



Public perceptions of Biogas

2022 National Survey Results

March 2023

Project number: RP2.1-02

Investigating public attitudes towards and perceptions of biogas and future fuels in Australia

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Australian Government
**Department of Industry,
Science and Resources**

AusIndustry
Cooperative Research
Centres Program

This work is funded by the Future Fuels CRC, supported through the Australian Government's Cooperative Research Centres Program. We gratefully acknowledge the cash and in-kind support from all our research, government and industry participants.

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ACKNOWLEDGEMENT

This work is funded by the Future Fuels CRC, supported through the Australian Governments' Cooperative Research Centres Program. The cash and in-kind support from the industry participants is gratefully acknowledged.

Project Information	
Project number	RP2.1-02
Project title	Investigating public attitudes towards and perceptions of biogas and future fuels in Australia
Research Program	RP2.1-02 A social license and acceptance of future fuels
Milestone Report Number	8 (Report on national survey on public perceptions of biogas)
Description	This report details the findings of a national survey to understand public perceptions towards biogas. It examines the public's response to biogas and its potential applications.
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Related Commonwealth Schedule	2.1.1 Reports on methods/techniques for tracking opinion trends leading to community engagement challenges.
Project start/completion date	Sep 2019/ May 2023
Access	Open – available publicly to all parties outside the CRC
Approved by	Brent Davis
Date of approval	February 2023

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Summary of Report

This report presents the findings of a recent national survey of the Australian public to understand their response to biogas as a future energy source. It builds on an earlier literature review by (Quintero Fuentes et al., 2023) on biogas which revealed that studies in relation to public perceptions of biogas is limited. Therefore, the survey aimed to fill the gap by contributing to the biogas public perception literature, specifically for the Australian context. A market research company was used to recruit the 2016 sample respondents. Similarly to previous surveys (Lambert & Ashworth, 2018; Martin et al., 2021), after answering a range of general questions about their knowledge (objective and subjective), awareness and initial support for biogas. Participants were treated twice during the survey, and to analyse the effects of the treatments, respondents were grouped into different cohorts, including a control group. Support for biogas was examined three times within the survey. Figure 1 shows the biogas support across Time 1 (before the first treatment—provided with a definition), Time 2 (after the first treatment) and Time 3 (after the second treatment—a message and image). An increase in support for biogas occurred during the different time points in the survey, suggesting that the information provided to respondents positively influenced their support for biogas.

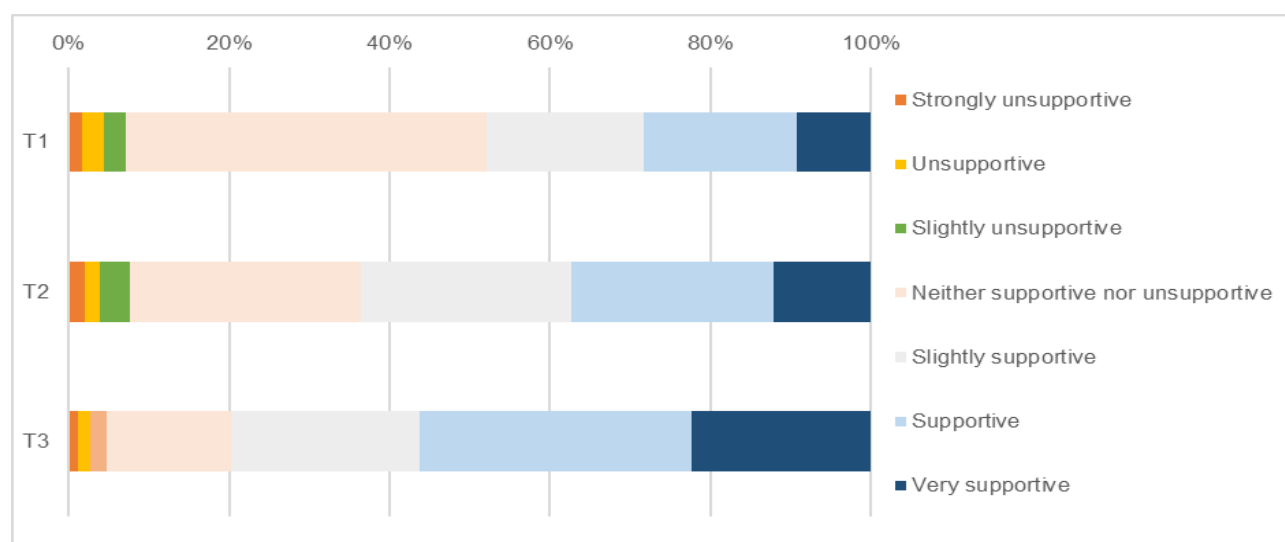


Figure 1. Support for biogas at Time 1, Time 2 and Time 3 within the survey.

Of the four messages provided, the greatest increase in support was shown from the message that *Biogas is a renewable, reliable and local source of energy*. The other statement: *The biogas industry supports local economies and regional communities, creating jobs, and offering new income sources, particularly for farmers* produced slightly more increased support in the mean than just the image or the economic investment opportunity message. These results provide some helpful insights on messages that positively convey information on biogas. Further analysis of participants' responses suggests that there was some reluctance towards using biogas in cars and aviation. These results illustrate that there maybe some concerns around safety or reliability of biogas for personal mobility use. There is potential to investigate these concerns further and assess how these maybe addressed if biogas is going to succeed as an important mobility fuel in the future.

1 Introduction

This report presents the findings of a recent national survey of the Australian public to understand their response to biogas as a future energy source. It builds on earlier research to understand the public's response to hydrogen (Lambert & Ashworth, 2018; Martin et al., 2021). Keeping the biogas survey design consistent with the rationale and question style of the earlier surveys (Lambert & Ashworth, 2018; Martin et al., 2021) offered the chance to compare and contrast results, and track population trends over time.

Low-carbon hydrogen has emerged as an important mitigation solution and is becoming increasingly important for the world's energy transition (Advisan, 2021). Biogas technology offers another attractive route to utilise biomass and to help meet energy needs (Balat & Balat, 2009). However, growth and community-wide adoption of low-carbon energy sources such as hydrogen and biogas are intrinsically linked to policy. Renewable energy policies, in turn, are influenced by public opinion. For example, the rapid adoption of biogas deployment in Germany occurred following the Renewable Energy Act (REA) implementation in 2000 but diminished after policy changes decreased the subsidy support schemes for biogas (Horschig et al., 2020). In contrast, in the United States of America (USA), biogas plays a significant role in the transport sector due to the support of federal and state policies (IEA, 2020; Schmid et al., 2019). Similarly, in the European Union (EU), support schemes promoting the utilisation of renewable resources have encouraged the development of biogas plants for energy production.

Similarly, as with other renewable energy sources, the success of biogas as a future fuel in Australia also depends on social acceptance. Increasingly, businesses in economically advanced democracies recognise the importance of operating within the boundaries of their 'social licence' (Gunningham et al., 2004). A social licence has been identified as a critical first step in ensuring the success for the nascent future fuels industry in Australia, as the global environmental benefits of renewable gases may not be convincing enough for some stakeholders (Segreto et al., 2020), especially in the Australian context (Hall et al., 2013; Martin & Rice, 2015). This is because opposition and social disapproval are challenging barriers to overcome and can severely inhibit project outcomes. Therefore, corporations are actively choosing to go beyond compliance to pursue social acceptance and support, or at least tolerance, of a technology as a laudable and necessary goal. As with other industries, the renewable energy sector also needs to continue to actively seek social acceptance and avoid community resistance (Wustenhagen et al., 2007).

For example, in Germany and Italy, negative public opinion towards the cultivation of maize for energy crops resulted in restraints that negatively impacted the development of biogas projects (Cici et al., 2012; Dobers, 2019; Horschig et al., 2020). At the same time, investors are generally reticent about biogas as an alternative energy source, in comparison to solar and wind energy, which currently capture the lion's share of new financial sector investments worldwide (IEA, 2020). A USA-based survey has shown that investors' willingness to invest in biomass-based energies had very low mean values in comparison to the top choices (solar and wind) due to perceptions of uncertainty and long return on investment cycles (Aguilar & Cai, 2010). However, recently concluded deliberative engagement processes with the Australian public have shown that Australians are interested in preserving the energy mix and keeping a diversity of choice available (Kambo et al., 2022, 2023). This suggests that if public opinion can influence the debate, biogas may have a strong role to play as a future fuel alongside hydrogen in the coming years.

Therefore, it makes sense to explore the orientation of Australian attitudes towards biogas as a potential energy source. Bioenergy and energy from waste projects present a huge investment opportunity in Australia. Carlu et al. (2019) estimate such an opportunity to be between AUD\$3.5 to AUD\$5.0 billion, with the potential to avoid up to 9 million tonnes of CO₂e emissions each year. Recognising that social acceptance can shift policy perspectives, community awareness is also seen as being crucial in its ultimate deployment and uptake (Carlu et al., 2019).

In response to this call to action, a desktop study on public attitudes towards biogas and biomethane was conducted in 2021. The study found there is a lack of literature and evidence surrounding this issue in Australia. (Quintero Fuentes et al., 2023). Quintero Fuentes et al. (2023) outlined the limits and bounds of knowledge as it exists in the context of biogas and social acceptance in Australia and provided a detailed account of:

- Technical information detailing what is biogas/biomethane
- Comparison of the international and national biogas production scenarios
- Issues relating to social acceptance and perceptions in general
- Identifying the potential drivers, barriers and stakeholders - their roles and interdependencies within specific socio-techno-political variables.

1.1 AIMS AND OBJECTIVES

Based on the survey results following on from the above literature review (provided as Supplement A), this report progresses the knowledge base on public's perceptions and attitudes towards biogas as a future fuel in Australia. It also identifies the requirements for a social licence to operate (SLO) that may help facilitate the adoption of biogas as a low-carbon fuel in Australia, thereby informing policy and regulatory considerations. Specific objectives aligned to each of these aims are tabulated as follows (Table 1).

Table 1. Aims and objectives of the report.

Aim	Objective
Progress the knowledge base surrounding the public's perceptions and attitudes towards biogas as a future fuel in Australia	Identify current knowledge and understanding of biogas and future fuels among the Australian public.
	Identify broader attitudes to, and perceptions of, biogas and future fuels.
Identify the requirements for a social licence to operate (SLO) that may help to facilitate the adoption of biogas as a low-carbon fuel in Australia	Identify the level of trust in institutions making decisions around biogas and future fuels applications.
	Identify trusted sources of information.
	Test message framing for biogas communication.
Inform policy and regulatory considerations for Australia	Identify policy considerations and outline the potential opportunities and challenges that may arise as a result of the public's response to current policy lines associated with biogas and future fuels applications.
	Compare outcomes with previous attitudinal surveys

As the existing literature and knowledge base on biogas and social acceptance is quite low, a national survey was useful to detect public attitudes and prevailing levels of knowledge and awareness. The next chapter provides a review of other international surveys investigating attitudes towards biogas. Chapter 3 details the methodology. While Chapter 4 reports the main results, and Chapter 5 provides our conclusions and proposed future work.

2 Literature review

A detailed literature review on biogas and social acceptance is provided in Supplement A (Quintero Fuentes et al., 2023). However, following this report, an additional literature review was conducted to understand how surveys have been used as an instrument to detect public attitudes towards biogas. Table 2 shows that although there is a considerable amount of literature on 'biogas surveys', the literature is severely limited when the search string is 'biogas survey and social acceptance'.

Table 2. Literature scan retrieved 09.11.2021.

Search String	Google Scholar	Scopus	Web of Science
Biogas survey	91,800 results	666 results	531 results
Biogas survey and social acceptance	24,700 results	10 results*	15 results*

* Results are from 2007 to 2021 inclusive.

From these limited numbers, the case for conducting a national survey on biogas is adequately strengthened. Furthermore, when the literature was scanned to identify the geographic focus of each study, it was found that most surveys on social acceptance of biogas have been conducted in Germany, France and Switzerland (Table 3) and none in Australia.

Table 3. Geographic Focus of References.

Geographical focus	Reference
Austria	(Starkl et al., 2007)
Czech Republic, Poland, Slovakia	(Chodkowska-Miszczyk et al., 2019; Chodkowska-Miszczyk et al., 2020; Martinat et al., 2017)
Germany, France, Switzerland	(Pestalozzi et al., 2019; Schumacher & Schultmann, 2017; Soland et al., 2013; Zander et al., 2015; Zaunbrecher, Arning, et al., 2018; Zaunbrecher, Daniels, et al., 2018)
Italy	(Mazzanti et al., 2021)
Nigeria	(Ajie et al., 2021)
South Africa	(Dumont et al., 2021)

If we restrict the focus to European studies, as social and democratic structures somewhat similar to Australia, it can be seen that the studies have a varied focus. For example, some studies have attempted to investigate social acceptance in a rural context, as agricultural waste can be a key feedstock in the biogas value chain. These surveys found differences in how local populations respond to the idea of a biogas plant near them (Chodkowska-Miszczyk et al., 2019; Chodkowska-Miszczyk et al., 2020; Martinat et al., 2017). A German study found that although people support biogas plants, people are concerned about the likely competition of land use, if it is used to grow energy crops instead of food (Zander et al., 2015).

Other studies have made cross-country comparisons and found that the political and cultural context in which biogas projects are embedded are important determinants for local acceptance (Schumacher & Schultmann, 2017). In the case of Switzerland, a study has shown that local acceptance towards existing biogas power plants is relatively high, as perceived benefits, costs and trust towards the plant operator are highly correlated (Soland et al., 2013). In contrast, an Italian study found that the acceptability of biogas does not heavily depend on socio-economic and demographic variables, but mainly relies on prior knowledge of the production process (Mazzanti et al., 2021). Some studies argue that an integrated approach allows for a holistic understanding of acceptable scenarios, wherein ecological and social perspectives can be analysed in one frame of reference (Zaunbrecher, Arning, et al., 2018; Zaunbrecher, Daniels, et al., 2018).

3 Methodology

3.1 SURVEY DEVELOPMENT

To achieve our research objectives, this survey used a modified design of the two previous surveys on social acceptance of hydrogen (Lambert & Ashworth, 2018; Martin et al., 2021) as well as adopting some questions from peers in China. In consultation with the FFCRC industry partners, some minor revisions were made to the final wording of the survey. Qualtrics Market Research (Qualtrics) then programmed the online questionnaire for testing by the research team for functionality issues, after which further programming revisions followed. Subsequently, an internal pilot was run to test the survey functionality. After passing the internal testing, the survey was issued to Qualtrics to find suitable respondents from the public to participate in the survey.

3.1.1 Survey flow and questions

Figure 2 provides an overview of the survey flow. The survey commenced with participant information and consent, followed by a screening question to fulfil the sampling quota. The survey was designed to treat respondents with different information at two different times within the survey. The first treatment was to understand the effect of providing a definition of biogas on support, while the second aimed to capture the influence of four different message frames combined with an image on respondents' attitudes. The survey design included a randomly separated control group to capture any potential response bias, and a placebo question was also asked twice to confirm the extent that any change in responses stemmed from the information provided. To capture any changes in perception, participants were asked to express their support for biogas three times during the survey—before and after each of the treatments. Those instances are referred to in this report as Time 1 (T1), Time 2 (T2), and Time 3 (T3), respectively.

The survey questions are provided in [Appendix C](#). Questions were designed to collect information on three sets of variables discussed by Lozano et al. (2022). The first set of variables is based on the Technology Acceptance Framework (TAF) by Huijts et al. (2012). TAF variables are composed of several sub-sets of variables, such as instrumental attitude, knowledge, and environmental identity. The two other sets of variables are behavioural variables and socio-economic variables. Besides this, respondents were asked to answer a range of questions to capture their support for biogas as a future fuel, their willingness to use biogas and its potential application. The biogas-related questions are as follows:

- 'How do you feel about biogas as a possible solution for energy and environmental challenges?' Where 1= 'Very unsupportive' to 7= 'Very supportive' and included a midpoint selection '4= Neither supportive nor unsupportive.'
- If respondents selected the midpoint, they were asked to provide a reason for their midpoint selection.

3.1.2 First treatment - definition

At the start of the second section of the survey, respondents were randomly assigned to either a treatment or control group. Roughly 75% of the respondents were randomly assigned to the treatment group, which was provided with a definition of biogas, while the control group was not given a definition. Providing a definition limited the opportunity for respondents with no prior knowledge of biogas to express pseudo-opinions whilst responding to the survey questions. At the same time, those with some knowledge of biogas may already hold pre-conceived ideas about biogas and its use and providing them with a definition would likely either confirm or challenge those ideas. Providing a definition of biogas would help to deal with this divergence in levels of knowledge about biogas. The definition presented to respondents in the treatment group was:

'Biogas is a mixture of methane, CO₂ and small quantities of other gases produced by anaerobic digestion of organic matter in an oxygen-free environment. The precise composition of biogas depends on the type of feedstock and the production pathway' (IEA, 2020).

3.1.3 Second treatment - message

In section 3 of the survey, respondents were randomly divided into five similar size groups. Of the five groups, one served as the control group (Group E), and no 'message' treatment was applied to this group. The rest of the four groups (Groups A to D) received a different 'message' treatment. The detail of the messages and their groups are displayed in Table 4 and Figure 3.

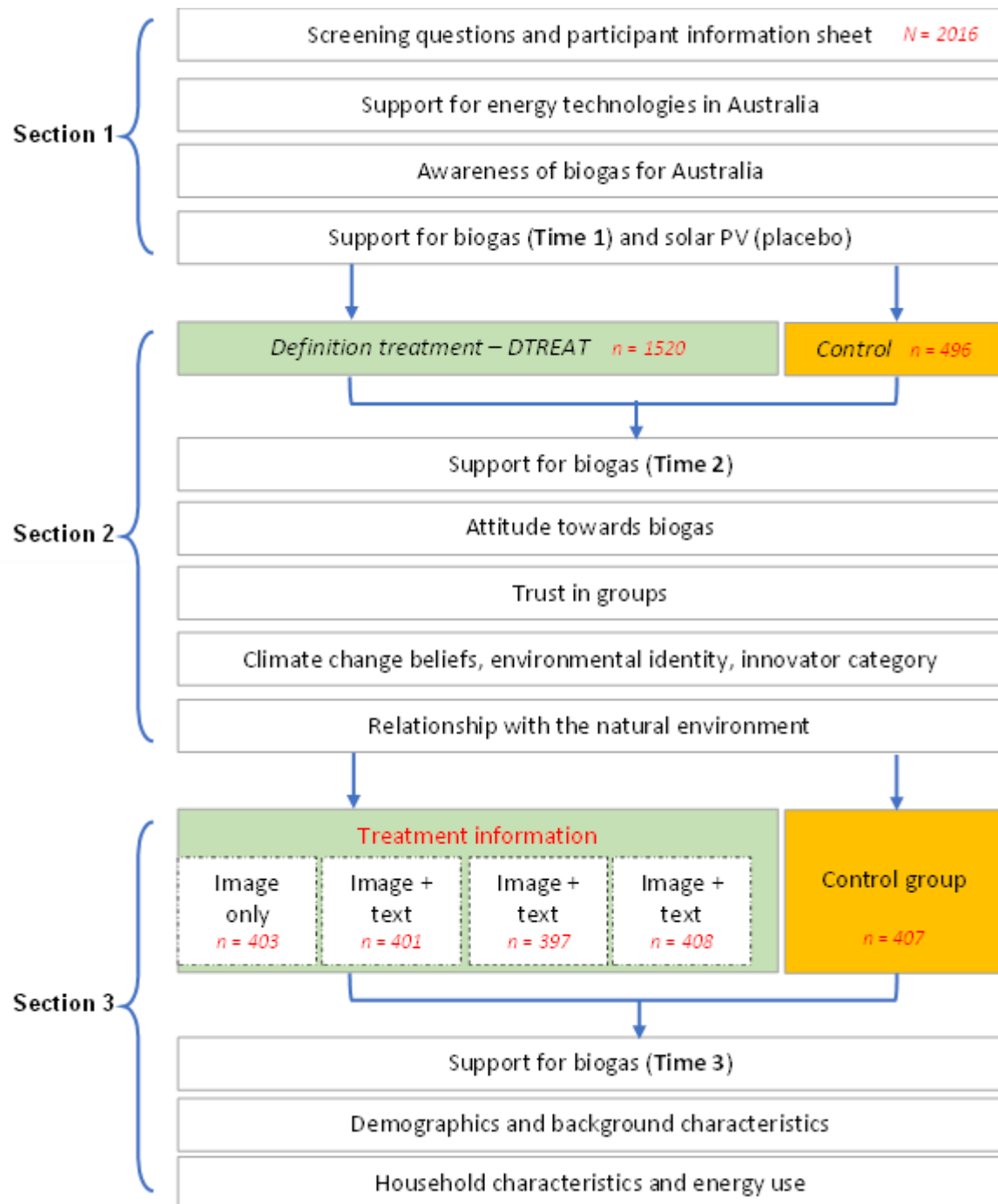


Figure 2. Survey flow and sections.

Table 4. Message treatment information.

Group	Message treatment combination	Message information characteristics	Treatment text
A	Figure 3 only	Biogas supply chain	n/a
B	Figure 3 + treatment text	Biogas as a local and clean energy source	'Biogas is a renewable, reliable and local source of energy.'
C	Figure 3 + treatment text	Broad economic prospects of biogas	'The investment opportunity for energy from waste projects is estimated to be AUD\$3.5 to 5.0 billion, with the potential to avoid up to 9 million tonnes of carbon dioxide equivalent (CO ₂ e) emissions each year.'
D	Figure 3 + treatment text	Local socio-economic opportunities for biogas	'The biogas industry supports local economies and regional communities, creating jobs, and offering new income sources, particularly for farmers.'
E	No message nor figure	n/a	n/a

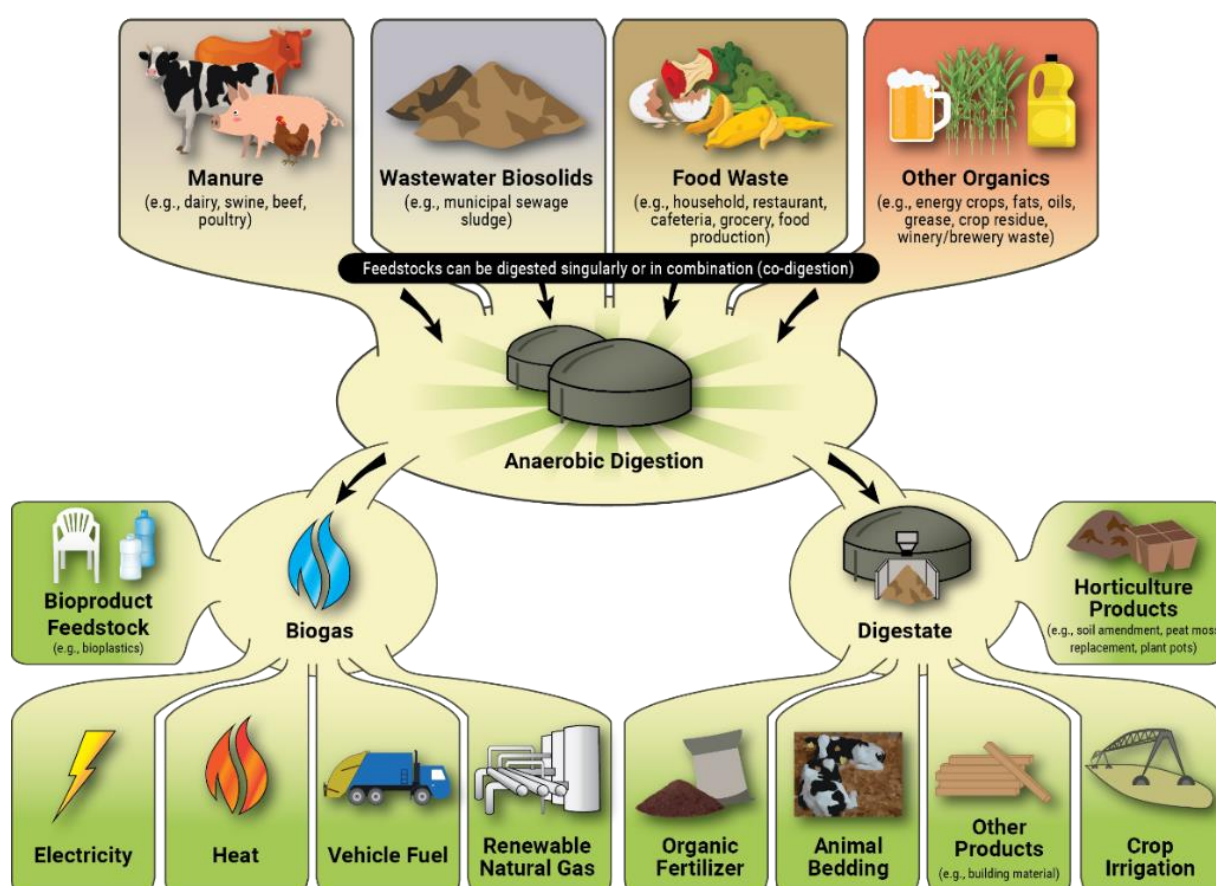


Figure 3. Image applied to treatment groups showing biogas supply chain. Source: (AgSTAR, 2020)

3.2 SAMPLING

The national biogas survey was conducted using a panel of respondents provided by Qualtrics from across Australia. Non-probabilistic quota-based sampling was used to select participants based on their age, gender, and place of residence. The quotas were determined by mimicking the characteristics of the Australian population from the 2016 Census data. Data collection occurred between 24th May and 7th June 2022. Qualtrics provided a total of 2,016 fully completed survey responses. The expected time needed to complete was 20-25 minutes. However, the highest number of respondents completed the survey in 21 minutes. Out of the 2016 respondents, 76 took one hour or more to complete the survey.

Qualtrics reported three rounds of data cleaning to ensure data quality. Also, the research team further processed and cleaned the data. Qualtrics' data cleaning included removal/checking whether there were instances of:

- Random responding - e.g. gibberish and nonsensical.
- Illogical or inconsistent - e.g. highly contradictory selections.
- Overuse of non-responses.
- Speeding.
- IP Address and GeoIP are located within the target countries and are also used as part of our duplicate check.
- Duplicate responses are evaluated unless otherwise stated.
- Straightlining - where the respondent selects identical or similar answers to questions for most or all of the survey.
- Bot Detection - using Captcha technology prevents bots from accessing the survey.

3.3 ANALYSIS

For the purposes of this report, respondents' characteristics are presented in [Section 3.4](#), while descriptive statistics are in [Appendix A](#). The results are in [Chapter 4](#), and all analyses were conducted in STATA16.

3.4 RESPONDENT CHARACTERISTICS

The last section of the survey included a set of questions relating to respondent demographics. Table 5 provides descriptive statistics on the composition of the survey's respondents. For example, it shows that the ratios of male and female respondents are similar to the Australian population. However, age brackets are slightly different compared to the Australian population, and the percentage of respondents born in Australia is 13.41% higher than the Australian population.

Table 5. Respondents' demographic characteristics.

Characteristics	Frequency (n)	Percentage (%)	Australian population (%) ^(a)
Gender			
Male	943	46.78	49.3
Female	1,068	52.98	50.7
Other	3	0.15	n/a
Prefer not to say	2	0.1	n/a
Total			
Age^(b)			
18-24	228	11.31	12.8% ^(c)
25-34	416	20.63	14.4
35-44	361	17.91	13.5
45-54	268	13.29	13.3
55-64	315	15.63	11.8
65+	428	21.23	15.8
Region			
Metro	1387	69%	
Regional	629	31%	
Country born			
Australia	1,615	80.11	66.7

Characteristics	Frequency (n)	Percentage (%)	Australian population (%) ^(a)
Outside Australia	401	19.89	
Aboriginal or Torres Strait Islander status			
No	1,864	92.46	97.2
Yes, Aboriginal	104	5.16	
Yes, Torres Strait Islander	29	1.44	
Prefer not to answer	19	0.94	

Notes: ^(a) source: <https://www.abs.gov.au/census/find-census-data/quickstats/2016/0>

^(b) Reports the percentage of the whole population, including 0-18 years. The percentage of respondents in the age group for the survey is higher because the survey only includes respondents aged 18 or above.

^(c) The percentage reported by the Australian Bureau of Statistics (ABS) is added to match the age group used in the survey. For example, age groups 35-39 and 40-44 were added to calculate the percentage for the age group 35-44 in the survey.

4 Results

4.1 INITIAL KNOWLEDGE AND AWARENESS OF BIOGAS

Within the first section of the survey, respondents were asked to self-report their subjective knowledge of biogas - 'How much do you know about biogas?' In total, 40.1% of the respondents had 'never heard of it' while 49.5% had. A smaller group, 10.4%, responded that 'I know about it and could describe it to a friend'. Those respondents that indicated that they 'have heard of it' and 'could describe to a friend' (59.9%, N = 1,207) were asked four follow-up questions. These questions related to four different aspects of biogas to further test their knowledge and understanding of biogas. The questions were: 'How biogas is produced?', 'How biogas is used?', 'How biogas is refined?' and 'How biogas is transported?'. As Table 6 shows, 27.8% of those 1,207 respondents had never heard about how biogas is produced. Similarly, 30.2%, 49.7% and 47.8% of them have never heard about how biogas is used, refined, or transported. A much smaller percentage of those 1,207 felt confident that they could describe how biogas is produced (15.9%), used (15.2%), refined (13.1%) and transported (13.6%).

Subsequently, three questions asked respondents about their objective knowledge of biogas. Respondents were asked to select 'True', 'False' or 'Don't know' in response to questions about biogas. The results are reported in Table 7 below. A large proportion of respondents, 57.7%, 52.9% and 61.5%, responded 'Don't know' to each of the knowledge questions. These findings somewhat align with the subjective knowledge questions, where 40.1% of total respondents indicated that they have 'never heard of biogas' (Table 6). Among respondents, 31.3%, 39.9% and 33.3% answered the first, second or third question correctly. While only 13.5% of respondents answered all questions correctly, 23.5% answered two questions, and 16.9% of the respondents answered one question correctly. Respondents who did not answer questions correctly accounted for 46.1%, slightly higher than the 40.1% who had never heard of biogas, which suggests some evidence of pseudo-opinions in the answer.

Table 6. Subjective knowledge of biogas production and its uses.

How much do you know about the following?	Never heard (%)	Heard (%)	Could describe (%)
Biogas (N = 2,016)	40.1	49.5	10.4
How is biogas produced? (n = 1,207 ^a)	27.8	56.3	15.9
How is biogas used? (n = 1,207 ^a)	30.2	54.5	15.2
How is biogas refined? (n = 1,207 ^a)	49.7	37.2	13.1
How is biogas transported? (n = 1,207 ^a)	47.8	38.6	13.6

Table 7. Objective knowledge score on biogas (N = 2,016).

Questions	True (%)	False (%)	Don't know (%)
Biogas is made from plastic (F)	11.0	31.3	57.7
Biogas is a low carbon fuel (T)	39.9	7.2	52.9
Biogas is a proven technology for achieving a circular economy (T)	33.3	5.2	61.5
Correct responses to knowledge questions	n		%
0/3 correct	930		46.1
1/3 correct	339		16.8
2/3 correct	474		23.5
3/3 correct	273		13.5

4.2 SUPPORT FOR BIOGAS

Support for biogas was tested three times during the survey: at the beginning (T1), before respondents were treated with the definition, then immediately after the first treatment (T2), and the second treatment (T3) (see Chapter 3). After the first treatment, a definition of biogas provided to 80% of the total sample, all respondents were immediately asked to indicate their support for biogas a second time (T2). By following this structure, the research team was able to test the impact of providing the definition as a treatment, by comparing the treated group's support for biogas with the control group's responses. The results in Table 8 suggest that while there was a slight effect on responses from just completing the survey questions up to that point, those receiving the treatment definition became more supportive towards biogas when compared to those in the control group.

Table 8 clearly illustrates the change in support for the treated group. The support change is most evident in the proportion of respondents who chose the options '*Slightly supportive*', '*Supportive*', and '*Very supportive*'. However, the most notable change within the treated group is the reduction in respondents that chose the midpoint '*Neither supportive nor unsupportive*' particularly when compared to the control group responses.

Table 8. Support for biogas after being treated with the definition.

	Control T1 & T2				Treated T1 & T2			
	n	%	n	%	n	%	n	%
Strongly unsupportive	9	2%	7	1%	25	2%	32	2%
Unsupportive	13	3%	10	2%	42	3%	28	2%
Slightly unsupportive	7	1%	6	1%	48	3%	71	5%
Neither supportive nor unsupportive	240	48%	227	46%	667	44%	354	23%
Slightly supportive	97	20%	100	20%	298	20%	429	28%
Supportive	95	19%	109	22%	289	19%	398	26%
Very supportive	35	7%	37	7%	151	10%	208	14%
TOTAL	496	100	496	100	1520	100	1520	100
	Mean		SD		Mean		SD	
Control group (n = 496)	4.67		1.2		4.77		1.18	
Treated group (n = 1520)	4.74		1.26		5.07		1.31	

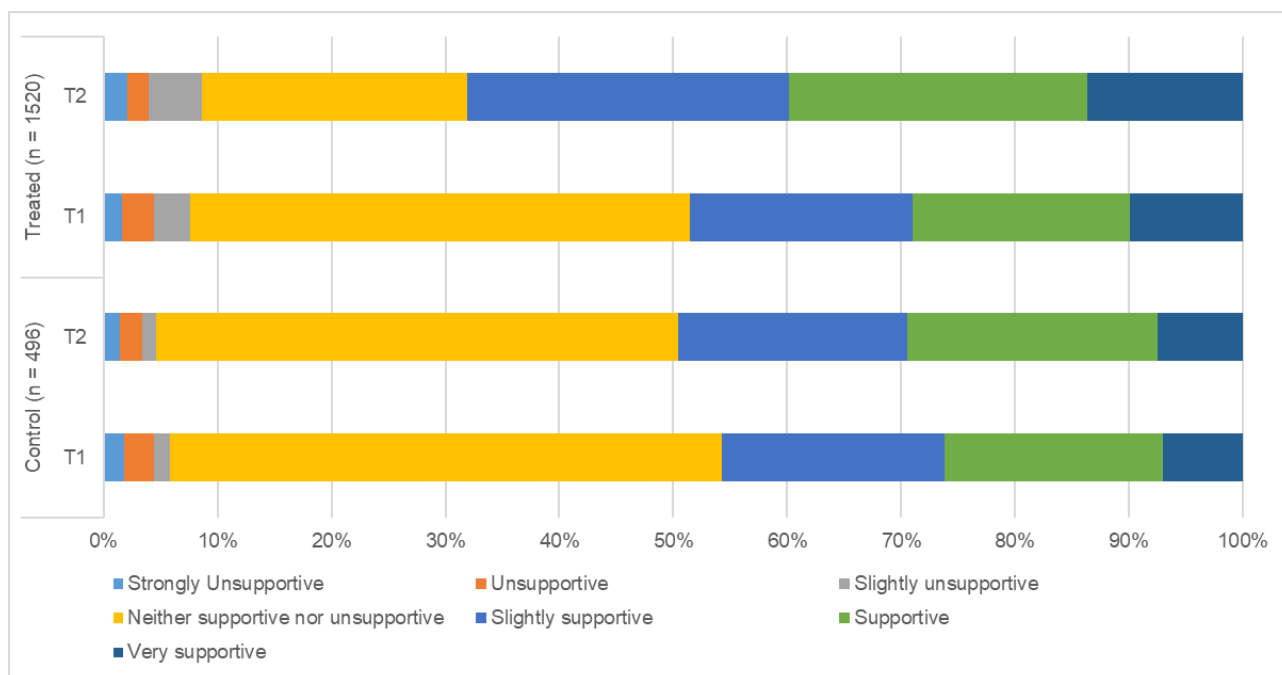


Figure 4. Support for biogas' change when comparing the control and treated groups for the first treatment—definition.

After completing a range of other questions in the third section of the survey, respondents were treated for the second time (A different message option combined with an image, as described in [Section 3.1.3](#)). After the second treatment, respondents were asked again to express their support for biogas for a final time (T3). While a control group was also used for this treatment, it was not the same control group for the first treatment, but rather a random mix of those from the first control group plus some of those respondents who had received the first treatment (the definition). As such, to show the differences in respondents' support, the research team separated all respondents into four cohorts to further examine the overall effect of the treatments.

Table 9 details the changes in support for each of the different cohorts over time. From the mean results, it can be seen that there was some survey effect of completing the survey questions over time (refer to Cohort 1, Table 10). However, this was minimal and only significant by T3. In addition, while providing the definition of biogas increased support for biogas, the message treatment was far more impactful. That said, the combination of providing a definition and a message treatment did have a similar significant positive effect on support.

Table 9. Changes in mean support for biogas at three different points during the survey.

Cohorts	Respondents who:	n	Mean support			Mean difference		
			T1	T2	T3	T1 to T2	T2 to T3	T1 to T3
Cohort 1	Pure control group—non-treatment	94	4.51	4.65	4.95	-0.14	-0.30	-0.44**
Cohort 2	Received first treatment—definition	313	4.69	5.01	5.11	-0.32***	-0.10	-0.42***
Cohort 3	Received second treatment—message	402	4.71	4.8	5.61	-0.09	-0.81***	-0.90***
Cohort 4	Received both treatments	1207	4.75	5.09	5.60	-0.34***	-0.51***	-0.85***
Total			4.72	5.00	5.50	-0.28***	-0.50***	-0.78***

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

Figure 5 visually compares biogas support between T1, T2 and T3. The proportion of respondents who chose the options 'Supportive' and 'Very supportive' significantly increased. Moreover, the number of respondents who opted for 'Neither supportive nor unsupportive' decreased considerably during the survey, especially within Cohort 3 and Cohort 4.

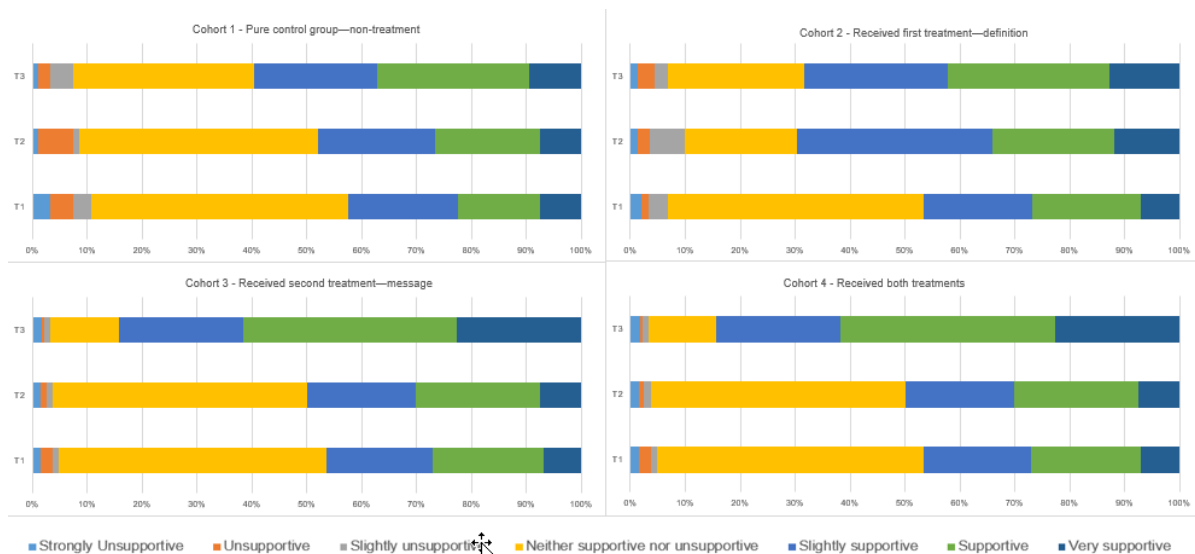


Figure 5. Change in support for biogas along the three-times point within the survey.

4.2.1 Reasons for midpoint selection

When indicating their support for biogas, respondents were provided with a midpoint option which was '*neither supportive nor unsupportive*'. Table 10 shows that, on average, respondents opted for the midpoint option 45.0%, 28.8% and 15.5% at T1, T2, and T3, respectively. This result suggests that respondents felt their knowledge of biogas had improved even with the small information presented, a definition and then a combination of an image and a message. In addition, the increases in the overall mean seen in Table 9 reinforced the increase of biogas support across the three-time points.

Table 10. Overall support for biogas at three different times during the survey.

At this point, how do you feel about biogas as a possible solution for energy and environmental challenges?	T1		T2		T3	
	n	%	n	%	n	%
Strongly unsupportive	34	1.69	39	1.93	24	1.19
Unsupportive	55	2.73	38	1.88	29	1.44
Slightly unsupportive	55	2.73	77	3.82	43	2.13
Neither supportive nor unsupportive	907	44.99	581	28.82	312	15.48
Slightly supportive	395	19.59	529	26.24	475	23.56
Supportive	384	19.05	507	25.15	684	33.93
Very supportive	186	9.23	245	12.15	449	22.27
	Mean	SD	Mean	SD	Mean	SD
Average response	4.72	1.25	5.00	1.29	5.50	1.24

Respondents who opted for '*neither supportive nor unsupportive*' (midpoint option), were also asked a follow-up question to identify why they chose the midpoint option. Table 11 below shows the options provided in the survey and the number of responses for each. For example, in T1, 84.6% of the 44.99% of respondents selected '*I do not know enough about biogas to decide*' as their reason for selecting the midpoint. As anticipated, this was the highest selected reason. As can be seen in Table 11, respondents had three main reasons for selecting the midpoint option, which were: (1) '*I do not know enough about biogas to decide*', (2) '*There are pros and cons of biogas, which makes my support neutral*', and (3) '*I do not have any feelings either way (positive or negative)*'.

Table 11. Reasons for selecting the midpoint option when asked for their support for biogas.

Midpoint selection reasons	T1		T2		T3	
	n	%	n	%	n	%
I do not know enough about biogas to decide	767	84.6	429	73.8	149	59.6
I do not have any feelings either way (positive or negative)	32	3.5	39	6.7	25	10
There are pros and cons of biogas, which makes my support neutral	63	7.0	59	10.2	52	20.8
I did not understand the question	10	1.1	6	1.0	7	2.8
I have no opinion on this issue	27	3.0	31	5.3	7	2.8
I don't care	5	0.6	10	1.7	7	2.8
Other reason (please specify):	3	0.3	7	1.2	3	1.2
Total n	907		581		250	

Note: Total n in T3 does not reflect the total number of respondents who chose midpoint option at the time. 250 respondents who selected the midpoint in T1 were also redirected to this question at T3.

4.2.2 Support for biogas across states and territories

Table 12 and Figure 6 illustrate the support for biogas by state and territory across the full sample – however, notably not differentiated by the different cohorts due to the smaller samples across each state and territory. Support for biogas was similar across all states and territories. However, respondents from the ACT were more supportive compared to the rest at T1 and T2. Interestingly, Tasmania's respondents were more supportive at T3. Although, given the small sample size for the ACT, Northern Territory and Tasmania, these numbers should be interpreted with caution.

Table 12. Support for biogas by States and Territories.

State or Territory	n	T1		T2		T3	
		Mean	SD	Mean	SD	Mean	SD
ACT	43	5.0	1.6	5.2	1.46	5.3	1.47
NSW	583	4.8	1.4	5.0	1.32	5.5	1.29
NT	10	4.7	0.8	4.5	0.85	5.6	1.07
QLD	372	4.7	1.2	5.0	1.25	5.6	1.17
SA	230	4.6	1.2	4.9	1.25	5.4	1.36
TAS	76	4.6	1.1	5.0	1.16	5.7	0.97
VIC	530	4.7	1.2	5.0	1.28	5.5	1.21
WA	172	4.6	1.2	4.9	1.36	5.5	1.23
Total	2016	4.7	1.2	5.0	1.29	5.5	1.24

Note: The sample is not differentiated by cohort groups for ease of comparison in this instance.

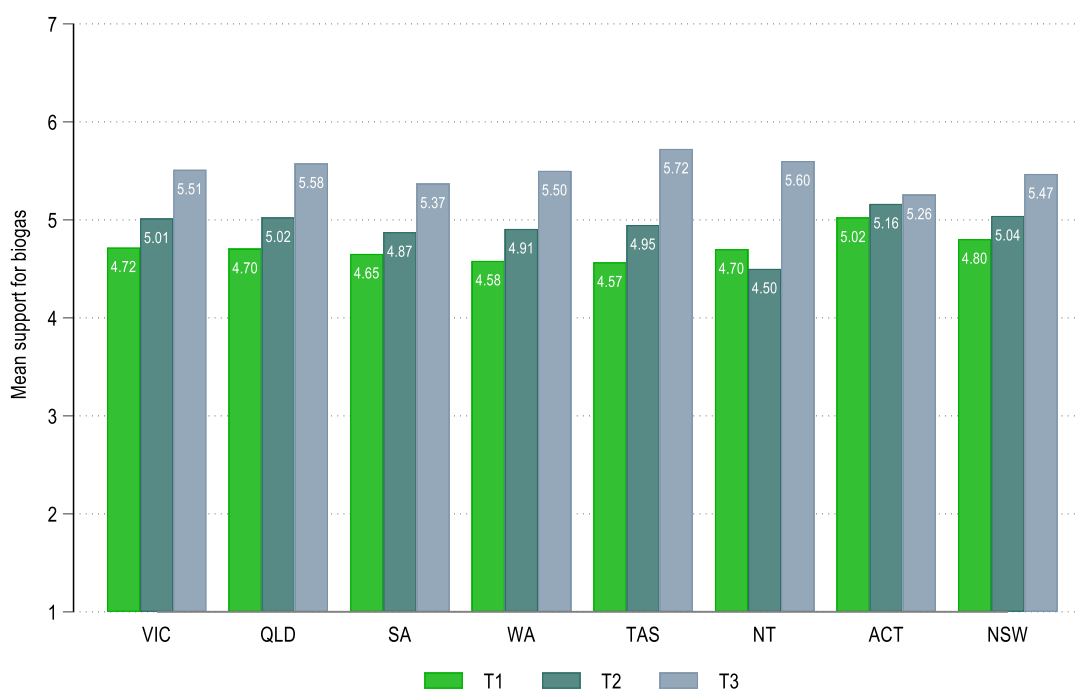


Figure 6. Support for biogas by States and Territories.

4.2.3 Influence of different message frames

Respondents were divided into five groups. Each group was provided with either a single image of biogas with no accompanying text or an image of biogas with a treatment text. Except for the control group, which received no image or text. The treatments groups are as follows:

- Group A – biogas supply chain image only
- Group B – image and treatment text: Biogas is a renewable, reliable and local source of energy
- Group C – image and treatment text: The investment opportunity for energy from waste projects is estimated to be AUD\$3.5 to 5.0 billion, with the potential to avoid up to 9 million tonnes of carbon dioxide equivalent (CO₂e) emissions each year
- Group D – image and treatment text: The biogas industry supports local economies and regional communities, creating jobs, and offering new income sources, particularly for farmers
- Group E - control

Table 13 shows the different mean responses before and after the second treatment—message. The control group, Group E has the smallest mean difference when measuring subjective support for biogas, which was expected. In contrast, the other groups have higher mean differences for biogas support. Group B has the highest mean increase in subjective support for biogas after the treatment, which suggests this message resonated the most positively and strongly with the respondents.

Table 13. Change in subjective support for biogas before and after second treatment - message.

Treatment Group	N	T2	T3	Difference
Group A	403	4.963	5.566	-.603***
Group B	401	5.088	5.756	-.668***
Group C	397	4.973	5.527	-.554***
Group D	408	5.032	5.569	-.537***
Group E	407	4.926	5.072	-.145***

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

4.3 PLACEBO

If the second treatment— a message (image and text) about biogas changed the support for biogas, we would not expect it to influence support for other technologies. Therefore, we asked respondents to indicate their support for solar PV before the definition treatment and after the treatment (where 1 = ‘*Strongly disagree*’ to 7 = ‘*Strongly agree*’). The mean comparison for the four cohorts is presented in Table 14. As expected, there was no significant change in the support for solar PV, suggesting the information treatment only influenced the support for biogas and not solar PV.

Table 14. Changes in mean support for solar PV (Placebo) at two different points during the survey.

Cohorts	Respondents who:	N	Before	After	Difference
Cohort 1	Pure control group—non-treatment	402	5.644	5.707	-.062
Cohort 2	Received first treatment—definition	94	5.522	5.500	.021
Cohort 3	Received second treatment—message	1207	5.641	5.663	-.022
Cohort 4	Received both treatments	313	5.678	5.684	-.006

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

4.4 ADDITIONAL RESPONSES TO VARIOUS ASPECTS OF BIOGAS

4.4.1 Willingness to use biogas

The survey also asked respondents: *If biogas were available today, how willing would you be to use biogas for cooking, hot water heating; space heating; in your car and other vehicles; aviation fuel; and shipping fuel?* Where (1 = ‘*Very unwilling*’ and 7= ‘*Very willing*’). The responses to the various purposes for biogas were not strongly inclined to one option, as shown in Figure 7. Although, on average, respondents were more willing to use biogas for ‘*hot water heating*’. Moreover, the least preferred options for biogas were for ‘*Aviation fuel*’ and ‘*Car fuel*’ with mean values of 4.72 and 4.74, respectively. While only marginally smaller means, it suggests there maybe some concerns about the use of biogas as a mobility fuel.

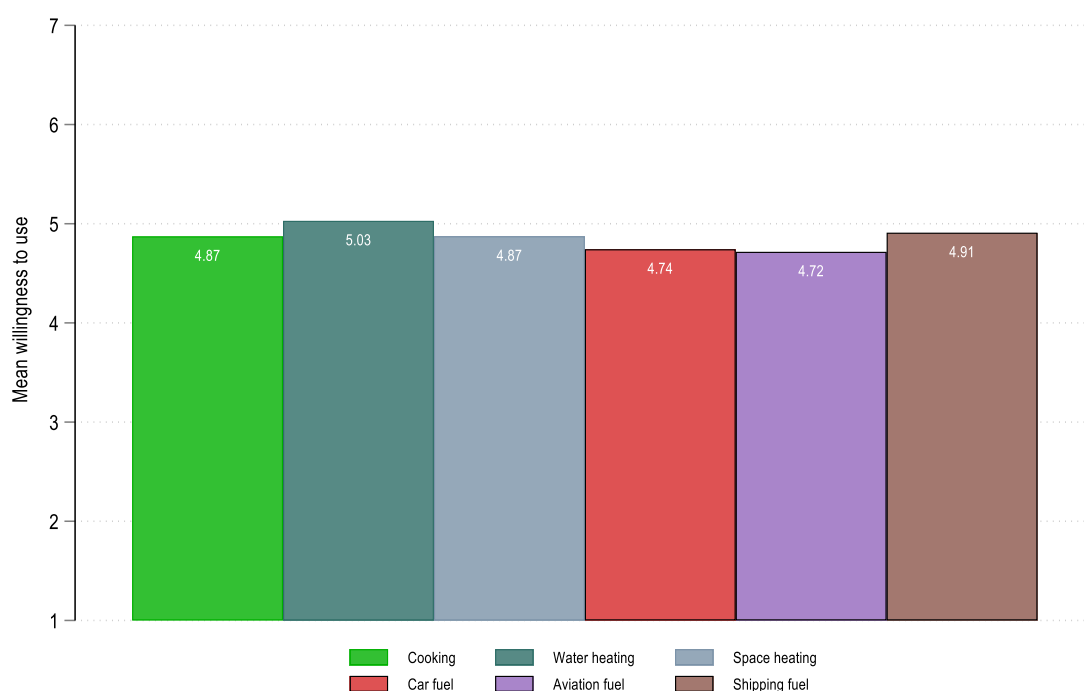


Figure 7. Mean willingness to use biogas for different purposes.

Table 15 shows the frequency of responses for willingness to use biogas for various purposes. On average, respondents who opted for the 'Neutral' option were almost 30%. However, if the three willingness-to-use options are added, 58.33% of respondents, on average, were willing to use biogas to some degree.

Table 15. Percentage of responses for willingness to use biogas for various purposes (N=2,016).

Use	Very unwilling	Unwilling	Slightly unwilling	Neutral	Slightly willing	Willing	Very willing
Cooking	3.77	3.67	4.96	28.08	21.73	24.26	13.54
Water heating	2.88	3.03	4.61	24.60	23.02	26.39	15.48
Space heating	2.98	3.47	5.65	28.87	22.77	22.67	13.59
Car fuel	3.77	4.91	5.61	30.65	21.83	20.54	12.70
Aviation fuel	3.42	4.37	5.56	33.98	20.59	20.63	11.46
Shipping fuel	2.73	3.22	3.87	31.40	20.88	25.10	12.80

Consistent with the overall support for biogas after the second treatment—image and message, the mean willingness to use biogas for different purposes increased, as seen in Figure 8.

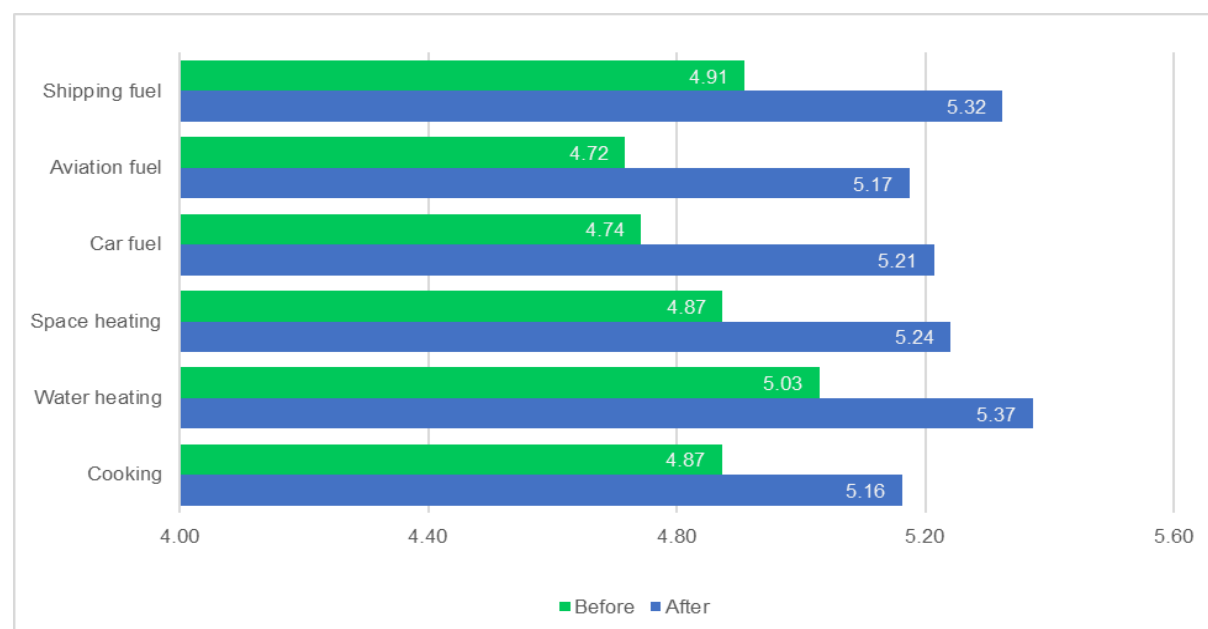


Figure 8. Mean willingness to use biogas before and after the second treatment – message.

Overall, support for using biogas increased before and after the second treatment—image and message. However, 'car fuel', 'aviation fuel' and 'shipping fuel' showed the most significant differences before and after the second treatment, as seen in Table 16.

Table 16. Mean test for willingness to use biogas before and after second treatment—message.

Use	N	Before	After	Difference
Cooking	2016	4.873	5.163	-.29***
Water heating	2016	5.030	5.373	-.343***
Space heating	2016	4.873	5.241	-.368***
Car fuel	2016	4.742	5.214	-.471***
Aviation fuel	2016	4.717	5.175	-.458***
Shipping fuel	2016	4.910	5.325	-.415***

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

4.4.2 Attitudes toward biogas

Before the [second treatment—image and message](#), respondents were asked, ‘Overall, do you think using biogas for energy in Australia would be?’ This question used a bipolar semantic differential scale to measure attitudes towards biogas, which presented positive words on one side (‘Very positive’ = +3), and negative words with the opposite meaning on the other side of the scale (‘Very negative’ = -3). For example, respondents rated whether using biogas for energy in Australia would be ‘Very useful’ (+3), ‘Very useless’ (-3), or somewhere in between, including 0 as a neutral value. Figure 9 shows respondents’ instrumental attitudes towards biogas before the second treatment. The results show that the respondents’ instrumental attitudes toward biogas in Australia still tend to be more positive.

Figure 10 shows respondents’ experiential attitudes towards biogas before the second treatment. Similar to the instrumental measures, the results show that respondents’ experiential attitudes towards biogas in Australia is also positive. However, a large number of respondents have a neutral feeling (‘Neutral’ = 0) towards biogas in Australia.

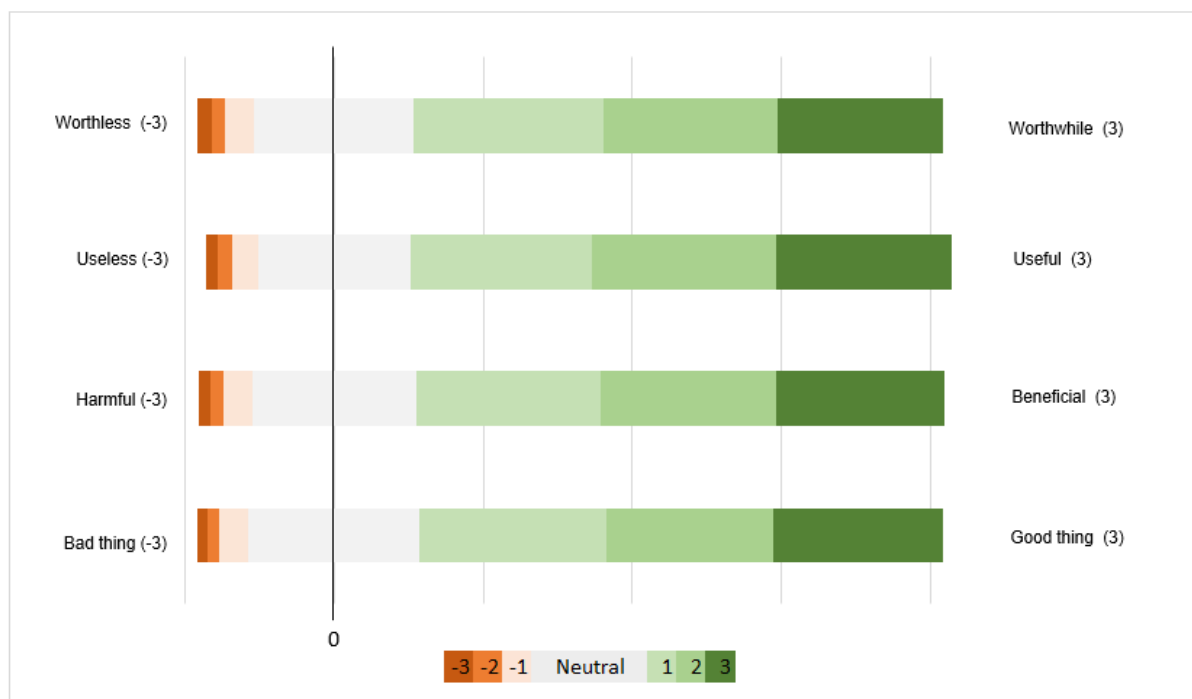


Figure 9. Instrumental attitudes towards biogas in Australia measured before second treatment—message.

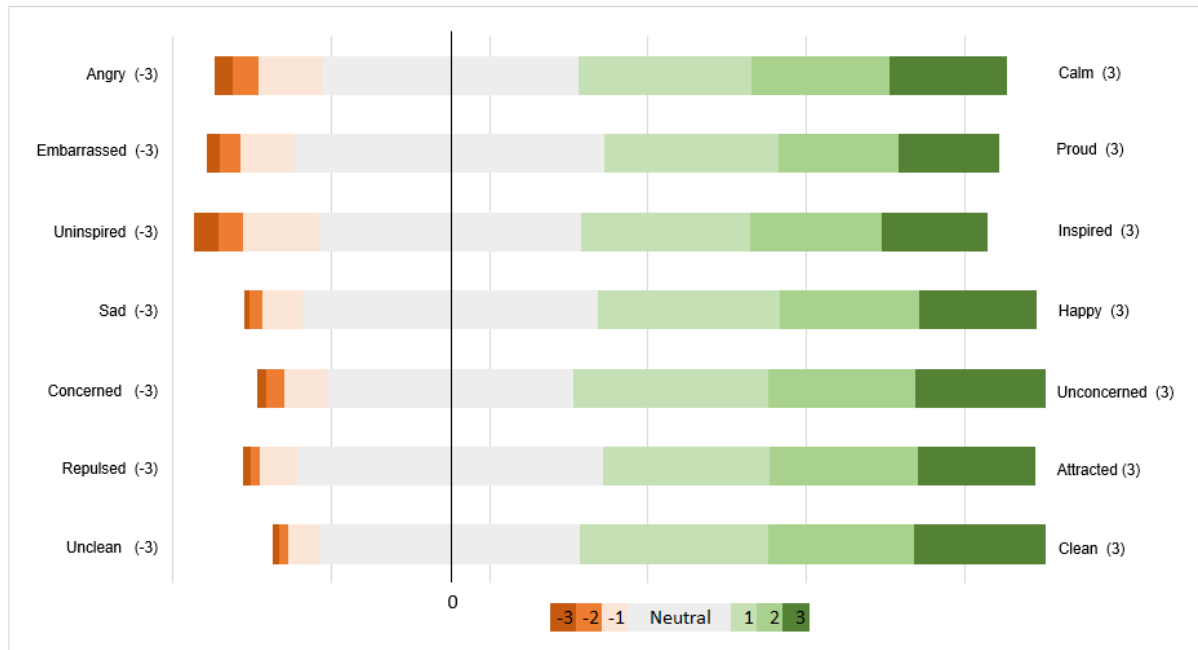


Figure 10. Experiential attitudes towards biogas in Australia measured before second treatment—message.

When calculated as a mean response, respondents' instrumental and experiential attitudes towards using biogas in Australia were slightly positive. Nevertheless, instrumental attitudes are more favourable (approximately +1.28) than experiential attitudes (approximately +0.88), which suggests that respondents see biogas as a good thing for Australia. However, they do not have a strong feeling about biogas at this point in time.

Table 17. Attitudes towards biogas in Australia.

Overall, do you think using biogas for energy in Australia would be:	Mean ^a	SD
Instrumental attitude		
Very useful - Very useless	1.253	1.376
Very beneficial - Very harmful	1.321	1.362
Very worthwhile - Very worthless	1.276	1.357
A very good thing - A very bad thing	1.265	1.347
Composite instrumental attitude score ($\alpha = .955$)	1.279	1.259
Experiential attitude		
Very calm - Very angry	1.086	1.29
Very proud - Very embarrassed	0.930	1.268
Very inspired - Very uninspired	0.990	1.338
Very happy - Very sad	0.922	1.262
Very unconcerned - Very worried	0.694	1.443
Very attracted - Very repulsed	0.736	1.321
Very clean- Very unclean	0.797	1.426
Composite experiential attitude score ($\alpha = .924$)	0.879	1.136
Overall attitude score		
Composite instrumental + experiential attitude score ($\alpha = .951$)	1.025	1.116

^a Measured on a 7-point bipolar scale, where -3 = most negative response (e.g. very worthless), 0 = neutral, +3 = most positive response (e.g. very worthwhile); $n = 2016$.

4.4.3 Preferences for biogas produced from different feedstock

Another question asked respondents to rank their willingness to use biogas produced from different feedstocks on a scale of 1 = 'Most willing' to 7 = 'Least willing'. The options included are depicted in Figure 11 and Table 18. Results in Table 18 show that 35.81% of respondents ranked 'Crops specifically grown for biogas production' as the source they would be most willing to use as a feedstock for biogas. On the other hand, only 3.17% of respondents chose 'Human faeces', and 5% chose 'Sewage sludge' from among the choices. Overall, 'Garden waste' (with a mean value of 2.97) was the biogas feedstock respondents were most willing to use, and 'Human

faeces' (with a mean value of 5.19) was the feedstock respondents were least willing to use, as seen in Figure 11. Table 8 shows all ranking frequencies for the range of biogas feedstocks.

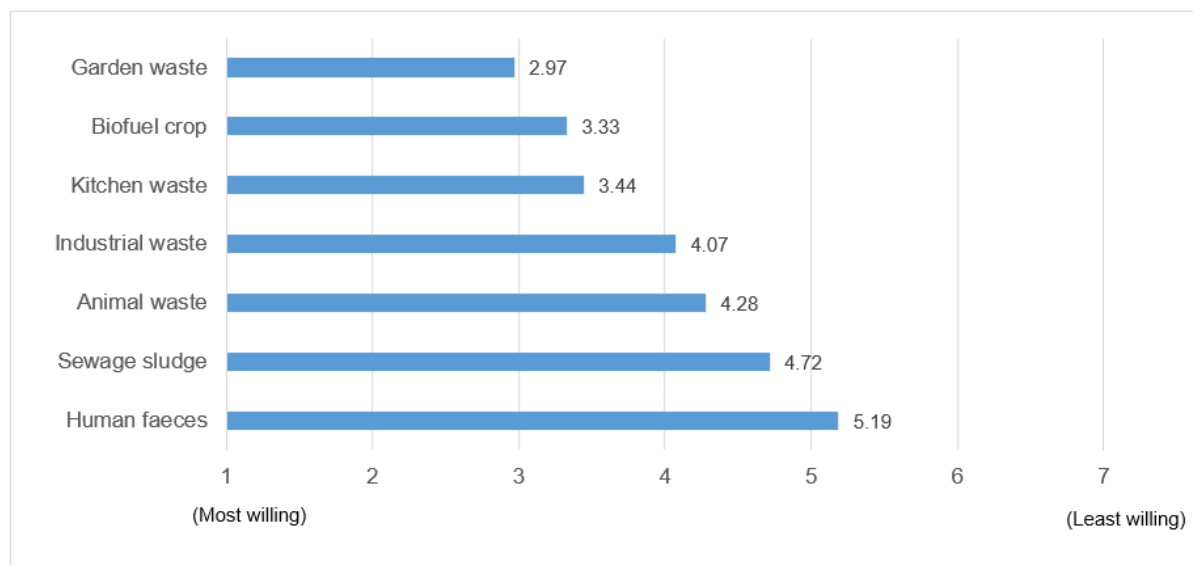


Figure 11. Mean ranking of feedstock sources for biogas production.

Table 18. Ranking frequency for different sources of biogas (N = 2,016).

Biogas' sources	Ranking frequency (%)						
	1	2	3	4	5	6	7
Garden waste	27.58	27.28	14.78	7.64	6.20	6.70	9.82
Kitchen waste	8.68	25.40	25.79	12.80	11.46	11.95	3.92
Sewage sludge	4.76	8.04	11.41	15.23	23.26	21.88	15.43
Human faeces	3.17	6.15	7.74	15.48	15.58	22.87	29.02
Animal waste	7.19	8.68	14.43	20.09	25.79	16.07	7.74
Industrial waste	12.80	13.99	11.26	20.39	12.30	15.08	14.19
Crops specifically grown for biogas production	35.81	10.47	14.58	8.38	5.41	5.46	19.89

Note: Scale is 1 = 'Most willing' to 7 = 'Least willing'

4.4.4 Aspects of biogas that you support the most

After the second treatment, respondents were also asked: 'What aspects of biogas do you support most? Please rank each item in order of support.' Where 1 = 'Most supportive' and 8 = 'Least supportive'. Figure 12 shows the mean ranked values of the various aspects of biogas. 'Biogas turns poo into products' and 'Bioenergy converts biomass into sustainable aviation fuel' were the least supported aspects of biogas with means of 5.12 and 5.09, respectively. While 'Biogas is a renewable natural gas' was the most supported aspect of biogas with a mean value of 3.49, followed by 'Biogas production effectively diverts waste from landfill' with a mean value of 3.74.

Of the total responses, 25.74% of respondents indicated they support the most 'Biogas is a renewable natural gas', with 56.54% in overall support. While 'Biogas turns poo into products' is the least supported, with only 8.38% of respondents mostly supporting that option, as seen in Table 19.

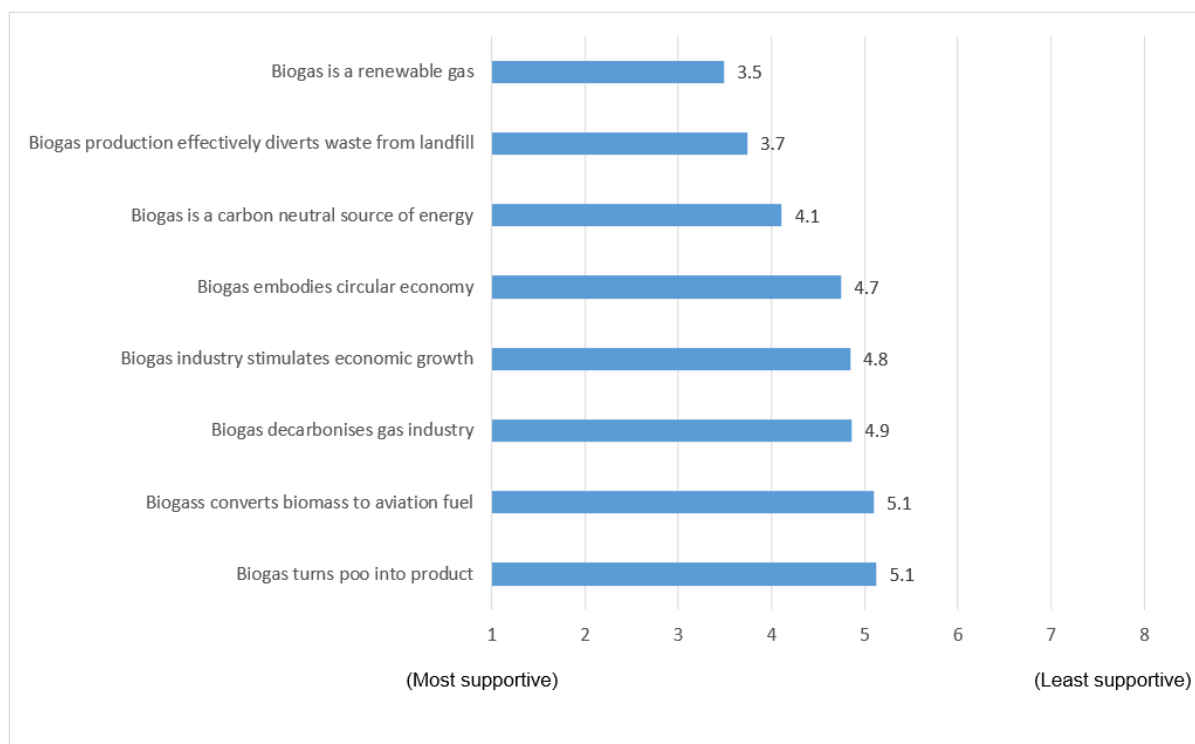


Figure 12. Mean ranking of support for various aspects of biogas

Table 19. Ranking frequency for different aspects of biogas (N= 2,016).

Aspect	Ranking frequency (%)							
	1	2	3	4	5	6	7	8
Biogas production effectively diverts waste from landfill	20.04	17.06	15.33	12.05	9.82	9.82	9.67	6.20
Biogas is a renewable natural gas	25.74	16.37	14.53	12.05	8.88	8.58	7.99	5.85
Biogas industry stimulates economic growth	8.04	9.72	11.76	14.38	13.54	15.18	13.99	13.39
Biogas is a carbon-neutral source of energy	14.73	16.27	12.80	13.49	12.95	11.06	9.38	9.33
Biogas embodies a circular economy concept	9.03	12.10	11.36	11.76	14.88	13.34	14.48	13.05
Biogas decarbonises the gas industry	7.54	10.22	12.70	12.65	13.94	14.63	14.93	13.39
Bioenergy converts biomass into sustainable aviation fuel	6.50	8.78	10.12	13.10	13.69	15.63	17.06	15.13
Biogas turns poo into products	8.38	9.47	11.41	10.52	12.30	11.76	12.50	23.66

4.5 HETEROGENEOUS FACTORS AND SUPPORT FOR BIOGAS

4.5.1 Support for biogas by gender

Of the 2016 respondents, 943 were male, accounting for 46.75%, and 1,068 were female, accounting for 52.98%. While five respondents opted for the options 'Other' or 'Prefer not to say', accounting for 0.25%. Consistent with other technologies, support for biogas was higher among male respondents than female respondents, as seen in Figure 13. Table 20 shows that the most significant difference in support for biogas by gender is seen in T1. However, it slowly dissipates as support for biogas by gender is not so significant in T3. This dissipation could suggest that, overall, women were influenced by the treatments and completion of the survey questions (see Table 22) over time to increase their support for biogas.

Table 21 and Table 22 show support for biogas by gender and the different treatment cohorts. As expected, males that were part of Cohort 1 as the control group, do not have a significant difference between T1 and T3. However, interestingly from Table 22, we can see that females that were part of Cohort 1 show a significant difference between T1 and T3. This suggests that as they worked through the survey and gleaned more information about biogas and its uses through the questions alone, they became more confident in their knowledge and were more willing to indicate their change in support than male counterparts.

Table 20. Mean test of support to biogas by gender.

Variables	Male		Female		Difference
	n	Mean	n	Mean	
T1	943	4.925	1068	4.547	0.378***
T2	943	5.152	1068	4.862	0.289***
T3	943	5.532	1068	5.463	0.07

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

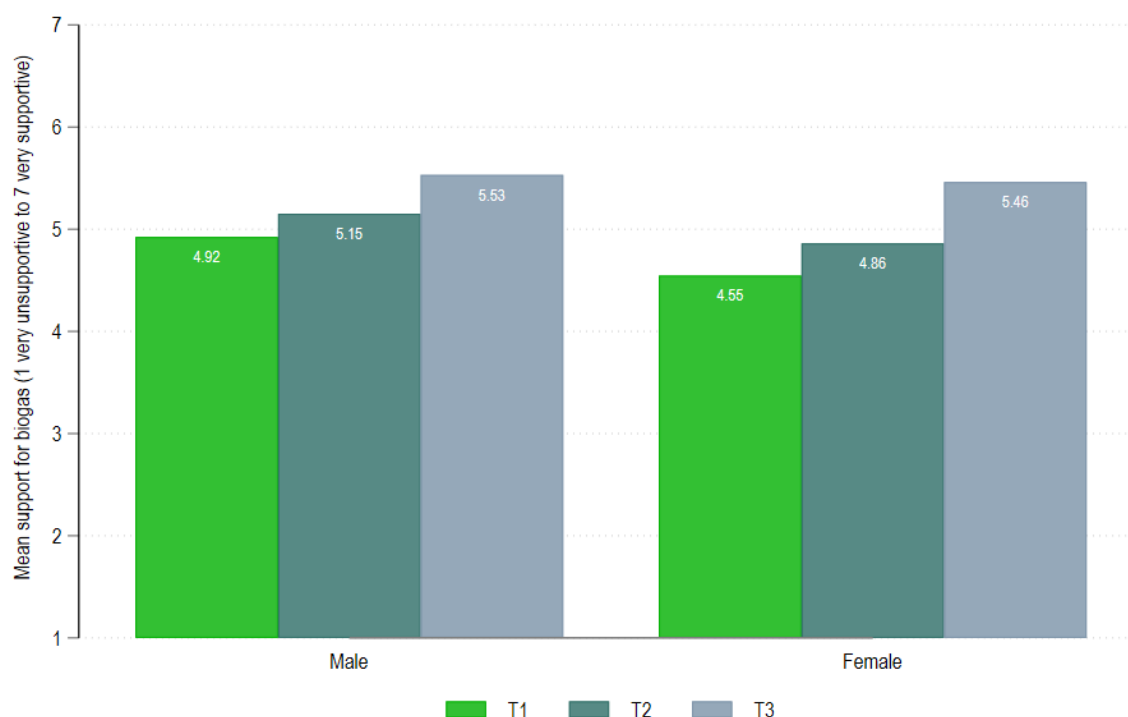


Figure 13. Mean biogas support by gender.

Table 21. Effect for male respondents by cohorts (n = 943).

Cohorts	Respondents who:	n	Mean support for biogas			Mean difference		
			T1	T2	T3	T1 to T2	T2 to T3	T1 to T3
Cohort 1	Pure control group—non-treatment	50	4.82	4.76	5.02	0.06*	-0.26***	-0.20
Cohort 2	Received first treatment—definition	143	4.916	5.217	5.133	-0.38***	0.08**	-0.22***
Cohort 3	Received second treatment—message	194	4.866	4.923	5.623	-0.112**	-0.70***	-0.76***
Cohort 4	Received both treatments	556	4.957	5.25	5.649	-0.38***	-0.40***	-0.69***

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

Table 22. Effect of message for female respondents by cohorts (n = 1,068).

Cohorts	Respondents who:	n	Mean support for biogas			Mean difference		
			T1	T2	T3	T1 to T2	T2 to T3	T1 to T3
Cohort 1	Pure control group—non-treatment	43	4.16	4.51	4.81	-0.35***	-0.30**	-0.65***
Cohort 2	Received first treatment—definition	170	4.49	4.84	5.09	-0.34***	-0.25***	-0.59***
Cohort 3	Received second treatment—message	208	4.56	4.68	5.61	-0.13**	-0.92***	-1.05***
Cohort 4	Received both treatments	647	4.58	4.95	5.56	-0.37***	-0.61***	-0.98***

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

4.5.2 Climate change beliefs

Consistent with previous surveys (Lambert & Ashworth, 2018; Martin et al., 2021), respondents were asked two questions to understand their attitudes towards climate change. The first was: *'Do you believe climate change is happening now or will happen in the next 30 years?'* This question has been asked in multiple surveys and was repeated in both of the earlier surveys investigating the Australian public's attitudes towards hydrogen. Comparing the results with previous surveys, Table 23 shows that there has been a marked increase in Australian citizens believing that climate change is already happening. However, the 2022 and 2021 results are very similar, with approximately 75% indicating climate change is happening, up from 70.3% in 2018. The percentage of participants that believe *'No, it is not happening and won't'* decreased from 9% in 2018 to 7.89% in 2022; however, the 2021 survey has the lowest percentage of participants believing *'No, it is not happening and won't'*.

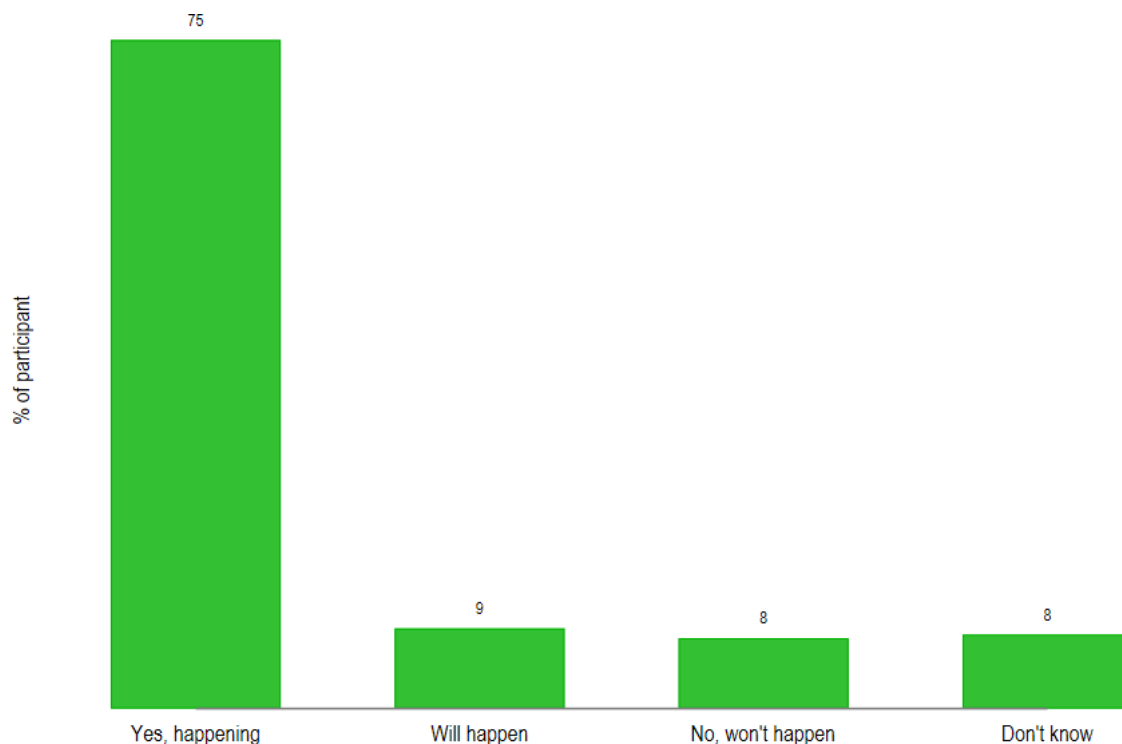


Figure 14 Belief that climate change is happening now or will happen in the next 30 years.

Table 23 Climate change belief from 2018 – 2022.

Do you believe climate change is happening now or will happen in the next 30 years?	2022 (N = 2016)		2021 (N = 3020)		2018 (N = 2785)	
	n	%	n	%	n	%
Yes, it is already happening	1509	74.8	2284	75.6	1959	70.3
It will start happening within the next 30 years	181	8.98	280	9.3	248	8.9
No, it is not happening and won't	159	7.89	231	7.6	250	9
I do not know/ I am not sure	167	8.28	225	7.5	328	11.8
Mean Response	1.496	0.951				

Note: 2021 data (Martin et al., 2021) and 2018 data (Lambert & Ashworth, 2018)

A second question taken from a previous CSIRO survey (Gardner et al., 2010) was: *'How convinced are you that climate change represents a real problem for Australia?'* Where 1 = *'Very unconvinced'*, 4 = *'Neither convinced nor unconvinced'*, and 7 = *'Very convinced'*. Table 24 shows that in 2022, 75.05% of the participants were *'Slightly convinced'*, *'Convinced'* or *'Very convinced'* that climate change represents a real problem for Australia. This result was approximately 7% lower than the responses in the 2021 hydrogen survey, where 81.7% of the participants were convinced, to some degree, that climate change was a problem for Australia. However, there

was consistency across both, with approximately 8% of the population choosing the ‘Neither convinced nor unconvinced’ option.

Table 24 How convinced are you that climate change represents a real problem for Australia.

How convinced are you that climate change represents a real problem for Australia?	2022		2021	
	n	%	n	%
Very convinced	712	35.3	1268	42
Convinced	484	24.0	788	26.1
Slightly convinced	317	15.7	410	13.6
Neither convinced nor unconvinced	150	7.4	241	8
Slightly unconvinced	89	4.4	88	2.9
Unconvinced	111	5.5	104	3.4
Very unconvinced	153	7.6	121	4
Total	2016	100	3020	100
	Mean	SD	Mean	SD
Mean response	5.3	1.9	5.7	1.6

4.5.3 Climate change belief and support for biogas

Figure 15 shows support for biogas for all respondents (treated and controlled) based on respondents’ climate change beliefs. From this, respondents with a higher belief that climate change is happening expressed higher support for biogas. While at T1, respondents choosing either of the options ‘Yes, it is happening’ or ‘It will happen in the next 30 years’ showed similar levels of support for biogas, at T3, respondents who chose the ‘Yes, it is happening’ option had a much higher mean support of 5.6, compared to those who answered ‘It will happen in the next 30 years’ with a mean support of 5.1. Those who are not convinced about climate change or did not know had slightly lower means.

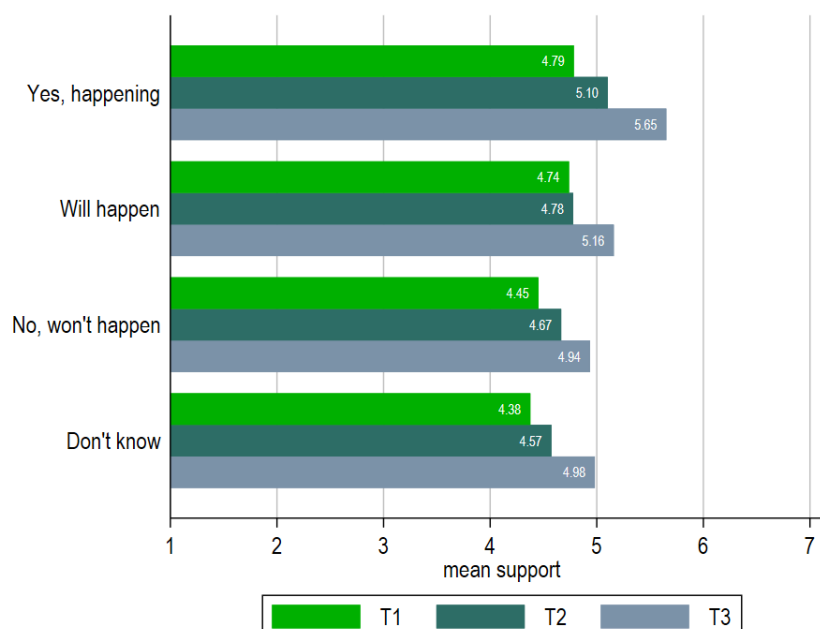


Figure 15. Support for biogas by climate change belief.

Table 25 shows the change in support for biogas for each one of the four cohorts among respondents who believe climate change is happening. Cohort 2 does not show a significant change in biogas support between T1

and T2, which is surprising because this cohort received the first treatment—definition. However, Cohort 3 and Cohort 4 had the highest significant differences for biogas support.

Table 25. Mean test of support for biogas for respondents who chose ‘Yes, it is already happening’ to the climate change question ($n = 1,509^*$).

Cohorts	Respondents who:	n	Mean support for biogas			Mean difference		
			T1	T2	T3	T1 to T2	T2 to T3	T1 to T3
Cohort 1	Pure control group—non-treatment	68	4.62	4.85	5.19	-0.236**	-0.34	-0.57***
Cohort 2	Received first treatment—definition	234	4.72	5.09	5.23	-0.38	-0.14*	-0.52***
Cohort 3	Received second treatment—message	312	4.77	4.88	5.76	-0.112**	-0.88***	-0.99***
Cohort 4	Received both treatments	895	4.82	5.20	5.76	-0.38***	-0.56***	-0.94***

Note: *** for p -values ≤ 0.01 ; ** for p -values ≤ 0.05 , and * for p -values ≤ 0.1

Figure 16 illustrates support for biogas by the respondents’ subjective perceptions of climate change. Those who are ‘Very convinced’ that climate change represents a real problem for Australia expressed the highest mean support for biogas. In line with the previous question on climate change, those respondents who were ‘Very convinced’ had the most significant increase in support for biogas at T3.

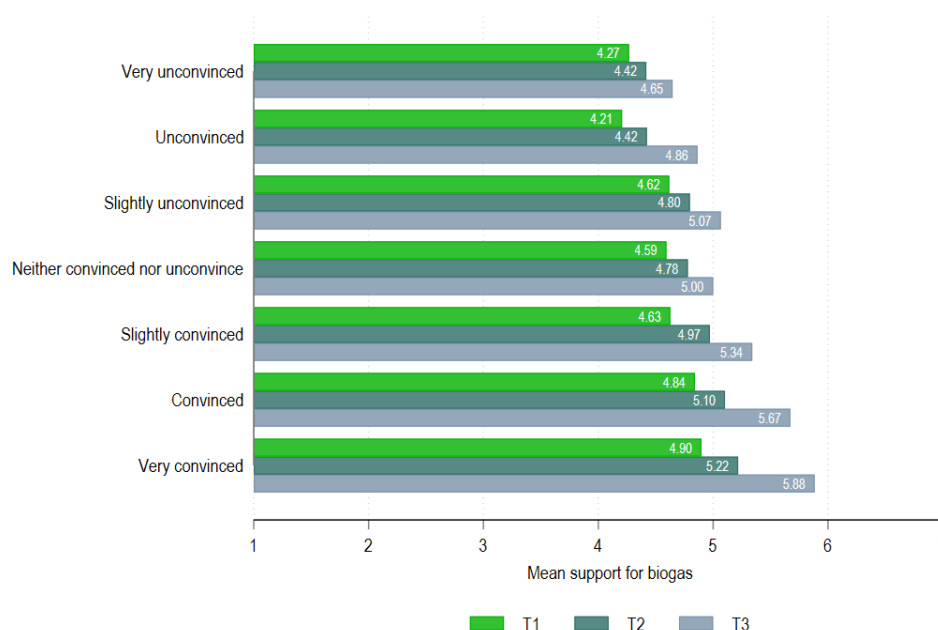


Figure 16. Support for biogas by subjective perception of climate change.

4.5.4 Support for biogas by innovator category

To understand whether respondents who were more positively disposed to new technology were likely to be more supportive of biogas, we used the Rogers (2003) innovation scale. Respondents were asked: ‘When thinking of your response to new technology, which of the following statements best describes you?’ The various options to respond to are detailed in Table 26, and the mean results seem consistent with the intent of the scale. That is, those who are more innovative and early adopters expressed higher support for biogas.

Support for biogas results by the self-reported innovation category is also illustrated in Figure 17. Interestingly, respondents who described themselves as ‘Late majority’ showed the largest increase in support for biogas at T3.

Table 26. Support for biogas by innovator category at T1, T2 and T3.

Category	Statement	T1		T2		T3	
		Mean	SD	Mean	SD	Mean	SD
Innovators	I closely follow new technology and take risks by being the first to purchase it.	5.2	1.76	5.4	1.68	5.8	1.52
Early adopters	I see the potential advantages in new technology and am one of the first to make use of its advantages and to profit from it.	4.9	1.36	5.2	1.33	5.6	1.23
Early majority	I am interested in new technology but at the same time I am pragmatic. I like to take time and be persuaded by the advantages. My decisions are (mainly) based on the recommendations of existing users.	4.7	1.10	5.0	1.19	5.5	1.12
Late majority	I am not thrilled by new technology, but rather appreciate security. It is safe to purchase a product when it has been on the market for some while and offers obvious advantages.	4.4	1.14	4.7	1.18	5.3	1.30
Laggard	I am traditional and have little affinity with new technology. I do not like changes in life and I purchase products only when the existing model I use is not produced anymore.	4.4	1.14	4.7	1.28	5.1	1.42

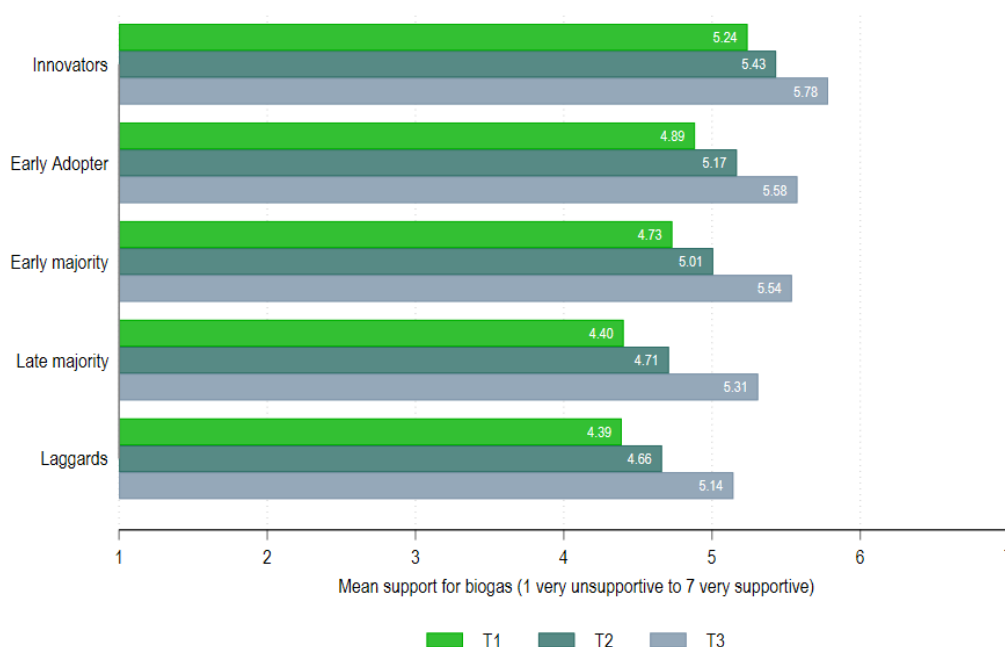


Figure 17. Support to biogas by innovator category at T1, T2 and T3.

Table 27. Mean comparison of support for biogas for respondents who indicated they are innovators or early adopters.

Cohorts	Respondents who:	n	Mean support for biogas			Mean difference		
			T1	T2	T3	T1 to T2	T2 to T3	T1 to T3
Cohort 1	Pure control group—non-treatment	27	4.037	4.482	4.926	-0.445*	-0.44***	-0.89***
Cohort 2	Received first treatment—definition	67	5.239	5.671	5.433	-0.38***	0.24	-0.19
Cohort 3	Received second treatment—message	118	4.932	5.077	5.678	-0.112	-0.60***	-0.75***
Cohort 4	Received both treatments	334	5.048	5.29	5.728	-0.38***	-0.44***	-0.68***

Note: *** for p-values ≤ 0.01 ; ** for p-values ≤ 0.05 , and * for p-values ≤ 0.1

4.6 SUPPORT FOR OTHER ENERGY TECHNOLOGIES

At the beginning of the survey, respondents were asked how much they agreed or disagreed with a diverse set of energy sources and related technologies concerning Australia's future energy needs. The scale used to answer this question was a 7-point scale, from '1=Strongly disagree' to '7=Strongly agree', including '4=Neither agree nor disagree' as a neutral option. Figure 18 shows the overall mean support for different energy sources. 'Solar PV' and 'Wind' are the energy sources with higher support, while 'Coal' and 'Nuclear' are the least favourites for Australia's future energy needs.

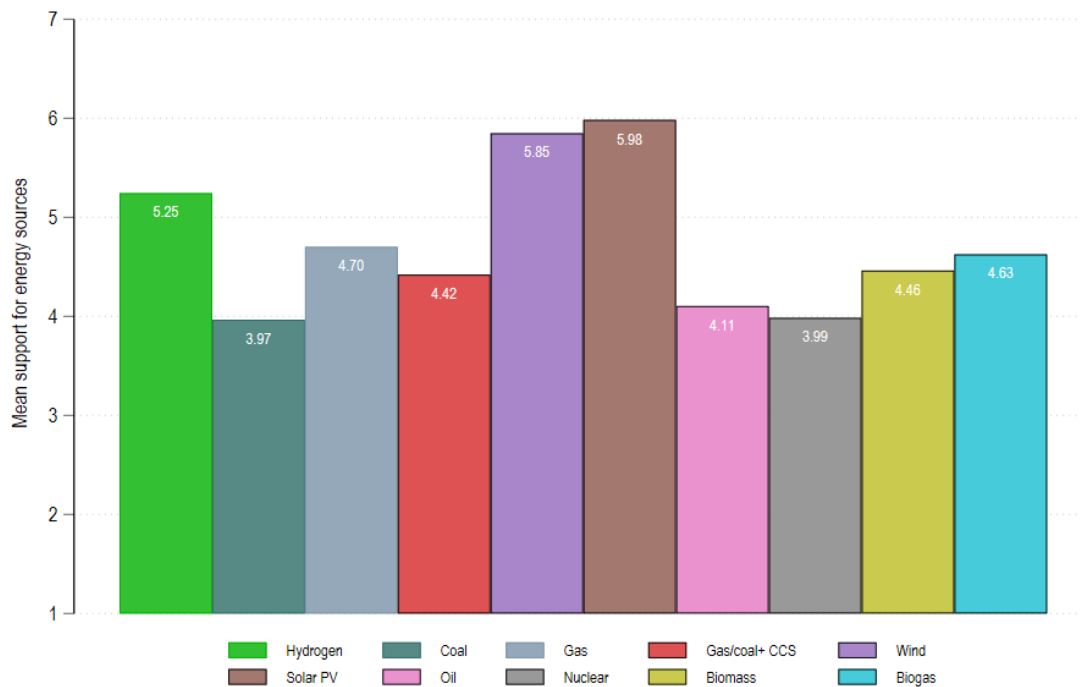


Figure 18. Mean support for different energy sources and technologies.

Table 28 shows that respondents strongly disagree with 'Nuclear' and 'Coal' as options for the future of Australia's energy needs. While 'Biomass' and 'Biogas' are the options with a high frequency of neutrality.

Table 28. Support for energy sources and related technologies concerning Australia's future energy needs is reported as frequency (N = 2,016).

Energy source	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	agree	Strongly agree
Hydrogen	0.74	1.84	2.73	25.60	23.91	26.34	18.85
Coal	14.48	11.95	13.59	17.91	16.96	14.63	10.47
Gas	4.61	7.14	8.88	19.59	24.85	22.27	12.65
Fossil fuel with CCS	5.65	7.49	10.37	28.27	21.33	17.46	9.42
Wind	1.39	0.89	2.73	9.23	17.36	28.92	39.48
Solar PV	0.50	0.94	1.39	8.18	16.32	31.10	41.57
Oil (Diesel)	9.57	10.17	14.78	23.36	19.05	13.84	9.23
Nuclear	16.72	10.27	12.60	18.60	14.24	15.08	12.50
Biomass	3.82	3.97	6.15	46.33	15.82	15.58	8.33
Biogas	3.13	3.32	5.56	42.21	17.86	17.26	10.66

4.7 SOCIAL LICENCE TO OPERATE AND BIOGAS

4.7.1 Organisational trust

Whether an organisation has a Social Licence to Operate (SLO), depends on how much respondents trust the organisation to minimise the impact on the environment and act in the best interest of consumers (Moffat & Zhang, 2014). To better understand the public's perceptions of different institutions involved in the biogas industry, respondents were asked the extent to which they thought particular organisations and groups would act in the best interests of consumers if a biogas economy was developed in Australia. Responses were on a 5-point Likert scale, where 1 = 'Strongly disagree' and 5 = 'Strongly agree'. Consistent with other trust questions, Figure 19 shows that the CSIRO is the most trusted institution, while those least trusted are the fuel/gas supply companies, media and car manufacturers.

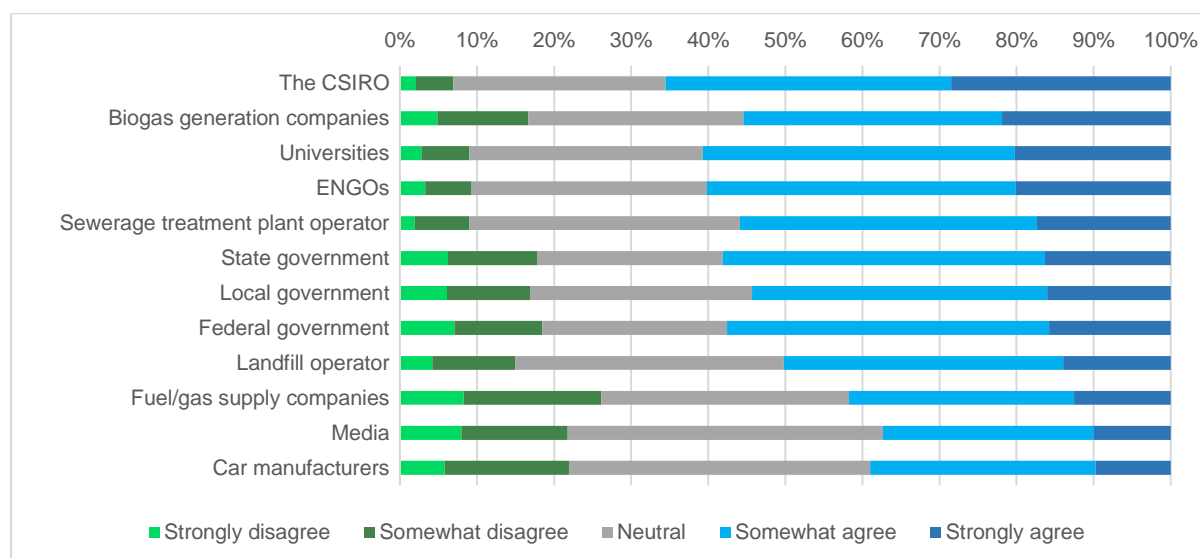


Figure 19. Respondents' trust in organisations to act in the best interest of the consumer.

For example, 25.5% of respondents 'Strongly agree' that The CSIRO should be the organisation overseeing the development of a biogas economy in Australia. On the other hand, 8.2 % of respondents 'Strongly disagree' that fuel/gas companies would have the consumer's best interests in developing a biogas economy in Australia. Also, many respondents answered either 'Neutral' or 'Somewhat agree' with most of the other organisations queried, suggesting a level of ambivalence amongst many respondents.

Table 29. Trust in organisations.

Group	Mean	SD
The CSIRO	3.85	0.959
Universities	3.69	0.954
Environmental NGO	3.68	0.968
Sewerage plant operator	3.62	0.917
Biogas companies	3.56	1.1
State Gov.	3.50	1.09
Federal Gov.	3.48	1.1
Local Gov.	3.47	1.07
Landfill operator	3.45	0.997
Car manufacturers	3.21	1.02
Fuel/gas supply companies	3.20	1.12
Media	3.18	1.05

5 Conclusions

This study surveyed 2016 respondents aged 18 and above and living in Australia to understand their overall support for biogas as future fuel for Australia. Overall public awareness of biogas is very low; however, when presented with information about biogas on the whole, Australians are supportive of biogas as a future fuel. Although in the beginning, almost half of the respondents selected the mid-point neutral option when asked to express their support for biogas. The primary reason for selecting that option was insufficient knowledge and information about biogas.

We also found that support for biogas at the baseline (T1) varies by socio-economic status. For example, respondents living in rented properties expressed significantly lower support for biogas than others. Similarly, respondents with an income larger than AUD\$500 per week expressed higher support for biogas than those earning less than AUD\$500 per week. Respondents living in regional areas were less supportive of biogas compared to those living in metropolitan areas, which may be impacted by concerns around competing land-use, and this would be interesting to explore further. Consistent with other questions about technologies, male respondents were more supportive of biogas than females.

The study found that providing a definition and information (image and text) about biogas increases support for biogas as a future fuel. The comparison of means between these different treatments suggests that mean support for biogas in T2 is significantly higher than in T1, so the definition provision increases support, while in T3 it was more significantly higher than at T2. Interestingly, information not only increased support but also reduced the gap in support for biogas among socio-economic groups such as gender and dwelling type. For example, support for biogas between males and females was significantly (based on the mean difference) different at T1 and T2, whereas the difference was not significant at T3. This reduced gap was also observed for income, dwelling type and regional location.

The feedstock individuals are most willing to use for biogas production includes garden waste, energy crops and kitchen waste. The highest number of respondents ranked energy crops as a preferred source of feedstock. Human faeces, sludge, and animal waste were the sources of feedstock that respondents were least willing to use for biogas production.

Ranking various aspects of biogas showed that the message that sat well with most participants was that biogas is a clean, renewable and a carbon-neutral source of energy: '*Biogas is a renewable natural gas*' followed by '*Biogas production effectively diverts waste from landfill*' were two aspects that found the most support. The fact that *biogas converts poo to product* received the lowest ranking.

5.1 IMPLICATIONS AND RECOMMENDATIONS FOR INDUSTRY

This study provided the first comprehensive look at how the Australian public views biogas as a potential future fuel to decarbonise Australia's energy supply. While there were low levels of knowledge about biogas to start with, over the course of the survey with different treatments, public support for biogas increased, albeit with some nuances in relation to how it is produced and what it might be used for. The responses suggest there was some reluctance to use biogas for use in cars and aviation which may illustrate some concerns either around safety or reliability for personal mobility use, as this was not the case for shipping fuels. There is potential to investigate these aspects further, as biogas could be an important mobility fuel in the future.

The effect of the different message treatments on overall support for biogas. While the definition increased immediate support for individuals, it was the combined image and text message that demonstrated the most significant increase in support. Of the four messages provided, the greatest increase in support was shown from the message that *Biogas is a renewable, reliable and local source of energy. The biogas industry supports local economies and regional communities, creating jobs, and offering new income sources, particularly for farmers* produced slightly more increased support in the mean than just the image or the economic investment opportunity. This provides some helpful insights on the best messages to positively engage on biogas and illustrates the benefits it will bring. However, for it to be considered as a viable future fuel, more communication and engagement at the local level will be an important requirement for industry and governments alike.

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Appendix A - Additional Respondent Characteristics

RESPONDENT'S CHARACTERISTICS (SAMPLE DESCRIPTION)

Characteristics	Frequency (n)	Percentage (%)	Australian population (%) ^(a)
Gender			
Male	943	46.78	49.3
Female	1,068	52.98	50.7
Other	3	0.15	n/a
Prefer not to say	2	0.1	n/a
Total			
Age^(b)			
18-24	228	11.31	12.8% ^(c)
25-34	416	20.63	14.4
35-44	361	17.91	13.5
45-54	268	13.29	13.3
55-64	315	15.63	11.8
65+	428	21.23	15.8
Region			
Metro	1387	69%	
Regional	629	31%	
Country born			
Australia	1,615	80.11	66.7
Outside Australia	401	19.89	
Aboriginal or Torres Strait Islander status			
No	1,864	92.46	97.2
Yes, Aboriginal	104	5.16	
Yes, Torres Strait Islander	29	1.44	
Prefer not to answer	19	0.94	

Respondents' education and employment characteristics are described in Table 30. Respondents with a *'Bachelor or Honours degree'* are the most represented being 26.44% of total respondents. Respondents with *'Year 12 or equivalent'* and *'Certificate III or IV'* are the second and third most represented at 14.83% and 13.05%, respectively. In relation to occupation 23.61% of respondents described themselves as *'Employ – Full Time'* and 16.07% as *'Retired'*. The occupational sectors that were most represented within the sample are *'Retail trade'* at 11.11% and *'Health care and social assistance'* at 10.32%.

Table 30. Respondents' education and employment characteristics.

Characteristics	Frequency (n)	Percentage (%)
Education		
Year 10 or below	192	9.52
Year 11 or equivalent	67	3.32
Year 12 or equivalent	299	14.83
Trade certificate or Apprenticeship	90	4.46
Certificate I or II	56	2.78
Certificate III or IV	263	13.05
Advanced Diploma / Diploma	261	12.95
Bachelor or Honours degree	533	26.44
Postgraduate degree (e.g. Masters, PhD)	248	12.3
Other (please specify)	7	0.35
Occupation		
Student	89	4.41
Household duties	115	5.7
Employed – Part Time	476	23.61
Employed – Full Time	631	31.3
Unemployed not looking for work	33	1.64
Unemployed looking for work	69	3.42
Retired	324	16.07
Not able to work	51	2.53
Casual/Contracts	111	5.51
Self-employed	102	5.06
Other (please specify)	15	0.74
Occupational sector (current or prior)		
Agriculture, forestry, fishing	39	1.93
Mining	27	1.34
Manufacturing	115	5.7
Electricity, gas, water, waste services	21	1.04
Construction	88	4.37
Wholesale trade	33	1.64
Retail trade	224	11.11
Accommodation and food services	73	3.62
Transport, postal and warehousing	72	3.57
Information, media and telecommunication	106	5.26
Rental, hiring and real estate services	18	0.89
Professional, scientific, technical ser	130	6.45
Administrative and support workers	126	6.25
Public administration and safety	63	3.13

Characteristics	Frequency (n)	Percentage (%)
Education and training	149	7.39
Health care and social assistance	208	10.32
Arts and recreation services	35	1.74
Other services	182	9.03
Not applicable	307	15.23

Table 31. Household characteristics.

Characteristics	Frequency	Percentage
Homeownership status	(n)	(%)
Owned outright	723	35.86
Owned with a mortgage	560	27.78
Purchased under a shared equity scheme	13	0.64
Rented	657	32.59
Occupied rent free	30	1.49
Occupied under a life tenure scheme	7	0.35
Other	26	1.29
Household composition	Frequency (n)	Percentage (%)
Group household		
Single person household	423	20.98
One parent with children	143	7.09
Couple with no children	534	26.49
Other family (e.g. extended family house)	100	4.96
Couple with children	618	30.65
Household income	Frequency (n)	Percentage (%)
\$3,500 or more per week or \$182,000 or more per year	99	4.91
\$3,000 - \$3,499 per week or \$156,000 - \$181,999 per year	48	2.38
\$2,000 - \$2,999 per week or \$104,000 - \$155,999 per year	171	8.48
\$1,750 - \$1,999 per week or \$91,000 - \$103,999 per year	153	7.59
\$1,500 - \$1,749 per week or \$78,000 - \$90,999 per year	151	7.49
\$1,250 - \$1,499 per week or \$65,000 - \$77,999 per year	178	8.83
\$1,000 - \$1,249 per week or \$52,000 - \$64,999 per year	184	9.13
\$800 - \$999 per week or \$41,600 - \$51,999 per year	218	10.81
\$650 - \$799 per week or \$33,800 - \$41,599 per year	169	8.38
\$500 - \$649 per week or \$26,000 - \$33,799 per year	186	9.23
\$400 - \$499 per week or \$20,800 - \$25,999 per year	136	6.75
\$300 - \$399 per week or \$15,600 - \$20,799 per year	115	5.7
\$150 - \$299 per week or \$7,800 - \$15,599 per year	67	3.32
\$1 - \$149 per week or \$1 - \$7,799 per year	57	2.83
\$0 or nil income	58	2.88
Negative income	26	1.29

HOUSEHOLD ENERGY CHARACTERISTICS

Table 32. Respondents' home energy sources.

Variable (N = 2016)	Frequency (n)	Percentage (%)
Electricity (grid connected)	1895	94
Gas (mains)	1230	61
Gas (bottled)	504	25
Solar hot water	524	26
Solar PV	706	35
Battery storage unit	262	13
Electric vehicle (Battery)	202	10
Hybrid vehicle	252	12.5

Table 33 shows respondents' situation in relation to their electricity bill. It shows that just over half of respondents do not have a problem paying their electricity bill in full (55.5%), 23.4% sometimes find it hard, while 8.3% struggle to pay their electricity bill. Only a small percentage (2.9%) report being in credit from their solar feed-in tariff which contrasts with the percentage who have solar PV.

Table 33. Which best describes your situation in relation to your electricity bill?

Situation	Frequency (n)	Percentage (%)
Paying my electricity bill in full is never a problem for me	1,118	55.5
I sometimes find it hard to pay my electricity bill when it becomes due	471	23.4
I always struggle to pay my electricity bill when it becomes due	168	8.3
My electricity bill is usually in credit after factoring in solar feed-in tariffs	59	2.9
I pre-pay my electricity bill	95	4.7
I do not pay for electricity in my house	105	5.2

The survey also asked respondents to rate their level of happiness with respect to their life in general and with the environment around them, using a scale of 0 very unhappy and 100 very happy. The question was: 'In general, how happy do you think you are with: a) your daily life?, and b) the environment around you?'

Figure 20 shows the density curves for the levels of happiness where the red line represents happiness with their daily life (red line) and the green line the environment around them. Both curves are skewed toward the right, showing that higher proportion of respondents are happy with their life and the environment around them. However, the higher green curve indicates that respondents expressed higher happiness in their daily lives in comparison to the environment around them (green curve).

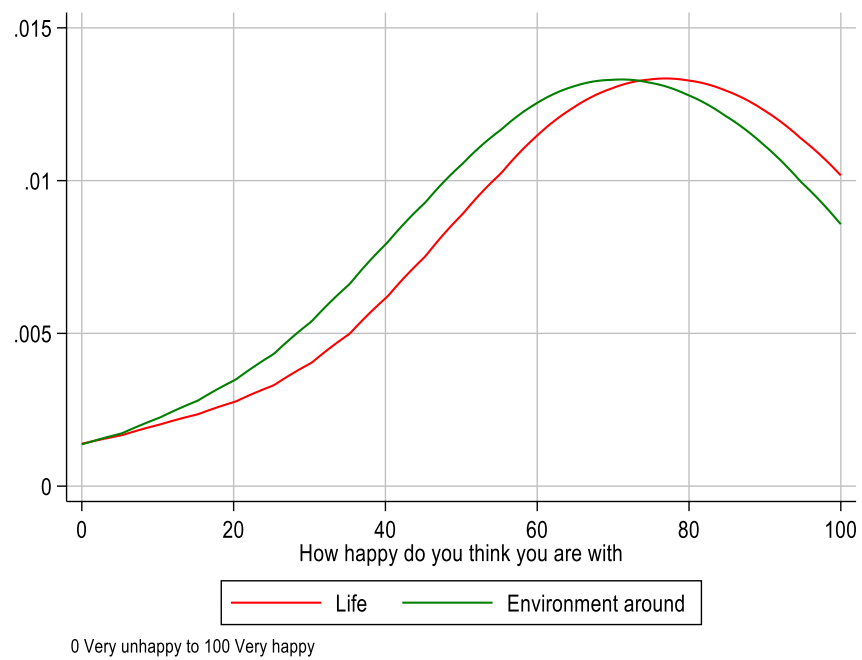


Figure 20. Density curves showing the distribution of respondents' levels of happiness with their daily life and the environment around them, respectively where the vertical axis is the density.

Appendix B - Key pieces of literature helpful in understanding how surveys have been used as instruments in social acceptance and/or biogas studies

Table 34: Scanning biogas survey and social acceptance studies where survey questions are published.

Survey focus	Questionnaire published	Reference
This study seeks to assess sociocultural and acceptability issues associated with the use of faecal waste (human excreta, cattle manure, etc.) as a source of energy in selected stakeholder areas in Benin City, Nigeria	Table 1 shows variable classification	(Ajie et al., 2021)
This paper proposes that the approach of social acceptance of renewable energy technology needs to include the concept of naturalness to understand the social rejection of biogas technology. Because naturalness concerns are not only strongly associated with the physical emotions of disgust and fear but also with disgust as a moral emotion, which is experienced as an indignity to the community, they have the potential to prevent energy projects from succeeding	indicate which of the renewable energy technology (i.e., solar, wind, hydro, biogas, and nuclear) they consider as clean (purity) and which as contaminated (risky). to report the extent to which they feel these emotions when they think about the different renewable energy technologies (i.e., solar, wind, hydro, biogas, and nuclear). Besides the feelings of disgust and fear, we also assessed participants' general concerns about the different energy technologies. If you had to choose the sources of your energy, which would you prefer. Please rank the renewable energy technologies (i.e., solar, wind, hydro, biogas, and nuclear) according to your preferences. to assess the status quo of energy sources used for lighting, cooking, and heating in the Jackson Informal Settlement (Study 2): Energy sources for lighting were assessed by providing participants with a list of energy sources including paraffin, gas, electricity, candles and other; and asking them to select the source(s) they use for this activity. emailed 19/11/21	(Dumont et al., 2021)
This study aims to analyse the determinants of citizens' perceptions regarding the construction of new biomass plants in their neighbouring areas. In particular, the focus is on prior knowledge of the production process of biogas as well as on other individual characteristics. The investigation is based on two repeated surveys conducted among the population living in two Italian areas where the construction of new large biogas plants were planned (the provinces of Oristano and Andria). The first survey analyses the main variables correlated with the degree of biogas acceptability particularly the biogas knowledge. The second survey (differentiated in two waves) focuses on the role of participatory processes and information campaigns undertaken by policy makers and environmental associations to	"Do you believe that a biogas plant could have positive impacts on the community?"; "Do you believe that a biogas plant could have negative impacts on the community?" and finally, "Do you believe that citizens who live in the vicinity of a plant must be compensated?"	(Mazzanti et al., 2021)

increase the social acceptance of communities regarding the construction of new biogas plants.	<p>“Would your reaction be positive or negative to the news regarding the construction of a Biogas plant in your territory?”.</p> <p>“Do you believe that citizens who live in the vicinity of a plant must be compensated?”</p> <p>“Do you know how biogas is produced?”, “Are you familiar with the biogas/bio-methane supply chain?”,</p> <p>“Do you know that bio-methane can be produced from biogas?”.</p> <p>“Do you know that with biogas it is possible to produce electricity?”,</p> <p>“Do you know that with biogas it is possible to produce thermal energy?”, and</p> <p>“Have you ever visited biogas plants?”</p>	
<u>Note</u> survey about RE (wind and solar) not biogas	Questions are included in manuscript in Table 2 and 3	(Safari et al., 2020)
investigates local acceptance based on a cross-national questionnaire study of 667 residents living near 11 biogas plants in the 3 national sub-regions of the Upper Rhine. Using descriptive methods in combination with multiple regression analysis, factors influencing local acceptance of biogas plants are investigated.	See table 9 in manuscript	(Schumacher & Schultmann, 2017)
to measure the effects of perceived benefits, perceived costs, trust towards the plant operator, perceived smell, information received and participation options on citizens' acceptance of “their” biogas plant.	Yes table 2 in manuscript	(Soland et al., 2013)

Appendix C - Copy of Survey

PARTICIPANT INFORMATION SHEET

Research Title: National Survey on Biogas

Researcher(s): Professor Peta Ashworth¹, Dr Katherine Witt², Dr Franzisca Weder³, Dr Amrita Kambo¹, Mrs Andrea Arratia-Solar⁴, Mr. Bishal Bharadwaj¹

- 1.School of Chemical Engineering, The University of Queensland, Brisbane, Australia
- 2.Centre for Coal Seam Gas, The University of Queensland, Brisbane, Australia
- 3.School of Communication and Arts, The University of Queensland, Brisbane Australia
- 4.Sustainable Minerals Institute, The University of Queensland, Brisbane Australia

Thank you for your interest in participating in this research project. Please read the following information about the project so that you can decide whether you would like to take part in this research. Your decision whether you take part, or not to take part, or to take part and then withdraw, will not affect your relationship with the University of Queensland.

What is this research about?

This survey is being conducted to investigate public attitudes towards and perceptions of biogas. The study is being conducted by a team of researchers from the University of Queensland, led by Professor Peta Ashworth at the School of Chemical Engineering. The survey is funded by the Future Fuels Cooperative Research Centre (FFCRC) and is part of a larger project called *Enhancing acceptance and a social licence to operate of future fuel infrastructure through community engagement and deliberative processes (RP2.1-01)*, which aims to understand current knowledge, attitudes and responses towards the development of a renewable gas industry in Australia, including biogas.

It is anticipated that the results of this research will be published and/or presented in a variety of forms. Findings from this survey will be used to prepare research reports and other relevant academic publications and might be further incorporated in comparative analyses, along with data and information collected from other studies conducted within the scope of the larger project *Enhancing acceptance and a social licence to operate of future fuel infrastructure through community engagement and deliberative processes*.

The information that you provide during the survey will be anonymous. The results from this survey will be presented as general conclusions only.

What will I need to do?

You are invited to respond to this online survey, which will take approximately 20 minutes of your time. We are keen to access the views of a range of Australians and you do not have to be an expert on the subject to participate.

Do I have to be a part of this program?

Please Note that participation in this survey is entirely voluntary and you are free to withdraw at any time without prejudice or penalty. Your consent to participate in the survey will be obtained if you choose to proceed.

If you decide to take part and later change your mind, you are free to stop at any time, and you would not need to give any explanation for your decision to stop participating. If you choose to stop participating, your data will not be used in the research. Once you have completed the survey you won't be able to change your answers.

What are the possible benefits of taking part?

Based on the survey results, the research team will publish reports and journal articles on how Australians' perceive biogas. These results will be useful to decision-makers in government and industry who develop and implement policies around Australia's future fuel transition.

What are the possible risks and disadvantages of taking part?

Participating in this research will not present any further risks than those of everyday life.

What will happen to the information about me?

All information collected about you will remain confidential. The information will only be accessible to members of the research team. It is anticipated that the results of this research project will be published and/or presented in a variety of forms. In any publication and/or presentation, information will be provided in such a way that you cannot be identified, except with your expressed permission.

What will happen if I decide to withdraw?

Your participation in this research is voluntary and you are free to withdraw from the research at anytime without needing to provide any explanation, and you will not receive any penalty or bias as a result of your withdrawal. Should you decide to withdraw, all the information collected from/about you will be destroyed and will not be used in the research.

Can I hear about the results of this research?

Several publications may result from the survey. These will be published on the FFCRC website and academic journals.

Who can I contact if I have any concerns about the project?

This study adheres to the Guidelines of the ethical review process of The University of Queensland and the National Statement on Ethical Conduct in Human Research. Whilst you are free to discuss your participation in this study with the Chief Investigator of the research Professor Peta Ashworth contactable by email at p.ashworth@uq.edu.au. If you would like to speak to an officer of the University of Queensland not involved in the study, you may contact the Ethics Coordinator on +617 3365 3924 / +617 3443 1656 or email humanethics@research.uq.edu.au

This research Ethics ID number: 2021/HE002761

- ☐ I declare that I have read the Participant Information Sheet and I am 18 years of age

Do you agree to participate?

- ☐ I agree to participate
☐ I do not agree to participate

RESPONDENT INFORMATION

In what year were you born? _____

Postcode: _____

What is your Gender?

- ☐ Male
☐ Female
☐ Other (please specify) _____
☐ Prefer not to say

Which of the following best describes your occupational status?

- | | |
|---|---|
| <ul style="list-style-type: none">• Student• Household duties• Employed – Part Time• Employed – Full Time• Casual/Contracts• Self-employed | <ul style="list-style-type: none">• Unemployed not looking for work• Unemployed looking for work• Retired• Not able to work• Other (please specify) _____ |
|---|---|

ENERGY SOURCES FOR AUSTRALIA

How strongly do you agree or disagree with the use of the following energy sources and related technologies as potential ways of generating Australia's future energy needs?

	Strongly Disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly Agree
Hydrogen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gas or coal with carbon capture and storage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Solar PV	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Oil (e.g. diesel/petrol)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nuclear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biomass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biogas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

KNOWLEDGE OF BIOGAS

How much do you know about the following?

	I have never heard of it	I have heard of it	I know about it and could describe it to a friend
Biogas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If → Question: How much do you know about the following? = Biogas [I have never heard of it] → then skip next question 'How much do you know about the following?'

How much do you know about the following?

	I have never heard of it	I have heard of it	I know about it and could describe it to a friend
How biogas is produced?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How biogas is used?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How biogas is refined?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How biogas is transported?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SUPPORT FOR BIOGAS – (T1)

At this point, how do you feel about biogas as a possible solution for energy and environmental challenges?

- ☐ Strongly unsupportive
- ☐ Unsupportive
- ☐ Slightly unsupportive
- ☐ Neither supportive nor unsupportive
- ☐ Slightly supportive
- ☐ Supportive
- ☐ Very supportive

If → Question: At this point, how do you feel about biogas as a possible solution for energy and environmental challenges? = Neither supportive nor unsupportive → then display following question:

Why did you select "Neither supportive nor unsupportive" for biogas as a possible solution for energy and environmental challenges?

- ☐ I do not know enough about biogas to decide
- ☐ I do not have any feelings either way (positive or negative)
- ☐ There are pros and cons of biogas, which makes my support neutral
- ☐ I did not understand the question
- ☐ I have no opinion on this issue
- ☐ I don't care
- ☐ Other reason (please specify): _____

PLACEBO PRE-TREATMENT QUESTION

At this point, how do you feel about solar PV as a possible solution for energy and environmental challenges?

- Very unsupportive
- Unsupportive
- Slightly unsupportive
- Neither supportive nor unsupportive
- Slightly supportive
- Supportive
- Very supportive

OBJECTIVE KNOWLEDGE SCORE

Below are some statements about biogas. Select True if the statement is correct and False if it is wrong. Select 'I don't know' if you are unsure.

	True	False	I don't know
Biogas is made from plastic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biogas is a low carbon fuel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biogas is a proven technology for achieving a circular economy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FIRST TREATMENT - DEFINITION

Biogas is a mixture of methane, CO₂ and small quantities of other gases produced by anaerobic digestion of organic matter in an oxygen-free environment. The precise composition of biogas depends on the type of feedstock and the production pathway (International Energy Agency 2021)

SUPPORT FOR BIOGAS (T2) – POST FIRST TREATMENT

At this point, how do you feel about biogas as a possible solution for energy and environmental challenges?

- ☐ Strongly unsupportive
- ☐ Unsupportive
- ☐ Slightly unsupportive
- ☐ Neither supportive nor unsupportive
- ☐ Slightly supportive
- ☐ Supportive
- ☐ Very supportive

If → Question: At this point, how do you feel about biogas as a possible solution for energy and environmental challenge? = Neither supportive nor unsupportive → then display following question:

Why did you select "Neither supportive nor unsupportive" for biogas as a possible solution for energy and environmental challenges?

- ☐ I do not know enough about biogas to decide
- ☐ I do not have any feelings either way (positive or negative)
- ☐ There are pros and cons of biogas, which makes my support neutral
- ☐ I did not understand the question
- ☐ I have no opinion on this issue
- ☐ I don't care
- ☐ Other reason (please specify): _____

WILLINGNESS TO USE BIOGAS

If biogas were available today, how willing would you be to use biogas for

	Very unwilling	Unwilling	Slightly unwilling	Neither willing nor unwilling	Slightly willing	Willing	Very willing
Cooking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hot water heating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Space heating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In your car and other vehicles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aviation fuel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shipping fuel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Biogas can be made from a range of sources. Please indicate how willing you would be to use biogas made from each of the following sources. Rank your answer from 1 (most willing) to 7 (least willing). Please drag and drop to rank each of the aspects.

- _____ Garden waste
- _____ Kitchen waste
- _____ Sewage sludge
- _____ Human faeces
- _____ Animal waste
- _____ Industrial waste
- _____ Crops specifically grown for biogas production

AFFECT AND BIOGAS QUESTIONS

Overall, do you think using biogas for energy in Australia would be

	+3	+2	+1	0	-1	-2	-3	
Very worthwhile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very worthless
Very useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very useless
Very beneficial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very harmful
A very good thing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	A very bad thing

When you think about the use of biogas in Australia, please indicate how it makes you feel:

	+3	+2	+1	0	-1	-2	-3	
Very calm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very angry
Very proud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very embarrassed
Very inspired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very uninspired
Very happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very sad
Very unconcerned	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very concerned
Very attracted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very repulsed
Very clean	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very unclean

TRUST IN GROUPS QUESTIONS

If a biogas economy was to be developed in Australia, to what extent do you agree or disagree that the following groups would act in the best interests of the consumer?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Federal government	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
State government	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local government	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biogas generation companies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fuel/gas supply companies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Car manufacturers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Landfill operator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Universities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The CSIRO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Media	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental Non-Government Organisations (ENGOS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sewerage treatment plant operator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CLIMATE CHANGE BELIEFS

Do you believe climate change is happening now or will happen in the next 30 years?

- ☐ Yes, it is already happening
- ☐ It will start happening within the next 30 years
- ☐ No, it is not happening and won't
- ☐ I do not know/ I am not sure

How convinced are you that climate change represents a real problem for Australia?

- Very unconvinced
- Unconvinced
- Slightly unconvinced
- Neither convinced nor unconvinced
- Slightly convinced
- Convinced
- Very convinced

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

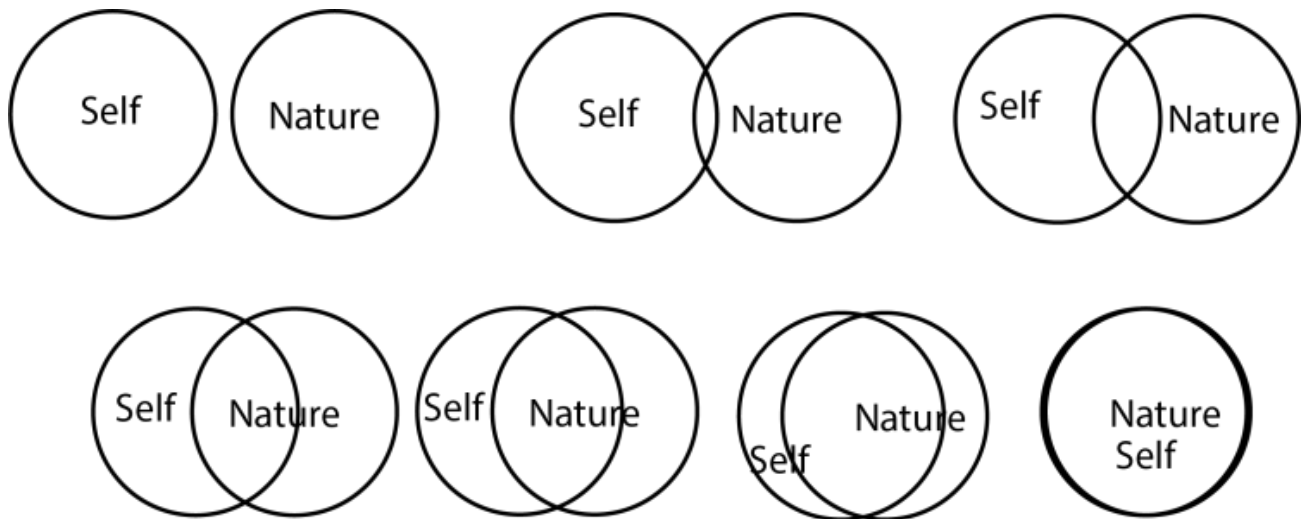
	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Global warming is a problem for society	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy savings help reduce global warming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am jointly responsible for the energy problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel jointly responsible for the exhaustion of energy sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel personally obliged to save as much energy as possibly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel morally obliged to save energy, regardless of what others do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plants and animals have as much right as humans to exist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans are seriously abusing the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ENVIRONMENTAL IDENTITY

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

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
An economic system based on free markets and unrestrained by government interference automatically works best to meet human needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I support the free-market system, but not at the expense of environmental quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The free-market system may be efficient for resource allocation, but it is limited in its capacity to promote social justice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The preservation of the free market system is more important than localized environmental concerns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Free and unregulated markets pose important threats to sustainable development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The free-market system is likely to promote unsustainable consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please select the image below that best describes your relationship with the natural environment. How interconnected are you with nature?



SUSTAINABILITY VIEW CATEGORY

When you think about sustainability, what is the first thing that comes to your mind?

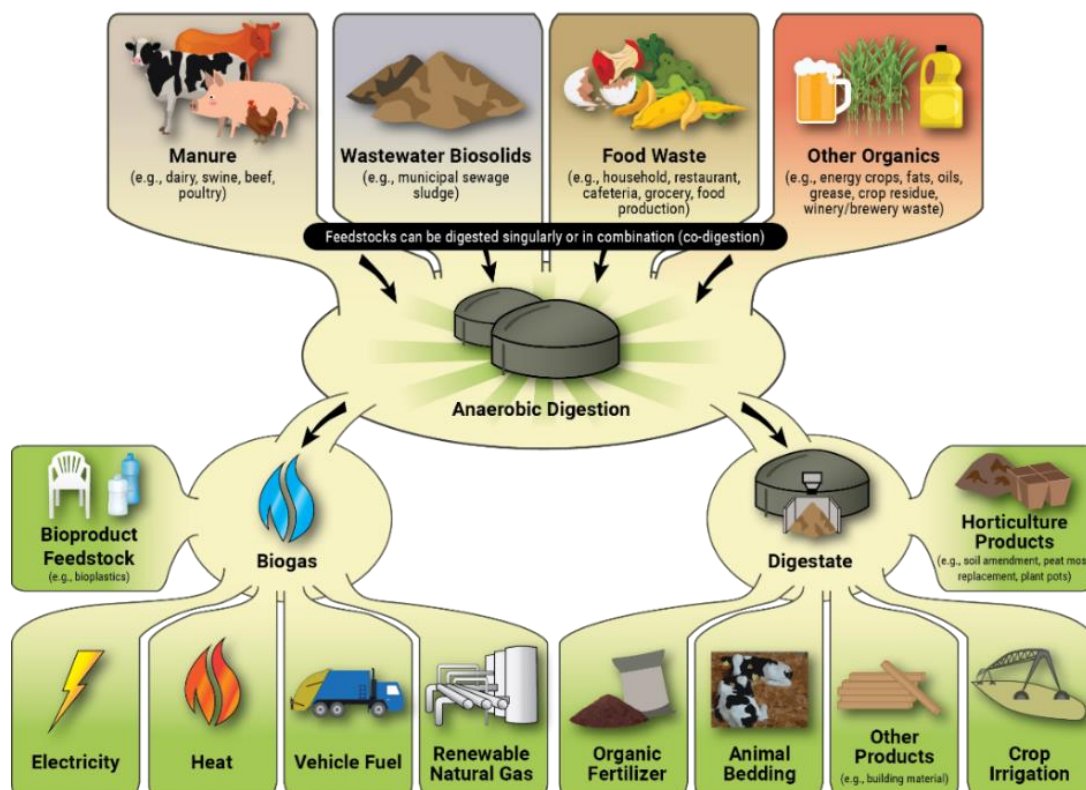
INNOVATOR CATEGORY

When thinking of your response to new technology, which best describes you?

- ☐ I closely follow new technology and take risks by being the first to purchase it
- ☐ I see the potential advantages in new technology and am one of the first to make use of its advantages and to profit from it
- ☐ I am interested in new technology but at the same time I am pragmatic. I like to take time and be persuaded by the advantages. My decisions are (mainly) based on the recommendations of existing users
- ☐ I am not thrilled by new technology, but rather appreciate security. It is safe to purchase a product when it has been on the market for some while and offers obvious advantages
- ☐ I am traditional and have little affinity with new technology. I do not like changes in life and I purchase products only when the existing model I use is not produced anymore

SECOND TREATMENT – MESSAGE

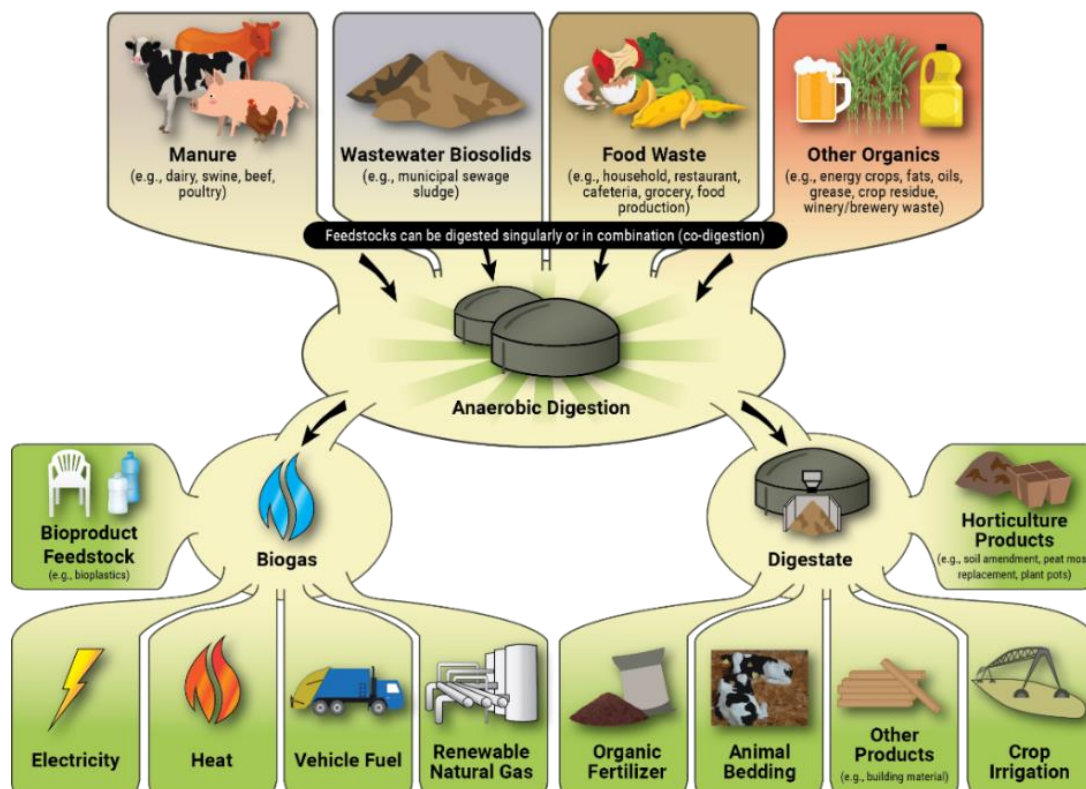
Treatment 1 (Group A)



Source: (AgSTAR, 2020)

Treatment 2 (Group B)

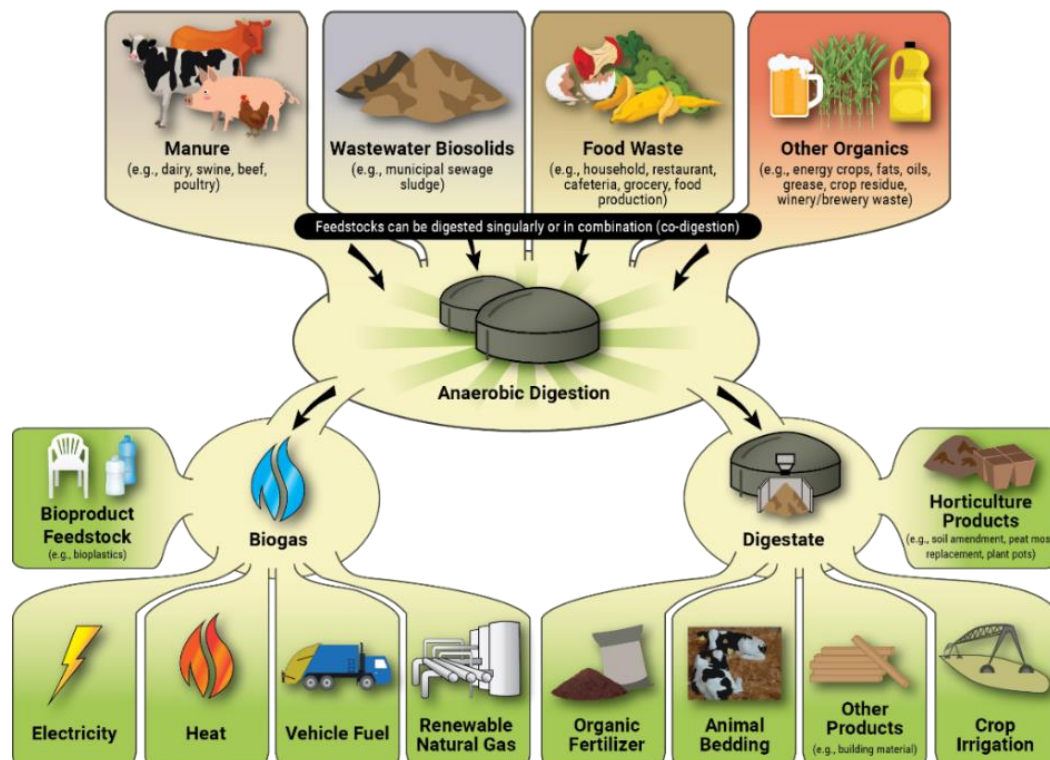
Biogas is a renewable, reliable and local source of energy.



Source: (AgSTAR, 2020)

Treatment 3 (Group C)

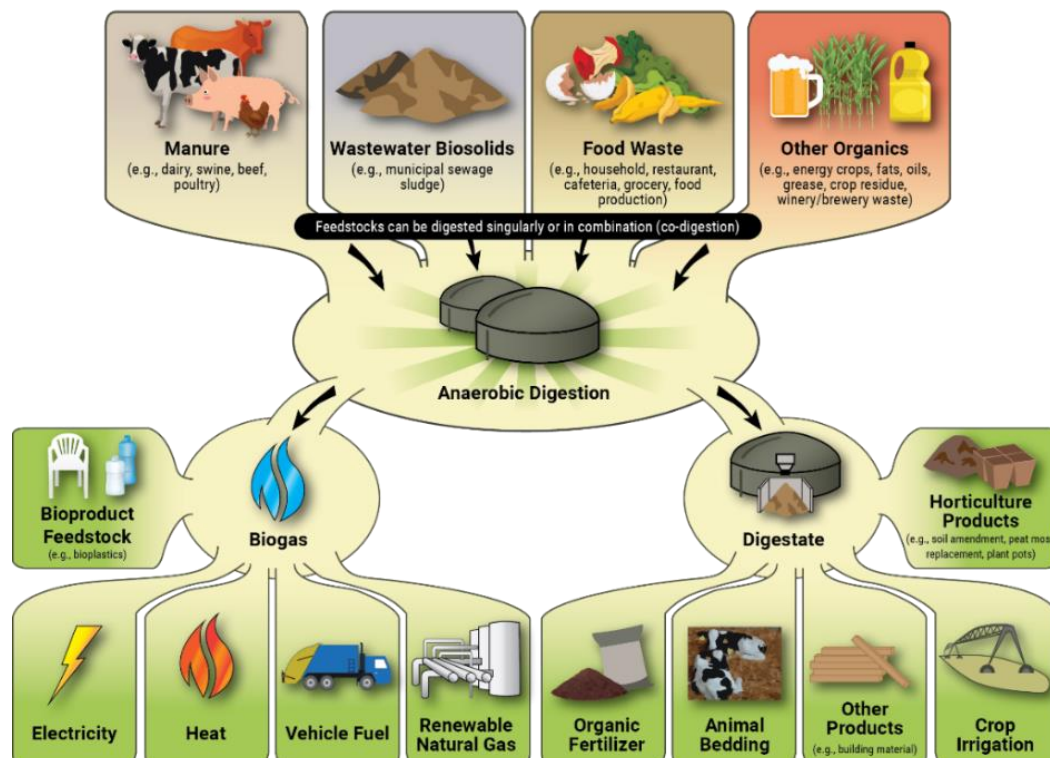
The investment opportunity for energy from waste projects is estimated to be AUD\$3.5 to 5.0 billion, with the potential to avoid up to 9 million tonnes of carbon dioxide equivalent (CO₂e) emissions each year.



Source: (AgSTAR, 2020)

Treatment 4 (Group D)

The biogas industry supports local economies and regional communities, creating jobs, and offering new income sources, particularly for farmers.



Source: (AgSTAR, 2020)

SUPPORT FOR BIOGAS (T3) – POST SECOND TREATMENT

At this point, how do you feel about biogas as a possible solution for energy and environmental challenges?

- ☐ Strongly Unsupportive
- ☐ Unsupportive
- ☐ Slightly unsupportive
- ☐ Neither supportive nor unsupportive
- ☐ Slightly supportive
- ☐ Supportive
- ☐ Very supportive

If → Question: At this point, how do you feel about biogas as a possible solution for energy and environmental challenges? = Neither supportive nor unsupportive → then display following question:

Why did you select "Neither supportive nor unsupportive" for biogas as a possible solution for energy and environmental challenges?

- ☐ I do not know enough about biogas to decide
- ☐ I do not have any feelings either way (positive or negative)
- ☐ There are pros and cons of biogas, which makes my support neutral
- ☐ I did not understand the question
- ☐ I have no opinion on this issue
- ☐ I don't care
- ☐ Other reason (please specify): _____

At this point, how do you feel about solar PV as a possible solution for energy and environmental challenges?

- ☐ Very unsupportive
- ☐ Unsupportive
- ☐ Slightly unsupportive
- ☐ Neither supportive nor unsupportive
- ☐ Slightly supportive
- ☐ Supportive
- ☐ Very supportive

Overall, do you think using biogas for energy in Australia would be

	+3	+2	+1	0	-1	-2	-3	
Very worthwhile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very worthless
Very useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very useless
Very beneficial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very harmful
A very good thing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	A very bad thing

What aspects of biogas do you support most? Please rank each item in order of support, where 1 = 'most supportive' to 9= 'least supportive'. Please drag and drop to rank each of the aspects.

- _____ Biogas production effectively diverts waste from landfill
- _____ Biogas is a renewable natural gas
- _____ Biogas industry stimulates economic growth
- _____ Biogas is a carbon-neutral source of energy
- _____ Biogas embodies a circular economy concept
- _____ Biogas decarbonizes the gas industry
- _____ Bioenergy converts biomass into sustainable aviation fuel
- _____ Biogas turns poo into products

If biogas were available today, how willing would you be to use biogas for

	Very unwilling	Moderately unwilling	Slightly unwilling	Neither willing nor unwilling	Slightly willing	Moderately willing	Very willing
Cooking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hot water heating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Space heating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For car and other vehicles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aviation fuel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shipping fuel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DEMOGRAPHICS, HOUSEHOLD CHARACTERISTICS AND ENERGY USE

Do you use the following in your household?

	Yes	No
Electricity (grid connected)	<input type="radio"/>	<input type="radio"/>
Gas (mains)	<input type="radio"/>	<input type="radio"/>
Gas (bottled)	<input type="radio"/>	<input type="radio"/>
Solar hot water	<input type="radio"/>	<input type="radio"/>
Solar PV (e.g. rooftop panels)	<input type="radio"/>	<input type="radio"/>
Battery storage unit	<input type="radio"/>	<input type="radio"/>
Battery electric vehicle	<input type="radio"/>	<input type="radio"/>
Hybrid vehicle	<input type="radio"/>	<input type="radio"/>

Do you subscribe to a green bin to collect garden waste?

- No
- Yes
- My council doesn't offer this service


Do you subscribe to renewable energy (sometimes called GreenPower) from your electricity provider?

☐ No

☐ Yes

If → Question: Do you subscribe to renewable energy (sometimes called GreenPower) from your electricity provider? = Yes → then display following question:

What percentage of the renewable energy do you subscribe from your energy provider?

	0	10	20	30	40	50	60	70	80	90	100
Please use slide bar to indicate											

Is your dwelling

Owned outright
Owned with a mortgage
Purchased under a shared equity scheme
Rented

Occupied rent free
Occupied under a life tenure scheme
Other

What is the level of the highest qualification you have completed?

Year 10 or below
Year 11 or equivalent
Year 12 or equivalent
Trade certificate or Apprenticeship
Certificate I or II

Certificate III or IV
Advanced Diploma / Diploma
Bachelor or Honours degree
Postgraduate degree (e.g. Masters, PhD)
Other (please specify)

Which best describes your individual income level (before tax)?

\$3,500 or more per week or \$182,000 or more per year
\$3,000 - \$3,499 per week or \$156,000 - \$181,999 per year
\$2,000 - \$2,999 per week or \$104,000 - \$155,999 per year
\$1,750 - \$1,999 per week or \$91,000 - \$103,999 per year
\$1,500 - \$1,749 per week or \$78,000 - \$90,999 per year
\$1,250 - \$1,499 per week or \$65,000 - \$77,999 per year
\$1,000 - \$1,249 per week or \$52,000 - \$64,999 per year
\$800 - \$999 per week or \$41,600 - \$51,999 per year

\$650 - \$799 per week or \$33,800 - \$41,599 per year
\$500 - \$649 per week or \$26,000 - \$33,799 per year
\$400 - \$499 per week or \$20,800 - \$25,999 per year
\$300 - \$399 per week or \$15,600 - \$20,799 per year
\$150 - \$299 per week or \$7,800 - \$15,599 per year
\$1 - \$149 per week or \$1 - \$7,799 per year
\$0 or nil income
Negative income

Which occupational sector do you work in (or worked in prior to ceasing work)?

Agriculture, forestry, fishing
Mining
Manufacturing
Electricity, gas, water, waste services
Construction
Wholesale trade
Retail trade
Accommodation and food services
Transport, postal and warehousing
Information, media and telecommunications

Financial and Insurance services
Rental, hiring and real estate services
Professional, scientific, technical services
Administrative and support workers
Public administration and safety
Education and training
Health care and social assistance
Arts and recreation services
Other services
Not applicable

In which country were you born?

☐ Australia

☐ Somewhere else

If → Question: In which country were you born? = Somewhere else → then display following question:

Which country were you born?

▼ Afghanistan (1) ... Zimbabwe (1357)

Are you of Aboriginal or Torres Strait Islander origin?

- ☐ No
- ☐ Yes, Aboriginal
- ☐ Yes, Torres Strait Islander
- ☐ Prefer not to answer

Which best describes your situation in relation to your electricity bill?

- ☐ Paying my electricity bill in full is never a problem for me
- ☐ I sometimes find it hard to pay my electricity bill when it becomes due
- ☐ I always struggle to pay my electricity bill when it becomes due
- ☐ My electricity bill is usually in credit after factoring in solar feed-in tariffs
- ☐ I pre-pay my electricity bill
- ☐ I do not pay for electricity in my house

What is your current status in relation to solar energy?

- ☐ I have solar PV panels installed to supply my home
- ☐ I have batteries at home to store solar energy
- ☐ I intend to install solar PV panels within the next 5 years
- ☐ I intend to have batteries at home to store solar energy
- ☐ I do not intend to install solar PV panels
- ☐ I do not know
- ☐ Other (please specify) _____



Which of the following best describes your household?

- | | |
|--------------------------|---|
| Group household | Couple with children |
| Single person household | Couple with no children |
| One parent with children | Other family (e.g. extended family household) |

In general, how happy do you think you are with? (0 = very unhappy, 100 = very happy)

Very unhappy Very happy

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Your daily life ()	
Environment around you ()	



Future Fuels CRC

Enabling the Decarbonisation of
Australia's Energy Networks



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Australian Government
Department of Industry,
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