NI and KN levels of objective knowledge on levels of support. Difference between the groups was significant for wave energy only (NI: B=0.095, β=0.058, p=0.528; KN: B=5.24, β=0.287, p=0.001; difference between mean scores, chi2=3.98, $p<0.05$). These models were repeated regressing perceived knowledge on levels of support, with difference significant for wind energy only (NI: B=0.269, β=0.216, p=0.017; KN: B=-0.100, β=-0.077, p=0.394; difference between mean scores, chi2=5.13, $p<0.05$). Furthermore, there were no significant differences between the conditions in terms of how much participants considered various factors, such as environmental issues, economic issues, or electricity price and reliability issues, when deciding whether to support energy technologies.

The more challenging aspect in this pattern of results is the lower level of support for renewable energy technologies. The difference in energy support between the conditions does not appear to be related to a variety of attitudes related to the environment or energy concerns. There were no significant differences between the NI and KN groups on willingness to pay to prevent environmental pollution; to pay an increase in annual electricity bills to use only renewable energy sources; concerns over future energy affordability and availability concerns; or attitudes towards saving energy.

The results suggest that there is a frame effect related to the knowledge questions that generated a *status quo bias* (Bolsen, Druckman & Lomax Cook 2014; Samuelson & Zeckhauser 1988). Although the objective knowledge questions were themselves framed neutrally, they nonetheless increased the emphasis on and salience of the topics covered, i.e. electricity generation, household energy use and costs, and national energy needs (see Appendix). Participants in the KN group reported a strong bias towards alternatives that perpetuate the status quo, demonstrating higher levels of support for conventional energy technologies that have been around for longer and with which the general population are most familiar, and that are seen as reliable and more affordable.

4.2. Frame: Cost & reliability

Hypothetically, prompting participants with questions about trade-offs between the economic and environmental costs and reliability of energy technologies should increase support for technologies that are considered cheaper and more reliable. Yet, of all the experimental conditions, this demonstrated the least effect. There were no significant differences in comparison to the NI group and not even a statistical trend in some direction; p-values do not remotely approach significance (Table 5 below).

We further examined energy support according to level of household income, to see if more affluent participants (vs. less) would exhibit distinct energy preferences when prompted with cost and reliability items. Regression models revealed that the only significant difference in support for any energy technology between income levels within the CR group was for CCS (income level $60,000-$80,999: B=0.92, β=0.233, p=0.05). No significant differences were found between levels of income between the NI and CR groups.

Table 5 Mean energy support, by No Information and Cost & Reliability conditions

	NO INFORMATION (n=122)	COSTS & RELIABILITY (n=119)	Difference	P value
Biomass	3.71	3.72	0.01	0.964
Coal	3.48	3.50	0.02	0.929
Coal seam gas	3.43	3.45	0.02	0.932
Gas	4.17	4.11	-0.06	0.749
CCS	3.85	3.88	0.03	0.887
Geothermal	4.77	4.85	0.08	0.696
Hydroelectric	5.76	5.58	-0.18	0.267
Nuclear	3.46	3.58	0.12	0.654
Solar (Thermal)	5.84	5.87	0.03	0.874
Solar (Photovoltaic)	5.95	5.94	-0.01	0.958
Wave	5.50	5.61	0.11	0.593
Wind	5.84	5.71	-0.14	0.480

Note: Mean score on 7-point scale: 1=Strongly disagree to 7=Strongly agree

In an attempt to uncover the motives that influenced individual preferences, participants were asked to indicate the extent to which they considered various factors when deciding whether to support energy technologies. Economic issues, and installation/maintenance costs, were significant factors in the CR group when compared to the NI group (Figure 5 below). As there were no similar differences between the other conditions (KN, CC and EB) compared to the NI group, it would appear that prompting participants with questions that increase the salience of economic and environmental cost and reliability trade-offs, as in the CR condition, may have some effect on the factors underlying support. However, this did not seem to translate in different energy support ratings.

Figure 5 Factors underlying energy preferences, by 'no information' and 'cost and reliability' conditions.

Note: NI sample n=122; CR sample n=119. ** P-value<.05*

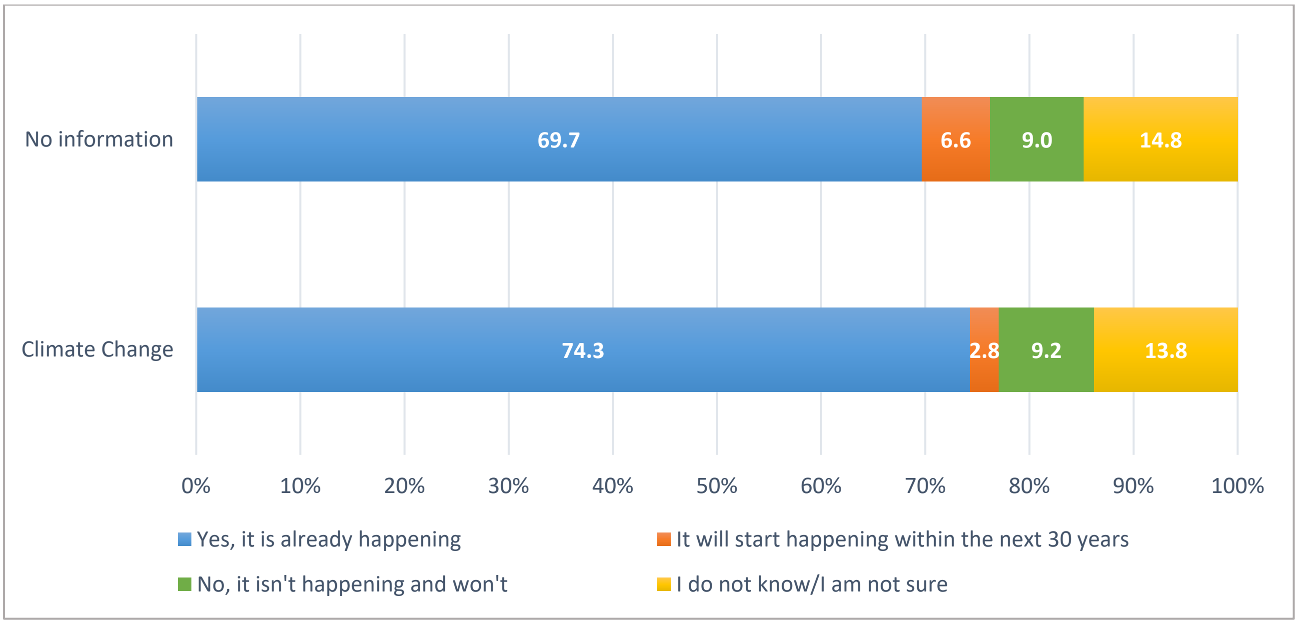
The findings suggest that economic issues, costs and energy reliability are the baseline factors that people consider to make their decisions about energy. This is not surprising, in the sense that cost and reliability are two key topics in discussions about the public preferences and investment in energy technologies.

4.3. Frame: Climate change

Perceptions about climate change have been associated with support for or lack of support for different energy technologies, and can also be related to different levels of energy efficient behaviours (e.g. Pisarski & Ashworth 2013). As in the other question order conditions, the hypothesis was that prompting participants with questions about climate change, environmental problems, and their personal values, beliefs and norms in relation to climate change and energy use, was expected to increase the salience of these topics when considering preferences for energy technologies. The extent to which climate change questions may increase the salience of the need to support renewable energy or other carbon mitigation technologies, is likely to be dependent on whether individuals believe that global warming is happening, and their values and levels of pro-environmental attitudes. This increase in salience might make pro-environmental individuals more concerned about climate change and thus more supportive of renewable energy. Conversely, for those individuals who do not believe that global warming is happening, prompting these issues may lead to a reverse pattern, by which they would support fossil fuel-related technologies more.

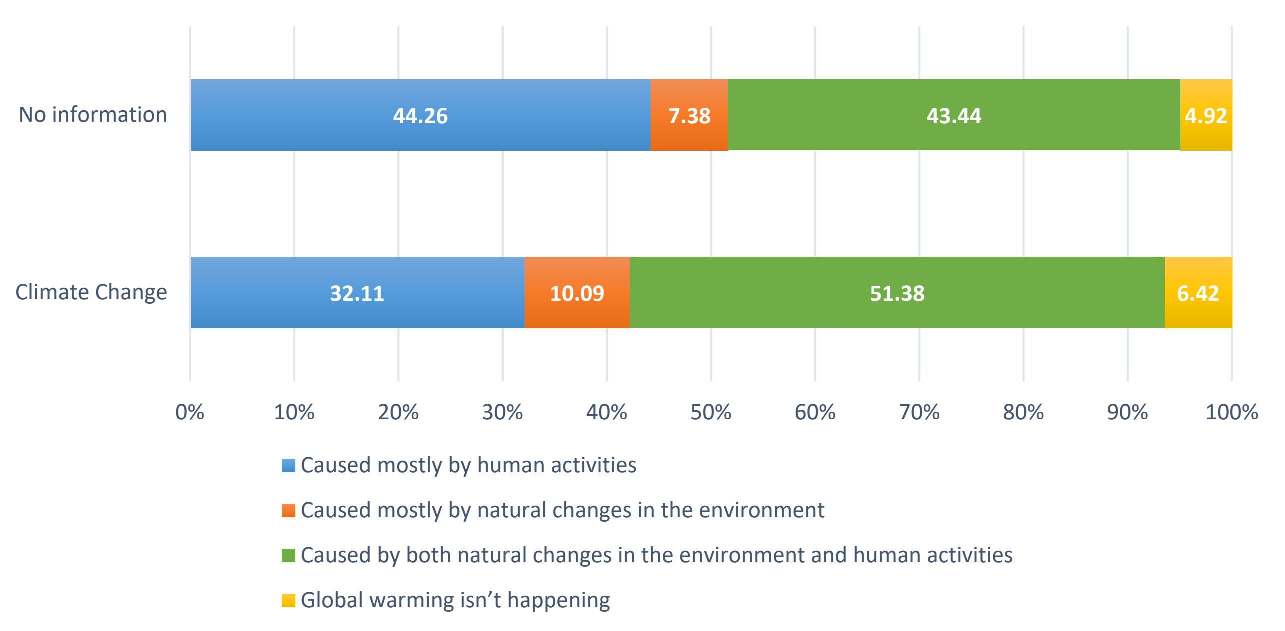
As shown in Figure 6 below, a slightly higher proportion of participants in the CC group believe that global warming is happening compared to the NI group. However, a lower proportion of participants in the CC group agreed that global warming is caused mostly by human activities (Figure 7).

Figure 6 Is global warming happening, by 'no information' and 'climate change' conditions.



Note: NI sample n=122; CC sample n=109. Pearson chi2(3) = 2.201; Pr = 0.532.

Figure 7 Causes of global warming, by No Information and Climate Change conditions



Note: NI sample n=122; CC sample n=109. Pearson chi2(3) = 4.061; Pr = 0.255

Mean energy preferences for the CC group are reported in Table 6 below. Compared to the NI group, there was a tendency towards an increase in support for coal, CSG, CCS and nuclear, and lower support for renewables, particularly wind energy, in the CC group. This pattern of results is very similar to that observed for the KN group (refer Table 4). These results are unexpected to some extent. Prompting with climate change questions should, in theory, increase the salience of the need for supporting energy technologies that are perceived as producing lower emissions, typically identified as renewable energy technologies.

Table 6 Mean energy support, by 'no information' and 'climate change' conditions.

	NO INFORMATION (n=122)	CLIMATE CHANGE (n=109)	Difference	P value
Biomass	3.71	3.92	0.20	0.337
Coal	3.48	3.83	0.35	0.142
Coal seam gas	3.43	3.75	0.32	0.184
Gas	4.17	4.35	0.18	0.394
CCS	3.85	4.18	0.33	0.114
Geothermal	4.77	4.85	0.08	0.689
Hydroelectric	5.76	5.59	-0.18	0.320
Nuclear	3.46	3.82	0.36	0.172
Solar (thermal)	5.84	5.67	-0.17	0.392
Solar (PV)	5.95	5.77	-0.18	0.338
Wave	5.50	5.29	-0.21	0.316
Wind	5.84	5.40	-0.44	0.042

Note: Mean score on 7-point scale: 1=Strongly disagree to 7=Strongly agree. Red indicates significant result.

UQ-SDAAP then examined whether this pattern of results differed according to beliefs about global warming. For participants who indicated they were uncertain, did not know or did not believe that climate change was happening, there were no significant differences in levels of support for energy technologies between those in the CC group compared to the NI group (note that these groups were n<40, thus lacked statistical power). The responses followed a similar pattern to those shown in Table 6 (above), with higher levels of support for fossil fuel-related energies and nuclear, and lower support for renewable energies. It was more surprising that this pattern was also seen for participants who do believe that global warming is happening. There were significant increases for support in the CC group compared to the NI group for coal (3.57 vs 3.01, $p<0.05$), and for nuclear (3.74 vs 3.07, $p<0.05$).

A closely corresponding pattern of results was found when examining beliefs about the causes of global warming. Participants in the CC group who believe global warming is caused mostly by natural changes in the environment, or by both natural changes and human activities, were significantly less supportive of wind energy compared to the NI group (5.01 vs 5.69, $p<0.05$) and hydroelectricity (5.43 vs 5.90, $p<0.05$). However, CC group participants who believe that global warming is caused mostly by human activities were more supportive of all energy technologies compared to the NI group, and support for CCS was significantly higher (4.23 vs 3.48, $p<0.05$).

Examining the consideration given to factors when deciding whether to support energy technologies, there were no significant differences between the NI and CC groups overall. Among participants who believe that global warming is happening, and those who believe that global warming is caused mostly by human activity, environmental protection and climate change issues were the factors considered to the greatest extent by both the NI and CC groups. However, those who believe that global warming is happening in the CC group considered climate change issues to a lesser extent than those in the NI group (5.90 vs 6.24 respectively, $p<0.05$).

These results suggest that a psychological mechanism is triggered when participants are prompted with climate change questions – even for those who believe that global warming is happening and is caused mostly by human activity. These findings did not appear to be mediated by prompting with the questions regarding values, norms and beliefs included in the CC section, as there were no significant differences in levels of support when these variables were added to regression analyses.

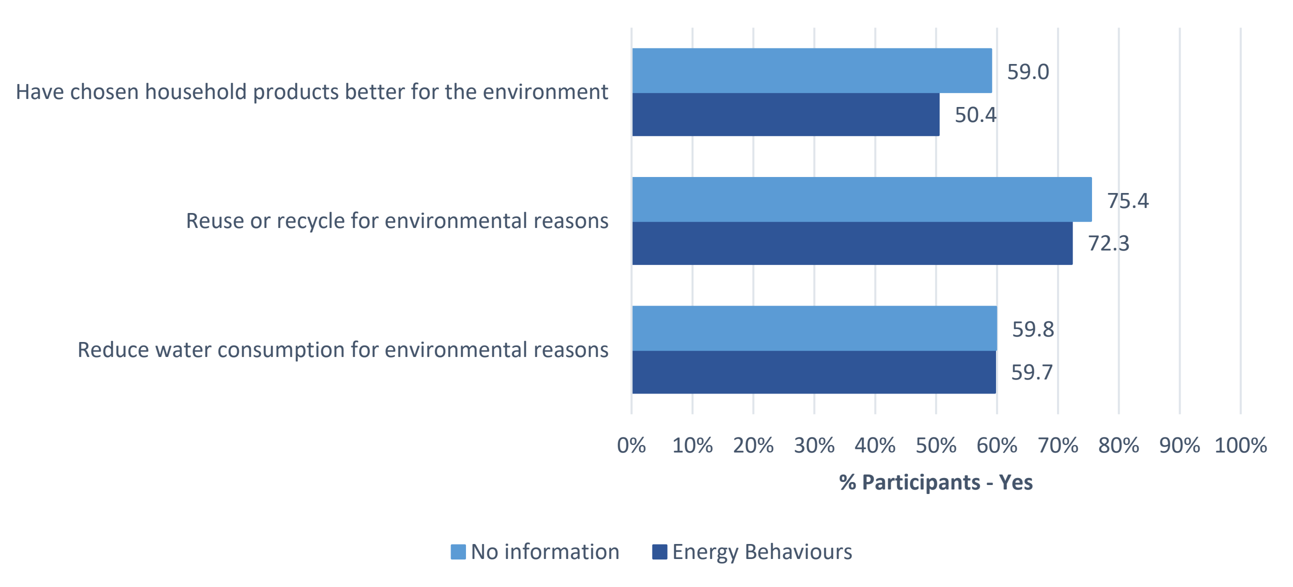
One possible explanation is that of ‘techno-optimism’, which Gardezi and Arbuckle 2018 define as ‘a belief that human ingenuity, through improved science and technology, will ultimately provide remedies to most current and future threats to human well-being’, such as climate change. In their study of farmers’ attitudes towards climate change adaptation, they found that techno-optimism can reduce farmers’ support for climate change adaptation and increase their tendency to express a preference to delay adaptation-related actions. In this instance it is possible that respondents thought that all possible technologies, including fossil fuels, will be required as we adapt to climate change. Particularly for developing the new technologies that require large amounts of conventional energy to power the transition.

4.4. Frame: Energy behaviours

We were interested to see whether first exposing participants to questions about their pro-environmental and/or energy efficient behaviours would result in differences in levels of support for particular energy technologies. The hypothesis behind prompting energy behaviours is based on Thøgersen and Noblet’s 2012 study of whether individual pro-environmental behaviours in daily life have implications (e.g. positive spillover or ‘wedge’ effect) for “support for” or “acceptance of” more radical structural changes, such as infrastructure change, which are decided at the political level. The study found that there was a positive relationship between pro-environmental behaviours and acceptance of wind energy that was not just due to a common mediating factor, such as individual levels of general environmental concern.

Figure 8 below shows that participants in both the NI and EB groups reported average levels of pro-environmental behaviours. In the past 12 months, almost three quarters of participants report having recycled at least once (72-75%) while around half of the participants reported having, at least once in the past year, purchased products good for the environment and saved water for environmental concerns.

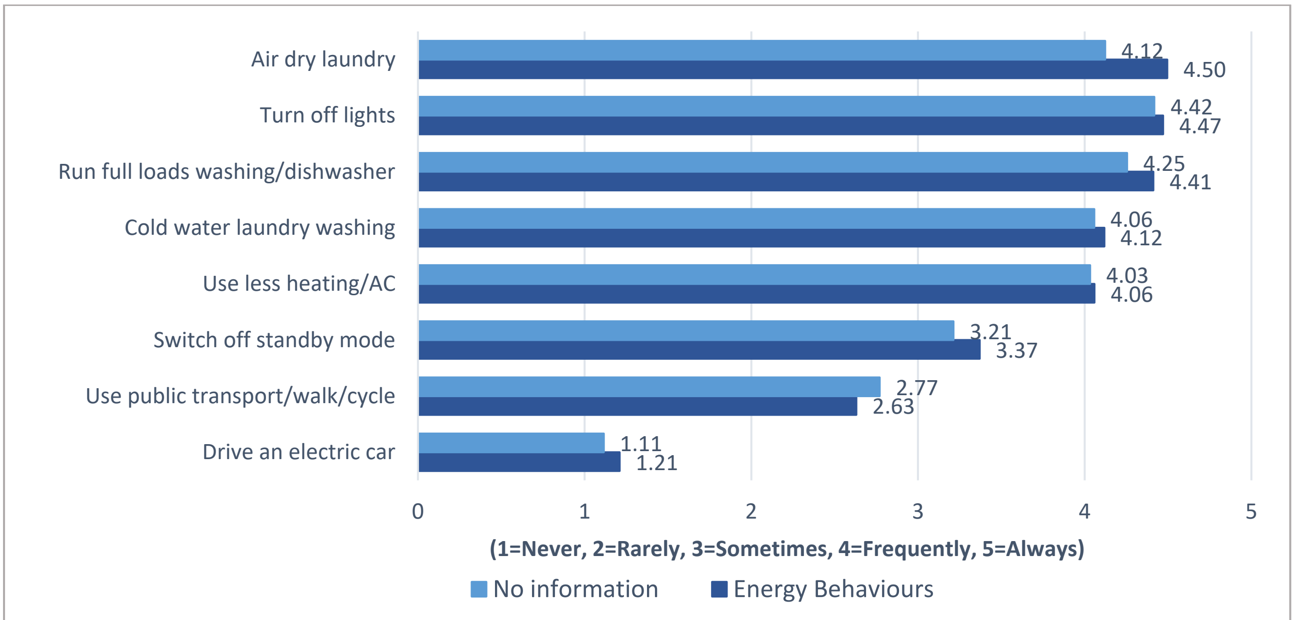
Figure 8 Actions undertaken due to environmental concern in the last 12 months, by 'no information' and 'energy behaviour' conditions.



Note: NI sample n=122; EB sample n=119.

Participants were asked how often they performed eight energy efficient behaviours in daily life, on a scale of 1=Never to 5=Always (Figure 9). The mean frequency varied according to the type of behaviour, with the highest frequencies reported for simple behaviours such as air drying laundry instead of using a clothes dryer; turning off lights; and only running full loads when using washing machines or dishwashers. In comparison, participants reported taking public transport, walking or cycling when possible to reduce the use of a car much less frequently; and almost never driving an electric car. There were no significant differences between the NI and EB conditions. Similar low proportions of participants in each of the conditions reported subscribing to Green Power (EB 13% vs NI 12%).

Figure 9 Frequency of energy-efficient behaviours in daily life, by 'no information' and 'energy behaviour' conditions.



Note: NI sample n=122; EB sample n=119.

The energy behaviours frame had a substantial effect on levels of support for energy technologies, including CCS (Table 7). Participants in the EB condition reported increased support for coal and CSG, and significantly higher support for gas, nuclear, CCS and biomass, compared to the NI group. However, there was little difference between the two groups in relation to support for renewable energies. It is unclear why renewable energy technologies did not seem to benefit from this effect, noting that levels of support for renewable energy are generally higher than those for fossil fuels.

Table 7 Mean energy support, by 'no information' and 'energy behaviours' conditions

	NO INFORMATION (n=122)	ENERGY BEHAVIOURS (n=119)	Difference	P value
Biomass	3.71	4.12	0.40	0.049
Coal	3.48	3.80	0.31	0.171
Coal seam gas	3.43	3.74	0.31	0.185
Gas	4.17	4.69	0.52	0.008
CCS	3.85	4.28	0.42	0.037
Geothermal	4.77	4.94	0.17	0.398
Hydroelectric	5.76	5.72	-0.04	0.815
Nuclear	3.46	4.11	0.65	0.013
Solar (thermal)	5.84	5.95	0.11	0.532
Solar (PV)	5.95	6.01	0.06	0.753
Wave	5.50	5.63	0.13	0.504
Wind	5.84	5.79	-0.05	0.784

Note: Mean score on 7-point scale: 1=Strongly disagree to 7=Strongly agree. Red indicates a significant result.

Turning to the consideration given to factors when deciding whether or not to support energy technologies, participants in the EB group considered reliability and electricity price issues to a larger extent (5.76 and 5.70 respectively, on a scale of 1=Not at all to 7=Very much), and location least (5.05). There were no significant differences between the NI and EB groups.

The pattern of results presented in Table 7 is very similar to the pattern seen in the section above for participants in the climate change condition who believe that global warming is caused mostly by human activity. It is interesting that the largest increases in support (albeit from a low base level) were seen for the fossil-fuel related energy technologies that may be perceived as somewhat 'cleaner' than coal. While it is difficult to directly attribute such changes in support, it is possible that when individuals realise the insignificance of their own energy efficiency behaviours or lack there-of, that they see the need for technologies such as CCS and nuclear to help mitigate climate change. There is also the potential that their concerns for reliability and pricing mean continued support for the more mainstream energy technologies also becomes a logical choice.

Thøgersen and Noblet 2012 note that many pro-environmental behaviours are common, accepted as general norms and/or are socially mandated (such as recycling and using energy-efficient light bulbs); or are ambiguous in that they produce both environmental and private benefits, and thus may not be thought of by an individual as related to environmental goals. In the EB condition, the first question (shown in Figure 8) was specifically framed around concern for the environment, so it may have reduced this type of ambiguity. However, this framing was not used for subsequent questions about household and daily energy efficiency behaviours that in Australia, are increasingly common.

Another possible explanation is cognitive dissonance theory (Festinger 1957), which suggests that people feel uncomfortable when they hold inconsistent attitudes and/or perceptions or behave inconsistently. Thus, to avoid the discomfort of dissonance, people generally seek to align behaviours and attitudes, and either adjust their behaviours, or rationalise the reasons for the behaviours and accordingly adjust their attitudes. Thøgersen and Crompton 2009 note that the amount of dissonance produced depends on whether an individual perceives their behaviours as linked to the same super-ordinate (common) goal, how similar the behaviours are, whether disparities are perceived as important, and their level of perceived control over the behaviour in the context of personal and contextual constraints. Therefore, an individual with higher levels of pro-environmental energy-efficient behaviours may report higher levels of support for energy technologies such as nuclear or CCS, if they see these as both linked to the same common goal, e.g. reducing energy emissions or reducing environmental pollution. Likewise, an individual with low levels of energy-efficient behaviours may report higher levels of support for fossil fuel-related energy technologies, bringing behaviours and attitudes into alignment to reduce dissonance.

5. Discussion & conclusion

The specific objective of this study was to explore the impact of increasing the salience of frames that prompt a variety of motives or criteria upon which people based their support for energy technologies, with a particular interest in CCS. Overall, the results in this report demonstrate the framing effects of questionnaire order, which often lead to unexpected impacts on participants and can result in biased findings. These effects remain largely ignored if no assessment or evaluation is performed of the messages and communications that industry, companies, universities and other stakeholders disseminate to the public.

Our preliminary results suggest that individuals' energy preferences may be influenced by exposure to the different frames presented. The largest effects were for the 'knowledge' and 'energy behaviours' frames. The 'knowledge' frame resulted in higher reported levels of support for fossil fuel-related energy technologies, notably coal, gas and nuclear energy, and reduced levels of support for renewable energies, particularly wind. This difference in energy support between the 'knowledge' and 'no information' groups does not seem to be explained by differences in levels of objective or perceived knowledge. Participants in the KN group reported a strong bias towards alternatives that perpetuate the status quo, demonstrating higher levels of support for energy technologies that have been around for longer and with which the general population are most familiar, and that are seen as reliable and more affordable. These findings align with those from the larger survey, which demonstrate that support for an energy technology is influenced by exposure and familiarity.

Most surprising was that the 'energy behaviours' frame increased reported levels of support for nearly all energy technologies, notably for fossil fuel-related technologies, including CCS, nuclear and biomass. It was the only frame that significantly increased overall levels of support for CCS. However, support for renewable energies remained relatively constant. The reasons underlying this pattern of results is unclear and points to the need for further research about the relationship between individuals' behaviours and levels of support for more radical structural changes and the thought processes that influence that support. It appears that when individuals realise the insignificance of their own personal contribution to reducing greenhouse gas emissions there is a recognition for a suite of options to be utilised including CCS.

Prompting participants with climate change questions had a similar effect overall to the 'knowledge' frame, with increases in levels of support for fossil fuel-related energy technologies, and reduced support for renewables. This pattern was replicated in the results for participants regardless of whether participants do or do not believe that global warming is happening. In contrast, for participants who believe global warming is mostly caused by human activity, this frame had the unexpected effect of raising support for all energy technologies, including fossil fuel-related energy technologies; significantly so for CCS. This result was very similar to that for the 'energy behaviours' frame, suggesting using cues that highlight individual norms, beliefs and behaviours in the broader context of the role human activities play in relation to global warming triggers a psychological mechanism.

'Techno-optimism' is one possibility where individuals have a positive view about the role that science and technology can play in overcoming challenges such as climate change. In this instance it is possible that respondents thought that all possible technologies, including fossil fuels, will be required as we adapt to climate change. Particularly for developing the new technologies that require large amounts of conventional energy to power the transition.

Finally, the 'cost and reliability' frame did not produce significant changes in any direction. The findings suggest that economic issues, costs and energy reliability are the baseline factors that people consider to make their decisions about energy. This is not surprising, in the sense that cost and reliability are frequently highlighted in discussions about public preferences and investment in energy technologies. They are also key factors individuals face when considering trade-offs in everyday decision-making about household and personal energy use.

Therefore, one recommendation might be to base messages on economic cost and affordability to reduce activating potential bias, and in a second order of priority, mention the collateral environmental benefits that the technology may bring. This may be a useful strategy for lesser known technologies such as CCS, highlighting its potential economic benefits, and downplaying links to arguments of climate change mitigation and adaptation that may be more polarising. However, the success of this type of message reframing using alternative justifications that highlight technological, economic and personal benefits rather than reducing climate change risks is unclear (e.g. see Bernauer & McGrath 2016). It is important to take into account that people often have strong opinions on topics that they know little about, and once they have formed opinions, they process facts in a biased manner, consistent with these prior opinions (Druckman & Bolsen 2011, pp 681). Messages should thus be tailored to take into account individuals' beliefs about climate change and its causes, and individual values and norms.

An important caveat to the results presented in this study is that when exploring public opinions on topics people are largely uninformed about, the results can be misleading, as in the case of CCS. In addition, it cannot be ruled out that some of the significant results reported may be statistical artefacts, or 'noise', as the effect size for many of the results was small and explained little of the variance in differences between conditions.

Further research based on the findings of this preliminary study will explore the effects of message framing in conjunction with the provision of different types of factual information.

6. References

Ashworth P, Wade S, Reiner D & Liang X. (2015), Developments in public communications on CCS, *International Journal of Greenhouse Gas Control*, vol 40, pp 449-458.

Ashworth P, Einsiedel E, Howell R, Brunsting S, Boughen N, Boyd A & Medlock J (2013), Public preferences to CCS: How does it change across countries?, *Energy Procedia*, vol 37, pp 7410-7418.

Ashworth P, Bradbury J, Wade S, Feenstra CY, Greenberg S, Hund G, & Mikunda T. (2012), What's in store: lessons from implementing CCS, *International Journal of Greenhouse Gas Control*, vol 9, pp 402-409.

Ashworth P, Jeanneret T, Gardner J, & Shaw H (2011), Communication and climate change: What the Australian public thinks, *Report No. EP112769,* Canberra: CSIRO Publishing.

Ashworth P, Carr-Cornish S, Boughen N & Thambimuthu K (2009a), Engaging the public on carbon dioxide capture and storage: Does a large group process work?, *Energy Procedia*, vol 1(1), pp 4765-4773.

Ashworth P, Boughen N, Mayhew M & Millar F (2009b), An integrated roadmap of communication activities around carbon capture and storage in Australia and beyond, *Energy Procedia*, vol 1(1), pp 4749-4756.

Bernauer T & McGrath L (2016), Simple reframing unlikely to boost public support for climate policy, *Nature Climate Change,* vol 6, pp 680-684.

Bolsen T & Druckman JN (2018), Do partisanship and politicization undermine the impact of a scientific consensus message about climate change?, *Group Processes & Intergroup Relations,* vol 21(3), pp 389-402.

Bolsen T, Druckman JN & Lomax Cook F (2014), How frames can undermine support for scientific adaptations: Politicization and the status-quo bias, *Public Opinion Quarterly,* vol 78(1), pp 1-26.

Boot-Handford ME, Abanades, JC, Anthony EJ, Blunt MJ, Brandani S, Mac Dowell N, ….Fennell PS (2014), Carbon capture and storage update, *Energy & Environmental Science*, vol 7(1), pp 130-189.

Bruine de Bruin W, Mayer LA & Morgan MG (2015), Developing communications about CCS: three lessons learned, *Journal of Risk Research*, vol 18(6), pp 699-705.

Bruine de Bruin W & Wong-Parodi G (2014), The role of initial affective impressions in responses to educational communications: The case of carbon capture and sequestration (CCS), *Journal of Experimental Psychology: Applied*, vol 20(2), pp 126.

Bruine de Bruin W (2011), Framing effects in surveys: How respondents make sense of the questions we ask. In G. Keren (Ed.), *Perspectives on framing,* London, UK: Taylor & Francis, pp 303-324.

de Best-Waldhober M, Daamen D & Faaij A (2009), Informed and uninformed public opinions on CO2 capture and storage technologies in the Netherlands, *International Journal of Greenhouse Gas Control*, vol 3, pp 322-332.

Druckman JN (2015), Eliminating the local warming effect, *Nature Climate Change,* vol 5, pp 176-177.

Druckman JN & Bolsen T (2011), Framing, motivated reasoning, and opinions about emergent technologies, *Journal of Communication,* vol 61, pp 659-688.

Dütschke E, Wohlfarth K, Höller S, Viebahn P, Schumann D & Pietzner K (2016), Differences in the public perception of CCS in Germany depending on CO_2 source, transport option and storage location, *International Journal of Greenhouse Gas Control*, vol 53, pp 149-159.

Festinger L (1957), *A theory of cognitive dissonance*, Evanston: Row Peterson.

Gardezi M & Arbuckle JG (2018), Techno-optimism and farmers' attitudes toward climate change adaptation, *Environment and Behavior*, Published online 9 August 2018. doi: 10.1177/0013916518793482.

Hammond J & Shackley S (2010), *Towards a public communication and engagement strategy for carbon dioxide capture and storage projects in Scotland: Scottish Centre for Carbon Capture Working Paper 2010-08*, Edinburgh: S*CCS*.

Huijts NMA, Molin EJE & van Wee B (2014), Hydrogen fuel station acceptance: A structural equation model based on the technology acceptance framework, *Journal of Environmental Psychology,* pp 38, vol 153-166.

Huijts NMA, Molin EJE & Steg L (2012), Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework, *Renewable and Sustainable Energy Reviews*, vol 16(1), pp 525-31.

International Energy Agency (IEA) (2013), Technology Roadmap – Carbon capture and storage. Paris.

Jeanneret T, Muriuki G & Ashworth P (2014), Energy technology preferences of the Australian public: Results of a 2013 national survey, CSIRO: Pullenvale. EP145414.

Kahneman D & Frederick S (2002), Representativeness Revisited: Attribute Substitution in Intuitive Judgment, In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* New York, NY, US: Cambridge University Press, pp 49-81.

L'Orange SS, Arvai J, Dohle S & Siegrist M (2014), Predictors of risk and benefit perception of carbon capture and storage (CCS) in regions with different stages of deployment, *International Journal of Greenhouse Gas Control*, vol 25, pp 23-32.

Nisa C, Witt K, Ferguson M, Hodson A & Ashworth P (2018), Australian Energy Preferences and the place of Carbon Capture and Storage (CCS) within the energy mix, The University of Queensland: Brisbane.

Oldendick RW (2008), Question order effects. In P.J. Lavrakas (Ed.), *Encyclopedia of Survey Research Methods,* Thousand Oaks, CA, USA: Sage Publications Inc, pp 663-665.

Pisarski A & Ashworth P (2013), The Citizen's Round Table process: canvassing public opinion on energy technologies to mitigate climate change, *Climatic Change,* vol 119(2), pp 533-546.

Rogelj J, den Elzen M, Höhne N, Fransen T, Fekete H, Winkler H, Schaeffer R, ...Meinshausen M (2016), Paris Agreement climate proposals need a boost to keep warming well below 2^0C, *Nature,* vol 534, pp 631-639.

Samuelson W & Zeckhauser R (1988), Status quo bias in decision making, *Journal of Risk and Uncertainty,* vol 1, pp 7-59.

ter Mors E, Terwel BW, Daamen DDL, Reiner DM, Schumann D, Anghel S, Boulouta I, …Ziogou F (2013), A comparison of techniques used to collect informed public opinions about CCS: Opinion quality after focus group discussions versus information-choice questionnaires, *International Journal of Greenhouse Gas Control*, vol 18, pp 256-263.

Thøgersen J & Noblet C (2012), Does green consumerism increase the acceptance of wind power?, *Energy Policy,* vol 51(C), pp 854-862.

Thøgersen J & Crompton T (2009), Simple and painless? The limitations of spillover in environmental campaigning, *Journal of Consumer Policy*, vol 32, pp 141-163.

Wallquist L, Visschers VH, Dohle S & Siegrist M (2012), The role of convictions and trust for public protest potential in the case of carbon dioxide capture and storage (CCS), *Human and Ecological Risk Assessment: An International Journal*, vol 18(4), pp 0919-932.

7. Appendix

7.1. Survey

PROJECT TITLE: Understanding attitudes towards low carbon technologies in Australia

PARTICIPANT INFORMATION

Project Overview

This research project intends to advance understanding about the social challenges associated with low carbon energy technologies regarding their public acceptance and use. The main aim is to identify public understanding of the different energy technologies, and the perceived risks and benefits of increasing the use of low carbon technologies in Australia.

This project is funded by the Australian government under the Carbon Capture and Storage Research Development & Demonstration, the Australian Coal Association Low Emissions Technology Pty Ltd (ACALET), the Carbon Transport and Storage Company (CTSCo) and the University of Queensland. These organisations partnered in order to better understand climate change mitigation, and to better inform public debate and policy makers on how low carbon technologies could be a real option in Australia.

What is involved?

You are invited to respond to this online survey which will take up to 25 minutes of your time. We are keen to access the views of a range of Australians and you do not need to be an expert in this field.

Do I have to be part of this program?

Completion of the online survey is completely voluntary and you are free to withdraw at any time without prejudice or penalty. If you wish to withdraw from the study your information will be removed from the study. We would like to encourage you to participate in the study as your participation will ensure that we understand your opinion about low carbon energy technologies and your preferred options for Australia.

How will my responses be recorded, used and kept?

The completed online survey will only be seen by members of the research team. All your personal information will be de-identified meaning that your responses will be assigned an identity code and your personal information will be detached from your survey responses. All data collected will be kept in locked storage for up to five years. Information will be used to prepare research reports and academic publications. Your personal information will not appear in any publications. Data collected in this survey may be used for comparative analysis to similar data collected in China and we would also like to be able to reuse some of your responses to compare with subsequent surveys and related research we complete on Australian attitudes to energy technologies.

How can I find out more about the study?

If you would like more information about this study please contact the project leader Peta Ashworth by phone (+61 7 3346 3883) or email (p.ashworth@uq.edu.au).

Has this project received ethical clearance?

This study adheres to the Guidelines of the ethical review process of The University of Queensland and the National Statement.

Please tick the appropriate box:

Yes, I have reviewed the information above and I agree to participate in this online survey

Sorry, I do not wish to participate in this online survey

Screening Questions:

What is your age (in years)?

What is your postcode?

What is your gender?

Male

Female

KNOWLEDGE – VERSION A

We would like to start by asking you some general questions about energy. Please choose what you think is the right answer.

How is most electricity in Australia generated?

a. By burning coal

b. By burning natural gas

c. Through wind and solar energy

d. At hydroelectric power plants

e. Don't know

In the average Australian home which of the following uses the most energy?

a. Lighting rooms

b. Heating water

c. Heating and cooling rooms

d. Power for appliances

e. Don't know

Evidence suggests that the fastest and most cost-effective way to address our energy needs is to…

a. Develop all possible domestic sources of oil and gas

b. Build nuclear power plants

c. Develop more renewable power plants

d. Implement more energy efficiency and conservation

e. Don't know

The largest component of a typical electricity bill is . . .

a. Wholesale energy costs

b. Network costs (poles and wires)

c. Retail costs and margins

d. Taxes and subsidies

e. Don't know

Please indicate your current level of knowledge about the following energy sources and technologies.

	No knowledge			Moderate knowledge			Expert knowledge
	1	2	3	4	5	6	7
Biomass	○	○	○	○	○	○	○
Coal	○	○	○	○	○	○	○
Coal seam gas	○	○	○	○	○	○	○
Gas	○	○	○	○	○	○	○
Gas or coal with Carbon Capture and Storage	○	○	○	○	○	○	○
Geothermal	○	○	○	○	○	○	○
Hydro-electric	○	○	○	○	○	○	○
Nuclear	○	○	○	○	○	○	○
Solar (concentrating solar/solar-thermal)	○	○	○	○	○	○	○
Solar (photovoltaic)	○	○	○	○	○	○	○
Wave/ tidal	○	○	○	○	○	○	○
Wind	○	○	○	○	○	○	○

SUPPORT – VERSION B

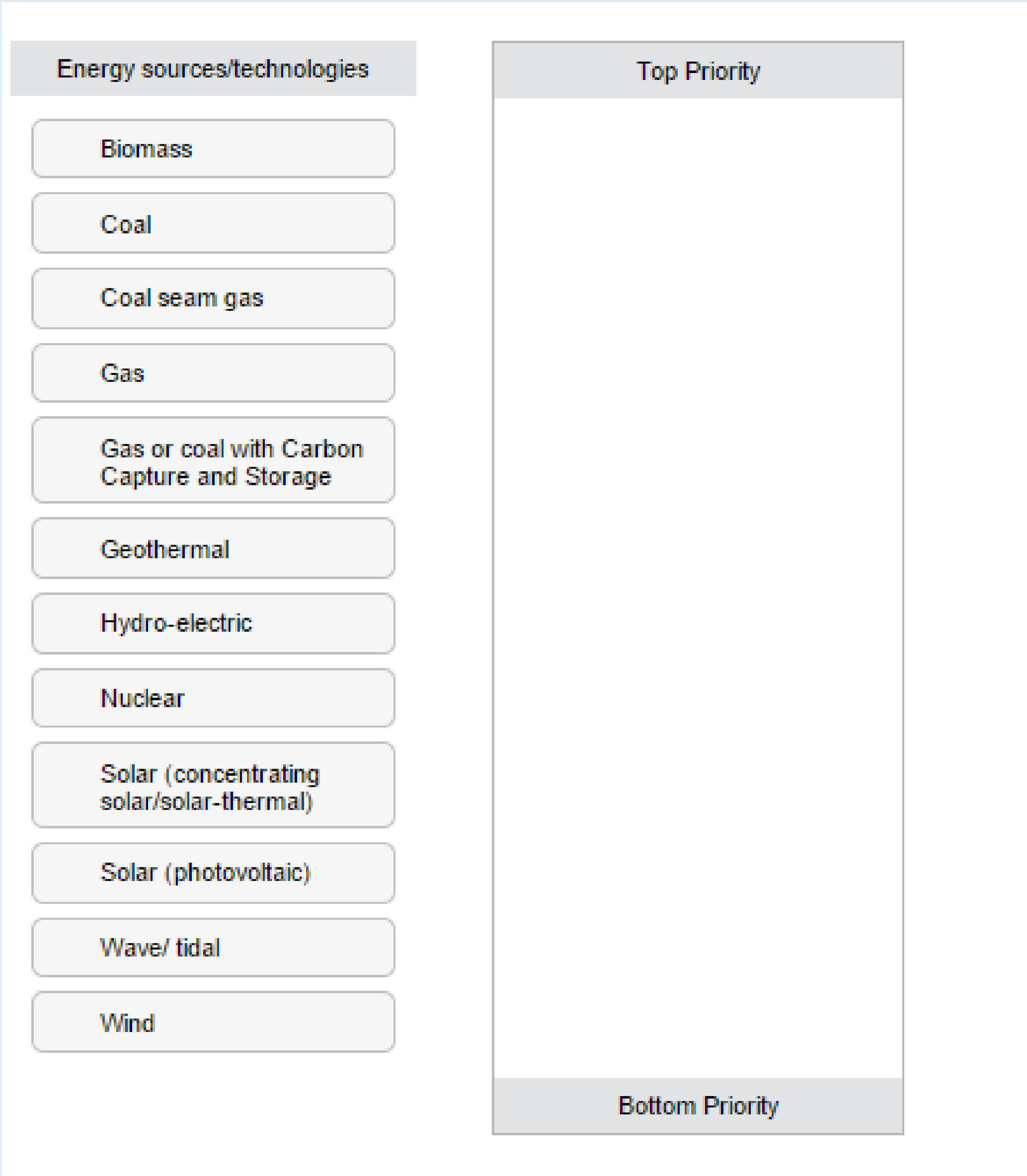
Please find below a definition of the different energy technologies.

Please indicate how strongly you agree or disagree with the following options as potential ways of generating Australia's future energy needs.

		Strongly disagree		Neither agree nor disagree				Strongly agree
		1	2	3	4	5	6	7
Biomass	The energy obtained directly from burning organic material (e.g., wood) or from refined organic matter (e.g., ethanol, biodiesel)	◯	◯	◯	◯	◯	◯	◯
Coal	The energy of coal converted into electricity in coal-fired power plants.	◯	◯	◯	◯	◯	◯	◯
Coal seam gas	The natural gas (mostly methane) that is attached to coal along its natural fractures, and is released when pressure on the coal seam is reduced. The energy of this gas is released by burning.	◯	◯	◯	◯	◯	◯	◯
Gas	The energy of gas (mostly methane) released by burning.	◯	◯	◯	◯	◯	◯	◯
Gas or coal with Carbon Capture and Storage (CCS)	The energy of gas or coal converted into electricity in power plants that use carbon capture and storage technologies. Carbon capture and storage (CCS) technologies capture carbon dioxide (CO2) from fossil fuel power plant exhaust and store it in underground reservoirs.	◯	◯	◯	◯	◯	◯	◯
Geothermal	The energy available as heat extracted from within the earth's crust, usually in the form of hot water or steam. These resources are accessed by drilling wells into the earth and piping the steam or hot water to the surface.	◯	◯	◯	◯	◯	◯	◯
Hydro	The energy of flowing water converted into electricity in hydroelectric plants.	◯	◯	◯	◯	◯	◯	◯
Nuclear	The energy produced from controlled, non-explosive nuclear reactions within a nuclear power plant.	◯	◯	◯	◯	◯	◯	◯
Solar (concentrating solar/solar-thermal)	The energy of sunlight (solar radiation) captured by concentrating mirrors focussed onto a heat transfer fluid which is used to generate steam and drive a turbine (concentrating solar/solar-thermal).	◯	◯	◯	◯	◯	◯	◯
Solar (photovoltaic)	The energy of sunlight (solar radiation) captured by solar panels (photovoltaic cells).	◯	◯	◯	◯	◯	◯	◯
Wave/tidal	The energy of the ocean's waves and tides captured by various types of wave energy converters/tidal turbines.	◯	◯	◯	◯	◯	◯	◯
Wind	The motion-based energy of wind captured by wind turbines. Wind turbines are large windmill-type structures that may be located on land or in the ocean.	◯	◯	◯	◯	◯	◯	◯

Please rank the following energy sources/technologies in the priority order that you would allocate public funds toward their development and implementation.

Select your priority ranking <u>from highest to lowest</u>, by dragging and ordering the options in the right column.



In deciding whether or not to support new energy sources and related technologies, please indicate how much you consider the following factors:

	Not at all			To some extent			Very much
	1	2	3	4	5	6	7
Environmental issues (e.g., impact on ecosystems, humans, plants and animals)	○	○	○	○	○	○	○
Climate issues (e.g., level of CO_2 emissions, global warming)	○	○	○	○	○	○	○
Economic issues (e.g., job opportunities, knowledge and skill development, power plant building	○	○	○	○	○	○	○
Cost (e.g., installation or maintenance cost)	○	○	○	○	○	○	○
Electricity price issues (i.e., the cost of electricity to you as the consumer of electricity)	○	○	○	○	○	○	○
Reliability of electricity supply (i.e., stability in the supply of electricity to your home, "power cuts")	○	○	○	○	○	○	○
Location of the energy infrastructure (such as power plants, transmission lines and pipelines	○	○	○	○	○	○	○

VERSION C – COST & RELIABILITY

Below are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?

a. Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs
b. Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent

Here is a list of statements about the environment. For each one, please indicate whether you agree or disagree with it:

	Strongly disagree			Neither agree nor disagree			Strongly agree
	1	2	3	4	5	6	7
I would give part of my income if I were certain that the money would be used to prevent environmental pollution	○	○	○	○	○	○	○
I would agree to an increase in taxes if the extra money was used to prevent environmental pollution	○	○	○	○	○	○	○
The Government should reduce environmental pollution, but it should not cost me any money	○	○	○	○	○	○	○

To what extent do you agree with the following reasons some people give to not pay more to use only renewable energy sources?

	Strongly disagree			Neither agree nor disagree			Strongly agree
	1	2	3	4	5	6	7
If I had more money I would be more willing to pay more to use only renewable energy	○	○	○	○	○	○	○
I consider there is already enough renewable energy in the general electricity supply mix	○	○	○	○	○	○	○
I do not trust that paying more for renewable energy would actually increase renewables in the mix	○	○	○	○	○	○	○
I do not believe there are environmental benefits associated with renewable energy	○	○	○	○	○	○	○
I am not interested in renewable energy	○	○	○	○	○	○	○
I don't think I should have to pay extra	○	○	○	○	○	○	○

Australian reliability standards require that, on average, each person in Australia should not be without electricity more than 10 minutes per year.

How many minutes each year would you accept being without access to electricity if it meant you had a lower electricity bill?

a. Up to 10 minutes each year, I think the current arrangement is necessary
b. Up to 30 minutes each year
c. Up to one hour each year
d. Up to two hours each year
e. More than two hours

Please indicate below how concerned you are that in the next 10-20 years…

	Not at all concerned	A little concerned	Somewhat concerned	Quite concerned	Extremely concerned
	1	2	3	4	5
Electricity will become unaffordable for you?	○	○	○	○	○
Gas will become unaffordable for you?	○	○	○	○	○
Petrol will become unaffordable for you?	○	○	○	○	○
There will be more frequent power outages?	○	○	○	○	○
There will be a national petrol shortage?	○	○	○	○	○

By how much would you be willing to increase your annual electricity bill to use only renewable energy sources? (Assuming your energy consumption remains the same)

Increase by: 0 %

0% 25% 50% 75% 100%

VERSION D – Climate Change

Do you believe global warming is happening now or will happen in the next 30 years?

a. Yes, it is already happening.

b. It will start happening within the next 30 years

c. No, it is not happening and won't

d. I do not know/ I am not sure

Assuming global warming is happening, do you think it is:

a. Caused mostly by human activities

b. Caused mostly by natural changes in the environment

c. Caused by both natural changes in the environment and human activities

d. None of the above because global warming isn't happening

How serious do you think are the following environmental problems facing the world?

	Not at all serious			Somewhat serious			Extremely serious
	1	2	3	4	5	6	7
Waste generation	○	○	○	○	○	○	○
Climate change (global warming)	○	○	○	○	○	○	○
Water pollution	○	○	○	○	○	○	○
Natural resource depletion (forest, water, energy)	○	○	○	○	○	○	○
Endangered species and biodiversity	○	○	○	○	○	○	○

Please indicate the extent to which you agree or disagree with each of the statements below.

	Strongly disagree			Neither agree nor disagree			Strongly agree
	1	2	3	4	5	6	7
Global warming is a problem for society	○	○	○	○	○	○	○
Energy savings help reduce global warming	○	○	○	○	○	○	○
I am jointly responsible for the energy problems	○	○	○	○	○	○	○
I feel jointly responsible for the exhaustion of energy sources	○	○	○	○	○	○	○
I feel personally obliged to save as much energy as possible	○	○	○	○	○	○	○
I feel morally obliged to save energy, regardless of what others do	○	○	○	○	○	○	○
Plants and animals have as much right as humans to exist	○	○	○	○	○	○	○
Humans are seriously abusing the environment	○	○	○	○	○	○	○

VERSION E – ENERGY BEHAVIOURS

Please say which, if any, of these things have you done or not done in the last 12 months, out of concern for the environment?

(tick as many as applicable)

a. Have chosen household products that you think are better for the environment

b. Have decided for environmental reasons to reuse or recycle something rather than throw it away

c. Have tried to reduce water consumption for environmental reasons

d. None of the above

Has your household installed any of the following items over the past ten years in your current primary residence?

	Yes	No. My house was already equipped.	No. It is not possible or feasible to make these changes in my house.	No. I didn't want to spend the money.
Top-rated energy efficient appliances? (e.g., washing machines, refrigerators)	○	○	○	○
Low-energy light bulbs (compact fluorescent, LED)	○	○	○	○
Energy efficient windows (e.g., double or triple glazed windows)	○	○	○	○
Thermal insulation of walls/ roofs	○	○	○	○
Solar panels for electricity or hot water	○	○	○	○
Air conditioning controlled by a utilities company	○	○	○	○

How often do you perform the following in your daily life?

	Never	Rarely	Sometimes	Frequently	Always
	1	2	3	4	5
Turn off lights when leaving a room	○	○	○	○	○
Cut down on using heating/ air conditioning to reduce energy consumption	○	○	○	○	○
Only run full loads when using washing machines or dishwashers	○	○	○	○	○
Washing clothes using cold water instead of warm/ hot water	○	○	○	○	○
Switch off standby mode of appliances/ electronic devices (e.g., TV, computer)	○	○	○	○	○
Air dry laundry instead of using a clothes dryer	○	○	○	○	○
Take public transport, walk or cycle when possible to reduce the use of a car.	○	○	○	○	○
Drive an electric car.	○	○	○	○	○

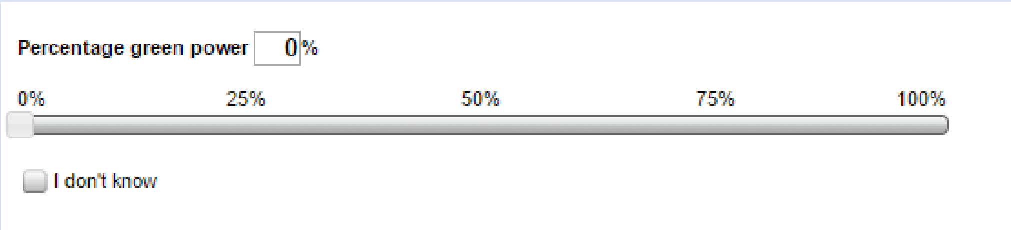
Do you subscribe to green power?

a. Yes

b. No

c. Don't know

(If yes) And what percentage do you subscribe to green power?



There is much discussion as to what might be the best options to transition to a more sustainable energy use.

The video below introduces you to some of these concepts.

https://www.youtube.com/watch?v=aHtbDmzjYgg

The following sets of questions are about your reactions to some of the technologies discussed in the video. Please select the answer that best represents your opinion.

Once you have watched the video, press 'Next' to continue

When you think about carbon capture and storage (CCS), what first comes to mind?

a. The advantages of CCS as a carbon reduction option outweigh the risks it poses

b. The risks of CCS as a carbon reduction option outweigh its advantages

c. Neither

d. Don't know

When you think about renewable energy (e.g., wind, solar, geothermal), what first comes to mind?

a. The advantages of renewable energy as a carbon reduction option outweigh the risks it poses

b. The risks of renewable energy as a carbon reduction option outweigh its advantages

c. Neither

d. Don't know

How likely do you think the following consequences are as a result of using CCS technology?

a. An increase in the risk of a major accident involving the public occurring

b. An increase in the risk of accidents occurring for future generations

c. An increase in environmental problems

d. An increase in health risks for the local host community

e. An increase in the risks of accidents related to the storage of CO_2using CCS technology

f. An increase in the risks of accidents related to the transport of carbon dioxide in pipelines.

g. An increase in the use of fossil fuels

1. Very unlikely
2. Unlikely
3. Somewhat unlikely
4. Neither likely nor unlikely
5. Somewhat likely
6. Likely
7. Very likely

How likely do you think the following consequences are as a result of using CCS technology?

a. An increase in economic growth

b. A decrease in climate change

c. An increase in employment

d. More affordable energy

e. A decrease in CO_2 emissions

f. A decrease in the dependency of energy supply from other countries

1. Very unlikely
2. Unlikely
3. Somewhat unlikely
4. Neither likely nor unlikely

5. Somewhat likely
6. Likely
7. Very likely

In relation to building and operating CCS projects in Australia:

a. How transparent do you think the decision making processes would be to determine whether or not to implement CCS technology?

b. How fair do you think the decision making processes would be to determine whether or not to implement CCS technology?

c. What do you believe would be the chance of a catastrophic/ irreversible event occurring?
   1. Very low
   2. Low
   3. Moderate
   4. High
   5. Very high

With regard to CCS projects to what extent do you trust <u>your government</u> to:

a. Act in the best interest of society

b. Act responsibly

c. Do what is right

   1. Not at all
   2. Very little trust
   3. Neutral
   4. Somewhat trust
   5. Trust a lot

With regard to CCS projects to what extent do you trust <u>the CCS industry</u> to:

a. Act in the best interest of society

b. Act responsibly

c. Do what is right

   1. Not at all
   2. Very little trust
   3. Neutral
   4. Somewhat trust
   5. Trust a lot

How likely do you think the following consequences are as a result of using renewable energy technologies?

a. An increase in the risk of a major accident involving the public occurring

b. An increase in the risk of accidents occurring for future generations

c. An increase in environmental problems

d. An increase in health risks for the local host community

e. An increase in the risks to wildlife (i.e. bird kill, bats etc.) when using wind technology

f. An increase in the risk of disputes over competing land use

1. Very unlikely
2. Unlikely
3. Somewhat unlikely
4. Neither likely nor unlikely
5. Somewhat likely
6. Likely
7. Very likely

How likely do you think the following consequences are as a result of using renewable energy technologies?

a. An increase in economic growth

b. A decrease in climate change

c. An increase in employment

d. More affordable energy

e. A decrease in CO_2 emissions

f. A decrease in the dependency of energy supply from other countries

g. A decrease in the dependence on fossil fuels

1. Very unlikely
2. Unlikely
3. Somewhat unlikely
4. Neither likely nor unlikely
5. Somewhat likely
6. Likely
7. Very likely

In relation to building and operating renewable energy projects in Australia:

a. How transparent do you think the decision making processes would be to determine whether or not to implement renewable energy?

b. How fair do you think the decision making processes would be to determine whether or not to implement renewable energy?

c. What do you believe would be the chance of a catastrophic/ irreversible event occurring?

1. Very low
2. Low
3. Moderate
4. High
5. Very high

With regard to renewable energy projects in Australia to what extent do you trust your government to:

a. Act in the best interest of society

b. Act responsibly

c. Do what is right

1. Not at all
2. Very little trust
3. Neutral
4. Somewhat trust
5. Trust a lot

With regard to renewable energy projects to what extent do you trust renewable energy industries to:

a. Act in the best interest of society

b. Act responsibly

c. Do what is right

1. Not at all
2. Very little trust
3. Neutral
4. Somewhat trust
5. Trust a lot

Imagine a CCS project is under consideration to be implemented near your residential area. How much money (in AUD$) would you be willing to pay to stop this from happening?

AUD$

Imagine a renewable energy project (e.g., wind farm) is under consideration to be implemented near your residential area. How much money (in AUD$) would you be willing to pay to stop this from happening?

AUD$

Imagine a CCS project is under consideration to be implemented near your residential area. How much money (in AUD$) would you want as compensation to consent having such a project close to you?

AUD$

Imagine a renewable energy project (e.g., wind farm) is under consideration to be implemented near your residential area. How much money (in AUD$) would you want as compensation to consent having such a project close to you?

AUD$

In your day to day life how important is …

	1 (Not important at all)	2	3	4 (Somewhat important)	5	6	7 (Very important)
Careful management of money (Thrift)	○	○	○	○	○	○	○
Going on resolutely in spite of opposition (Persistence)	○	○	○	○	○	○	○
Long-term planning	○	○	○	○	○	○	○
Giving up today's fun for success in the future	○	○	○	○	○	○	○
Personal steadiness and stability	○	○	○	○	○	○	○
Working had for success in the future	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	1 (Strongly disagree)	2	3	4 (Neither agree nor disagree)	5	6	7 (Strongly agree)
Individuals should sacrifice self-interest for the group.	○	○	○	○	○	○	○
Group welfare is more important than individual rewards.	○	○	○	○	○	○	○
Group success is more important than individual success.	○	○	○	○	○	○	○
Individuals should only pursue their goals after considering the welfare of the group	○	○	○	○	○	○	○
Group loyalty should be encouraged even if individual goals suffer	○	○	○	○	○	○	○
Individuals should stick with the group even through difficulties	○	○	○	○	○	○	○

What is your primary source(s) of information about energy sources and technologies? (Pick your top 3 options)

a. National newspapers

b. State newspapers

c. Local newspapers

d. Periodicals (e.g., magazines)

e. Academic articles based on scientific research

f. Professional reports from the industry

g. Professional reports from the government

h. Professional reports from other stakeholder groups (i.e. NGO's)

i. Blogs

j. Twitter

k. Facebook

l. Television
m. Family/ friends/ colleagues
n. Other (please specify)

How much do you trust the following sources of information?

	Not at all	Very little trust	Neutral	Somewhat trust	Trust a lot
National newspapers	◯	◯	◯	◯	◯
State newspapers	◯	◯	◯	◯	◯
Local newspapers	◯	◯	◯	◯	◯
Periodicals (e.g. magazines)	◯	◯	◯	◯	◯
Academic articles based on scientific research	◯	◯	◯	◯	◯
Professional reports from industry	◯	◯	◯	◯	◯
Professional reports from government	◯	◯	◯	◯	◯
Professional reports from other stakeholder groups (i.e. NGO's)	◯	◯	◯	◯	◯
Blogs	◯	◯	◯	◯	◯
Twitter	◯	◯	◯	◯	◯
Facebook	◯	◯	◯	◯	◯
Television	◯	◯	◯	◯	◯
Family/Friends/Colleagues	◯	◯	◯	◯	◯

What is the highest level of education you have completed?

a. Below Year 10
b. Year 10 or equivalent
c. Year 11 or equivalent
d. Year 12 or equivalent
e. Certificate (including trade certificate)
f. Diploma/Advanced diploma
g. Bachelor degree (including honours)
h. Graduate diploma/Graduate certificate
i. Postgraduate degree
j. Other (please specify)

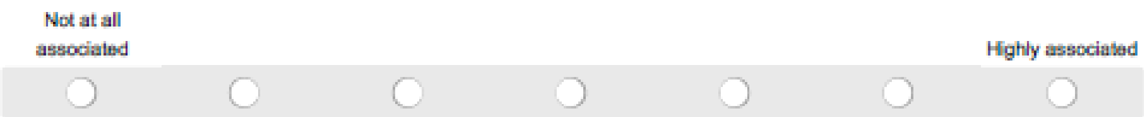
Which term below best describes you?

a. Employed full time
b. Employed part time or casual
c. Self employed
d. Unemployed
e. Retired/pension recipient
f. Home duties
g. Full time student
h. Part time student
i. Other (please specify)

Which term below best describes your employment?

a. Manager or Administrator
b. Professional
c. Associate Professional
d. Tradesperson or Related Worker
e. Advanced Clerical or Service Worker
f. Intermediate Clerical, Sales and/or Service Worker
g. Intermediate Production or Transport Worker
h. Elementary Clerical, Sales or Service Worker
i. Labourer or Related Worker
j. Other (please specify)

To what extent is your job associated with the Coal and/ or Gas Industry?



What is your household's total income per year (before tax)?

a. Less than $30,000
b. $30,000 - $59,999
c. $60,000 - $89,999
d. $90,000 - $119,999
e. $120,000 - $149,999
f. $150,000 - $179,000

g. $180,000 - $199,999
h. $200,000 - $219,999
i. $220,000 - $239,999
j. $240,000 - $269,999
k. $270,000 - $299,999
l. More than $300,000
m. Other (please specify)

Which of the following best describes your household?

a. Group household
b. Single person household
c. One parent with children
d. Couple with children
e. Couple with no children
f. Other family (e.g. extended family household)

Do you rent or own the home in which you live?

a. Rent
b. Own
c. Other (please specify)

Which party did you vote for in the last election?

a. The Coalition: Liberal Party of Australia
b. The Coalition: National Party of Australia
c. Australian Labour Party
d. Australian Greens
e. Nick Xenophon Team
f. Pauline Hanson's One Nation
g. Other (please specify)

A summary of the findings will be made available to participants on the completion of the project. Would you like the summary to be emailed to you? Please tick the appropriate box.

a) Yes

b) No

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

CREATE CHANGE