



Citizens' panels on the role of future fuels in a low carbon future energy mix in Australia: WA and National Youth

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Project number: RP2.1-07

Deliberative engagement processes on the role of future fuels in a low carbon future energy mix in Australia: WA and National Youth

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Summary of Report

This report provides an overview of two citizens' panels held in April/May 2022 sponsored by the Future Fuels Cooperative Research Centre. The main aims of the panels were to i) document what Australians see as the challenges, opportunities and priority actions that will help Australia transition to a low-carbon energy future; ii) identify challenges, opportunities, and trade-offs in relation to the implementation of future fuels in the future energy mix; and (iii) track participants' journey (pre- and post- facto) and evaluate the citizens' panels process based on participants' experience. Pre- and post- surveys along with transcriptions of recordings from each of the deliberative sessions helped to inform the research outcomes.

The citizens' panels brought together a sample of members of the public from across Western Australia (the WA panel) and a sample of young people (18-29 years) from across the nation (the national young person or NYP panel). Participants from each panel met twice a week over a period of three weeks to learn about climate change, Australia's current energy system, future low carbon energy possibilities, including future fuels and then discussed the role they see for future fuels in Australia's future energy mix. The panels were conducted online, due to the continued uncertainty surrounding COVID-19 restrictions and to maintain consistency with prior panel processes conducted in 2021.

The citizens' panels provided insights into the factors the Australian public prioritise when considering the transition to low-carbon futures, with or without future fuels. Benefits and challenges were identified when the participants considered the energy transition. Participants were interested to preserve the *mix* in Australia's energy choices, adding to the diversity in Australia's fuel types over time. Both the WA and NYP panels are seeking government and industry to work together to deliver a just, affordable and equitable transition; keeping our options open; allowing for research and innovation to continue; and aspiring to see Australia emerge as a global leader in renewable energy. However, participants raised a range of questions when considering differences between a future fuels scenario and an all-electric scenario. Some of these included:

- Which pathway will be more affordable?
- Will all Australians (including regional and remote inhabitants) have equitable access to new renewable energy options?
- How will the workforce be prepared?
- What are the long-term environmental effects/impacts of new energy pathways?

The quantitative results showed that as the panels concluded, participants' self-rated knowledge of hydrogen and biogas (the future fuels of focus) improved over time. As the panels progressed their support towards, willingness to use, and experiential responses or feelings towards hydrogen shifted towards the positive end of the scale.

Recommendations

During the deliberations, participants expressed the need to consider the perspectives, rights and interests of two specific groups of society thought to be critical players in energy transition: children (as the adults and leaders of the future) and First Nations peoples. It was suggested that this was required not only to develop a sense of what these groups think of future fuels, but what the groups can architect and contribute in terms of vision and direction. Decarbonisation is becoming a broadly agreed social policy imperative, and truly inclusive, democratic approaches are required. Indeed, the Future Fuels CRC project steering committee recognised the need to include and understand the views of younger Australians, which is the rationale for the panel specifically for 18-35 year olds (NYP). However, the panels also identified the need to include First Nations people in the national conversation with a specific focus on engagement with leaders and communities where new energy infrastructure may impact on access to land and water.

From a topical perspective, a clearer understanding around issues in relation to cost and affordability of changing the current energy system is needed. With a focus on integrative thinking, it may be prudent to deploy future deliberative democracy forums as 'solution-finding' interventions (Hartz-Karp & Marinova, 2021), where the problems of cost, and specifically the distribution of cost and effective incentives and disincentives are explored in finer detail. For a more comprehensive picture, it makes absolute sense to revisit the notion of a national hydrogen survey to see what the latest movements and trends are at the broadest level. A national survey targets a larger subset of the population as compared to citizens' panels and so is helpful to triangulate and further evaluate the effectiveness of any information provision and communication in relation to future fuels.

1. Introduction

The research project *RP2.1-07 - Deliberative engagement processes on the role of future fuels in Australia's future low-carbon energy mix* investigated public attitudes towards future fuels and their associated production processes and use. Initially, through a deliberative engagement process, [three citizens' panels were held in February and March, 2021](#). These brought together members of the public from Greater Melbourne, the Illawarra/Wollongong region, and the state of South Australia.

This report details the findings from two further citizens' panels conducted in April/May 2022. The focus was to determine the views of the public from Western Australia (WA panel) who are not connected to the east coast grid, and the perceptions of young persons (18 – 29 years) (NYP panel) from across the nation. The main aims were to: i) identify and document what Australians see as the opportunities, challenges and considerations in relation to the implementation of future fuels in the future energy mix; ii) collectively devise principles that can guide Australia's path to a low carbon future and iii) track participants' journey (pre- and post- facto) and evaluate the citizens' panel process based on participants' experience.

Following the same process as the 2021 panels, the 2022 panels met twice a week over a period of three weeks to learn about climate change, the current Australian energy system, future energy possibilities including future fuels and then discuss the role they saw for future fuels in the future energy mix of Australia. While it is recognised that all sectors of the economy are expected to contribute to reducing greenhouse gas emissions, this study concentrates on the role of future fuels in the energy generation and distribution sector. However, linkages to other sectors including transport are also recognised as being important.

The report provides a short background in Chapter 2, following with methods in Chapter 3. Chapter 4 documents the citizens' panels composition and characteristics. The qualitative results are provided in Chapter 5. Chapter 6 discusses the quantitative results arising from the deliberations and surveys completed by participants respectively. Chapter 7 provides an evaluation of the process. Chapter 8 provides a discussion on the key findings and Chapter 9 draws out the main conclusions ending with recommendations and indicates suggested next steps and future work.

2. Background

For the 2021 panels, participatory, deliberative approaches were chosen to engage with selected panel participants, because they are recognised as being effective when it comes to implementing energy technologies, innovations and policies (e.g. Batel & Devine-Wright, 2015; MacArthur, 2016). To enable comparison with the prior panels, it was decided to keep the methods as consistent as possible with the 2021 exercise.

2.1. DELIBERATIVE PROCESSES

Deliberative engagement processes were the preferred tool in the 2021 exercise as they provide a much richer understanding when compared with other conventional modes of obtaining public opinion. While two previous surveys have presented results on levels of awareness and baseline support for hydrogen in Australia (Lambert & Ashworth, 2018; Martin et al., 2021), these deliberative processes were purposefully designed to add to that knowledge base. Deliberative research, is based on the notion of deliberation, where deliberation has been defined as *mutual communication that involves weighing and reflecting on preferences, values and interests regarding matters of common concern* (Dryzek, 2002; Mansbridge, 2015).

2.2. CITIZENS' PANELS

For the 2021 exercise, a form of citizens' panels was used. Citizens' panels involve groups of people who are selected to be representative of the wider public. Because the process is conducted over an extended period, this allows for multiple short surveys to be issued at points before, during and after the panel discussions. This helps to show how information is being processed and how perceptions change over time. This ability to track how participants respond to new types of information, with manageable group sizes, made citizens' panels a good fit for this research.

A **Citizens' Panel** is an opportunity for a representative group of people to come together to discuss a specific issue. Participants are selected to statistically represent (demographically and attitudinally) the members of a wider population. These people meet together over an extended period of time to learn about an important issue, discuss it with other fellow citizens and come up with recommendations or present a collective view on a topic.

A **large group process** usually involves workshop-style collaboration, consisting of a mix of large group plenary sessions featuring expert presentations followed by questions, and small group breakout sessions where participants discuss the topics amongst themselves with the help of a facilitator. The workshop also features a series of questionnaires to capture participants' experience.

Deliberative workshops developed out of focus group method as a more in-depth alternative that provides participants with an opportunity to learn about and discuss an issue so that they reach an informed position. Deliberative workshops are dialogue events where the focus is on having informed discussion on a specific topic. A defining feature of those type of workshops is that all group discussions are supported by facilitators. Facilitators' main role is to support participants to communicate and interact in productive and respectful way.

Deliberative workshops allow the organisation conducting the event to have a greater understanding of reasons and explanations behind an opinion or how people's views change as they are given new information.

Keeping in mind the above stated normative definitions, the finer details as they relate to the methods involved in the 2022 exercise are described in the following chapter.

3. Methods

For the sake of consistency and alignment, the project governance, panel design, process outline, and data analyses were kept the same as the 2021 panels with respect to design and implementation. Minor changes were made to account for procedural and operational learnings from the 2021 panels and any changes along with reasons why, are explained below.

3.1. PROJECT GOVERNANCE

The role of Industry Steering Committee (ISC) and the Independent Advisory Panel (IAP) remained the same as in 2021. The ISC provided input on industry needs and suggestions of best geographic locations to focus on, while the IAP provided strategic support and advice. In the planning phase, ISC and IAP members helped to ascertain key aspects of the panel design. Namely, the members gave advice on briefing guide content, presenters chosen and presentation outline, scenario selection, participants' activities. The finalised content was vetted for accuracy and bias by the IAP. The IAP and ISC continue to offer support in promoting the process, outcomes and overall findings and recommendations to relevant institutions and organisations.

3.2. PANEL DESIGN

For consistency with the 2021 panels, the 2022 were conducted online due to the uncertainty of further COVID disruption and to keep them consistent for comparison purposes. Like last time, the panels met twice a week

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over a period of three weeks. At the start of each week, participants from all locations attended one combined 2.5-hour learning session, where a series of expert presentations (Refer Appendix 3: Presentation to Citizens' Panels) and Q&A interactions took place (Refer Appendix 1: Questions via deliberations). Participants were also required to attend a second weekly 2.5-hour panel deliberation session, with each panel meeting in separate sessions on separate days (see Figure 1). The deliberative processes (the panels) were designed to fit into a three week period to give participants time to process information and do 'homework' or think of questions, while minimising participant fatigue and subsequent drop-out. Second, fitting the panels into three weeks reduced the possibility of panels' responses to the information presented being overly influenced by major announcements, media events or political debates that may have arisen outside of the panels.

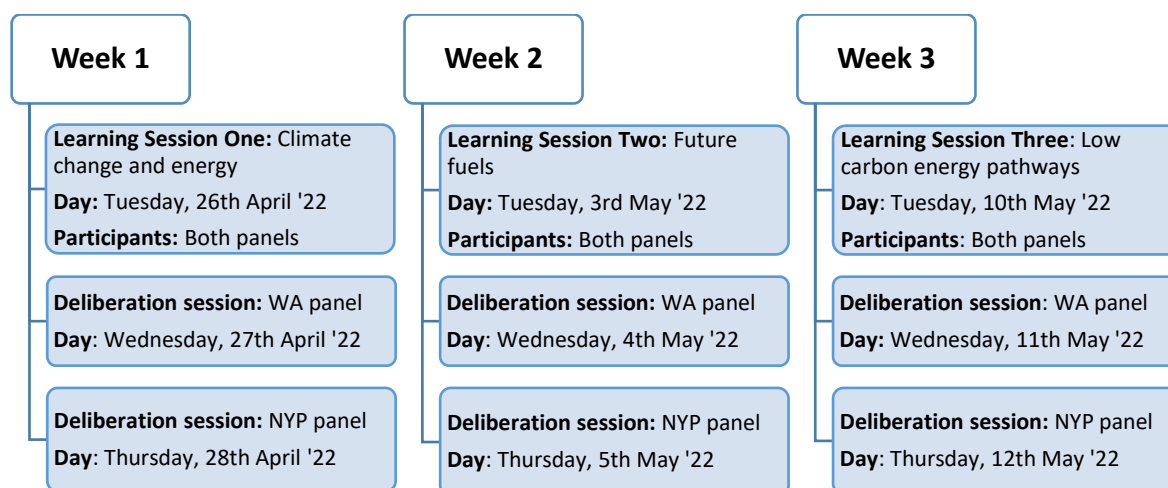


Figure 1: Citizens' panels schedule

3.2.1. Information provision, lines of questioning and weekly reporting

Since research indicates that the information provided to the participants during the process has the greatest influence on their opinions (Goodin & Niemeyer, 2003; Thompson et al., 2015), the validity and veracity of deliberative process are highly dependent on how presenters are selected and how evidence is provided (Roberts et al., 2020). For this reason, the information provision aspect in 2022 remained as close as possible to the 2021 exercise, as did the logic and rationale behind the learning sessions (See Section 3.2.2 in [Interim Report \(2021\)](#) for details). However, a few changes were made in response to logistics and past learnings as follows:

3.2.1.1. Briefing guide

In alignment with 2021 panels, a briefing guide was emailed to participants ahead of the panels. A few amendments were made to the briefing guide to update statistics and add relevant information from more recent public discourse on Australia's energy landscape.

3.2.1.2. Presentations during learning sessions

Science, academia, industry, and government experts were invited to deliver presentations on climate change, Australia's energy system and potential decarbonisation scenarios. A few presentations were swapped in the 2022 panels in keeping with presenter availability and based on suggested improvements from the previous year. The list of presentation topics, presenter background and outline of the content is shown in Table 1 below.

3.2.1.1. Weekly agendas and reports

A weekly agenda was emailed to each participant as part of a weekly report at the end of each deliberation session and prior to the commencement of the next week's learning session. The agenda outlined the learning topics and specific activities for the week. The weekly report combined the PowerPoint presentations for the week, outcomes of the break-out room deliberations and results from the surveys evaluating participants' experience with the process each week.

Table 1: Presentation topics and descriptions

Topic	Presenter expertise	Presentation outline
Climate change	Climate	Australia's changing climate; Oceans; Greenhouse gases; Future climate projections (temperature, rainfall, fire weather, sea level)
Energy today	Energy systems	Primary energy and energy usage; Fossil energy; CO ₂ emissions; Quality of life; Energy consumption & exports; Electricity; Gas; What is a way forward
Hydrogen	Hydrogen technology	Hydrogen as an energy carrier; Hydrogen in Australia; NHS and other government initiatives; Hydrogen demonstration projects; Uses of hydrogen (transport, gas networks, industrial processes, electricity generation, export)
Biomass/biogas	Biogas technology	Organic waste generation; Drivers for biomethane industry; Food/garden waste generation; Biogas production; Biogas and zero net CO ₂ emission
Energy vulnerability	Energy justice	Energy poverty and vulnerability; Why does it matter; Energy vulnerability measures
Potential decarbonisation pathways	Energy markets	Current energy supply; Emissions intensity; Reducing emissions from gas and electricity; Existing energy supply chain; Hydrogen supply chain; Electricity supply chain; What are the costs to society?
Trade-offs and challenges of energy transitions	Social justice	Economic/Social/Environmental trade-offs; Energy transitions over the years; Trade-offs of energy transitions
Gas substitution roadmap	Energy policy	Plan to decarbonise; meet emissions reduction targets; policy recommendations and actions

3.2.1.2. Lines of questioning

Participants had the opportunity to ask questions in the Q&A session following the presentation or to submit their questions via the chat function in Zoom. The research team collected the questions submitted online, and a written response to each question was sent to all participants after the citizens' panels concluded, via separate reports. In total, the participants submitted more than 200 questions. Participants mainly asked questions that required further information around the presented topics, clarifying content of the presentations and requesting more detailed information in relation to either the data or content presented.

All questions were grouped together by topic and answered in Q&A booklets issued at the end of the panels. This process differed from the 2021 panels, where selected questions were answered in the weekly reports. As a result, the 2022 Q&A booklets offer a comprehensive compilation of the questions posed by participants and provide further insights into current levels of public awareness.

3.2.2. Tasks for deliberations

As with the learning sessions, the logic and rationale behind the deliberation sessions remained the same (see Section 3.2.3 in [Interim Report \(2021\)](#) for details), where the exploratory, iterative and evaluative nature of the deliberation tasks and activities is described. Figure 2 and Figure 3 show how learning topics lead into specific tasks for deliberations and how the qualitative and quantitative outcomes are linked to each deliberation task.

3.1. DATA ANALYSES

This report analyses multiple types of data items, namely, facilitator-led content created on Google docs and self-reported data from participants collected via surveys. Other data items collected during the citizens' panels include saved Zoom chat windows, audio-video recordings transcribed into text files. Figure 4 describes the nature of all the data items (whether qualitative or quantitative) that were generated during the panels.

	Learning topics	Questions/ tasks for deliberations	Outcomes
Week 1	Climate change and energy today	<ul style="list-style-type: none"> ✓ What do you value most about our current energy system ⊘ What are the aspects/ things about the current energy system that you would like to change? 📋 What are the principles that would guide the path to a low carbon energy future for Australia? 	<ul style="list-style-type: none"> ✓ Aspects of the energy system participants' value most ⊘ Aspects of the current energy systems that participants would like to change
Week 2	Hydrogen, biogas and opportunities, challenges and considerations for future fuels	<ul style="list-style-type: none"> 📋 What are the principles that would guide the path to a low carbon energy future for Australia? (continued) 👍 What do you believe are the opportunities and challenges for FFs in our daily lives and the economy more broadly? ♻️ What are the considerations we need to make now to be able to incorporate FFs in the future low-carbon energy mix of Australia? 	<ul style="list-style-type: none"> 👍 Opportunities for FF ⊘ Challenges for FF ♻️ Considerations for FF
Week 3	Potential decarbonisation pathways, trade-off and challenges for energy transitions, energy vulnerability	<ul style="list-style-type: none"> 📋 What are the principles that would guide the path to a low carbon energy future for Australia? (finalising) 🔍 FF pathway exploration and evaluation 🔍 All-electric pathway exploration and evaluation 	<ul style="list-style-type: none"> 📋 A set of principles to guide the path to a low-carbon energy future 🔍 FF pathways evaluation against principles. Identify opportunities and challenges of FF pathway 🔍 All-electric pathways evaluation against principles. Identify opportunities and challenges of all-electric pathway

Figure 2: Citizens' panels process – deliberations and qualitative outcomes

	Learning topics	Questions/ tasks for deliberations	Quantitative results	
Week 1	<ul style="list-style-type: none"> Pre-deliberation survey Climate change and energy today 	<ul style="list-style-type: none"> ✓ ⊘ 📋 	<ul style="list-style-type: none"> Feedback survey 	<ul style="list-style-type: none"> 📊 Descriptive Statistics 😊 Attitudes 💡 Perceived effectiveness
Week 2	Hydrogen, biogas and opportunities, challenges and considerations for future fuels	<ul style="list-style-type: none"> 📋 👍 ♻️ 	<ul style="list-style-type: none"> Feedback survey 	<ul style="list-style-type: none"> 📊 Descriptive Statistics 😊 Attitudes 💡 Perceived effectiveness
Week 3	Potential decarbonisation pathways, trade-off and challenges for energy transitions, energy vulnerability	<ul style="list-style-type: none"> 📋 🔍 🔍 	<ul style="list-style-type: none"> Post-deliberation survey 	<ul style="list-style-type: none"> 📊 Descriptive Statistics 😊 Attitudes 💡 Perceived effectiveness

Figure 3: Evaluation of citizens' panels process - surveys and quantitative outcomes

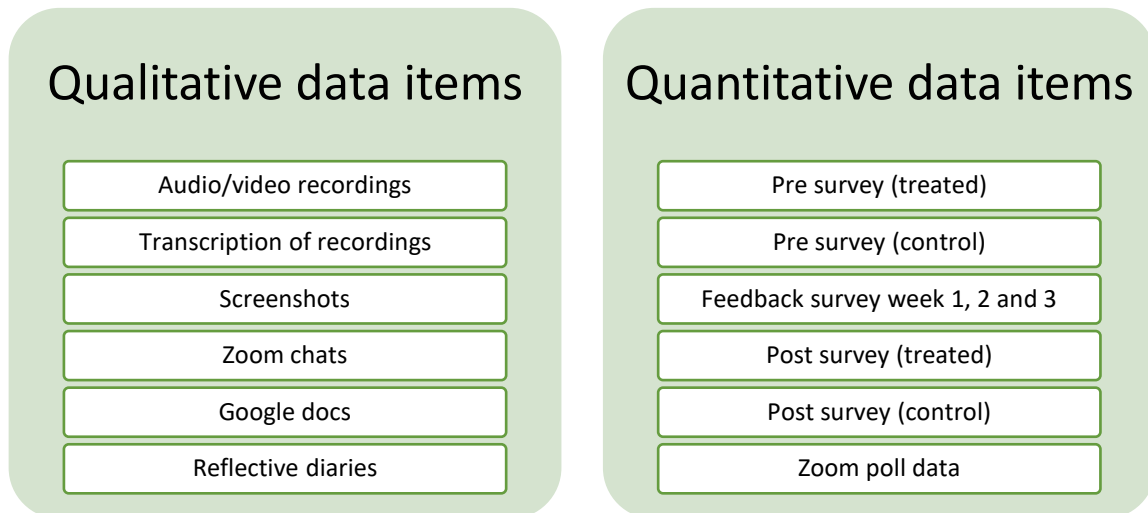


Figure 4: Data items collected during the citizens' panels

The first round of analysis took place while the deliberative sessions were live, and the participants were online. This involved a quick analysis of the content generated by the facilitators in each of the break-out groups, which was captured as live feed during the deliberative processes in Google docs (Figure 5). Content in the Google docs was quickly analysed by frequency of mention to identify the main themes that emerged from the deliberations. These themes were reported back immediately to participants for verification. For the more detailed reporting of results, the Google docs content was coded into themes and then categorised by multiple team members and over multiple iterations to check for consistency and thoroughness. In addition to the facilitators' notes in Google docs, full transcripts from the Zoom recordings were cleaned and cross-referenced to check that themes had not been missed, and whether other themes may be identified. Themes identified through this process are reported in Chapter 4. To highlight themes, selected quotes have been inserted to provide examples and meaning to the summary information.

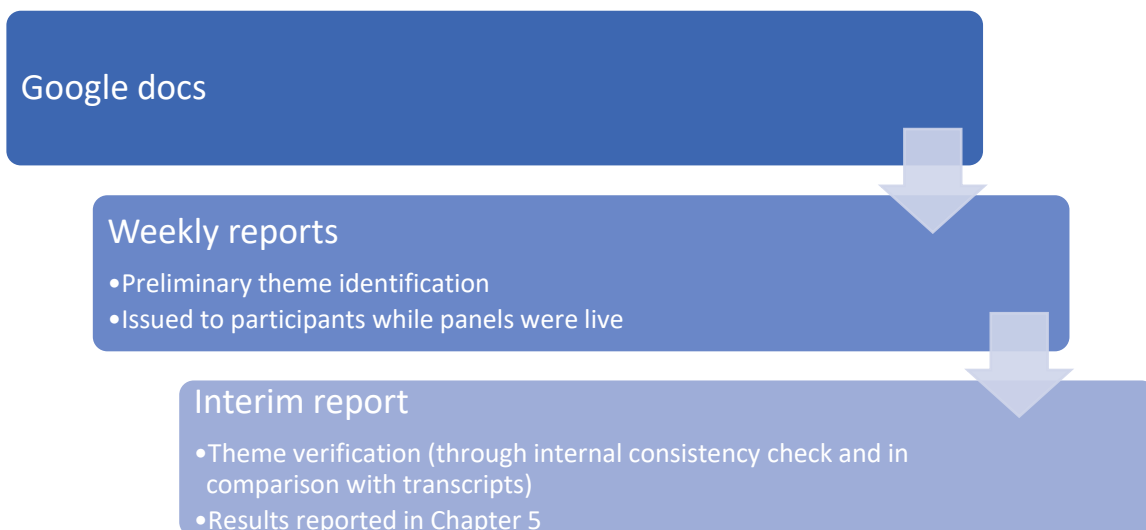


Figure 5: Data items and results produced following qualitative analyses

Information from the pre- and post- surveys were first checked for incomplete or unmatched responses. Using participants' unique identifiers, we identified 35 and 39 participants, that could be matched with their survey responses over time. These are reported as descriptive statistics showing changes in means responses before and after the deliberations. This analysis provides insights into how participants' attitudes towards the various technologies, including hydrogen, changed because of the panel process. There are also several measures that

point to how the participants viewed the effectiveness of the panels and their involvement in them, which are also included in this report, as shown in Figure 6.

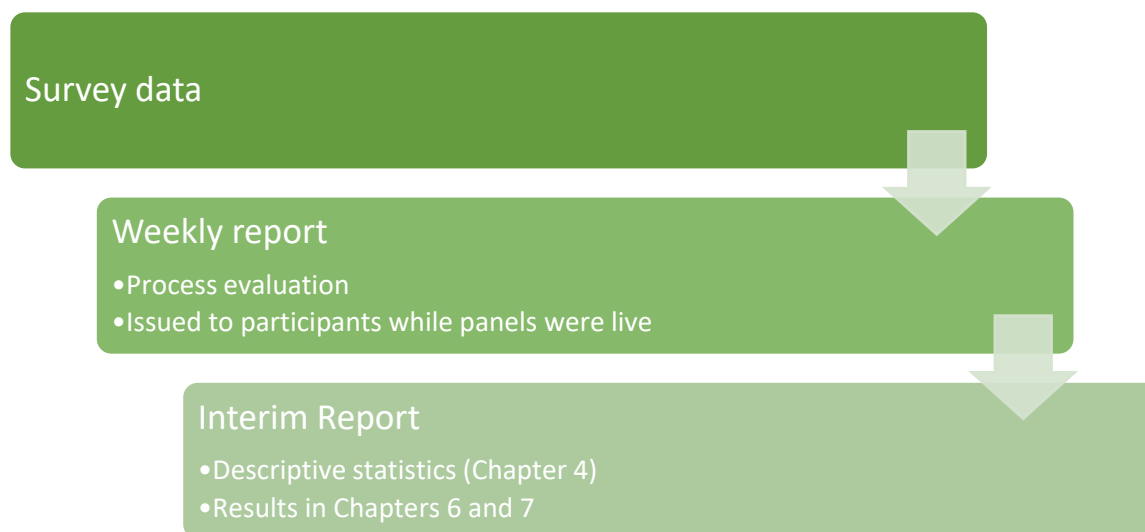


Figure 6: Data items and results produced following quantitative analyses

3.2. RECRUITMENT OF PARTICIPANTS

There was a goal to recruit 50 participants for each of the two panels – WA state and NYP which included two control groups of 15 individuals in each. The control groups did not participate in the online deliberative processes but did complete the same survey as participants before and after the panels. Further explanation of the role of control groups and how they were used is provided in results Section 6 below.

Basic demographic criteria of gender, age and employment were selected to guide the recruitment. Table 2 and Table 3 constitute the desirable sample frames in accordance with ABS guidelines for the WA and the NYP panel, showing numbers of participants required in each category:

Further, the market research company was asked to adhere to the following requirements:

1. Employment status: Ensure an even distribution based on workforce participation (i.e., employed, unemployed and retired).
2. Geographical distribution: Ensure an even spread across regional/rural/city areas where possible. If possible, recruit each participant from a unique postcode.
3. Additionally, if participants had participated in the 2021 panels, they could not take part in this round.

While most quotas were filled easily, the recruiters experienced some difficulty identifying people in line with the sampling frames. There were also a number of 'dropouts', as anticipated. Learning from the 2021 panels which aimed for panel sizes of 42 participants, it was decided to recruit up to 50 participants in total, assuming that some would pull out. Nevertheless, the market research company reported difficulties recruiting in the lead up to federal elections and had to work harder on 'convincing' people, particularly within the younger population, to commit to the time required for full participation. Despite their efforts, the actual sample size continued to shrink over the course of the panels. Only respondents deemed to have completed all the participation requirements were paid the full incentive amount, others were paid a partial amount, and those who did not attend were not paid at all. However, in this report the final sample size is determined by the number of participants whose survey responses could be tracked based on the pre- and post- surveys (for WA, n= 35 and for NYP n= 36).

Table 2: Sample frame for WA panel

Citizens' panel: West Australia (WA) panel							
Sample distribution by state, age and gender							
Region	Quota for region	Treated*			Control*		
		Male	Female	Total	Male	Female	Total
Bunbury	3	2	1	3		1	1
Mandurah	2	1	1	2	1		1
Perth - inner	4	2	2	4	1	1	2
Perth – north-east	5	2	3	5	1	1	2
Perth – north-west	11	6	5	11	1	1	2
Perth – south-east	10	5	5	10	1	1	2
Perth – south-west	8	4	4	8	1	1	2
Western Australia - Outback (north)	2	1	1	2		1	1
Western Australia - Outback (south)	2	1	1	2	1		1
Western Australia - Wheat Belt	3	1	2	3		1	1
Total	50	25	25	50	7	8	15

*Please include non-binary if available

Table 3: Sample frame for NYP Panel

Citizen panel: national young persons (NYP) panel												
Sample distribution by state, age and gender												
Cohort	Age group	Gender	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total	
Treated	18-24	Male	2	2	2	1	1	1	1	1	11	
		Female	2	2	2	1	1	1	1	1	11	
		Other*	1	1	1						3	
	25-30	Male	2	2	2	1	1	1	1	1	11	
		Female	2	2	2	1	1	1	1	1	11	
		Other*	1	1	1						3	
	Total			10	10	10	4	4	4	4	4	50
	Control	18-24	Male	1		1		1		1		4
			Female		1		1		1		1	4
Other*											0	
25-30		Male		1		1			1		3	
		Female	1		1		1		1		4	
		Other*									0	
Total			2	2	2	2	2	2	2	1	15	

*If non-binary is not available, replace with males in 25-30 age bracket and females in 18-24 age bracket for NSW, Victoria and Queensland.

4. Citizens' panel composition and characteristics

4.1. DEMOGRAPHICS

Table 4 below shows that of the targeted 50 participants there were only 35 and 39 respectively in the WA and NYP panels and as expected, there was some attrition over the three weeks. As with the previous panels there was a higher proportion of individuals who possessed a bachelor's degree or above. Higher education rates among participants may be related to the more complex and technical nature of the discussion topic, which may arguably appeal to a more educated cohort, or it could also reflect the type of person who signs up to participate in market research, who may also arguably be a more educated, engaged citizen. Certainly, the commitment of time required to participate fully in the deliberative engagement process requires a level of engagement and interest in the topic that goes beyond most market research processes.

Table 4: Composition of panel and their socio-demographic characteristics

Variables	WA			NYP		
	Quota (n)	Start	End	Quota (n)	Start	End
GENDER						
Male	25	19	18	22	20	18
Female	25	20	17	22	19	18
Other				6		
AGE						
18-24		7	5	25	18	17
25-30		2	2	25	21	19
30-40		7	5	--	--	--
40-50		9	9	--	--	--
50-60		8	7	--	--	--
60+		6	7	--	--	--
TOTAL	50	39	35	50	39	36
EMPLOYMENT STATUS						
Employed full time		16	15		23	18
Employed part-time		5	5		4	5
Student		8	4		9	9
Housework		4	5			
Unemployed/other		1	2		3	4
Retired		5	4			
LEVEL OF EDUCATION (%)						
Year 10 or below		3%			5%	
Year 12 or equivalent (11)		23%			26%	
Certificate I, II III or IV		15%			18%	
Advanced Diploma / Diploma		5%			10%	
Bachelor's degree level and above		54%			41%	

4.1.1. Participants' household energy profile

Because the focus of the engagement was on energy, it was felt important to capture the range of energy each household was using to see if this might influence attitudes and responses to future fuels as shown in Table 5.

Table 5: Participants' household energy profile

Energy Use	WA		NYP		Total	
	N	%	N	%	N	%
Electricity (grid)	39	92	39	97	78	95
Gas (mains)	39	72	39	72	78	72
Gas (bottled)	39	31	39	26	78	28
Solar hot water	39	21	39	23	78	22
Solar PV	39	56	39	26	78	41
Battery storage unit	39	5	39	18	78	12
Battery electric vehicle	39	8	39	8	78	8
Hybrid vehicle	39	3	39	3	78	3

5. Qualitative Results

The results presented below are derived from the iterative thematic analysis of participants' statements as captured by the break-out room facilitators in Google docs, cross-referenced with full transcripts from the Zoom recordings. Notes taken by the facilitators were placed into themes and sub-themes, counted and reported in descending order and compared to the Weekly report themes to check for consistency. The emergent themes and their categories are presented in the tables that follow in order of their frequency of mention. The themes and categories have been named in a way that preserves the authenticity of voice from the participants rather than being grammatically correct. Some statement did not fit into any of the identified categories or may have been off-topic. These sorts of comments, jokes and asides can play an important role in establishing group dynamics but are not particularly useful in their content. Rather than being omitted, they have simply been coded as indeterminate.

5.1. WHAT PARTICIPANTS' VALUE MOST ABOUT OUR CURRENT ENERGY SYSTEM

In this activity, participants were asked to discuss the question “What do you value most about our current energy system?” To summarise, the most valued characteristic of Australia’s current energy system is that it underpins a quality lifestyle with many comforts, conveniences and benefits. Participants in both WA and NYP panels highly value this lifestyle, which was described as privileged and, importantly, they recognise that a reliable energy supply affords that desirable lifestyle. Discussion about what is ‘good’ about the current energy system appears to have also triggered ideas about what could be better, and some of these ideas were also put forward. This category includes references to energy being too expensive, not being managed or communicated well enough, lack of diversity in providers as well as both hopes and concerns for hydrogen.

Related to the first category, energy was valued as an essential service, being described as a ‘basic need’. As such, social justice characteristics such as its broad accessibility, affordability (despite some participants views of it being too expensive), and its consistent availability were valued. Having a choice between energy providers, between energy sources (such as gas or electric for cooking, or between fossil fuels or renewables) was also valued by participants, and particularly so for the younger panel. Similarly, being able to exercise a degree of personal control in where and how people engage with energy, either through the grid, or off-grid, through feed-in options, the choice and amount of technology adopted, etc was also valued in both panels.

Further detail of the Participants’ responses are discussed separately for each panel below.

5.1.1. WA panel

The WA panel’s responses are summarised in Table 6. An explanation of the themes/subcategories is provided in the sections that follow (in the same order as the table – descending counts). The statements are not *ad verbatim*, but as close to as possible, being captured by the facilitators in each of the break-out discussion groups. There were seven break out groups in this deliberation.

Table 6: WA panel - What do you value most about our current energy system?

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
A privileged life	30	Having choice is important	14
Reliability	22	Sustainable/renewable options	10
Supports desired lifestyle	8	Choice of providers	2
Can it be better?	24	No nuclear	1
Too expensive	5	Latest technology	1
Better environmental management is needed	5	Indeterminate	12
Better communication is needed	3	Self-empowerment	8
Consumers do not have much of a voice	2	Having a feed-in tariff option, government rebate	7
Regional areas underserved	2	Technology for getting off the grid	1
Limited choice of providers	2	Early warning systems	5
Better leadership is needed	1	Good communication	3
Concerns about hydrogen	1	Fuel watch system	1
The promise of hydrogen	1	Transparency	1
Limited options for consumers	1	Profit and conscience	4
Basic necessity	14	Availability of renewable options	2
Availability	8	Creates jobs	1
Affordability	4	Economic outlook	1
Accessibility	1	Conscientious actions	3
Energy system is as valuable as water	1	Saving energy	2
		Smart appliances	1
		Grand Total	114

5.1.1.1. A privileged life

Without any doubt, the one thing that WA participants value the most about the current energy system is its reliability. Having a reliable energy supply underpins many other identified values and was said to afford a “privileged” lifestyle (especially when compared to other countries), where citizens have the luxury of “taking energy for granted” as a basic “expectation” and they “don’t have to think about it”. Having reliable power “24 hours a day, 7 days a week at the flick of a switch” was highly valued by West Australians. However, it was also thought that the system’s stability, as well as the safety and integrity of the infrastructure are largely taken for granted. The energy system was described as a “set and forget” system that keeps everyone comfortable across all seasons. Another value of a reliable energy system is that it allows people to stay connected and be entertained. An increasingly important value is that it allows people (from anywhere, including rural and remote places) to work from home. The energy system was referred to as being convenient and reliable with blackouts and shortages being a rare occurrence:

“Convenient & reliable - electricity is there and don’t have to worry about supply to appliances. Our system may not be best for environment, but it at least works.”

“Integrity in the system. We have procedures and processes - compared to other countries which is not consolidated. When we lose power, it can be reinstated/restored. We are in a good place. Things will be repaired.”

“Keeping our power grid consistent. Power outages are not more than a yearly occurrence.”

“There is an element of privilege and expectation in our energy supply.”

5.1.1.2. A basic necessity

Energy – its availability, affordability and accessibility were also seen as a basic necessity of life, despite there being an awareness that having a safe, reliable energy system is a unique Australian privilege (when compared to other nations). The energy system was likened to water, as another basic necessity of life, as participants struggled to articulate the aspects of the energy system they most value:

“Availability. Used to living in a first world country where it is available.”

“Accessibility - all our needs are being met. Access to electricity, petrol, hot water. Not struggling for any of these things.”

“As much as water”.

5.1.1.3. Having choice is important

West Australians value the ability to choose between different sources and providers of energy. Participants felt that if WA were to have a more diverse energy system with multiple providers, offering energy from multiple sources (such as solar, gas, electricity, electric and gas cars, solar and wind), and at competitive rates, their position as consumers would improve. Therefore, the prospect of sustainable and renewable options being added to the energy mix is seen in a favourable light. One group expressed their aversion towards nuclear energy and reported that they valued the prospect of avoiding nuclear waste and its dangerous effects on health.

“Good to have some choices e.g. solar power. WA has fewer choices than eastern. Like that we have been able to use the sun. Looking at battery storage but waiting for prices to come down. “

“Appreciate having different types of energy available. Gas for cooking is great.”

5.1.1.4. Self-empowerment

Participants in four groups, brought up the economic value they see in installing solar panels in the home. They relayed their experiences in saving money on electricity bills as a result of the installation (from the feed-in tariff). Those with roof-top solar also appreciated the government rebate they received at the time of installation. Further to this, having an option to store solar electricity at home via batteries was thought to further improve their experience and strengthen their ability to go off-grid.

2.1-07. Deliberative engagement processes on the role of future fuels in the future low carbon energy mix in Australia

5.1.1.5. Early warning systems

Recognising uncertainty that may arise with energy transition, West Australians stated that they valued open, honest and timely communication about potential disruptions whenever and wherever possible. They did not expect systems to be perfect but appreciated being “kept in the loop” where it was known that changes and upgrades were imminent. They gave examples of what they considered as ‘good communication’:

“Good experience to see them explain changes and upgrades.”

“SMS system very good keeping informed and updated around work...not yet perfect.”

“Fuel watch system - lots of processes to help consumer in place even if pricing is not great.”

5.1.1.6. Profit and conscience

For one participant, it was felt to be “unconscionable” to ignore the renewable energy generation opportunity in WA since there is such a high concentration of light and heat. They felt that education around solar energy and its benefits must be more clearly brought home to the wider public. There was a general sentiment that participants could reconcile easily with a ‘clean’ Australian energy system that replaces fossil fuels and still brings in export income and generates domestic job opportunities.

“So we could still sell energy but sell clean energy, or sell hydrogen that’s, you know, obviously safely stored. So, we don’t have to lose GDP from energy by going clean, that might be something that could happen down the track.”

“With fossil fuels, especially coal we need to phase out a lot faster. You know, it’s been one of the biggest failings that we haven’t been trying to move the economy further away from that already.”

5.1.1.7. Conscientious actions

The energy system was described as a complex and diverse system, but this allows for individual choices and personalisation of energy use behaviour. Some participants valued that they were able to act on their personal beliefs and values in their choices of energy use. For example, they welcomed the prospect of contributing towards the health of the planet by saving energy on their own initiative where possible. They also saw value in investing in new smart appliances that are designed to be energy efficient.

5.1.1.8. Indeterminate

As in any natural conversation, there were statements that were asides, or jokes, and which did not directly relate to the activity question. These were marked as indeterminate. As this was the first activity of the three-week period, it can be inferred that both participants and facilitators were warming up to their roles and falling into informal chit-chat as is normal in this type of interaction.

5.1.1.9. Can it be better?

Several statements were coded into this category as participants pre-emptively launched into the second activity as they began discussing their discomforts and grievances with the system, along with what they valued. Statements coded in this category, therefore offer an insight into what participants might like to *change* about the energy system. Some of these insights are discussed more deeply in Section 5.2. Participants mostly expressed frustration about perceived complacency around climate change action and that current energy lifestyles are unsustainable. There was an appetite for stronger action on climate change and retirement of the fossil fuel system:

“It’s about the future of life on earth. Humans can’t work or live in extreme heat. Humans consume a lot of energy to live, it’s not sustainable.”

“Do not value the emissions from fossil fuels, wish we moved quicker.”

There were several complaints from participants who found current energy prices too high. However, it was acknowledged that:

“We are so privileged that we complain about prices - but we still bear it. No one is boycotting petrol.”

The need for clear communication about ‘clean’ energy was stated, including information about new projects and innovations that might impact them. What is ‘clean’ and how do we determine that it is ‘clean’?

“Need good communication about the production of all materials in a ‘clean’ energy system. Are batteries clean energy?”

“Heard that Woodside is opening a hydrogen plant. Like to know what this will do? Not (much) information about this at a grass roots level - we need simple clear information.”

Participants indicated that they felt that they were not being heard by the political system and struggled with the fact that they did not seem to have a voice – either as consumers or as political subjects of a democratic nation. Participants also drew attention to regional areas and how they are under-served in comparison to urban areas. They related their experiences around how regional friends and families struggled with regular power cuts, especially during summer.

A desire for more service providers was also expressed, as currently WA consumers feel they have limited options to choose from.

In the specific context of hydrogen, some interest in knowing more about hydrogen was expressed, however some participants shared concerns around hydrogen’s safety and offered that supply chains had not yet been tested.

“We just don't know anything. As we learned yesterday, I feel I know very little (about hydrogen). And I think this is something I'd like to know about.”

5.1.2. NYP panel

NYP panel’s responses to the Activity 1 question easily fell into categories similar to the WA panel. Although the topical content was similar, emphasis differed to some extent (based on values against the count of google doc statements). The results are reported in descending order of Google docs statements categorised against theme/subcategory (Table 7).

5.1.2.1. A privileged life

As with the WA panel, the NYP panel were aware of how privileged their lives are due to the everyday conveniences offered by a reliable energy system. It was discussed how outages are rare and living standards are far higher than other countries, who are not so lucky to have an energy system that is operable day and night, all year around. Participants appreciated the current energy system for making modern lifestyles easy, enjoyable and struggle free.

5.1.2.1. Having choice is important

As with the WA panel, the NYP participants’ value the ability to choose. However, the NYP panel was more emphatic when stating their preference to see more sustainable/renewable options in Australia’s energy mix. They value diversity in the system - gas, electricity, hydro, solar, wind etc – and want to see more growth in the green energy sector:

“I value energy that does not produce emissions.”

“SA - we have 60% renewable energy in the grid and this will grow to 85%. At the moment if it's sunny we can run on completely renewable energy.”

“Options for consumers to select green energy nationwide.”

There was a strong appreciation of Australia’s sunny climate and the opportunity that this offers residents to install solar panels and save money. Overall participants reported positive experiences around solar energy:

Having a wide variety of options and in QLD you can use the sun as an advantage to save money and use solar panels.

Table 7: NYP panel - What do you value most about our current energy system?

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
A privileged life	31	Basic necessity	13
Reliability	22	Affordability	5
Supports desired lifestyle	6	Accessibility	4
Reliable; sustainable/renewable options	1	Availability	3
Air travel	1	Accessibility, Affordability	1
Reliable; jobs	1	Self-empowerment	9
Having choice is important	25	Having a feed-in tariff option, government rebate	4
Sustainable/renewable options	20	Discounts/incentives	2
Diverse sources of power	1	Technology for getting off the grid	2
More than one supplier	1	Backup systems	1
Latest Technology	1	Indeterminate	5
Market competitiveness	1	Indeterminate	4
Transparency	1	Longevity	1
Can it be better?	24	Conscientious actions	5
Accessible but contributes to climate change	5	Smart meters/ monitoring systems	4
Too expensive	3	Saving energy	1
Less reliable in remote areas	3	Learning	6
Regional areas underserved	3	Education	4
Cynicism/apathy	1	Good information	2
Environmental considerations	1	Safety	3
Better environmental management is needed	1	Safe infrastructure	2
Nothing	1	Safe to use	1
Too expensive; options	1	Profit and conscience – creates jobs	3
Energy providers foster dependence	1	Renters’ concerns and options	2
Restricted supply	1	Less options for renters	1
Reliance on coal	1	Greenpower offsets	1
Climate change awareness	1	Visual amenity	2
The system is vulnerable to natural disasters	1	Eyesore	1
		Out of sight out of mind	1
		Grand Total	128

There was a feeling that having more energy suppliers in the market would better it would be for everyday Australians because it would increase competitiveness. More players in the market and more transparency in pricing was thought to be good for consumers looking for better deals. Interest was also expressed in all new technologies (such as heat pumps) that offer more efficient heating systems than what some participants currently had. Whilst the need for diversity in the energy system was expressed, an acknowledgement was made towards Australian families who may have connection to the coal mining industry, and that their welfare ought not to suffer when Australia transitions to other energy sources.

5.1.2.2. Basic necessity

As with the WA participants, the NYP panel also related well to an energy system that was affordable, accessible and available. Where restrictions in supply are evident (as in underserved regional areas), there was discomfort that the system is not fair for everyone:

“Accessible if in a metro area, central Queensland may not be all connected to the main grid.”

“Moved to Tasmania at start of the year - Gold Coast prioritises energy more. Is Tasmania more behind in terms of accessibility. Commercialisation of it. In QLD hear about energy and the networks. Whereas in Tas is a lot less. “

“Affordable so that everyone can play a part.”

5.1.2.3. Self-empowerment

Participants shared their experiences with solar energy and valued the rebates offered by the government to incentivise the uptake of solar panels. They related positive experiences around receiving feed-in tariffs for energy exported to the grid.

“In Victoria with rebates it was a government push to get solar. That was a good thing to come from the government.”

“Good solar rebate program here, harness solar energy. NZ more wind, hydro is something they want to do.”

Participants also indicated their value for having access to energy sources which allows them to be self-reliant when access to the grid is cut-off (during extreme weather events). Even though there is gratitude for a reliable and ever-present connection to energy, a need persists to have local back-up systems to meet energy needs during natural disasters or difficult times.

5.1.2.4. Conscientious actions

NYP participants relayed positive experiences around smart meters and apps that allow them to monitor their energy-use and save energy. The real-time data generated by the tracking apps, allows them to ‘see’ their energy use and encourages them to alter their behaviour and act conscientiously towards saving energy. The reduced energy bills, because of their own conscientious actions, were considered a bonus.

“Vic government is giving out smart monitors for free. I have one and I can see how much power I am using. Having access to data - smart meters - is really helpful/useful. Spending 5c an hour right now! Then you can see the changes when appliances are used. If I could see the usage go up, I would turn appliances off (air con).”

5.1.2.5. Learning

NYP participants valued the information that they received through the citizens’ panels presentations. They also expressed a wish for education campaigns targeting fence-sitters and older generations about energy sources (other than coal/fossil fuels).

“Not well educated but younger generation is aware and do know that there are other options. Parents and older don’t know about other sources. Having information more readily could convince fence sitters.”

5.1.2.6. Safety

Participants noted their appreciation for the safety aspect of Australia’s energy infrastructure:

“The infrastructure in Australia looks like it’s in better condition and less risky for outages. Doesn’t look like the infrastructure will fall apart.”

5.1.2.7. Profit and conscience

Participants were acutely aware that the energy sector is a huge employer in Australia, particularly for their age group and they also valued the export income that fossil fuels have so far been generating for Australia:

“From an economic standpoint, that’s probably Australia’s biggest worry is if we stop exporting all of this fossil fuels and stuff what’s our economy going to end up looking like?”

5.1.2.8. Renters’ concerns and options

A participant who was renting stated that they had limited options to install renewable energy systems in the home. Another participant brought the group’s attention to GreenPower which is an option provided by some energy retailers. For those who can afford to pay for it, Greenpower was seen to be a good alternative since it adds more supply of renewable energy into the grid on the consumers’ behalf.

“Future interest in renewables is high in this group but most are renting so have no options to install. All participants would put solar on given the chance or if they had the income to afford it right now.”

5.1.2.9. Visual amenity

Participants placed value on how infrastructure ‘looks’ and how visible it is. Although they appreciate having power available 24/7, they would be very concerned if it impeded scenic amenity in any way. Their preference is to have infrastructure that remains out of sight and out of mind:

“It is hidden - solar panels. But the power stations are hidden.”

5.1.2.10. Indeterminate

As before, statements not speaking in direct relation to the activity question were placed in this category. NYP statements in this category were much less in comparison to WA. One category ‘longevity’ is also placed here because one participant spoke of a hypothetical case where they imagined that people who have made good money from the fossil fuel industry may have a vested interest or be uncaring towards the environmental impact of the industry and therefore may be more interested in maintaining the status quo. However, this aspect of valuing the longevity of the current fossil fuel-based energy system does not come through as a belief held by the NYP panel themselves, as will be evident in the next section.

5.1.2.11. Can it be better?

The NYP panel were concerned about the detrimental effect the current fossil fuel-based energy system has on the environment. Many stated their awareness around climate change and felt there was currently too much reliance on coal. These participants are seeking better outcomes in terms of environmental management in order to preserve ecological systems for future generations:

“We are lucky as we have energy sources. But huge environmental cost. Our generation is becoming aware of that. We are becoming more aware of the need to change and that is a positive. “

The panel also worry about cost-effectiveness and that energy costs are disproportionately high for some to manage:

“People are struggling, cost of living so much more expensive.”

There was also discomfort around the fact that regional areas are underserved and that remote areas have a very unique subset of problems not shared by their urban counterparts. There was a belief that more investment is needed to improve the infrastructure in countryside areas:

“Other remote areas like NT, only one power station, as soon it blows out for a few days.”

“Interesting to hear about other remote area, cyclone damage and floods, neighbourhood rivalry because some connected to the hospital grid. Account for cyclone but above-ground power lines still being built.”

The group also expressed an element of frustration, cynicism and apathy as they also stated that they did not have a voice. Instead they felt that political vested interests took precedence over public good:

“Energy companies have too much leverage over consumers even if you can change (providers?). We have solar but not all have access. We have gas or electricity, so the companies have a lot of power and the consumer does not have a lot to say.”

“Govt focuses the investment where the votes are. This is the approach of the current government.”

5.1.3. Summary

Both panels highly valued the key characteristics of reliability and safety in the current energy system that afforded citizens an easy, privileged lifestyle with comforts, choices and convenience. Access to round the clock energy is an expectation and seen as a basic necessity. The ready availability of safe, reliable energy is taken for granted and people enjoy the fact that they do not have to think about it, or even to see large energy infrastructure in their everyday lives. High living and safety standards are greatly valued and the participants expressed that they would struggle to adapt if either of these fell.

Individual choice in energy supply and between providers was important to all participants. Also, the flexibility and freedom to personalise household energy use behaviours to minimise costs, cater for special needs and interests (such as three-phase power), or to express personal beliefs and values such as climate change action were also highly valued in both panels.

Both panels value open, honest and early communication where issues of common interest are discussed transparently and pre-emptively.

There is interest in both panels for technologies that can improve a consumer’s self-reliance when blackouts occur.

Visual amenity is valued. The fact that the current energy system mainly operates ‘behind the scenes’ where for most of the population, large scale energy infrastructure is either far removed, or ‘hidden’.

The NYP panel is slightly different to the WA panel in that they expressed greater concern with the continued reliance on coal, although the WA panel also expressed similar sentiments. Both panels would be happy to see more diversity and competition in the energy market as more energy sources (other than coal) that are renewable, clean, and green come into the energy-mix. Both panels want to see more choice, not less – more retailers, more providers, more services, more diversity.

The NYP participants’ unique concerns were around (i) future employment opportunities, recognising the large workforce involved in the current energy system, (ii) feelings of being disadvantaged as renters, where they may not be eligible for rebates and incentives offered to homeowners, nor able to make choices about energy sources or providers and (iii) a perceived lack of awareness amongst older generations of their concerns about climate and the future. They are also more concerned about the state of the environment as it is perceived to be being handed down to future generations in a less vibrant and healthy condition.

5.2. WHAT PARTICIPANTS WANT TO CHANGE ABOUT THE CURRENT ENERGY SYSTEM

In Activity 2, participants were asked to discuss the question: What are the aspects/things about our current energy system that you would like to change? As expected, those items reported in Section 5.1.1.9 and 5.1.2.11 'Can it be better?' emerged as items that both panels wanted to see as changes in our current system:

5.2.1. WA panel

The WA panel's responses to Activity 2 question are summarised in Table 8.

Table 8: WA panel - What aspects/things about our current energy system that you would like to change?

Thematic analysis of Google docs	Count of Google doc statements	Thematic analysis of Google docs	Count of Google doc statements
Subcategories		Subcategories	
A lot to put on to individuals...	18	Clear mandate from government	12
Lower cost, more financial incentives to shift to renewables	6	Quicker transition away from fossil fuels	7
Better feed in tariffs	3	Better government strategy/mandate	4
Carbon tax	3	Better communication from government	1
More government subsidies	2	Build capacity to understand issues at stake	6
Lower cost, more financial incentives to shift to renewables; energy storage	2	No nuclear	4
More affordable; energy storage technology	1	Carbon capture	1
More government funding towards green energy	1	Improve connection to renewables	1
Build diversity in the energy system	17	Better monitoring and honest reporting	5
More solar	5	More transparency	4
Nuclear as an option	3	More corporate responsibility to reduce energy use	1
Better service and more choices for regional areas	3	Look out for people losing jobs in the Coal industry	4
More provider options; opportunities to negotiate costs	2	Provide new jobs	3
Tidal/wave energy	1	Public-private partnerships	1
More innovative payment plans	1	Indeterminate	2
More provider options	1	Reduce export of emissions – less coal exports	2
More wind power	1	Improved visual amenity – less poles and wires	2
Build capacity to embrace conscientious lifestyle choices	15	Better services for regional and remote Australia – more reliable, more affordable	1
Education/information (energy efficiency, env metrics)	5	Greater focus on the environment	1
More financial incentives and rebates	5	Grand Total	85
Better awareness	3		
Support for energy efficiency	1		
Reduce footprint / conscientious lifestyle choices	1		

5.2.1.1. A lot to put on to individuals...

Participants in the WA panel recognised that there would be costs associated with decarbonising and discussed how “it was a lot to put on to *individuals*” to bear the costs of the transition. The transition was seen as a collective responsibility and these participants believed there should be more incentives, subsidies and support for individuals and households. For some, the costs and required expenditure to transition on their own were felt

to be too overwhelming to consider. For these individuals, the main concerns were around the affordability of energy and the cost of new energy infrastructure, accessories and appliances as it was felt to be out of their control. As such, although the desire to transition towards renewables is strong, to take any real action to actualise this desire, it was felt that individuals would need to be supported by government initiatives.

“More ways to move to greener energy, can be cost prohibitive. I am not sure it is worth it. It is a huge cost outlay and will need to pay it off over time.”

“A lot to put on to individuals - needs more government assistance.”

Participants reiterated the value they place on incentives such as feed-in tariffs, subsidies, and lower costs, and would like to see improved technology for storing renewable energy (in the home), if feed-in tariffs are no longer offered and thus no returns from exporting energy to the grid.

5.2.1.2. Build diversity in the energy system

Once again, the participants reiterated their desire to see more diversity built into the energy system. They wanted to see all feasible renewable energy technologies being explored, not just solar and wind power, although they are the two most obvious. Some participants also want to see developments in tidal/wave energy being explored. While others suggested that nuclear power could be an option within Australia’s energy-mix however, others were strongly against it.

In addition to exploring different sources for renewable energy, participants also wanted to see more energy companies and providers come into the market. Some participants felt that at the moment there is not enough competition in the market, with the result being that they feel have to pay what the energy companies ask them to pay. It was suggested that an individual’s capacity to negotiate better deals is severely compromised due to a lack of choice.

Once again, the need for better services in regional and remote areas was emphasised and adding innovative and diverse energy sources and additional suppliers was thought to be one measure to address some of the issues around meeting the energy needs of rural and remote communities.

5.2.1.3. Build capacity to embrace conscientious lifestyle choices

Participants also felt that an individual’s ability to act upon their desire for renewable energies is comprised due to a lack of awareness and knowledge amongst the public. The WA panel acknowledged that the younger generations were better informed and more aware than their older counterparts. However, they suggested that if the country is to move forward as a whole, then those who are less aware need to be brought along. Once again, the call for action on public education was mainly directed toward government:

“Younger people may be more educated and aware - and more concerned and more willing to change, even if it’s at a higher cost. My kids are more adamant about recycling and water conservation. They don’t pay the bills, but they will be a lot more willing to make changes at whatever cost it is - it’s their future. Younger generation can see it will happen in their lifetime.”

“Young people are more aware. Let’s get more information out there - not misinformation. Need to spend more time correcting misinformation and make sure there is education.”

“Grass roots lists of what an individual and communities could do. People generally want to act but don’t know what to do.”

The participants wanted to see better education and awareness building exercises (placing an onus on the government) so that the population could embrace conscientious lifestyles – where less is more. Where the effects of energy decisions made in the household and at the individual level are better known and can be better managed. Some participants mentioned embodied carbon emissions and wondered if energy consumption may become a more conscientious, mindful act. They sought greater clarity on behavioural changes that individuals can make in their daily lives.

“Changing our perspective on what we take for granted. Bigger fridges, bigger houses, bigger this and bigger that. We need to cut back a lot individually and we need to know that it is what we need to do.”

“Lack of connection to the pollution we create. Understanding and reminders of light switch pollution, energy associated with the products we buy.”

“When you go and buy some furniture or you buy a car, you buy an appliance, we don't think hang on, there was electricity used to make that appliance there. There are emissions attached...we're not really aware of it...and I think that affects our ability to make conscious decisions.”

5.2.1.4. Clear mandate from government

Participants could not overstate their need for a clear mandate from the government. They want to see quick, timely and forceful action to counter the perceived threats brought on by climate change. Participants felt that an overarching strategy from the government was missing and that the actions taken thus far, were too few and far between:

“I'd like us to be increasing the rate we transition to more renewable energy sources. Unrealistic to transition everything quickly. Tasmania are doing a good job at switching to renewables and other States need to do this before 2025.”

“If it's not enforced it's not going to happen.”

“Too piecemeal. Needs an overarching strategy for change. Government needs to mandate.”

5.2.1.5. Build capacity to understand issues at stake

Participants stated their own lack of awareness around other issues at stake which they felt impeded their own ability to take action in the long run. They sought more information around complex technologies such as CCS and nuclear power to be able to determine for themselves what the considerations around these technologies should be:

“We don't know a lot about carbon capture. Heard a professor saying that if we planted 1B trees we would solve the carbon problem. Are the greens doing enough about that?”

5.2.1.6. Better monitoring and honest reporting

Participants also sought better monitoring and reporting from the energy industry. Participants were seeking transparent communication from industry about their current and future plans. They also wanted to see better reporting on energy use in the business sector:

“Business uses more energy than individuals. Yet they are not supplying that information.”

“Govts need to share that information about what businesses are doing. We need to know the truth of what is going on.”

5.2.1.7. Look out for people losing jobs in the Coal industry

Although participants reported that they would like to see less reliance on coal, they held concerns about people currently employed in the fossil-fuel industry and how new jobs would be created for them?

“WA government is shutting down coal powered stations - puts people out of work.”

5.2.1.8. Indeterminate

Only two statements were coded in this category, which is positive since it implies that discussions and note-taking stayed largely on track in this activity.

5.2.1.9. Reduce export of emissions

Participants reported that they were keen to see Australia's export income come from clean and green energy, rather than coal. There was an awareness of how Australia was exporting its emissions overseas in a bid to protect its own GDP:

"Our production is going overseas - facilitating climate change. We are supplying other producers (i.e. emissions impacts)."

5.2.1.10. Improved visual amenity

The case for improved visual amenity was made again. Participants reiterated that they would like to see energy infrastructure remain 'hidden', hoping to see improved outcomes in environmental management. Case in point - not being not-in-my-backyard (NIMBY) – but I want trees-in-my-backyard (TIMBY). How can the development of new energy infrastructure come along with better environmental considerations?

"Some kind wireless power distribution."

"Actually, I would also like to see a reduction of power lines so that it doesn't impact on tree growth."

5.2.1.11. Greater focus on the environment

There were participants who drew attention to the fact that environmental concerns ought to be reconciled against our desire for a healthy GDP.

5.2.1.12. Better services for regional and remote Australia

The case for better services in regional and remote Australia was made as participants cited the unfairness of access in comparison to urban areas:

"In Bunbury - lots of blackouts so there are reliability issues. Cost is a big factor - it's expensive - seems more expensive than Victoria. I'm not doing it as tough as some. Will renewables be more expensive? Will it get worse?"

5.2.2. NYP panel

The NYP panel's responses to activity 2 question are summarised in

Table 9.

5.2.2.1. Build diversity in the energy system

As with the WA panel, the NYP see sense in building diversity into the system. Participants felt that there is currently too much reliance on fossil fuels. Given the urgency brought on by climate change, participants expressed the need to transition away from fossil fuels and shift the focus to renewable energy. Participants saw sense in incorporating biogas into Australia's energy mix, especially since it could bring multiple benefits of dealing with food waste and serve pressing environmental management needs (for example, weed management):

"Potentially for biogas. In the NT, instead of burning grass we could harvest the grass, could be of potential use."

"As a country, we grow far more food that we can consume so exploring biogas would make sense."

Table 9: NYP panel - What aspects/things about our current energy system would you like to change?

Thematic analysis of Google docs	Count of Google doc statements	Thematic analysis of Google docs	Count of Google doc statements
Subcategories		Subcategories	
Build diversity in the energy system	22	Better billing/metering system; more transparency	1
Nuclear as an option	4	Less special interest/lobby groups	1
More renewables	4	Less exports to China	1
Incorporate biogas	3	Cater to renters' needs - More options for renters are needed	11
Transition away from fossil fuels	3	Reliable infrastructure for renewable energy transport	10
Nuclear is complex	2	Not enough capacity to support electric cars	3
Weigh in on diverse technologies available	2	EVs unsafe/unsustainable	2
Focus more on Hydrogen	2	More sustainable fuel options	2
Less reliance on fossil fuels	1	More accessible recharge stations	1
Hydrogen options	1	More charging stations for electric cars	1
Build capacity to understand issues at stake	19	More government incentives	1
Education/information (energy efficiency, env metrics)	8	Improve systems' stability	8
Better education/information	4	Better reliability	2
Too many solar providers, difficult to choose	2	Energy security	2
Life cycles	2	Energy storage	2
Sustainable electric cars	1	Fuel security	1
Circular economy	1	Improve connection to renewables	1
More transparency	1	Clear mandate from government	5
A lot to put on to individuals...	16	More political support	4
Lower cost	5	More pressure on developers to include solar	1
Corporate responsibility	4	Build capacity to embrace conscientious lifestyle choices	4
Government support in agricultural areas	2	Support for energy efficiency	1
Public-private partnerships, more affordable	1	Observe Earth Hour	1
More provider options; opportunities to negotiate costs	1	Consumers to be more proactive	1
Use agricultural land to generate power	1	Is Earth hour enough?	1
Less private ownership of the grid	1	Greater focus on the environment	2
Lower cost, more financial incentives to shift to renewables	1	Better environmental management	1
Better monitoring and honest reporting	12	Less coal exports	1
Transparency	3	Improved visual amenity – opposition about the eyesore of the wind turbine	1
Better billing/metering system	3	Grand Total	110
No to false advertising	1		
Less conflict of interest - resource sector (?)	1		
Online apps to keep track of energy use	1		

There was an equal amount of interest in hydrogen and exploring the options it could create for Australia, given that there is experience and established industrial processes to produce hydrogen. A participant spoke of their expectations around hydrogen for diesel vehicles – that if engines could be repurposed to work with hydrogen, there would be less waste (in relation to redundant engine equipment) to manage:

I work for ... a pretty large diesel engine company... as a company, we're sort of looking towards hydrogen, because none of the planning that they've done for electric powered vehicles is sort of going to work out to be sustainable in the longed term actually ...but a lot of the engines that we have now can also be sort of converted to (hydrogen) and not actually having to dispose of them. And, like rip them out and throw them in the bin. So, it saves waste there as well."

Some participants expressed an interest in nuclear fuels and wondered why Australia can purchase nuclear submarines and export parts and materials for nuclear plants overseas, but not use the same for domestic energy production. Others brought attention to the hazards of nuclear waste and the complexity involved in building, running, and maintaining nuclear energy plants.

5.2.2.2. Build capacity to understand issues at stake

In the case of nuclear power, some participants were moved to state their complete aversion towards the technology. Other participants admitted to a lack of knowledge in relation to how things work and stated their desire for education and information on a range of topics so that they could make informed choices based on trustworthy information:

"I don't know enough about biogas".

"Not much education on energy and climate change. Last two years on covid. In Australia we don't learn about energy.

"Too much choice - how to know what you need in terms of solar systems. Recommended providers for particular areas so you know you're getting quality product."

Seeing how participants raised valid concerns in relation to their own lack of knowledge, there is a case for building capacity within the wider population so that more people can understand various socio-political-economic issues at stake. Participants vocalised their need for a trustworthy source of information as they stated their current reliance on word-of-mouth recommendations and provider websites. Since these information sources cannot be vetted, participants wished for a system where a 'stamp of approval' was evident. In this instance it was government who would provide that approval:

"The government can have a website or something that's got recommended providers for particular areas, or they've got, you know, they've got that stamp of approval, so you know, that you're getting a good product"

5.2.2.3. A lot to put on to individuals...

As with the WA panel, NYP participants also relayed their discomfort at their inability to switch to renewables, of their own accord. They felt that industry ignored its corporate responsibility as its own self-interest may be to protect profit and maintain the status-quo vis-à-vis the reliance on coal. Participants also felt that more action needed to come from governments:

"Government says we must do green energy ourselves - some hydro, some wind farms. Puts onus on consumer. All big corporations put it on consumers to do sustainable things e.g. recycling rather than changing the systems"

Participants stated their desire for a systemic change, geared towards making green energy affordable for the wider public. High costs were stated as a barrier that's too hard to overcome for an isolated individual, who as is, struggles with the high cost of living.

5.2.2.4. Better monitoring and honest reporting

Rather than individuals, the participants felt the onus ought to be placed on governments, businesses, and industry to explain, honestly and willingly, what they are doing in terms of their energy-use. The participants

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stated their desire for transparency and felt that conflicts of interest, politics, and false advertising all had a negative influence on outcomes:

“I wish there was more transparency about where our energy comes from and where we get our energy.”

“The way that energy is reported - the companies have support from the mining companies they are not encouraged to report on other supplies of energy. The information is censored.”

Participants also developed a negative image of energy companies when they issued inaccurate bills based on incorrect estimates and faulty meters. Participants suggested they would welcome new, better meters and improved meter-reading practices. There was a positive perception of apps that help consumers monitor their energy usage.

5.2.2.5. Cater to renters' needs

A uniting factor amongst the NYP panel was their shared experience and struggle around renting. Participants reported feeling constrained by their situation as renters where they could not translate into practice what they felt morally obligated to do:

“As a renter we don't get as many options as we like - would like to renewable energy but can't ask the landlord to install solar panels. Want to be able to invest in renewables but may not be able to afford a house.”

“As a renter, I don't have the option. I am kind of stuck. No guaranteed - not truthful. What are the green energy deals really doing?”

“Concern is for climate change/planet rather than money. Would like to see rentals required to have solar. Reliable infrastructure for renewable energy transport”

Again, the sentiment was that the government ought to have measures in place targeting landlords to improve renewable energy features in investment properties. There ought to be more schemes to facilitate first-home buyers and incentivise uptake of renewable energy systems into new homes currently being built.

“My parents had solar and instilled that (value) in me. But now I rent - I can't do anything about it. I'm never going to own a house in Sydney.”

5.2.2.6. Reliable infrastructure for renewable energy transport

Extensive discussion ensued in two groups with regards to the pros and cons of electric vehicles for transport. Some participants felt that electric vehicles would be cheaper to run considering petrol prices. Some participants were wary of the fact that only limited recharging stations are available and that it takes a long time to recharge electric vehicles. Other problems that participants noted were that batteries are flammable and come at a huge environmental cost associated with disposing of hazardous chemical waste. Other participants lamented the lack of good public transport systems as an option.

5.2.2.7. Improve systems' stability

Participants stated their need for stable systems such that fuel and energy security were assured. With regards to fossil fuels, there were concerns whether supplies of unleaded petrol would run out. With respect to renewable energy there were concerns that it was dependent on weather conditions. Participants also indicated that energy companies may need to work on producing reliable contingency plans:

“Fuel security - we only have 3 weeks supply of unleaded petrol, we can run out of petrol very quickly.”

“With renewable energy it can be unreliable as it depends on the weather (rain can mean you don’t get as much energy).”

“Reliable contingency plans for energy company.”

Participants also expressed their need for reliable storage systems for renewable energy. In their view, a domestic or neighbourhood storage system could take pressure off the larger system and reduce overall costs. Participants cited the need for better connections between the grid and renewable energy generators:

“Storage is part of reliability. Reduce the cost of power if people are using power during the day, at night they can store, and release it in the day. No need for as large power station.”

5.2.2.8. Clear mandate from government

As with the WA participants, NYP participants felt that a clear mandate from the government is needed. There was discomfort around the fact that weak political will undermined Australia’s ability to respond well to the climate change crisis:

“Lack of political support is big issue. Covid created fast response, why can’t this happen for energy and climate change.”

“More political support for diversified energy & representation of other options to fossil fuel industry?”

Participants wanted to ensure that policy and regulations are designed to target developers and ensure that new building stock that is being created, must have renewable energy features (such as solar panels) or at least commit to having features installed within five years of being built.

5.2.2.9. Build capacity to embrace conscientious lifestyle choices

Participants also felt that more could be done to empower consumers so that they could embrace conscientious lifestyle choices. They wanted to know what the simple things are that individuals can do on their own. Who would enlighten the uninitiated. How energy can be more productively used in the home. What is energy efficient behaviour? Participants spoke about WWF’s Earth Hour’ initiative, for example, as a good resource that builds capacity within individuals to firstly understand what conscientious lifestyle choices look like, and secondly embrace those choices as far as their circumstances allow.

“I feel that people think it’s an expensive switch to make and there is lot of information out there, but people don’t take the time to research it.”

5.2.2.10. Greater focus on the environment

Participants cited their awareness that exporting coal translates to exporting emissions. They felt there was a need for greater consideration of emissions and environmental effects, along with consideration of profit and income.

5.2.2.11. Improved visual amenity

As with WA, the NYP panel discussed the visual pollution that is caused by certain renewable energy interventions – specifically the case of wind turbines. Participants spoke of their discomfort at being confronted with windmills on their horizon line.

5.3. OPPORTUNITIES AND CHALLENGES FOR FUTURE FUELS IN DAILY LIVES AND THE ECONOMY

In this activity, participants were asked to discuss the question: “What do you believe are the opportunities and challenges for future fuels in our daily lives and the economy more broadly?”

In the 2021 panels this activity was conducted on the day after the learning sessions. However, in 2022, the agenda was amended to commence the activity on the same night as the learning session, so that the presentations would be fresh in the minds of the participants. Although each break-out room held participants from the same panel (WA or NYP), all facilitators (across both panels) shared a summary of their group discussions in plenary. The weekly report also summarised the discussion in a section titled “Deliberations in break-out rooms (Tuesday)”, common to both panels. As a result, there may have been some cross pollination of ideas across the panels in Week 2. In the next Sections 5.3.1 and 5.3.2, the opportunities and challenges for future fuels as perceived by the two panels are discussed:

5.3.1. Opportunities

5.3.1.1. WA panel

The WA panel perceived the potential of future fuels to be ‘better, smarter than fossil fuels’ giving WA the chance to think globally while acting locally, and to emerge from the legacy of the industrial revolution. An ‘economic benefit’ was perceived as ‘the export potential of renewable energy’; as was the benefit of local job creation and development of new domestic industries. The potential to collaborate with other countries was seen as an opportunity. Several statements were coded as ‘creates optimism’, as they read in the same vein as one note below:

“Good that (we) are actively looking to solve these problems in impressive way.”

Participants also perceived ‘environmental benefits’ of future fuels, as biogas in particular, offers ‘a serious approach to waste’ and therefore presents an opportunity where garbage is perceived as a solution rather than a problem. A caveat is that effective education is in place to ensure that the benefits of biogas are obvious and easily understood for all Australians. The WA panel welcomed the chance of having ‘more choice’ in relation to energy sources.

5.3.1.2. NYP panel

The NYP panel also perceived the environmental benefit of future fuels, specifically in reducing CO₂ emissions. Several statements from the NYP panel were also coded ‘creates optimism’ as they referenced the power of maintaining positive mindsets whilst encouraging a more conscious lifestyle where objects could be reused over and over:

“Individuals can make a difference - promoting demand for renewables.”

The NYP panel also welcomed the prospect of having ‘more choice’ in Australia’s future energy mix. Taking this one step further, the NYP panel expressed the hope that future fuels could ‘reduce energy costs’ into the future, specifically in the context of rising costs of living and inflation. Alongside this hope, the NYP panel welcomed the prospect of new jobs opening up in the area recognising that transitioning employees may have a chance to reskill into new areas. The economic benefits of exporting future fuels were also recognised. The panel acknowledged the advantage associated with the ‘good use of available resources’ – to mitigate costs whilst harnessing a natural process; and ‘innovation’ required to harness an energy source that hasn’t been used before. Finally, the NYP panel expressed the hope that a wider application at the household level would lead to systems being in place to implement future fuels into new developments such that a sustainable future could be enabled.

5.3.1.3. Summary

Table 10 presents the themes identified in the Google doc statements across the two panels in order of prevalence which included: ‘Better, smarter than fossil fuels’, ‘reduces CO₂’, ‘economic benefits’, ‘creates optimism’, ‘environmental benefits’, ‘safety’, ‘more choice in energy’. The WA panel recognised education as an opportunity and welcomed the prospect of international collaboration, while the NYP panel placed more emphasis on ‘new jobs/skills’, ‘reduced energy costs’, ‘innovation’, ‘new systems to implement applications at household levels’.

Table 10: What do you believe are the opportunities for future fuels in our daily lives and the economy more broadly?

Opportunities (WA)		Opportunities (NYP)	
Thematic analysis of Google docs	Count	Thematic analysis of Google docs	Count
Better, smarter than fossil fuels	7	Reduces CO ₂	4
Economic benefits	5	New jobs/skills	3
Creates optimism	4	Creates optimism	3
Environmental benefits	3	Reduce energy costs	3
Serious approach to waste	3	Good use of available resources	2
Safety	1	Economic benefits	2
Education can be effective	1	More choice in energy	2
International collaborations	1	Application at household level	1
More choice in energy	1	System to implement from the start	1
		Environmental benefits	1
		Innovation	1
Total	26	Total	23

5.3.2. Challenges

5.3.2.1. WA panel

'Concerns about cost', 'affordability' and 'accessibility' dominated the discussion when the WA panel considered the challenges in relation to future fuels. There was also an understanding that changing the mindset of the wider population may present a significant challenge. Uncertainty about how households may be impacted was a concern for all in this group. Educating citizens about new forms of energy was stressed as being vital, because participants felt there is currently a lack of understanding about the technology and the benefits it could bring. It was also seen to be important to explain how the new skills would be taught to the workforce required to enable the safe production of future fuels. The WA panel understood that new infrastructure would be needed and wondered whether a lack of political will, care and fragmented governance would exacerbate a lack of trust in the government (based on past experiences with recycling). The panel questioned how local people would be involved if energy were privatised and how concerns about safety would be addressed.

5.3.2.2. NYP panel

As with the WA panel, the highest number of Google doc statement were themed under the category 'concerns about costs' as participants conveyed their concerns about how costs would be passed onto all energy consumers and how such costs might impact cost of living across society. In particular, how vulnerable individuals would cope. This concern was linked to the next theme of 'financial risk and uncertainty' as participants questioned what would happen if the technology were to fail or whether the costs turned out to be prohibitive for households. The NYP panel were also concerned about 'job losses' across the fossil fuel industry and how this could become a societal challenge if some fossil fuel industry employees were left behind? Another worry was whether the new energy systems would be accessible to all Australians?

Participants also deliberated about the 'new infrastructure needed' for the transition and questioned if existing infrastructure could be converted or whether it would have to be replaced? A set of statements acknowledged how 'changing mindsets' to integrate the new fuels may present as a severe challenge. While another set of statements themed as 'public acceptance', highlighted how widespread use may be hampered if levels of acceptance remained low. As well, how uncertainty around the technology implied that people may need more information before they could meaningfully decide:

"Challenge of new appliances and new techniques, prices and suppliers will change."

"Right now it's a guess - we don't have all the information on all the technologies and each new option can change the goal posts."

As with the WA panel several statements acknowledged 'lack of political will/care' as a problem as participants wondered how responsibilities would be shared across Australia's complex governance structures. The need for a supportive policy that drives private investment was raised. There was also lament that 'good use of available resources' was not being evidenced (e.g. landfills flare biogas at source):

“Biogas is just going to waste - not utilising - something just waste”

Participants acknowledged that ‘public education’ would present itself as a challenge as the levels of awareness would be expected to be low. ‘Safety’ of hydrogen and concerns around how hydrogen burns and what happens if there was a hydrogen fire were also raised.

5.3.2.3. Summary

Table 11 compares the themes identified in the Google doc statements across the two panels in order of prevalence below. There are several common or very similar themes. Both panels raised ‘concerns about cost’ and acknowledge challenges in relation to ‘changing mindsets’, ‘new infrastructure needed’, ‘lack of political will/care’, ‘involving stakeholders. Doubts over governments and how they will handle things was conveyed in several themes (although the wordings vary slightly). The NYP panel recognised education as a challenge in contrast to WA (who perceived it as an opportunity). NYP are concerned about ‘job losses’ and WA are concerned about the new skills needed. Of particular interest to the NYP panel is the prospect of new jobs/skills, reduced energy costs, innovation, new systems to implement applications at household levels.

Table 11: What do you believe are the challenges for future fuels in our daily lives and the economy more broadly?

Challenges (WA)		Challenges (NYP)	
Thematic analysis of Google docs	Count	Thematic analysis of Google docs	Count
Concerns about cost	8	Concerns about costs	9
Changing mindsets	7	Financial risk and uncertainty	4
Uncertainty about household impacts/benefits	5	New infrastructure needed	4
Educating citizens about new forms of energy	4	Changing mindsets	3
New infrastructure needed	3	Public acceptance	3
Lack of understanding about the technology and its benefits	3	Job losses	2
Concerns about safety	2	Lack of political will/care	2
Lack of political will/care	2	Safety	2
Involving people/stakeholders	2	Uncertainty (need more information to decide)	2
Lack of trust in government	1	Accessibility	1
New skills needed	1	Complex governance/responsibility	1
Energy privatised	1	Public education	1
Fragmentation of governance	1	Good use of available resources	1
Total	40	Total	36

5.4. CONSIDERATIONS TO INCORPORATE FUTURE FUELS IN AUSTRALIA’S LOW CARBON ENERGY MIX

In this activity, participants were asked: “Keeping in mind the opportunities and the challenges you discussed in Tuesday’s session, what are the considerations you think we need to make now to be able to incorporate future fuels in the future low carbon energy mix of Australia?”

5.4.1. WA panel

The top three themes within the WA panel’s considerations centred around the need for integrated planning, affordability and costs; and strong government leadership and legislation (see Table 12):

5.4.1.1. Understanding the need for integrated planning

Recognising that a “ginormous” change is impending, the WA panel voiced the need for a plan, which incorporated long-term thinking, energy efficient design, mindful land use change/footprints where new infrastructure is put in place alongside the retrofit/reuse of existing infrastructure. The panel recognised the value of a circular economy and went on to reiterate that ‘waste reuse is good’.

Action plan to use existing infrastructure that can be used soon. Also identify what future infrastructures need to be developed.

“Problem of Hydrogen is the infrastructure. Find a way to standardise energy delivery. Then it is up to the government to deliver the energy to households using the best method in terms of efficiency and the environment.”

“Biofuels - we are already creating the waste so we should be using rather than sending it to landfill and generating methane.”

5.4.1.2. Affordability and costs

As with many of the previous discussions, concerns around ‘affordability’ were raised and the need for ‘financial incentives’ was reiterated. The need for ‘social equity’ was also emphasised to be of importance:

“WA has a large reliance on household gas usage - any change to this will be costly”.

“Don’t want to create and us and them, everyone will have to benefit and engage with the new system.”

Table 12: WA panel’s considerations to incorporate future fuels in the future low carbon energy mix of Australia

Thematic analysis of Google docs	Count of Google doc statements	Thematic analysis of Google docs	Count of Google doc statements
Subcategories		Subcategories	
Understanding the need for integrated planning	20	Strong leadership	8
Plan for change	4	Government leadership/legislation needed	6
Waste reuse is good	4	Collaborative leadership (PPPs)	2
Energy efficient design	3	Public education campaigns	6
New infrastructure needed	3	Good public education/communication needed	6
Use existing infrastructure well	2	Urgent actions	5
Long-term thinking and planning	2	Need to act now	5
Carbon capture technology is ideal	1	Safety and uncertainty	4
Land use change/footprint	1	Safety	3
Affordability and costs	11	Uncertainty	1
Financial incentives needed	4	Strong feelings	3
Affordability	3	Cynicism/apathy	2
Cost equations over time	3	Be creative/innovative	1
Social equity	1	Indeterminate*	1
		Grand Total	58

5.4.1.3. Strong Leadership

A desire for strong leadership was also emphasised. When expressing the need for strong government leadership and legislation, participants’ comments were quite specific and solution oriented. Collaborative leadership and public-private partnerships (PPPs) were seen to be valuable tools across all sectors:

“Governments and councils start planning and implementing new energy principles in all the infrastructure coming online, inclusive right of way / corridors and property lines.”

5.4.1.4. Public education campaigns

Education was another common occurring theme. Participants recognised the importance of public education campaigns emphasizing the need for timely, up-to-date, unbiased information to generate enthusiasm and passion towards renewable energy amongst the wider public:

“First thing we need to do is massive education programs right now, with real life examples of where this is working.”

5.4.1.5. Urgent actions

The need for urgency was emphasised clearly and vocally in as many as three groups. The participants recognised that the time to act is now. They felt a strict timetable is needed if Australia is to capitalise on the new technology and local manufacturing opportunities presented by a future fuels industry.

“We need to be able to access the future energy options in a fast and timely manner.”

5.4.1.6. Safety and uncertainty

As with the 2021 panels, ‘safety’ was a key consideration and came up as a discussion in two groups, statements specifically around the safety of refuelling stations were made. Although one group perceived biofuels to be safer than nuclear as an option, the uncertainty around future fuels options triggered participants into expressing a desire for ‘grandfather clauses’ whilst the most ‘environmentally conscious’ option is being determined? It is interesting to note that conversations around pre-existing refuelling stations did not emerge as this may have provided more comfort to the groups as happened in earlier focus groups on the topic. However, these citizens’ panels purposely did not focus on transport which might be the reason for this.

“Hydrogen or biogas refuelling station logistics - monitoring of levels”

5.4.1.7. Strong feelings

Although ‘uncertainty’ was acknowledged, a positive response was evidenced in the theme of ‘be creative/innovative’ where participants acknowledge the value of remaining open to new research and developments. At the same time, some statements were coded as ‘cynicism/apathy’ where it was stated:

“We heard this before.”

“Apathy like with the union.”

One participant drew attention to the fact that they had been made aware of global warming and its potentially deleterious effects as far back as the 90s. With the belief that “we’ll all be dead”, the participant expressed frustration that “no action” was being taken with the belief that over the years, a general complacency had set in. It was stated that “Australia has become a bit apathetic about things...we don’t fight as much as we used to” (about things that matter).

5.4.2. NYP panel

Thematic analysis of NYP panel’s Google doc statements are shown in Table 13.

5.4.2.1. Urgent action

Thematic analysis shows that the NYP panel are most concerned about taking ‘urgent action’ for decarbonisation – far more than the WA panel and perhaps the earlier panels. Participants are seeking clarity on timeframes with respect to implementation of with upfront planning for and investment in energy transition starting now. Urgency was spelt out through statements such as:

“Implementation of timeframes and consequences for ff targets set by an overarching national body (not government)”

“Start investing in the infrastructure now”

Table 13: NYP panel's considerations to incorporate future fuels in the future low carbon energy mix of Australia

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Urgent action	14	Strong leadership	6
Future-looking infrastructure/decisions now	8	Collaborative leadership (public-private partnership)	3
Set plans and timelines	6	Government funding/support	3
At the consumer end	11	Public education campaigns	5
Impacts on households/household needs	5	Public acceptance/education	3
Costs to consumer	3	Training in new skills	2
Siting new infrastructure	1	Disillusionment	3
Energy reliability	2	Political motivations	3
Equity and access	8	Environmentally conscientious choices	3
Social equity (remote regions)	8	Export opportunities	1
Scales of economy	7	Lockdown as short-term relief	1
Scales of economy	7	Weigh up new technologies	1
		Grand Total	57

Multiple statements specified the nature of actions that need to be taken with respect to infrastructure. In particular, how existing infrastructure would be repurposed and converted and how would new infrastructure be built for current and future energy needs to ensure reliability. The desire to transition away from fossil fuels to renewable energy was clearly stated:

“We have so many new technology options that every household could have renewable energy regardless of other factors. Make sure that they are maintained.”

“Limiting use of fossil fuels in transport and heating. Removing coal completely. Could create more opportunities for future fuels. Need to replace current (unsustainable) energy sources.”

5.4.2.2. At the consumer end

The NYP panel were conscious of the need for social justice and raised considerations about what could be expected 'at the consumer end'. This followed on from their concerns about the impact on households and householders' energy needs. Participants wondered how fossil fuels would be replaced in households and what consumers would need to do to get on with integrating future fuels into their current energy systems? Considerations for how household appliances would be replaced? How the energy would be stored? Similarly, considerations on the reuse of infrastructure for recharging/refuelling. The panel also stated their concerns around 'costs to consumers'. Participants wondered how feasible the new technologies would be when considering the costs, especially for those who had already invested towards currently available renewable options:

“Cost on consumer needs to be considered. If it's too expensive, then it won't be adopted. If affordable for low-income earners, then it will be adopted.”

The panel reiterated that Australia's energy transition needs to be feasible, reliable and profitable. They felt Australians' energy needs ought to be met in a manner comparable to, or more advanced, than the current energy system and available technology. There were questions around how quickly future fuels transport options would develop in comparison to EVs which are already in the market.

In terms of feasibility, they also raised concerns about how sites for new infrastructure would be identified:

“Infrastructure - where will it be built - needs consultation - particularly in relation to more contentious energy. Plus, anything that impacts residential.”

5.4.2.3. Equity and access

Equity and access was a theme underlying discussion in as many as five groups. The groups reiterated that energy resources ought to be accessible and affordable to everyone. Reliability, equity and access must be the bottom line. Specifically, concerns around remote and regional areas were raised:

“In remote areas, facilities are not maintained or Infrastructure is not built.”

“Distance between capital cities can be quite large, how will networks set up? Challenge is localised and regional production, including balancing consumer expectations in the potentially slow transition to achieving similar levels of reliability and ease of access to that currently.”

There was concern also in relation to a potential rise in the unemployment rate, specifically in the context of fossil fuels and mining industries. Participants wanted to know what would happen to employees when their industries shut down? A point was made:

‘...starting to look at areas of country that depend on fossil fuels and mining - start preparing for transition and industry to be shut down. All new generation plants should be in those areas to create jobs for people who would otherwise lose them.’

5.4.2.4. Strong leadership

As with the WA panel, a desire for strong leadership was expressed. The NYP panel urged the government to learn from international experiences of renewable energy development and energy transition to see what can work in the Australian context and then to collaborate with the private sector to invest in the new infrastructure that Australia needs. The panel anticipated that the government could support the transition by:

“Encouraging the renewable energy sector with tax incentives, production quotas, employment quotas (maximising jobs), making education available and more accessible, making education focused around future technologies, government funded research and development into future technologies”

Interest was also expressed in promoting the development of future fuelled vehicles. The panel wanted to see governments working with car manufacturing companies to communicate what technology suites are being considered and what the timelines for developments might be. This was thought to give people time to consider their options in the choice of new vehicle, specifically whether to invest in an electric vehicle now or wait a few years for a future fuelled vehicle.

5.4.2.5. Public education campaigns

The NYP panel recognised the value of public education campaigns in raising awareness and building confidence in future fuels in comparison to existing fuels. The NYP panel agreed that targeted education campaigns offer a chance to consider current public opinions and overcome resistance if they:

“Provide unbiased information about the entire production chain and the environmental costs at each stage of production of future fuels, including waste.”

In addition to broad public education campaigns, the NYP panel also anticipated the need for training a future workforce, specifically educating professional and trades people like electricians and mechanics, and emergency service providers who would all need to upskill during the transition. It was thought that the opportunity for people to obtain new jobs in the renewable industry would rely on their capacity to transfer skills across from existing industries and their ability to obtain new training and knowledge.

5.4.2.6. *Environmentally conscientious choices*

The NYP panel expressed their willingness to make environmentally conscientious personal energy and consumer choices. There were also opportunities seen for Australia becoming an exporter of environmentally responsible energy and energy-related products, with several participants expressing the belief that although COVID-19 restrictions and lockdowns had reduced emissions in the short term, there was an opportunity for Australia to export low emissions and emissions-free energy (in place of fossil fuels), provided that new technology is properly evaluated (for environmental outcomes):

“Need to make sure that we are transitioning in the right way, not moving towards technologies which deflect from one problem to another (e.g. currently two ways of producing hydrogen, one less environmentally friendly than the other)”

5.4.2.7. *Change political dynamics*

A degree of disillusionment was evident in the NYP panel’s discussions in relation to current political dynamics. Political motivations were looked at askance with a general belief that climate change was not on the 2022 election agenda. There were concerns expressed that such an omission could reinforce complacency and the narrative that climate change is a long way off and the Australian contribution is minimal and therefore change neither urgent nor critical.

5.4.3. Summary

When participants are asked what considerations we need to make to incorporate future fuels in Australia’s low-carbon energy mix, Table 12 and Table 13 offer a summated view on how discussions proceeded. In both tables, themes emerge around participants’ expressed need for urgent action and strong leadership on decarbonisation, public education campaigns with balanced information to assist the population to move forward, and a need for concerns around affordability, equity and access to be addressed. Moreover, NYP are concerned about social justice issues such as impact on low-income earners, renters, and remote and regional Australians. In addition, the NYP are seeking information on likely impacts on households and how householders can become better placed to cope with the changes that are coming. They seek support from governments (despite being disillusioned with political motivations) as they are seeking to make environmentally conscientious choices.

5.5. PRINCIPLES TO GUIDE A PATHWAY TO A LOW CARBON ENERGY FUTURE FOR AUSTRALIA

Over the course of the deliberation, each panel was tasked to develop principles that should guide the path to a low carbon energy future for Australia. During the first session of week three, participants in each group were asked to indicate whether each of the principles they had developed collectively represent their views fully, partially or not at all (see Table 14 and Table 15).

5.5.1. WA Cohort Principles

The principles developed by the WA panel display the panel’s desire for education (to build awareness), ambitious leadership (to implement clean energy solutions and drive decarbonisation) and an equitable transition (showing concern for the welfare of current and future generations). The power of government in driving social change is recognised and collaboration between governments and between government and the private sector is seen as a core value. An expectation is placed upon government and industry to work together. Accountability, transparency and compliance is also desired from industry. The need to secure reliable and accessible future energy supply is acknowledged with a simultaneous need to reduce current energy footprints. The WA panel recognised the value of increasing energy use efficiency at all stages in the life cycle of the built environment - from design, construction, to everyday operation. Strong leadership and regulation from all levels of government

is expected. A desire was also expressed to build and support local supply chains to encourage the use of reusable products, low carbon transport options, disincentivise polluting transport activities, as well as providing equitable access to low carbon vehicles and public transport. The need for minimal negative environmental impact was underscored across all groups. The WA panel understands that any designs for Australia's future energy system must respect Traditional Owners and their rights. Best practice research and planning was seen as being an important driver of change with the need to make research findings public and accessible to inform decision-makers, policy makers and importantly, the public.

Table 14 enumerates each of the principles developed by the WA panel and summarises the extent to which each principle met individual participants' needs.

5.5.2. NYP Cohort Principles

The NYP principles held many similarities to those developed by the WA panel. For example, the desire for widespread education (to build awareness) was just as strong (with an emphasis on inclusivity), whilst also discerning a need for up-to-date information on the risks vs benefits of current energy sources.. The desire for ambitious leadership (to implement clean energy solutions and drive decarbonisation) was keenly expressed and manifested in a principle that pressed upon an urgent need to develop a long-term policy (to reach a carbon emissions reduction target), capable of withstanding political pressure of changing governments. An equitable transition (showing concern for the welfare of current and future generations) was of even more concern to the NYP panel. The need to include youth through consultation, including school children, acknowledging their role as future leaders was expressed as being vital in creating an environmentally responsible energy system. The NYP panel devoted two principles specifically around how the youth ought to be included and engaged in a dialogue around Australia's energy transition.

As with the WA panel, the NYP group recognises the power of government in driving social change, reiterating the value of collaboration and the need to hold industry accountable via legislation. Transparency, equity, affordability, reliability, incentives, choice/selection in renewable options are all seen as vital.

With respect to the built environment, the NYP panel discerned a need for efficient building design elements. The role of empowered consumers who can be conscious of the way they use energy, is recognised and supported. An inventive solution of installing 'usage metres' on buildings, was offered as a way of encouraging the right behaviours from an educated and self-aware populace. The need for education on clean energy and decarbonisation was also underscored by the principles of this group. Research institutions were seen as an entity that can support Australia in becoming a world leader in renewable energy innovation. Table 15 documents NYP panel's principles and the extent to which they meet the participants' needs.

Table 14: WA panel – principles and voting results on principles (Wednesday, 11th May)

Principle No. & Title	Represents my views well	Partially represents my views	Does not represent my views
Principle 1 - Education	79%	21%	0%
Developing education programs for all Australians through consultation with diverse populations to ensure that all current and future generations will benefit and gain the new knowledge and skills required to move to cleaner energy and decarbonisation of the economy.			
Principle 2 – The need for low carbon leadership	79%	18%	3%
Australia must be a global leader in implementing a low carbon economy and be future focused.			
Principle 3 - Equity	79%	18%	3%
Energy is a basic human right for current and future generations. Future renewable energy must be universal, equitable, available to all where costs are not a barrier regardless of location, wealth or ability. Energy for all without sacrificing the habitability of the earth for future generations.			
Principle 4 – Role of government	97%	3%	0%
Collaboration at all levels of government to provide strong leadership to drive changes and behaviours towards a net zero carbon emissions future.			
Principle 5 – Accountability and transparency for industries	86%	14%	0%
Accountability and transparency for industry to adopt future fuels to achieve zero emission. Accountability of measurements needs to be monitored by an independent body. Targets need to be reported, compliance is rewarded and non-compliance is penalised.			
Principle 6 – The future energy supply	94%	6%	0%
Produce the required combined renewable energy using the technologies available today and the emerging technologies, in a reliable and affordable price structure, to meet the agreed climate change deadline.			
Principle 7 – the future energy demand of buildings and consumption	80%	17%	3%
Legislate and incentivise to ensure that every aspect of the life cycle of the built environment and industry, from design, construction, and operation reduces energy footprint and increases energy efficiency.			
Principle 8 – Supply chain considerations	86%	14%	0%
Support local supply chains where viable or necessary (for critical equipment) to reduce risks, whilst making reusable products and maximising value.			
Principle 9 - Transport	86%	14%	0%

Create financial incentives for low carbon transport options and disincentivize polluting transport activities while ensuring equitable accessibility for electric vehicles and public transport.			
Principle 10 - Environment	72%	28%	0%
All energy decisions (extraction, supply, manufacture and distribution) should prioritise balanced sustainability and focus on decarbonisation of the planet; with minimal negative environmental impact. Future designs should respect Traditional Owners, their rights, habitat and utilisation.			
Principle 11 - Research	89%	11%	0%
Government and industry work together in producing accurate research and planning. Develop a national, public, up-to-date database of research findings to help inform decision-makers and policy.			

Table 15: NYP panel – principles and voting on revised principles (Thursday, 12th May)

Principle No. & Title	Represents my views well	Partially represents my views	Does not represent my views
Principle 1 - A need for an overarching long-term policy target	79%	17%	3%
Government should develop a long-term policy to reach a carbon emission target, like net-zero. The target should be overseen by a government body, like an independent commission, to withstand through government changes.			
Principle 2 - Inclusion of youth through consultation	76%	7%	17%
Younger people, including school students, should be included and consulted in decision-making, to acknowledge future leaders. Constant, long-term engagement, though, for example, a youth council and nation-wide youth surveys of which the inputs have to be considered in policy making and made publicly available.			
Principle 3 - Switch to variety of new and renewable energy options	86%	10%	3%
Australia should be leading investments in and utilising a diverse range of new technologies in order to create a highly efficient energy system which minimises potential energy losses which would result from use of a single or limited technologies. All technologies considered should be incentivised and education should be provided in order to shift general public perspective and understanding. The transition to new technologies should be based upon proven effectiveness/value.			
Principle 4 - Need for maintaining reliability	77%	20%	3%
Government must hold energy providers accountable for meeting transition milestones. Milestones that have been achieved need to be maintained relative to increasing demand.			
Principle 5 - An environmentally responsible energy system	73%	20%	7%
The Australian Government should ensure that decision making is unified to meet "climate change" goals through consultation with young people, environmental groups, Land-owners and Traditional Owners.			

Principle No. & Title	Represents my views well	Partially represents my views	Does not represent my views
Principle 6 - Incentives to increase affordability/switching to renewables	93%	7%	0%
Governments should ensure the transition to renewables is affordable through a range of incentives for consumers, as well as disincentives for industries using fossil fuels. This will secure equal access for all.			
Principle 7 - Education	87%	13%	0%
Create a positive, engaging, and comprehensive education campaign for renewable energy. This should also include up to date information on the risks of current energy sources and their effects.			
Principle 8 - Transparency and Equity	74%	24%	3%
Form an independent ethics committee to ensure transparency, manage access to incentives, and public education to provide equal access for all.			
Principle 9 - Built environment	82%	18%	0%
Government needs to facilitate the transition to low carbon options and renewable infrastructure. This should be achieved through incentivising low cost, energy efficient building design elements, as well as empowering consumers to be conscious of their energy usage by the installation of usage metres on buildings.			
Principle 10 - Research	82%	15%	3%
Australia should be investing in their own research into renewable technologies, while also encouraging and incentivising the private sector to join and collaborate. This will ensure that Australia becomes a world leader in renewable energy innovation.			

5.6. COMPARING FUTURE FUELS VS ALL-ELECTRIC PATHWAY

During week three learning sessions, participants were presented with two potential decarbonisation pathways that were identified in the recent public discourse on energy transition. These included a future fuels scenario (where natural gas is replaced either partially or wholly by hydrogen) and an all-electric scenario (where natural gas is replaced wholly by electricity) (for more details on the presented pathways see the presentations in Appendix 3). It is acknowledged that there are still many technical and economic uncertainties in both of these future scenarios and the best available information was presented by experts recommended to the project or chosen to be as factual and neutral as possible. Additionally, each presentation was peer reviewed by the IAP to ensure that content was verified as independent and credible. Participants were encouraged to raise questions and experts responded to clarify some of the uncertainties. However, since the industry is in its emergent phase and new knowledge continues to emerge, there are limits to which uncertainty can be resolved. Indeed, being asked to evaluate the two pathways under conditions of uncertainty did prove to be a challenge for participants.

In the deliberation sessions during that final week, participants were tasked with discussing each of the two potential decarbonisation pathways separately and identify the opportunities and challenges related to each. The second part of the exercise was to assess how well each pathway aligned with their collectively derived principles for decarbonisation. It is to be noted that this last exercise was edited based on the struggles observed in the 2021 citizens' panels, where participants were tasked to assess hypothetical scenarios too far into the future (for details, see Section 4.1.7 of the 2021 [Interim Report](#)). By editing the activities to consider opportunities, challenges and considerations in relation to the two pathways, the activities were simplified for the participants.

5.6.1. Future fuels pathway: WA

The WA panel identified opportunities, challenges and considerations in relation to the future fuels' pathway as follows:

5.6.1.1. Opportunities

The opportunities for the future fuels' pathway were identified within the WA panel as follows (Table 16).

Positive outlook in relation to a better future:

Participants held a positive outlook in relation to the future fuels' pathway. They expected that when renewable gases (like hydrogen and biogas) replaced natural hydrocarbon gas, a long-term solution could be enforced to establish a healthier environment, allowing future generations a "place to live". Participants expect that renewable gases will help Australia meet its commitment to a low carbon future. They also expect to see sustainable skills emerge from the technological innovation that must ensue to make this future a real possibility.

Keep options open

Despite the positive outlook toward future fuels, participants felt the need to reiterate that Australia must keep its options open and continue to explore prospects for other energy sources. As long as natural gas networks can be decarbonised, future fuels will remain an option but if this fails to happen it is hard to speculate what will happen to the gas industry overall. There was an understanding that future fuels provided a good alternative when the electricity grid was down. Participants saw this as an opportunity to further develop smaller, more localised distribution networks to insulate against shocks within the centralised system. They reiterated that innovative solutions could still come from the developments within the solar industry, and such exploratory exercises were necessary and must continue to keep Australia's options open.

Australia's advantage

Participants could envisage Australia's advantage in being a first mover in the global hydrogen industry. There was a recognition of the resources available to Australia. In particular, natural resources and supportive communities to develop the industry. Participants felt that the hydrogen industry may allow Australia to retain its gas infrastructure and become a global leader in the field all at the same time.

Positive outlook in relation to economic prospects

Participants held a positive outlook in relation to the economic prospects of the renewable gas industry. There was a belief that our export income could be 'cleaned' up as a result of replacing gas with renewable gases. Domestically, participants were hopeful that new jobs would result and existing workforce could transition to low carbon jobs with retraining.

Expand knowledge systems to build a just energy system

Participants understood the benefits of establishing renewable gases, as explained above. However, they reiterated that in doing so, there is an opportunity to expand our current knowledge systems based on experiences held within first nations' people on the one hand, and the international community on the other. To be successful, participants reiterated that Australia must take on lessons learnt in the past (looking towards history) and include provisions that eliminate the energy poverty that many Australians still encounter. There is an expectation that the industry will demonstrate altruism in bringing along disadvantaged sections of society and establish justness as Australia transitions towards a low carbon future.

Table 16: Opportunities of a future fuels' pathway (WA)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Positive outlook in relation to a better future	9	Positive outlook in relation to economic prospects	4
R&D	3	Retraining	2
Retraining	1	Exports	2
Good solutions soon	1	Expand knowledge systems to build a just energy system	4
Healthier environment	1	Just transition	2
Next generation	1	Learn from others	1
Long-term solution	1	Diverse knowledge	1
Low carbon future	1	New appliances for energy efficiency	2
Keep options open	7	Appliance technology	2
Nuclear	2	Disseminate accurate information/education so people can understand the issues at stake	2
Power networks	1	Hydrogen - question	1
Good alternative	1	Education	1
Best choices	1	Expecting an affordable energy system	2
All option should be included	1	Costs	1
Electrification	1	Affordability	1
Australia's advantage	6	Efficient use of household waste	1
Hydrogen - positive	2	Biogas - positive	1
Resource abundance	1	Grand total	37
R&D leaders	1		
Early adoption	1		
Community support	1		

New appliances for energy efficiency

Participants felt that enabling a future fuels pathway could foster the development of new technology and appliances. If these appliances were designed to be energy-efficiency, then overall, efficiencies around energy usage would be enforced in the wider population; as and when older appliances were replaced.

Disseminate accurate information/education so people can understand the issues at stake

However, some questions remained with participants as they undertook this exercise, reinforcing the need to disseminate accurate information and educate the generation that must make the change so that they can understand the issues at stake.

Expecting an affordable energy system

Cost and affordability weighed on participants' minds. They also debated whether the future fuels pathway would be more or less affordable than the current system.

Efficient use of household waste

In the context of biogas, participants were glad to see that there was an opportunity for them to use their household waste to generate energy. They envisaged that the future fuels pathway would capitalise on this avenue of putting household waste to good use.

In the next section, the challenges foreseen by the participants are reported.

5.6.1.2. Challenges

When debating the challenges in relation to future fuels pathway, the participants enumerated the following concerns (Table 17):

Ensuring a just, affordable and equitable transition

As reported in the opportunities section, the participants brought up the questions of cost and affordability more strongly. Participants felt it would be hard for each individual to bear the costs if they fell upon individuals. There was a view that although transitions entail a degree of suffering, the winners and losers in the transition must be managed so that pain (and benefit) is equitably distributed.

“Not everyone will be able to afford it, make it so that no financial stress is caused in the transition.”

“Might initially be expensive and hit households which might make uptake difficult.”

Table 17: Challenges for a future fuels pathway (WA)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Ensuring a just, affordable, and equitable transition	10	Concerns about supply	3
Costs	4	Appliances supply	1
Just Transition	2	Resource constraints	1
Affordability	2	Gas	1
Cost to people	2	Impacts	3
Impacts in relation to appliances	5	Environment	1
Appliances waste	4	Carbon storage	1
Small impact	1	NBN	1
Seeking more information/education	5	Government's role and attitude	2
Transition impacts	1	Agreement on policies	1
Safety	1	Government	1
Hydrogen question	1	Retraining the workforce is a challenge	2
Methane	1	Retraining	2
Nuclear	1	Educate the public	2
Resistance to change	4	Education	2
Contestation	4	Grand Total	39
Timely action	3		
Time constraint	2		
Immediate action	1		

Impacts in relation to appliances

Participants wondered what the impact on households would be if appliances had to be changed to accommodate future fuels, especially in the case of those households that had already switched to electric appliances. Apart from the cost associated with changing over, participants were concerned about the amount of waste that would be generated because of redundant appliances. They also wondered how a cohesive rollout plan would be delivered in case many people had to switch their appliances:

“Challenge of creating a lot of waste with the transition. This could be a big pile of rubbish causing a new problem to solve an old one. I hate waste - could we use our old ones until they wear out?”

“If we use H₂ gas and we go above 10% then everyone or a large number in the community would need to change over. Developing a cohesive roll out plan is challenging. This impacts infrastructure and also household appliances. The logistics of the changeover at

the household level is not clear how this would be done. How many areas would be impacted at a time?

Seeking more information/education

A few comments seemed to imply that participants were seeking more knowledge and clarity around some topics related to hydrogen, methane and the safety of nuclear power. A few examples are listed below:

"Would they put H₂ in a gas cylinder and provide it to us?"

"What are the issues if we don't adopt FF in a low carbon future?"

"Could educate about nuclear..."

Resistance to change

Participants envisaged that many people in the population could resist the change out of reluctance, fearing what they had to lose. These people could easily represent the government, be part of the industry or be members of the general public.

Timely action

Participants felt that the timeframe to implement changes in the energy system is short if we are avoiding irreversible environmental damage. Given the short timeline, it feels as if Australia is racing against time and participants wondered if the requisite changes to the energy system could be made mainstream quickly enough. They felt that implementing timely action could significantly challenge this transition.

Concerns about supply

Participants expressed concerns in relation to supply constraints. There were doubts about whether Australia would have enough raw materials to supply the renewable gas industry. There were doubts raised in relation to peak gas – would there be enough gas supply at peak hours to meet consumer demand? And would Australia have enough new appliances to service the population?

Impacts

Participants were concerned about a range of issues. Some statements classified under this theme of 'impacts' are as follows:

"If we produce hydrogen via a method that produces carbon, we need to store that – and that is a waste product if we cant use it for anything... and then we need to store it (the carbon)."

"I reckon weather and environment will be a challenge – I dare say it will escalate before it goes backwards."

"This is like the NBN, but this has a bigger impact."

Government's role and attitude

Participants felt that there might be some contention between governments and industry to come to an agreement over policies. Participants also thought it might be challenging for the government to be transparent with the public in the approach they adopt.

Retraining the workforce is a challenge

Participants felt that retraining the workforce would be more of a challenge than an opportunity with the belief that retraining and reskilling are challenging at both personal and institutional levels:

“When you transition from one job to another it is difficult. This is a challenge and not an opportunity while this is happening.”

Educate the public

Participants thought that the wider population would need education around the prospects of future fuels, but particularly the current working age generations who would have to make the changes. and those sections of society who might put up resistance to the change. As a solution, they felt that community education programs and workshops that are accessible to everyone might be needed:

“From my experience, the generation that has to make the change, are not educated. The generation that wants to make the change - the youth- are educated, but then it's going to be too late for them to make the change. So ... there's this opportunity/challenge (that) is really about educating the educated - because we were never educated about it at school, at university or at work.”

5.6.1.3. Considerations

WA panel's discussed considerations (Table 18) in relation to the future fuels pathways were as follows:

Table 18: Considerations for a future fuels pathway

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Just Transition	6	Timely action	3
Just Transition	3	Nuclear	1
Social destabilisation	1	Moving forward	1
Exports	1	Apocalyptic	1
Inclusivity	1	Impacts in relation to appliances	2
Keep options open	5	Appliances supply	1
Energy options	2	Appliances change	1
Electrification	1	Safety considerations	1
R&D	1	Safety	1
Nuclear - negative	1	Balanced growth	1
Seeking more information/education	3	Government	1
Fossil Fuel question	1	Grand Total	21
Resources availability	1		
Manufacturing	1		

Just Transition

Socio-cultural considerations were front of mind for the participants. Concerned about social destabilisation and upset, participants wanted to ensure that people involved in the affected industries were looked after. They wanted to see that cultural consideration is kept in mind, such as where First Nations peoples' voices are heard when deciding on large scale infrastructure. Participants were mindful that the export of renewable gases might benefit developed nations more than developing nations, which might still not have the relevant infrastructure in place. Inclusion and transparent information on spending was crucial towards building public trust.

Keep options open

Once again, participants were found comparing choices and debating which options would be best for Australia. They wanted to see innovation, research and development of other renewable energy systems and felt that future fuels could be a key component of Australia's energy mix when used alongside electrification.

Seeking more information/education

Participants wondered what issues would arise if we didn't adopt future fuels in a low carbon future, impacts around manufacturing and whether we were still relying on gas pulled out from the ground.

Timely action

Participants also described time as a constraint when climate change is viewed as an urgent problem requiring urgent action. They wanted to see fast and timely action and would weigh in positively on whatever pathway that could get us to a low carbon future within the timeframe imposed by climate change:

"Realise the importance - keep moving forward. Don't slow down!"

Impacts in relation to appliances

Once again, the prospect of changing over appliances was daunting and participants wondered how the supply chains and inputs would work in relation to the new appliances if they were so needed.

Safety considerations

Safety considerations were a priority and people expected that any new systems/technology would be thoroughly tested before making its way to the public.

Balanced growth

Participants felt that there ought to be a balance imposed on economic growth since other considerations are key at this time. From the statement below, the sentiment is that while economic growth is important, it should not be prioritised as a policy objective singularly, with the belief that it would be socially acceptable to compromise economic opportunities where needed to protect equally important social and/or environmental objectives.

"Government must be comfortable making decisions without the 'exponential growth to GDP' mindset. There is a balance that people will understand."

5.6.1.4. Evaluating the future fuels pathway against the principles: WA

Figure 7 shows how the WA panel responded when asked the question: *keeping in mind the pros and cons discussed earlier, to what extent can a future fuels pathway meet your principles?* Over half (59%) of the participants assessed the future fuels pathway as meeting all the principles they had devised earlier. Around a third thought that principles 3 (35% of participants) and 4 (33% of participants) were only partially aligned, with Principle 9 receiving the highest "no" vote (8% of participants). Principle 3 considers equity and social justice, principle 4 considers the ability of the government to lead the transition and principle 9 considers financial incentives for low carbon transport options, (including electric vehicles which may in part explain the no responses). It therefore appears that in relation to the future fuels pathway, there are doubts about government leadership, particularly whether it will come in good time and whether it will adequately emphasise the values that underpin social justice.

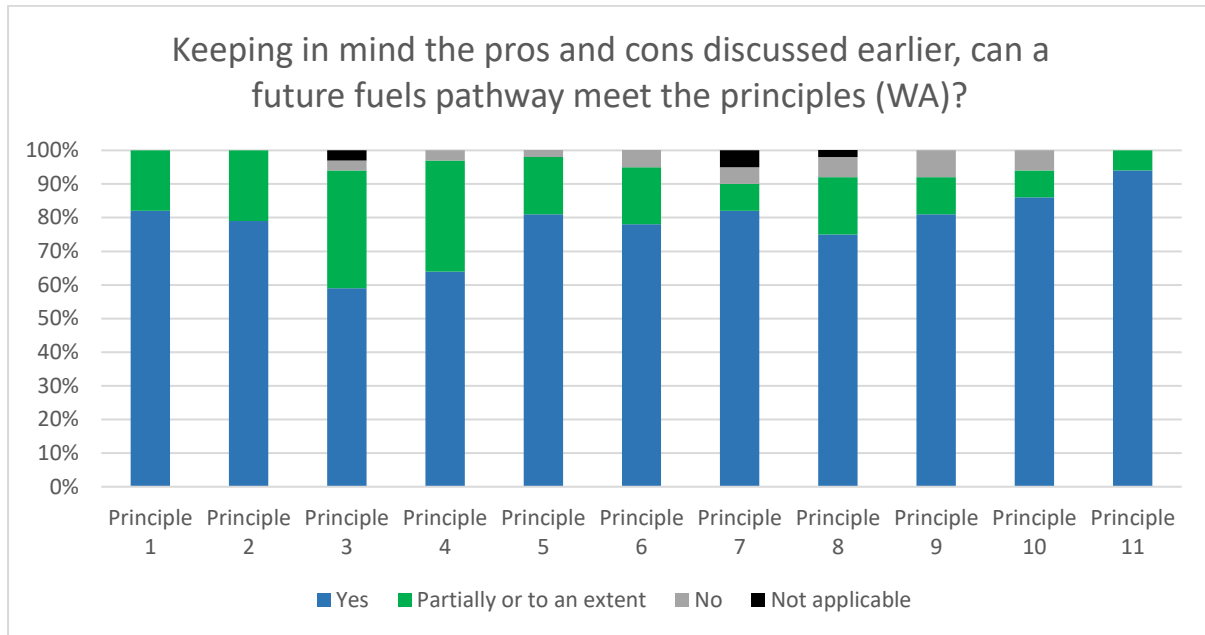


Figure 7: Evaluating future fuels pathway against principles WA (Wednesday, 11h May 2022)
 Source: Zoom poll data and break-out room manual voting¹

Principle 3 – Equity: *Energy is a basic human right for current and future generations. Future renewable energy must be universal, equitable, available to all where costs are not a barrier regardless of location, wealth or ability. Energy for all without sacrificing the habitability of the earth for future generations.*

Principle 4 – Role of government: *Collaboration at all levels of government to provide strong leadership to drive changes and behaviours towards a net zero carbon emissions future.*

Principle 9 – Transport: *Create financial incentives for low carbon transport options and disincentivize polluting transport activities while ensuring equitable accessibility for electric vehicles and public transport.*

5.6.2. All-electric pathway: WA

When presented with the all-electric pathway, WA participants debated opportunities, challenges and opportunities as follows:

5.6.2.1. Opportunities

Opportunities perceived by the WA panel with respect to the all-electric pathway are summarised in Table 19.

Infrastructure is already established

Participants were positive towards the all-electric pathway, seeing that the state's electricity infrastructure is already well established. In particular, solar energy systems are commonly seen and wind farms have also been set up. In addition, Australia's weather lends an advantage as WA has plenty of wind and sunshine to rely on to keep its solar and wind infrastructure up and running.

Pro all-electric

Participants were in favour of seeing more innovation, research and development regarding technology and manufacturing on one hand and social programs on the other. In relation to an all-electric pathway, it was noted:

¹ Due to failure of the Zoom poll mechanism on this night, the UQ team resorted to manual voting to collect the data from participants. Votes were collected by the facilitators and recorded on Google docs and verified by the participants. Despite the technical issue, participants and facilitators reported that the system worked well and was in fact a perfect team building opportunity.

“Love this idea. Then it is the brainy people in government that get to work this out for all of Australia. They just need to work out how to produce the electricity in the first place.”

Table 19: Opportunities for an all-electric pathway (WA)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Infrastructure is already established	12	Employment opportunities – job creation	3
Local network	1	Debating the timing	3
Solar energy	4	Appliances - lifecycle	1
Solar panels	3	Solar - Hydrogen	1
Solar-and others	1	Timing concerns	1
Solar-wind	1	Seems far-fetched, better to keep an open mind	2
Transition to electricity has started	1	Not convinced with all-electrical	1
WA-infrastructure ready	1	Positive aspects related to hydrogen	1
Pro all electric	7	Improvement in transport infrastructure	1
100 % electric future	2	(Infrastructure for EV could help transport industry)	
R&D opportunity	5	Green export	1
Debating the cost	4	Development of rural and regional areas - Opportunity for rural areas	1
Cost - high upfront cost	1	Conscientious energy use fostered by personalised energy storage devices	1
Cost to transition	1	Grand total	35
Share infrastructure and reduce cost	1		
Simplicity of one energy option	1		

Debating the cost

Groups debated costs, wondering if the cost of electrification would be higher or lower than establishing a hydrogen industry. It would be simple to have one energy source; however, would that imply lower or higher costs?

Debating the timing

Some participants held the view that it might be faster to implement this pathway.

Employment opportunities

Participants believed that new jobs could be created whilst this pathway was implemented:

“Job creation and localisation of supply chain and supply from ground to table.”

Seems far-fetched, better to keep an open mind

Some participants stated that it would be wise to keep options open. They perceived benefits around hydrogen that could not be gleaned from an all-electric scenario alone. For example, they perceived that stored hydrogen could be a ‘cleaner’ system than batteries.

Improvement in transport infrastructure

Participants had a positive outlook towards the all-electric pathway as electric transport options would increase.

Green export

Some participants referred to natural gas and opportunities it may also present in future, with one stating “we export all our gas without processing it - if Australia became an in-house processor, we could export cleaner energy”.

“Export increases for green energy”.

Development of rural and regional areas

Participants felt there was an opportunity to improve liveability and infrastructure in rural and regional areas feeling that the all-electric pathway could stimulate growth in non-coastal and non-city areas.

Conscientious energy use fostered by personalised energy storage devices

Some participants felt that if battery technology could improve, it would have multiple benefits – increasing self-reliance and in-turn fostering more energy conscious behaviours as consumers could directly observe how much electricity they have generated, used and saved on-site.

5.6.2.2. Challenges

Participants' views on the challenges they perceived in relation to the all-electric pathway are summarised in Table 20:

Table 20: Challenges for an all-electric pathway (WA)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
We need to keep our options open	9	Ensuring a just, affordable and equitable transition	3
Not convinced with all electrical	4	Cost - future energy depend on cost (Solar- wind - hydrogen)	1
Limits research	3	Equitable energy access	1
Seasonal supply	1	Environmental cost	1
Open to new energy options	1	Timing concerns	3
Debating the cost	8	Timing concerns	2
Cost - high upfront cost	4	Pessimism	1
Cost to transition	2	Existing mechanisms that keep coal in play	2
Costs	1	Fossil fuel lobby	1
Appliances cost	1	Coal lock-ins	1
Politics and bureaucracy	5	Debating employment opportunities	2
Political cycle, short-term planning	2	Job losses	1
Red tape	2	Job creation	1
Government	1	Collaboration is needed	2
Upgrade to infrastructure	4	Bipartisan support	2
Electricity network concerns	3	Resistance to change	2
Infrastructure	1	Behavioural change	2
Safety	3	Seeking clarity on industry initiatives	2
Debating batteries	3	Transparency	1
Batteries - negative	1	Industry leading	1
Hydrogen - positive	1	Grand Total	48
Batteries - positive	1		

We need to keep our options open

Several groups reiterated their discomfort with an all-electric pathway, stating that Australia needed to keep its options open. Since relying solely on one energy source limits their options and removes competition from the market. It negatively impacts innovation – especially when research and development is currently underway investigating other renewable energy sources. It also takes away a safety net (of having alternative sources of power) when there are blackouts. Participants doubted the wisdom of going down a “one-way street”:

“It looks like a one-way street.”

“Just electricity means no back up if it goes down.”

“We don’t want frequent blackouts, we want reliability.”

Debating the cost

Debates around costs carried on from the earlier parts of the activity when participants were discussing opportunities. Participants felt that the upfront costs would be superlatively high as there would be higher costs at a larger scale. The cost on households would also be increased as they might have to replace all their gas appliances and find monies to invest in expensive batteries:

“If we go electricity only there will be a huge infrastructure cost. There is currently a huge use of gas and appliances for heating or stoves in households. If we move to electricity there would be a huge infrastructure cost to increase the transmission demands.”

Politics and bureaucracy

Participants felt that political apathy and slow governments would be detrimental to an effective transition. Participants once again, placed onus on governments, reiterating their need to see fast, unanimous and effective actions following on from firm decisions:

*“Getting the government on board - getting them off their a**es to do something. If they committed to getting this done, it would be done faster. They are just wishy washy. Trying to please everyone and not achieving anything.”*

Upgrade to infrastructure

Participants anticipated that large-scale upgrades would be required to existing electrical infrastructure – implying more poles and wires. As with the future fuels pathway, again participants anticipated that households would also need to switch their appliances. All these activities were considered to potentially be onerous and difficult, not to mention increasing costs.

Debating batteries

Participants debated the pros and cons of batteries as storage solutions against hydrogen. There were negative perceptions in relation to the cost associated with household scale batteries and the environmental problems associated with the waste and disposal of batteries. Some comments were made around the cost-effectiveness of batteries if they were shared (at neighbourhood scale). Other participants felt that hydrogen offered a far cleaner storage solution, especially if we are planning to secure the survival of our future generations:

“If we are using solar then we need another source for evenings or batteries. Batteries are not clean. H is clean - we need think of the future.”

Ensuring a just, affordable and equitable transition

Participants restated their need to see through a just transition – for the environment and for all present and future generations. Often people missed out on the latest technology options out of affordability issues, and this aspect needs to be dealt with.

“We need to look at a future energy that is clean - solar, wind, hydrogen. This is based on being cost effective. We need a few options and not rely on a single source.”

“Older tech heaters are the cheapest to buy, most expensive to run and least efficient. Others like heat pumps aren’t affordable. Equity issue.”

Timing concerns

There were concerns around whether an all-electric future could be implemented and helpful towards meeting our 2050 target. Participants doubted that it could happen by 2050, given the size and scale of the transformation needed.

Existing mechanisms that keep coal in play

Participants relayed their understanding of how coal lobbies had successfully been granted lock-in periods allowing them to last far beyond 2050. They doubted how coal emissions would be brought down in the context of these realities.

Debating employment opportunities

Participants could perceive new jobs being created but were mindful of the losses that would be experienced by those workers who are made redundant as a result of relying only on electricity as an energy source.

Collaboration is needed

Participants envisaged a giant teamwork exercise to actualise this pathway into reality and once again wondered how we could “get everyone focussed on planet survival and wellbeing”?

Resistance to change

Participants who had relied all their life on cooking with gas wondered how they would adapt to new electrical appliances. Other participants expected that, in general, the population could resist the change-over.

Seeking clarity on industry initiatives

Some participants observed the recent activities undertaken by industry and wondered what was happening. They were seeking full and transparent disclosure around these activities to determine how they would be affected as individuals.

5.6.2.3. Considerations

WA panel debated the following considerations in relation to the all-electric pathway Table 21.

Seeking more information

Not surprisingly, there were many questions left outstanding as participants deliberated and delved deeper into the considerations of the pathways out to 2050. Participants wondered whether electrification would be easier to implement than future fuels, given it was just “more of the same”. They also wondered what would happen without fossil fuels. For example, could hydrogen fully replace fossil fuels? Would Australia continue to export fossil fuels for others to use? How would the reliance on fossil fuels lessen if we need to make electricity to make hydrogen? They struggled to imagine the practical aspects of how things would work on a day-to-day basis.

Debating the role of a proactive industry

Some participants observed that market forces would drive innovation towards decarbonisation as proactive entities would deem it logical to invest in renewable electricity if they could perceive the profits easily (for example, the case was given of Elon Musk and electric vehicles). However, it was also thought that private sector investment and industry pressure could move governments to act in certain ways – resulting in positive or negative outcomes:

“Mining is interesting - positive and negative - have done damage and also inject money into economy; a driving force for innovation.”

Other participants wondered what new industries could emerge as a result of electrification and which existing industries would benefit from an all-electric pathway.

Table 21: Considerations for an all-electric pathway (WA)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Seeking more information	8	Test cases	3
Hydrogen - question	3	Ideas to replicate	1
Rhetorical question	2	R&D opportunity	1
Solar car question	1	Phased transition	1
Fossil fuel exportation question	1	Debating batteries	2
future fuel question	1	Batteries - positive	2
Debating the role of a proactive industry	6	Debating the impact of changing appliances	2
Industry leading	4	Appliances - change and waste	1
New industry considerations	2	Appliances - lifecycle	1
Ensuring a just, affordable and equitable transition	4	Seeking government leadership	2
Subsidies to support changes	1	Government	2
Opportunities linked to where people live	1	Debating quantities of waste	1
Equitable energy access	1	Hydrogen - negative	1
If affordable people would adopt it	1	Impact on export income	1
Collaboration is needed	4	Exports	1
Countries collaboration	2	Grand Total	37
Bipartisan support	2		
We need to keep our options open	4		
Ironic comments	2		
Not convinced with all electrical	1		
Can people continue to have choices?	1		

Ensuring a just, affordable and equitable transition

Participants reinstated the fact that the success of the all-electric pathway would depend on whether it was cost effective for consumers. Participants could imagine a good uptake if costs remained accessible and equitable. However, they foresaw that the government's role would be to put suitable subsidies in place, seeing that WA is a rich state that can afford to share the money around.

Collaboration is needed

Participants acknowledged that there was a strong need for bipartisan support, and Australia would also have to learn from the international experience and apply what wisdom is relevant to the nation.

We need to keep our options open

The necessity to keep options open was highlighted again. Participants felt that the removal of choice entailed a less fair system – as consumers would lose out on backup options. As participants relayed their sentiments, the facilitator noted:

“Might not be viable to go 100% might get close, but seems far-fetched to do it all with electricity, hydrogen might fill those gaps”

Test cases

Participants wondered what the experience had been in the case of South Australia's regional hubs. They also wondered if there were systems in place to test out the feasibility of this option. Although every challenge brings with it an opportunity for research and development, participants wondered:

“Should there be a testing phase? Can you do it on a progressive small-scale basis and then rollout? People will prefer this.”

Debating batteries

The debate on batteries continued. Participants felt batteries would be a useful option when consumers lose power. There was hope as participants had observed the advent of cheaper and more advanced batteries in the previous six months.

Debating the impact of changing appliances

The debate over changing appliances continued. Some participants observed that appliances don't last forever, while others felt it was a needless expense and waste to change something that was working perfectly fine.

Seeking government leadership

Participants were unhappy with piecemeal initiatives and wanted to see more decisive actions, citing Howard's gun law reform as an example, where strong and decisive action led to good outcomes.

Debating quantities of waste

The debate on which pathway would be more wasteful continued. Participants wondered whether the all-electric pathway would be better since hydrogen might trigger much more obsolescence. Participants relayed their sentiments, as noted by the facilitator:

“Transition via retrofit to produce less waste, hydrogen might trigger a lot more obsolescence.”

Impact on export income

Some participants wondered whether income from exports would take a hit since the export of batteries alone may not bring in as much income as exporting a source of fuel like hydrogen.

5.6.2.4. Evaluating the all-electric pathway against the principles.

Figure 8 shows how the panel responded when asked the question: *keeping in mind the pros and cons discussed earlier, can an all-electric pathway meet the principles?* Figure 8 shows that participants had the greatest doubts around principles 8, 2 and 6. Principles 8, 2 and 6 are as follows:

Principle 8 – Supply chain considerations: *Support local supply chains where viable or necessary (for critical equipment) to reduce risks, whilst making reusable products and maximising value.*

Principle 2 – The need for low carbon leadership: *Australia must be a global leader in implementing a low carbon economy and be future focused.*

Principle 6 - The future energy supply: *Produce the required combined renewable energy using the technologies available today and the emerging technologies, in a reliable and affordable price structure, to meet the agreed climate change deadline.*

The all-electric pathway was therefore seen as less likely to support local supply chains (noting that solar panels and wind turbines are almost exclusively produced outside of Australia) thus increasing supply risks (as experienced during the COVID-19 pandemic). Also, there was concern expressed repeatedly about the lack of current recycling and waste produced from solar panels.

It is also less likely that an all-electric pathway would make Australia global leader in a low energy economy, possibly related to the lack of local manufacturing and supply of renewable energy components, but also because other countries have already led the way in renewable energy development.

It was also thought that the all-electric pathway is less likely to meet the expectation of keeping energy supply reliable and affordable through a combined MIX of energy technologies.

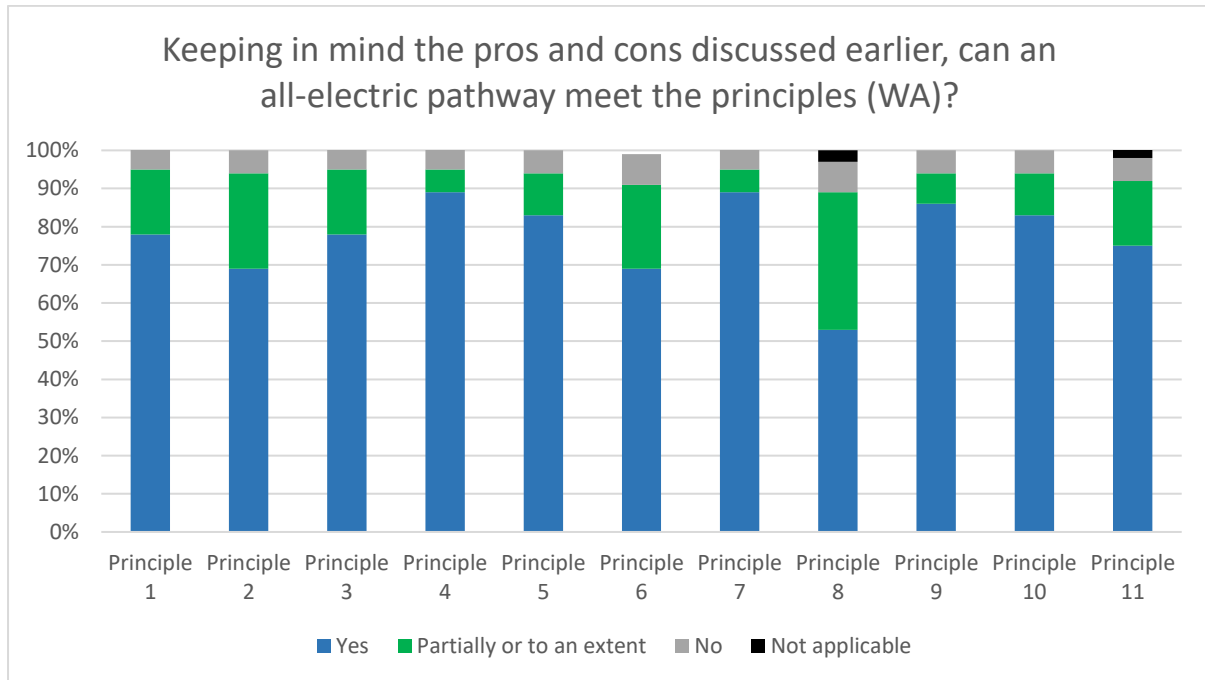


Figure 8: Evaluating all-electric pathway against principles WA (Wednesday, 11th May 2022)
Source: Break-out room manual voting

5.6.3. Future fuels pathway: NYP

5.6.3.1. Opportunities

Opportunities perceived by the NYP panel are summarised in Table 22. When debating the pros in relation the future fuels pathway, participants recognised that:

The onus is on research and the goal is to be a leader in renewable technology innovation

Participants perceived hydrogen to be a practical solution to a pressing world problem (carbon emissions reduction). However, they could see a need for proving hydrogen technology as an important first step. Participants felt that Australia could take a lead in technological advancement through building skills and investment in research and development activities. Some participants were excited by the idea that Australia could become a global leader in clean energy innovation, becoming a nation that is taking practical steps rather than speaking purely in theoretical terms. However, to actualise this vision, the onus is squarely placed on the science and research sector to deliver the innovation and advanced technological systems that are needed.

Development of local economy and regional and remote Australia

Next, participants identified an opportunity to support the national economy in Australia on the back of an export hydrogen industry (particularly if the fossil fuels contribution to the economy is reduced) as they could see new jobs being created – lowering the unemployment rate and thought to be good for the economy overall. They also foresee an opportunity to develop regional and remote parts of Australia – as local manufacturing could entail the requirement of developing new infrastructure – all of which could create new jobs and opportunities. Such development was also thought to facilitate an improvement in the living standards of remote and regional Australians as their access to energy would be secured.

Reducing emissions in the environment

The next obvious benefit that this panel perceived was in terms of reducing emissions in the environment. They perceived future fuels to be environmentally-friendly options (under the green hydrogen provision) that would reduce negative impacts, be sustainable and clean.

Table 22: Opportunities of a future fuels pathway (NYP)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
The onus is on research and the goal is to be a leader in renewable technology innovation	11	Better for consumers	2
Hydrogen - positive	1	Cost for individuals	1
R&D	3	Costs	1
R&D leaders	5	An option that builds self-sufficiency	2
Relationship between countries	1	Self-sufficiency in energy	2
Renewable energy	1	Funding for research and education	2
Development of local economy and regional and remote Australia	8	STEM education	1
Energy access	1	Environmental education	1
Industry opportunity	1	Current infrastructure will get a new lease on life	1
Job creation	6	Current infrastructure	1
Reducing emissions in the environment	5	Replace export of non-renewable energy source	1
Decarbonisation	2	Exportation	1
Environmentally-friendly options	3	Grand total	34
Having choice is good	2		
Energy mix	2		

Having choice is good

As reported earlier, the panel welcomed the prospect of having choice as future fuels were perceived to add to the energy mix:

“Opportunity for diversification of the sources of energy, leads to greater choice and sense of security with public.”

Lower costs for consumers

Some participants postulated that the costs for consumers would be lowered if Australia went down this pathway.

An option that builds self-sufficiency

Participants believed that Australia could be self-sufficient and self-reliant if future fuels industries were developed:

“Will stop countries from relying on other countries for energy e.g. reliance on Ukraine and Russia cutting off energy supply as a bargaining chip. Self-sufficiency and being able to contribute to our own future fuels reduces our reliance on other countries.”

Funding for research and education

Participants saw an opportunity/need for funding science, technology, engineering and mathematics (STEM) education programs within Australian universities. They also reinforced the importance of educating the Australian public about environmental issues and energy.

Current infrastructure will get a new lease on life

Participants could see that once blending had been fully tested, existing infrastructure could be repurposed easily for future fuels. This would make the roll out of future fuels easy. A participant stated:

“Once you got the process down pat, you could start rolling it out pretty quickly”.

Replace export of non-renewable energy source

Participants also identified an opportunity to replace non-renewable energy as a source of our export income. They were positive about hydrogen being a ‘clean’ replacement for Australia’s fossil fuel exports.

5.6.3.2. Challenges

The challenges perceived for a future fuels pathway are summarised in Table 23 and discussed as follows:

Table 23: Challenges for a future fuels pathway (NYP)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Ensuring a just, affordable and equitable transition	8	Preparing the workforce	3
Costs	5	Retraining	2
Costs for individuals	1	Specialist skills	1
Equal access	1	Making up for economic losses if fossil fuel industry winds up	3
Just transition	1	Exportation	1
Resistance to change	7	Job losses	2
Behavioural change	2	Appliances	2
Contestation	2	Appliances - negative	1
Environmental education	1	Appliances implementation	1
Reluctance to move away from fossil fuel	2	Keep options open	2
Infrastructure and planning	4	R&D	2
Difficult to implement in the long-term	1	Clear vision is needed	1
Infrastructure	2	Not easy to visualise a future system	1
Logistical challenge	1	Global demand	1
Ensuring that hydrogen generation method stays green	3	Global uptake	1
Hydrogen - negative	1	Grand total	34
Not fully fossil-fuel free	1		
Limits to performance	1		

Ensuring a just, affordable and equitable transition

As with the WA panel, NYP want a just, affordable and equitable transition. They perceived this to be a challenge although they anticipated that the biggest hurdle would be costs. New infrastructure would imply costs increased at the consumer end initially, although they might reduce in the future. Participants wanted clarity on how equitable access to hydrogen supply would be assured and how people currently facing energy poverty would be looked after.

Resistance to change

Resistance to change would be the next big hurdle in the participant’s view. Resistance could come from people who don’t on principle like change. Changing behaviours, ways of life, getting used to new appliances, new vehicles, new infrastructure would be all too much. People with low levels of awareness may put up high levels of resistance. NYP had serious doubts about the older generation, believing they would be less aware and less willing to change:

“Older generation typically are less open to change (notably this is also the generation holding power in our government).”

Infrastructure and planning

Building in new infrastructure would take time, money and effort. When resisting forces are in play, efforts at new infrastructure development can become onerous. Currently town planning stipulations may be at crossroads with the needs and requirements of this new industry. This panel anticipated that logistical challenges around implementing such infrastructure development for future fuels would be huge, given the length and breadth of Australia as a country.

Ensuring that hydrogen generation method stays green

Participants were wary of the fact that there are different methods available for the generation of hydrogen. They wondered whether dependence on fossil fuels would be exacerbated if generation methods were not green. Would hydrogen be so environmentally friendly in that case?

Preparing the workforce

Having a hydrogen ready workforce would be a challenge. It takes time and effort to retrain people and if enough specialist workers are missing, it will slow down the transition.

Making up for economic losses if fossil fuel industry winds up

Participants wondered what would happen to Australia's export income, and local economy when the fossil fuel industry winds up. How would the losses be made up. Participants were seeking more clarity on what it would mean for Australia as a developed nation when this happens.

Appliances

Switching home appliances would be a challenging task as participants wondered how onerous it would be to make the swap.

Keep options open

Participants also reinforced the importance of continued innovation and development. Even if hydrogen and biogas technology becomes proven and refined, participants saw the need for continuous improvement and innovative thinking. They expressed a desire to see ongoing investment in science and technology in order to adapt and innovate as required.

Global demand

Participants wondered what would happen if Australia went too far ahead of global demand. If there is not enough uptake globally, then the investment and infrastructure in Australian projects could come to waste.

Clear vision is needed

Participants also identified that it is hard to imagine the future. They discussed how more clarity is required in developing a collective vision around the role of hydrogen/biogas in Australia.

5.6.3.3. Considerations

NYP panel's discussions around the considerations that need to be made towards 2050 in relation to the future fuels pathway are summarised in Table 24.

Ensuring a just, affordable and equitable transition

As reported in previous sections, the need for a just, affordable and equitable transition was reinforced. Some participants wondered if there was enough renewable energy to go around. Could we imagine that it would be offered for free?

Seeking more information

Some questions remained with the participants as they wondered where hydrogen projects would be sited. Where would infrastructure be built, and which setting is best suited to hydrogen projects – rural or urban.

Assess the long term environmental effects

Participants acknowledged the newness and excitement around hydrogen but also noted that it is too early for anyone to assess what the negative impacts could be in the long term. Just as in the case of fossil fuels, no one could imagine where we were headed as a planet at the start:

“Fossil fuels - many didn’t know the damage but may realise there are better options or discover that some options are not viable under all circumstances. One day we will be the boomers!”

Table 24: Considerations for a future fuels pathway (NYP)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Ensuring a just, affordable and equitable transition	5	Keep options open	2
Costs	2	We may have other option	1
Accessibility	1	Other energy options	1
Just Transition	1	Collaboration is needed	2
Free energy	1	Bipartisan approach	1
Seeking more information – hydrogen question	2	Australian tailored transition	1
Assess the long-term environmental effects	2	Keep it green - decarbonisation	1
Long-term effects of hydrogen,	1	Early communication is needed	1
Fossil fuels damage	1	Grand total	15

Keep options open

Participants wanted to keep their options open going into the future. Apart from hydrogen/biogas, they wanted to see advancements in diverse fields, for example, kinetic energy. Participants anticipated that by 2050, we could have a large palette of sound options to choose from.

Collaboration is needed

The panel understood the need for collaboration. Internally there needs for bipartisan support. Externally we must learn from the experience of other nations and implement solutions that are well adapted to suit Australian conditions.

Keep it green

Participants were mindful of the many ways hydrogen can be made and reiterated that the production methods must remain green:

“I think it just needs to go to electrolysis, I think if we do the steam methane reforming SMR, we having to capture emissions, still, it’s almost like a temporary fix, and then maybe down the track, we then need to get rid of that as well. So my advice would be just to go straight to electrolysis just completely remove carbon emissions from the picture.”

Early communication is needed

Participants also noted that early communication is the key to success. They wanted to ensure that all citizens receive clear information:

“They need to communicate clearly. With the citizens. And I don’t know. Yeah, through different resources, like on the news, but maybe also social media. So different age groups are targeted?”

5.6.3.4. Evaluating the future fuels pathway against the principles: NYP

Figure 9 shows how the panel responded when asked the question: keeping in mind the pros and cons discussed earlier, can a future fuels pathway meet the principles? Principle 8 and principle 5, were two principles with the least amount of ‘yes’ votes.

Principle 8: Transparency and Equity - *Form an independent ethics committee to ensure transparency, manage access to incentives, and public education to provide equal access for all.*

Principle 5: An environmentally responsible energy system - *The Australian Government should ensure that decision making is unified to meet "climate change" goals through consultation with young people, environmental groups, land-owners and Traditional Owners.*

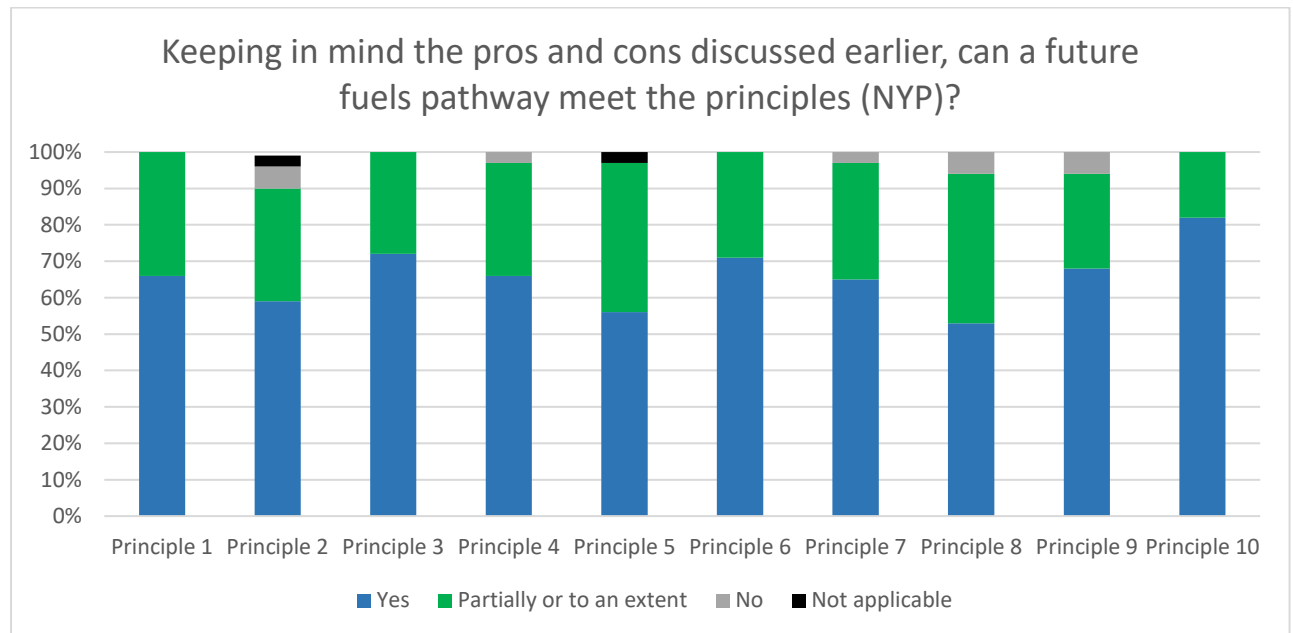


Figure 9: Evaluating future fuels pathway against principles NYP (Thursday, 12th May)
Source: Zoom poll data

Comparing Figure 9 and Figure 10, it can be seen that the future fuels pathway gleans more ‘yes’ votes than the all-electric pathway. Although there are doubts about how certain principles will be honoured in the future fuels pathway, there is slightly more confidence in the NYP panel around the prospects of future fuels. This was especially the case with respect to principle 10, which received 82% ‘yes’ votes:

Principle 10 – Research: *Australia should be investing in their own research into renewable technologies, while also encouraging and incentivising the private sector to join and collaborate. This will ensure that Australia becomes a world leader in renewable energy innovation.*

It may be inferred that the NYP panel is placing its highest hope on research activities and private enterprises to rise up and meet the challenges of our present times.

5.6.4. All-electric pathway: NYP

5.6.4.1. Opportunities

In relation to the opportunities of an all-electric pathway, participants recognised the following (Table 25):

Capitalise on existing system and knowledge

Since Australia already has a well-established electricity infrastructure in place, participants anticipated it would be easy to capitalise on the existing system and knowledge that the sector has acquired. Less decisions would need to be made and the roll out may be easier since the work required could be phased out over time. Also the technology is tried and tested and proven itself to be safe.

Development of the local economy

Participants anticipated that the local economy would grow and develop as the transition to an all-electric scenario would involve more people than just the energy companies. New jobs would be welcomed and a diversification of business opportunities might result. They pondered what advancements could result from developing an allied materials industry in service of the energy sector:

“Rubber is good insulation for transmission lines. Could we be looking at investing in plantations to provide this resource. Or are there other materials that can be used that we can develop/produce within Australia.”

Table 25: Opportunities for an all-electric pathway (NYP)

Thematic analysis of Google docs	Count of Google doc statements	Thematic analysis of Google docs	Count of Google doc statements
Subcategories		Subcategories	
Capitalise on existing system and knowledge	9	Expectations placed on batteries	3
Technology is known and established	4	Batteries as an export commodity	1
Some infrastructure already in place	2	Home energy storage	1
Phased approach	2	Grid independence	1
Easy to integrate in current systems	1	Advantages of a single energy source	3
Development of the local economy	5	Energy efficient appliances	1
Business integration	3	Positive prospects due to a focussed approach	1
New jobs	2	Good to have only one energy source	1
Better for the environment	4	Less push back for renewable options	2
Sustainable future	1	Renewable to produce electricity	1
Responsible mining	1	People may be more accepting	1
Environmentally friendly	1	Expecting to see lower costs	2
Low carbon emissions	1	Economy of scale	2
Exploring transport options	3	Debating safety and risk	2
Bring back old technologies	1	Technology is known and established	1
Transition has already started	1	Risky to have it all in one source	1
EV advantages	1	Grand total	33

Better for the environment

Some participants believed that the all-electric pathway would be better for the environment as it would entail fewer emissions and take pressure off for mining gas.

Exploring transport options

Some participants believed an all-electric pathway could be a good opportunity to revitalise old technologies like trams. Some participants anticipated that electric vehicles would require less maintenance. Since research has already begun for development of electric vehicles, transition would be helped along.

Expectations placed on batteries

Several expectations were placed on the requirements of batteries. Robust batteries would be welcomed if it meant less reliance on the electric grid and greater self-sufficiency. Some participants felt that Australia could manufacture and charge large batteries as export commodities and to regional and remote areas where electrical supply is unreliable. They also wondered if Australia could establish transatlantic powerlines, generating power locally to support vulnerable communities and earn export income at the same time.

Advantages of a single energy source

As electricity would be a single energy source, some participants argued that the single focus would imply greater efficiency since all human energy would be focused on developing one system.

Less push back for renewable options

Some participants believed there would be less push back for this pathway, especially if hydro and wind power were part of the renewable equation.

Expecting to see lower costs

Participants were hopeful that economy of scale would imply lower costs for consumers – in terms of unit price of electricity and in terms of appliances, maintenance, and service costs. An economy of scale should bring all costs down and be more cost effective in the end.

Debating safety and risk

There was some debate about safety and risks. Some participants anticipated that since electricity systems are well known and well established, there would be less risk (in comparison to the development of an all-new hydrogen alternative). However, as there would be only one energy alternative, some participants wondered whether it would be “*Good to keep your eggs nice and safe in the one basket*”.

5.6.4.2. Challenges

In relation to the challenges of an all-electric pathway (Table 26) participants recognised the following:

Table 26: Challenges for an all-electric pathway (NYP)

Thematic analysis of Google docs	Count of Google doc statements	Thematic analysis of Google docs	Count of Google doc statements
Subcategories		Subcategories	
We need to keep our options open	13	Impacts in relation to appliances	4
Risky to have it all in one source	6	Appliances recycling	2
Not all industries can function with an all-electric system	2	Phased approach	1
Risky to have it all in one source - no competition	1	Appliances - cost	1
Learning curve	1	Increased pressure and demands on the system requiring upgrades	4
Lack of diversification	1	Demand pressure	1
Limitations	1	Time of implementation	1
Country collaboration	1	Infrastructure	1
Redundancies and losses	6	EV infrastructure capacity	1
Impacts on exports	2	Reliable transport options	2
Job losses	2	Battery development	2
Waste from transition	1	Regional development	2
More R&D	1	Regional issues	1
Dependence on finite resources continues	4	Infrastructure	1
Still have to mine resources	2	Debating batteries	2
Price of commodity	1	Electricity storage	1
Responsible mining	1	Battery development	1
Debating the costs	3	Existing mechanisms that keep coal in play – Fossil fuel phase out	1
Cost of upgrading network put onto consumers	1	Social challenges - consensus	1
Not affordable for the individual	1	Grand total	42
Cost for households	1		

We need to keep our options open

Following on from the debate on safety and risk, many participants questioned the wisdom of relying solely on one alternative. It would be risky to rely only on one source since a heavy strain would be placed on the electrical grid. Participants anticipated that likelihood of outages would increase; and there would be no backup when extreme weather events effected supply:

“One single energy increases risk and vulnerability - one network, global unrest and wartime may increase susceptibility to interruption. Also vulnerability to cyclone/ climatic events.”

“Might not be good to have all eggs in one basket.”

A lack of competition would result, and this would not be good as prices could go up. Moreover, participants felt that certain industries would flounder as they cannot rely only on electricity alone. Also, what would happen if Australia alone went down this path and didn't adequately invest in sound alternatives:

“If the world didn't follow a similar path, would Australia fall behind. This is a potential missed opportunity - Australia's won't reap benefits of potentially highly successful technologies, infrastructure will be missing and it will take time to catch up.”

Redundancies and losses

Participants were concerned about redundancies and losses, as relying completely on one option would shut down many industries. This would imply job losses and loss of income. Australia may also lose a significant portion of its export income. As existing technology becomes redundant, a lot of waste would be generated. Participants enquire:

“What do we do with all the old stuff, infrastructure?”

Dependence on finite resources continues

Participants also argued that the reliance on finite mining resources would continue as we need certain materials like copper, cobalt and lithium. Participants wondered if any humanitarian issues would ensue if these materials had to be sourced from overseas.

Debating the costs

Some participants argued that costs might increase for individuals and households, especially if they had to transition away from gas. Also:

“Cost of upgrading the network for 100% energy mix will be substantial and is likely to be passed on to consumers.”

Impacts in relation to appliances

Participants worried about the cost of replacing gas appliances already in use. They also worried that appliances in good working condition would become redundant and destined for recycling and landfill. They anticipated that the changeover of appliances would imply several logistical challenges.

Increased pressure and demands on the system requiring upgrades

Participants wondered if Australia's existing network could keep up with the increased demand. Apart from adding new households to the grid, capacity would also have to be increased to accommodate the demand for electric vehicles. Together this could place a greater strain on the network. How would the network manage upgrades in tune with increased demands?

Reliable transport options

Participants doubted that there would be sufficiently reliable transport options as current options for recharging are few and far between.

Regional development

Participants were concerned that the regions would be left behind if we went down an all-electric pathway:

“Electric cars need chargers. Location of chargers is going to benefit major cities but what about regional/ remote areas. How will the infrastructure be maintained and range requirements of vehicles in remote areas met (think NT, WA).”

Debating batteries

Participants wondered whether battery technology would advance fast enough. Currently, there are limited long-life battery options; therefore, storing renewable electricity at home is difficult.

Existing mechanisms that keep coal in play

Some participants believed that fossil fuels could never be completely phased out.

Social challenges - consensus

Participants wondered if all Australians would be onboard with this option.

5.6.4.3. Considerations

In relation to an all-electric pathway, participants gave importance to the following considerations out to 2050 (Table 27):

Table 27: Considerations for an all-electric pathway (NYP)

Thematic analysis of Google docs Subcategories	Count of Google doc statements	Thematic analysis of Google docs Subcategories	Count of Google doc statements
Upgrade to infrastructure	3	Seeking clarity on roles and responsibilities	2
Infrastructure	1	Infrastructure	1
Upgrades to grid network	1	Government	1
Supply issues	1	Improve rental standards	2
We need to keep our options open	3	Improve rental standards by introducing renewable energy options	2
Risky to have it all in one source	2	Preparing the workforce – reskilled workers	1
More R&D	1	Timing concerns – time of implementation	1
Redundancies and losses	3	Dependence on finite resources continues – still have to mine resources	1
Waste from transition	1	Grand total	18
Fossil fuel phase out	1		
Appliances recycling	1		
Social justness	2		
Acknowledge indigenous rights	1		
Impacts on exports	1		

We need to keep our options open

Based on the above discussions, participants reiterated the importance of keeping our options open:

“If 100% electric only how would we maintain and bulletproof the one energy source from failing. Would sectioning parts be a good idea. Need a balance between affecting many people and few people.”

Participants felt that we need to rely on research and development in many fields and keep considering alternatives. A blinkered approach would be detrimental to our growth as a nation:

“Utilising kinetic energy. Wireless transmission of energy - many ideas need to be considered and developed. Many ideas are simply not being explored.”

Upgrade to infrastructure

Issues around infrastructure upgrades in relation to generating adequate supply were raised again.

Social justness

Participants wanted to see socially just outcomes. There were concerns for vulnerable communities overseas and within Australia. The impact of export on other countries must be considered alongside acknowledgement of local indigenous communities. A participant offered that we should:

“Donate all mining land back to indigenous people.”

Improve rental standards

Participants wanted to see improvements in rental standards. They wanted to see policies that pressure landlords to improve tenants' renewable options and/or provide incentives to place solar panels on homes.

Seeking clarity on roles and responsibilities

Participants wondered whose responsibility it would be to make the necessary upgrades and changes? Who would oversee the energy outputs and maintain the supply. Participants also wondered what role governments would play.

Redundancies and losses

Waste resulting from the transition continued to be a pain point needing greater resolution and clarity:

“How to deal with waste from current technologies which will be discontinued (fuel cars, electrical appliances, etc.)”

Dependence on finite resources continues

There were some concerns about the continued reliance on mining and how this could be managed responsibly:

“We use a lot of metals, copper etc. and they need to be mined. Hydrogen doesn't need to be mined. Mining needs to be considered in a more sustainable way. Downsides - need to find a compromise. Can you mine responsibly? Genuine conservation to mitigate risks.”

Preparing the workforce

Concerns persisted around how the workforce would transition. Would workers who are losing jobs be retrained and reskilled:

“Lack of skilled worked - how will workers in current industries be able to transition to working with new technologies? What training and/assistance will need to be provided?”

Timing concerns

Lastly, participants wondered how the implementation would be timed? Would we make it in time as such a change over would be a huge undertaking.

5.6.4.4. Evaluating the all-electric pathway against the principles: NYP

Figure 10 shows how the NYP panel responded when asked the question: keeping in mind the pros and cons discussed earlier, can an all-electric pathway meet the principles?

Overall, 'yes' votes were quite low for nearly all the principles (especially when compared to the voting of the WA panel for the same exercise). This indicates that the NYP has little faith that an all-electric pathway is a wise choice for Australia's low carbon future. Principles 3 and 6 had the least amount of 'yes' votes:

Principle 3: Switch to variety of new and renewable energy options - Australia should be leading investments in and utilising a diverse range of new technologies to create a highly efficient energy system which minimises potential energy losses which would result from use of a single or limited technologies.

Principle 6: Incentives to increase affordability/switching to renewables - Governments should ensure the transition to renewables is affordable through a range of incentives for consumers, as well as disincentives for industries using fossil fuels. This will secure equal access for all.

These votes reiterate some of the discussion around accessibility, reliability, choice and competition reported in the previous sections. It also reinforces the panel's needs and the fallacy of relying on a 'one-way street' as it compromises diversity in the system.

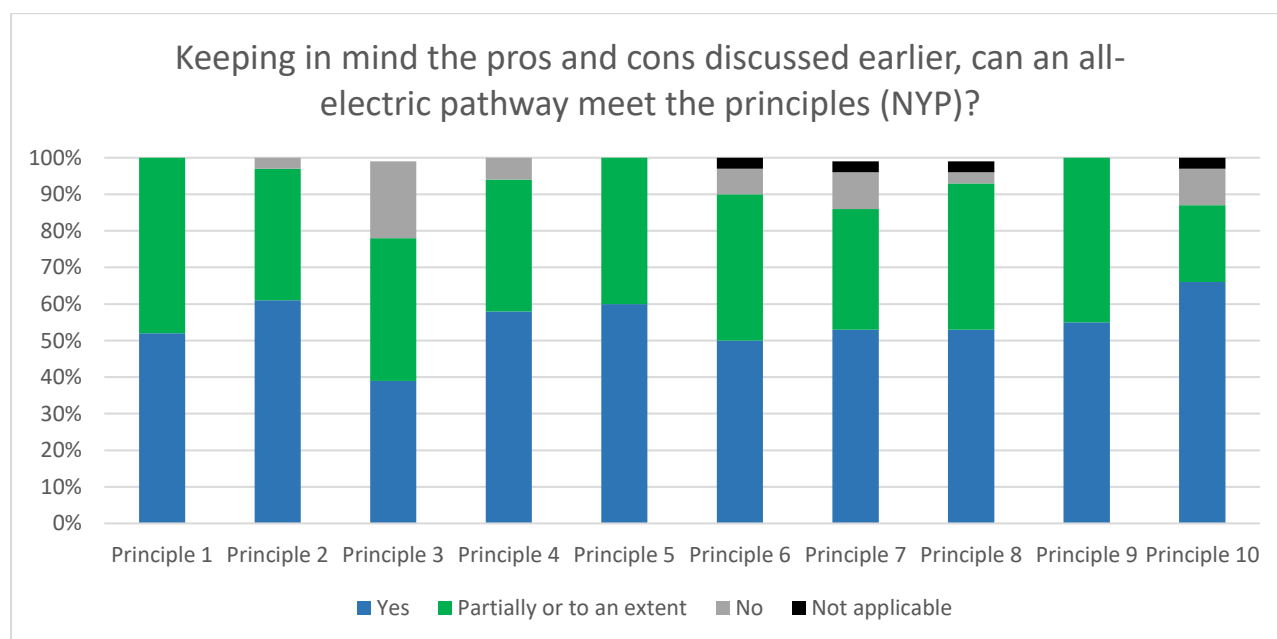


Figure 10: Evaluating an all-electric pathway against principles NYP (Thursday, 12th May)

Source: Zoom poll data

As with future fuels pathway, principle 10 received the highest score (66%). Again, the onus is placed very much on research activities and private enterprise if the all-electric pathway is to be successful. NYP panel is thus far unconvinced around the veracity of the all-electric pathway and questions how an all-electric pathway would allow Australia to become a world leader in renewable energy innovation:

Principle 10 – Research: *Australia should be investing in their own research into renewable technologies, while also encouraging and incentivising the private sector to join and collaborate. This will ensure that Australia becomes a world leader in renewable energy innovation.*

6. Quantitative results

There is a methodological assumption that participation in deliberative processes will influence how participants understand and think about the research topic. To test this assumption, control groups for each panel were established in the recruitment process. The control groups did not participate in the panels, but did complete the same survey as participants at the same time, before and after the panels. It was assumed that there would be a change in participants' responses to questions about perceptions resulting from their participation in the panels and not from external influences such as policy announcements, media, or other events.

Analysis of the responses of the control group shows no or negligible change in their responses from before to after the panels, which confirms that change in responses by participants is likely due to participation and not exogenous influences.

The following results sections describe participants' responses:

Based on our earlier quantitative research on public attitudes towards hydrogen (ARENA national survey in 2018 (Lambert & Ashworth, 2018) and FFCRC national survey in 2021 (Martin et al., 2021)), selected questions were used in the citizens' panels to enable greater comparison. Participants were asked to complete these online surveys pre and post the panel process. Collecting answers to the same set of questions helps to understand how the public's perceptions on hydrogen evolve with time. A selection of pertinent results are discussed in the following sections.

6.1. PARTICIPANTS' SELF-RATED KNOWLEDGE OF HYDROGEN APPLICATIONS

Participant were asked to respond to three questions to rate their knowledge of hydrogen and its applications before and after the citizen panel. The bar graphs (Figure 11) shows that before the citizen panel, many participants selected the option that 'they had never heard' about the hydrogen and its applications. After the panels, many participants selected the option that they 'could describe' hydrogen and its application to their friends. This trend was observed in both groups (NYP and WA) and is a straightforward and expected result.

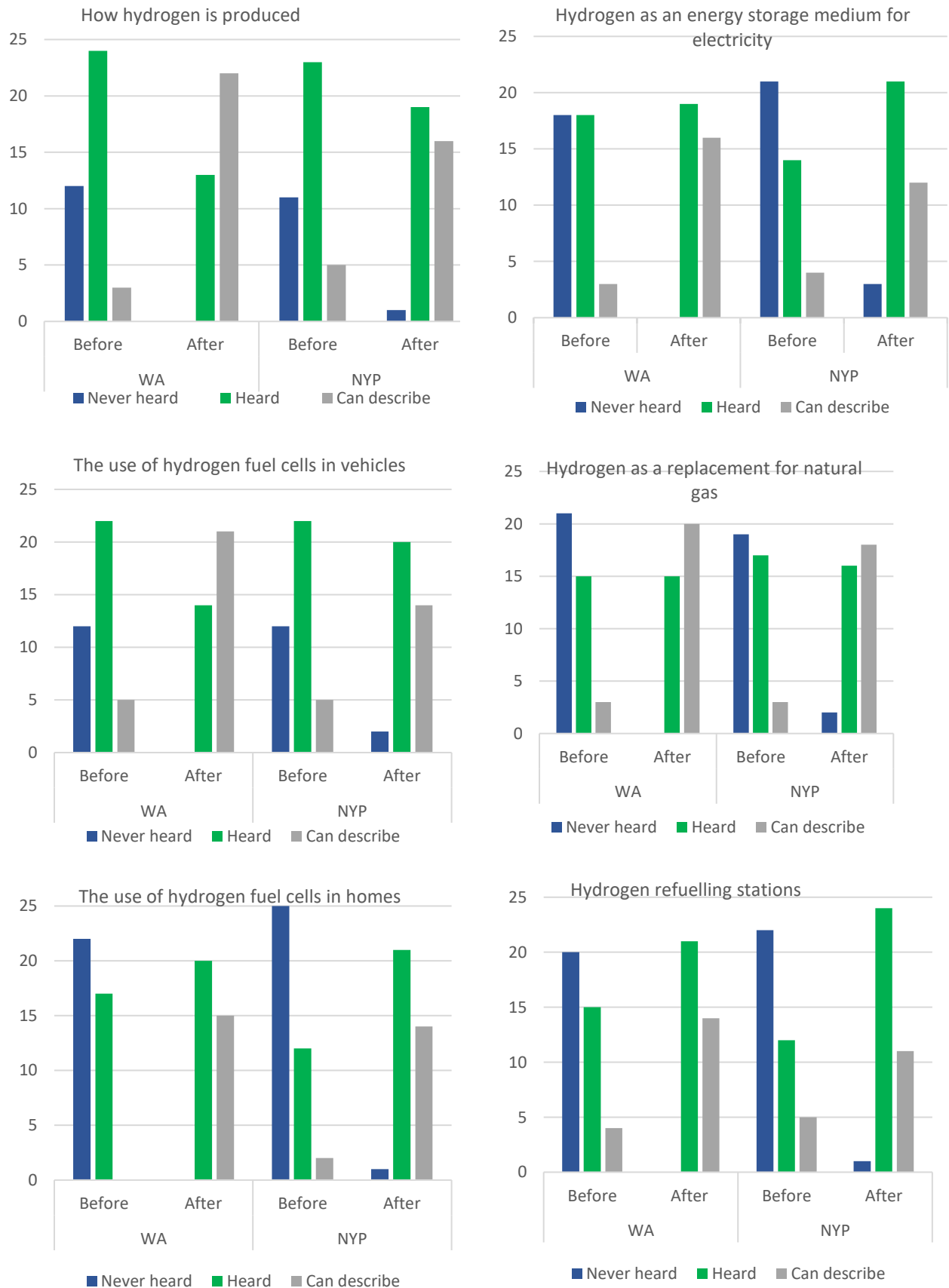


Figure 11: Participants' pre- and post- self-rated knowledge of hydrogen

6.2. PARTICIPANTS' PERCEPTIONS OF ENERGY SOURCES AND TECHNOLOGIES DURING THE PANELS

To understand change in participants' general perceptions of energy sources and technologies, their support and willingness to use hydrogen, we asked three questions before and after the panels:

- How do you feel about hydrogen as a possible solution for energy and environmental challenges?
- If hydrogen were available today, how willing would you be to use it in your home for the following uses?
- 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?

The key questions covered general support for hydrogen, willingness to use hydrogen in homes and level of agreement with various energy sources and technologies.

6.2.1. Support for hydrogen

By the end of the process, general support for hydrogen increased in both panels. Before the panels, people from the NYP were slightly more supportive towards hydrogen compared to WA (see Figure 12).

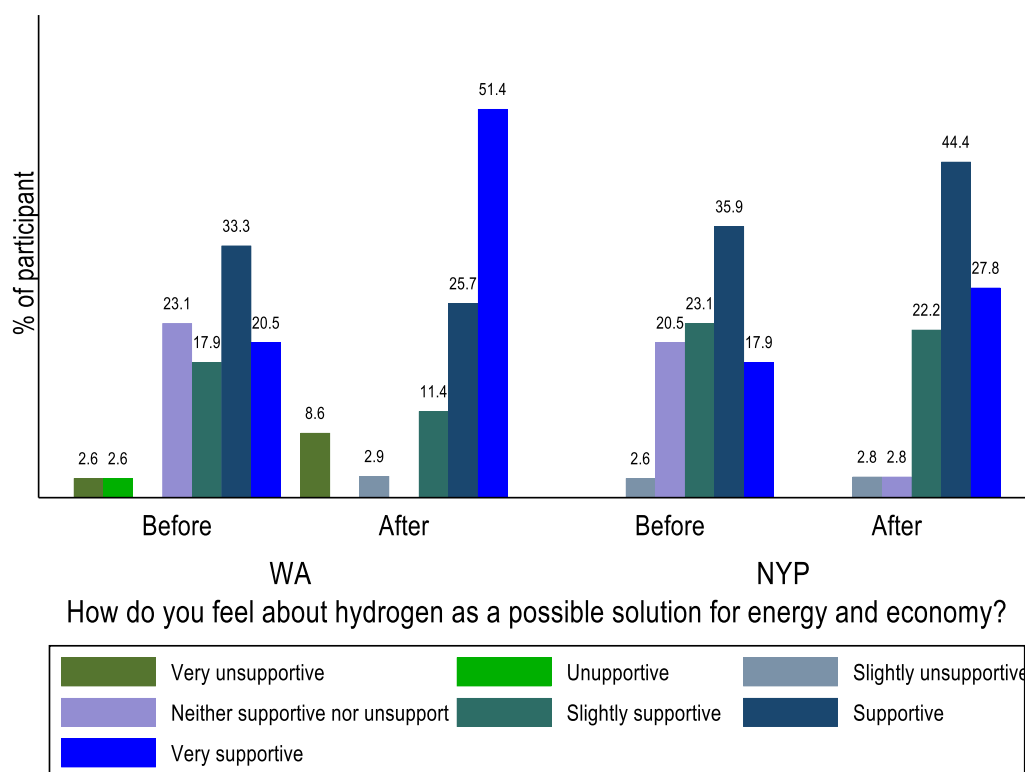


Figure 12: Pre- & post- change in support for hydrogen as a potential solution for energy and environmental challenges

6.2.2. Agreement with energy technologies

Participants were also asked to indicate their level of agreement with a range of energy technologies using a Likert scale: 1 = strongly disagree to 7 = strongly agree. Table 28 shows the mean responses for each of the technologies. Agreement with hydrogen and biomass* as potential sources to meet Australia's future energy needs, registered the largest and most significant positive increases. Given that hydrogen and biogas were the two topics of focus within the learning sessions, the results are not surprising. This result reinforces the impact of information provision engendering positive engagement with topics of interest. Agreement with oil decreased

significantly. Similarly, there was a slight positive (not significant) increase in agreement for CCS, wind, nuclear and solar at the end of the panels. This result reinforces the value in presenting information to the public, from a research-led team and possibly as important that the information has been vetted over by an IAP whose role is to balance the priorities of a gas led ISC to ensure its credibility.

Table 28: Mean test for levels of agreement across the range of energy technologies and sources

Variables	Before N	Mean	After N	Mean	Difference
Hydrogen	67	5.507	67	6.209	-0.701***
Coal	67	3.119	67	2.657	0.463
Gas	67	4.090	67	3.970	0.119
CCS	67	3.955	67	4.104	-0.149
Wind	67	6.269	67	6.418	-0.149
Solar	67	6.373	67	6.448	-0.0750
Oil	67	3.687	67	3.179	0.507*
Nuclear	67	4.269	67	4.418	-0.149
Biomass	67	4.493	67	5.119	-0.627**

Note: *** p<0.01, ** p<0.05, * p<0.1

6.2.3. Willingness to use hydrogen in the home

Willingness to use hydrogen in the home was overwhelmingly positive both before and after the panels. Figure 13 displays participants' willingness to use hydrogen for six different applications in the home. As with 2021 citizens' panels results, from the responses it appears that most participants were confident about using hydrogen safely in the home – to generate electricity, for cooking, and home heating - or externally for cars. The question used a Likert scale response from 1=very unwilling to 7= very willing and asked *If hydrogen were available today, how willing would you be to use it in your home for the following uses:*

- On-site electricity generation
- Cooking
- Using natural gas that contains some hydrogen (i.e. a blend)
- For driving hydrogen fuel cell electric vehicles
- Hot water heating
- Space heating.

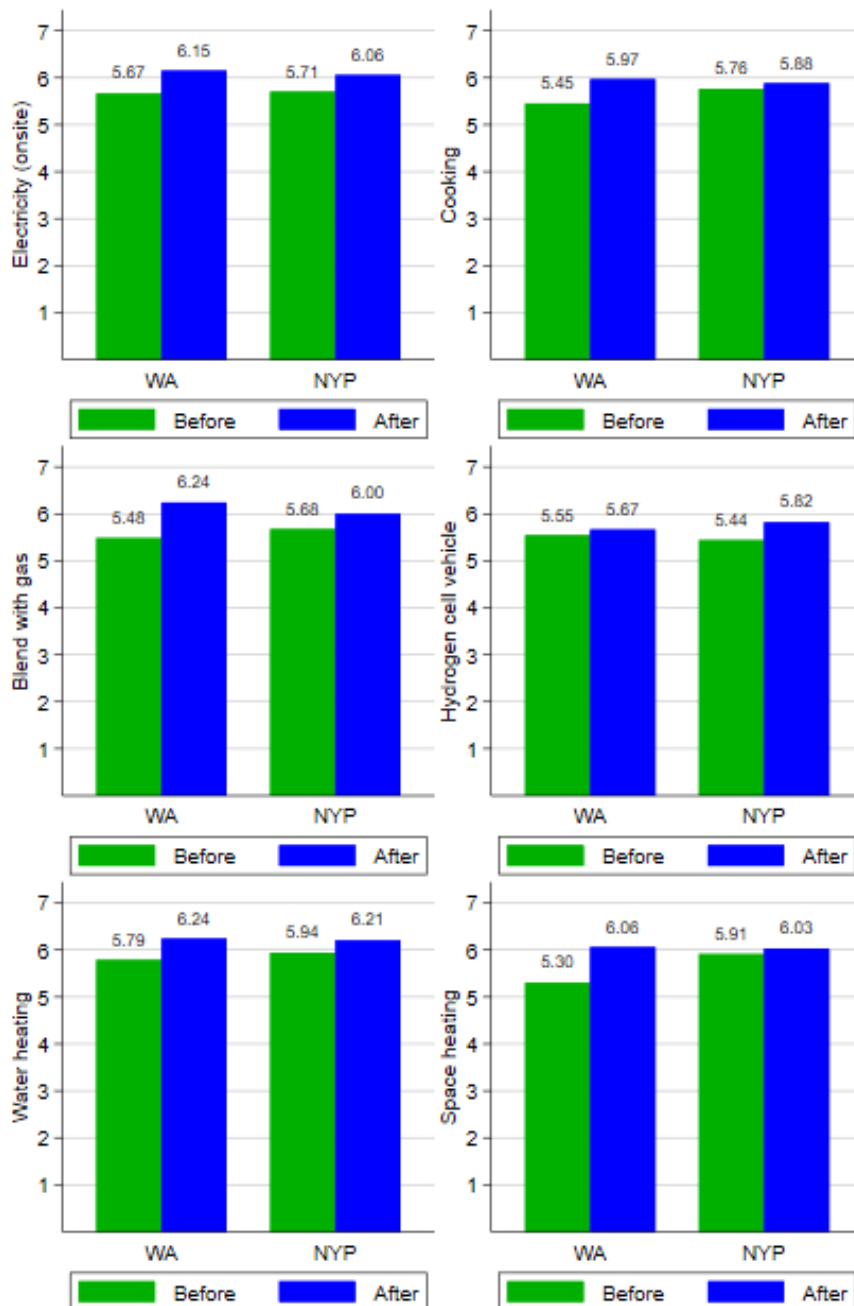


Figure 13: Bar graphs showing mean value of participants' willingness to use hydrogen in the home

6.2.4. Feelings and affect towards hydrogen

We also measured participants' attitudes in relation to the experiential (affect; feelings) and instrumental (benefits; functions) dimensions of their attitudes towards hydrogen. The literature recommends disaggregating these two measures when assessing attitudes and so we included two separate questions with their own discreet measures.

The first explored participants' experiential responses to hydrogen asking: *When you think about the use of hydrogen in Australia, please indicate how it makes you feel.* Responses ranged from:

- Very angry (-3) to Very calm (+3)
- Very embarrassed (-3) to Very proud (+3)

- Very uninspired (-3) to Very inspired (+3)
- Very sad (-3) to Very happy (+3)
- Very concerned (-3) to Very unconcerned (+3)²

Table 29 and Figure 14 show the change in participants' experiential response or feeling toward hydrogen. Participant were slightly positive with mean value ranging 1.1 to 1.3 before the citizen panel. After the citizens' panel, participants' attitude toward hydrogen changed significantly for all positive aspects which is a positive result.

Table 29: Change in participants' experiential responses or feelings towards hydrogen²

Variables	Before		After		Difference
	N	Mean	N	Mean	
When you think about the use of hydrogen in Australia, please indicate how it makes you feel:					
Angry-Calm	67	1.239	67	1.896	-0.657***
Embarrassed-Proud	67	1.134	67	1.776	-0.642***
Uninspired-Inspired	67	1.299	67	1.821	-0.522**
Sad-Happy	67	1.119	67	1.716	-0.597***

Note: *** p<0.01, ** p<0.05, * p<0.1

The second question explored participants' instrumental responses to hydrogen (utility, benefits) asking: *Overall, do you think using hydrogen for energy in Australia would be:*

- Very worthless (-3) to Very worthwhile (+3)
- Very useless (-3) to Very useful (+3)
- Very harmful (-3) to Very beneficial (+3)
- Very Bad (-3) to Very good (+3)

To capture the positive and negative perceived experiences again, the response scale was from -3 through to +3. Again, responses were overwhelmingly positive with a significant positive increase for each response which demonstrates participants deemed hydrogen to be worthwhile, useful and a good thing for Australia (Table 30 and Figure 15).

Table 30: Change in participants' perceived instrumental responses to hydrogen.

Variables	Before		After		Difference
	N	Mean	N	Mean	
Overall, do you think using hydrogen for energy in Australia would be:					
Worthless-Worthwhile	67	1.970	67	2.328	-0.358**
Useless-Useful	67	1.836	67	2.269	-0.433**
Harmful-Beneficial	67	1.761	67	2.104	-0.343
Very bad – Very good	67	1.761	67	2.313	-0.552***

Note: *** p<0.01, ** p<0.05, * p<0.1

² Due to an error in Qualtrics programming, the scales for the very concerned – very unconcerned row was flipped in the survey delivered to participants. Since the scales did not accord with the other variables (which ranged from negative to positive feelings), participants may have gotten confused, and their responses may not be entirely accurate as their interpretation of the question may have varied to our original intention. Due to this reason, this variable is omitted from Table 30 and Figure 14, since it is hard to interpret the resulting numbers against the other values.

Variables	Before		After		Difference
	N	Mean	N	Mean	
When you think about the use of hydrogen in Australia, please indicate how it makes you feel:					
Unconcerned -Concerned	67	-0.403	67	-0.433	0.0300

Note: *** p<0.01, ** p<0.05, * p<0.1

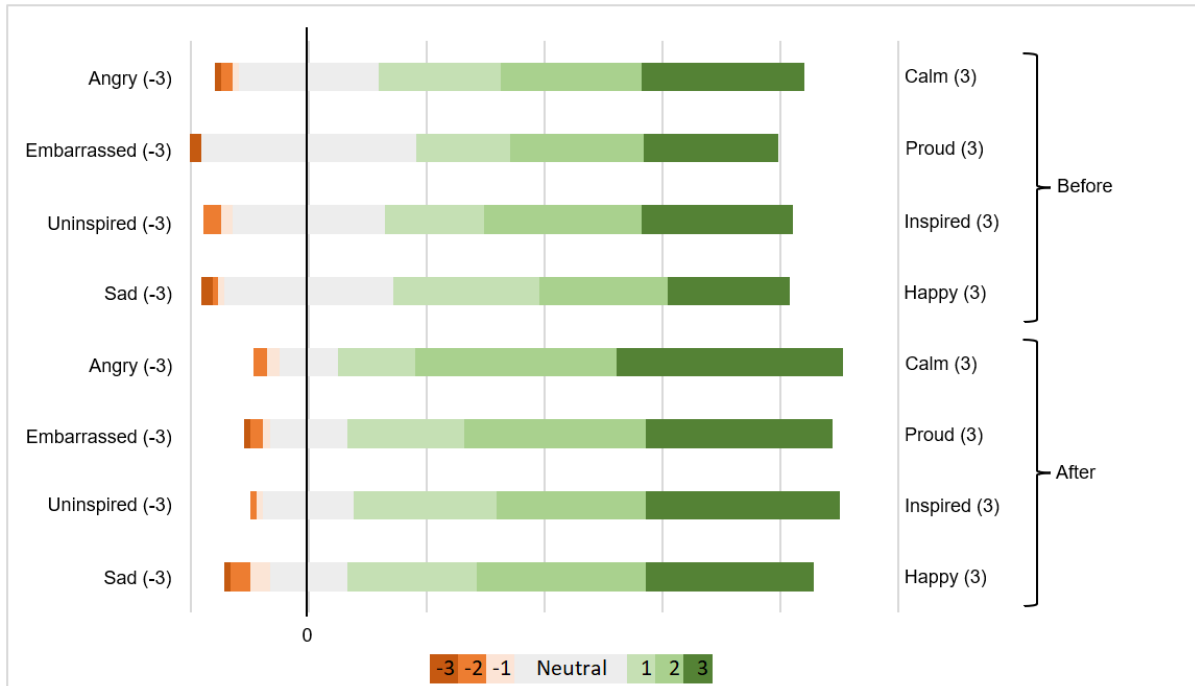


Figure 14: Change in participants' experiential responses or feelings towards hydrogen²

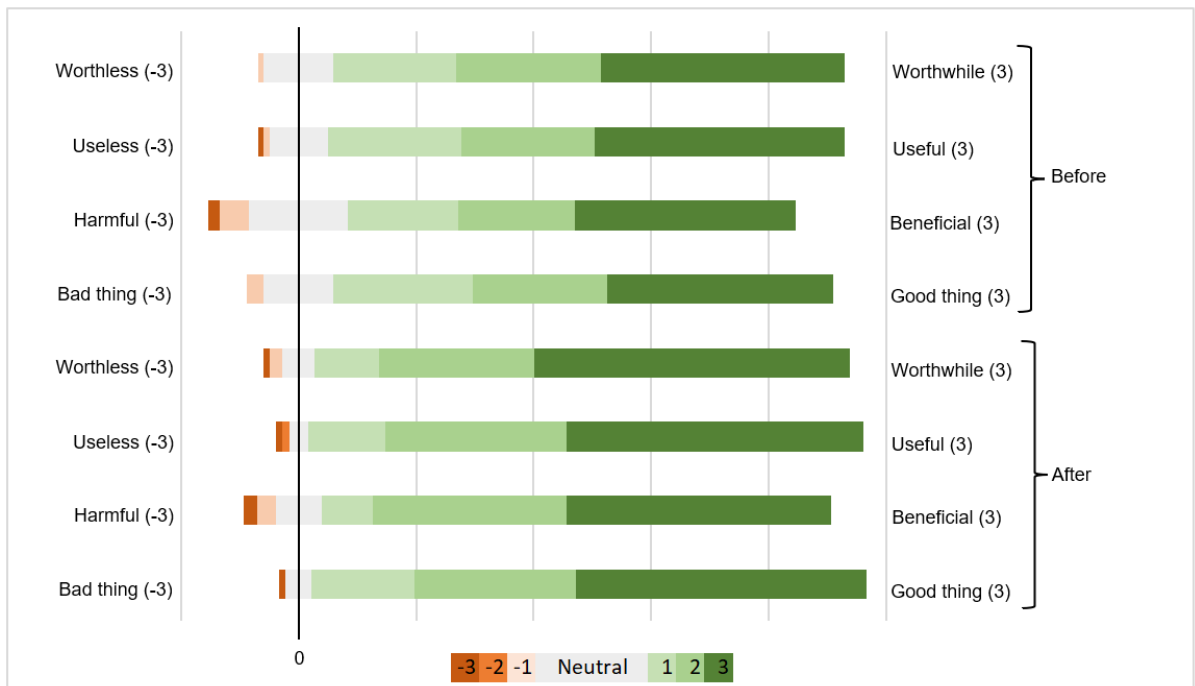


Figure 15: Change in participants' perceived instrumental responses to hydrogen

6.3. ALIGNMENT WITH ENERGY GENERATION SOURCES FOR AUSTRALIA AND SUPPORT

6.3.1. Sources of energy generation

Participants were given four different statements about energy sources and priorities for Australia and asked to indicate how close each statement is to their own point of view (1=strongly against and 7=strongly aligned). The statements included:

- *Australia should focus on renewables, even if we need to invest more in infrastructure to make the system more reliable*
- *Australia should focus on renewables but in the meanwhile continue to use gas as a transition fuel to make the transition smooth and affordable*
- *Australia should focus on traditional energy sources such as coal & gas, even if the environment suffers to some extent*
- *Australia should focus on traditional energy sources such as coal & gas in a post-COVID environment to allow for economic recovery*

No significant change in mean of response was observed before and after the panels (Table 31). However, participants mostly aligned with the view point that Australia should focus on renewables even if it means we need to invest more in infrastructure to make the system reliable.

Table 31: Change in participants' preferences for energy generation priorities in Australia

Variables	Before		After		Difference
	N	Mean	N	Mean	
Australia should focus on renewables, even if we need to invest more in infrastructure to make the system more reliable	67	6.522	67	6.612	-0.0900
Australia should focus on renewables but in the meanwhile continue to use gas as a transition fuel to make the transition smooth and affordable	67	5.433	67	5.701	-0.269
Australia should focus on traditional energy sources such as coal & gas, even if the environment suffers to some extent	67	2.299	67	2.433	-0.134
Australia should focus on traditional energy sources such as coal & gas in a post-COVID environment to allow for economic recovery	67	2.701	67	2.881	-0.179

6.3.2. Use of hydrogen: export opportunities

Another important aspect around energy is the Australia's export of coal and other fossil fuels. To explore participants views on energy export, we asked participants to respond to the statements below, asking how much each statement aligned to *their own point of view (1=strongly against and 7=strongly aligned)*:

- Australia should continue to export coal to developing countries, to help them reduce poverty and develop their economies.
- Australia has an abundant supply of fossil fuels, and we should continue to export them to keep our economy strong.
- Australia should develop a renewable energy industry by investing in hydrogen technologies, to help other countries reduce their carbon emissions.
- Australia should continue to export fossil fuels to keep our economy strong in a post-COVID environment and use some of the profits to establish a renewable energy industry for export.

The mean response, reported in

Table 32 shows participants were significantly less inclined to agree with the view that *Australia should continue to export coal to developing countries, to help them reduce poverty and develop their economies*. Participants grew to be more aligned with the statement that *Australia should develop a renewable energy industry for export (such as hydrogen), to help other countries reduce their carbon emissions*. Although, the difference in mean responses are not significant, it confirms some of the qualitative results where participants stated their preference was to reduce export of *emissions* rather than to lose any export income. Since export of fossil fuels constitutes a large contribution to Australia's income, the promise of hydrogen and renewable gases is that concerns around export of emissions can be eased without losing any of the monetary benefits that an export income brings as

long as the regulator finds a way to commercially charge for hydrogen since it is not a tangible commodity and currently expensive to produce.

Table 32: Change in participants' preferences for energy exports for Australia.

Variables	Before		After		Difference
	N	Mean	N	Mean	
Australia should continue to export coal to developing countries, to help them reduce poverty and develop their economies	67	4.463	67	3.627	0.836***
Australia has an abundant supply of fossil fuels and we should continue to export them to keep our economy strong	67	3.821	67	3.299	0.522
Australia should develop a renewable energy industry for export (such as hydrogen), to help other countries reduce their carbon emissions	67	6.418	67	6.537	-0.119
Australia should continue to export fossil fuels to keep our economy strong in a post-COVID environment and use some of the profits to establish renewable energy industry for export	67	4.313	67	3.761	0.552*

6.4. ENERGY POLICY AND TRADE-OFFS BETWEEN THE ECONOMY AND THE ENVIRONMENT

Using an established measure around trade-offs between prioritising either the economy or the environment participants were given the statement: Energy policy can involve difficult trade-offs between the economy and the environment. Which of the following statements best describes your view? Responses included:

- The highest priority should be given to protecting the environment, even if it hurts the economy.
- Both the environment and the economy are important, but the environment should come first.
- Both the environment and the economy are important and balancing the two should be the highest priority.
- Both the environment and the economy are important, but the economy should come first.
- The highest priority should be given to economic considerations even if it hurts the environment.

From Figure 16, at the start of the panels, WA panel was split between a 'balanced' view and an 'environment over economy' view. However, after the panels, participants tended to choose the 'environment over economy' option as their choice.

For the NYP panel, an interesting result emerged. Majority participants chose 'environment over economy' and 'balanced' options. These two bars did not change much after the panels. However, the percentage of participants choosing 'environment first' increased by the time the panels concluded and the percentage choosing 'economy over environment', completely disappeared.

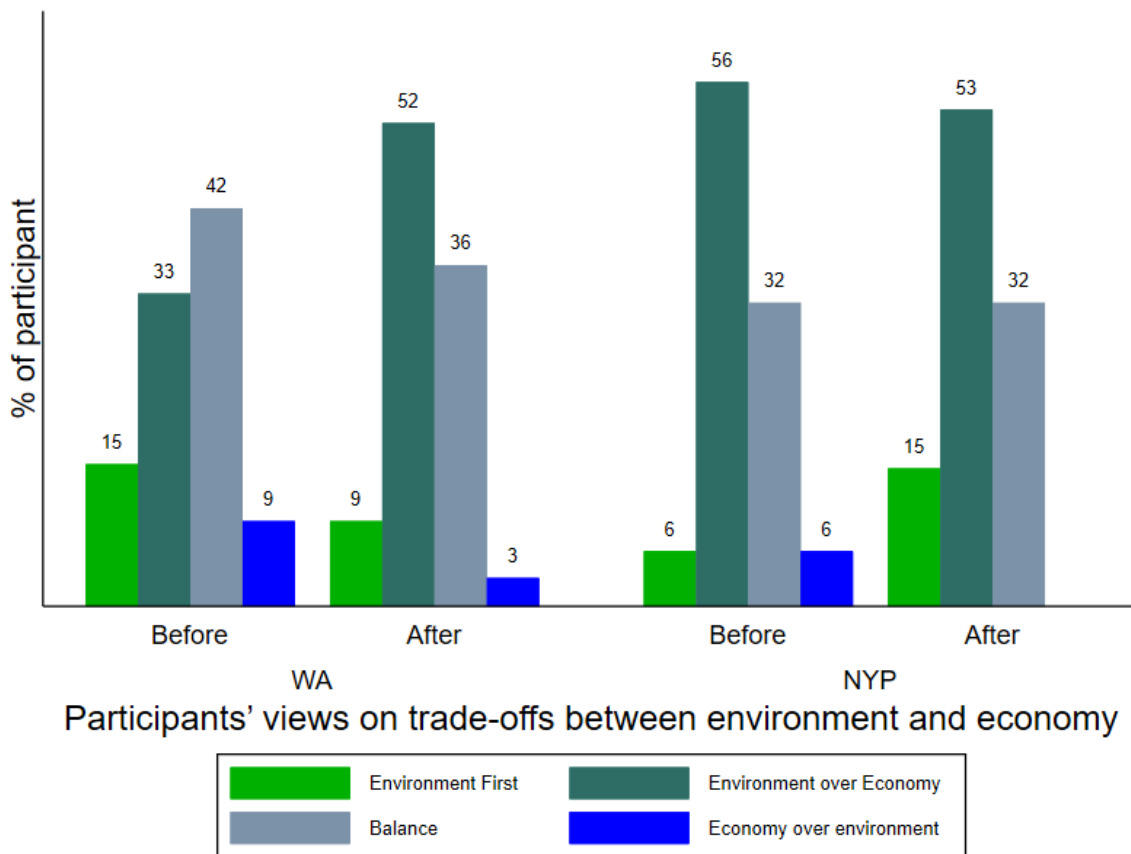


Figure 16: Bar graph showing participants' views on trade-offs between the environment and the economy

Next, we categorised participants based on the options that they aligned with: 'environment first', environment over economy', 'balanced' and 'economy over environment', and assessed how their support towards hydrogen changed before and after the citizens' panels. Figure 17 illustrates how participants support for hydrogen generally increased over time. The only category who bucked the trend was the participants who favoured 'economy over environment'. For this category of participants, support for hydrogen fell over time. It may be inferred that hydrogen and biogas are an environmentalists' first choice; and that economists fail to see the cost-effectiveness of this technology suite or hold concerns over the loss of royalties from Australia.

The success of gas industry in the future, seems therefore to rest upon industry's willingness to embrace environmental values similar to what the public already hold. Holding on too hard and fast purely to techno-economic models will spell disaster unless enviro-socio indicators are deeply embedded into modelling and scenario planning exercises. Proactive engagement to identify such enviro-socio indicators direct with public is an essential next step. Embedding these indicators into long-term strategies follows on. Lastly, demonstrating how these environmental and social values underpin techno-economic models, and then going back to the public to explicate this, is the last hurdle to cross. Industry members who see themselves engaging in such end-to-end exercises, will deeply benefit in establishing their roles within a society which is seeking to see evidence of altruism and social justice.

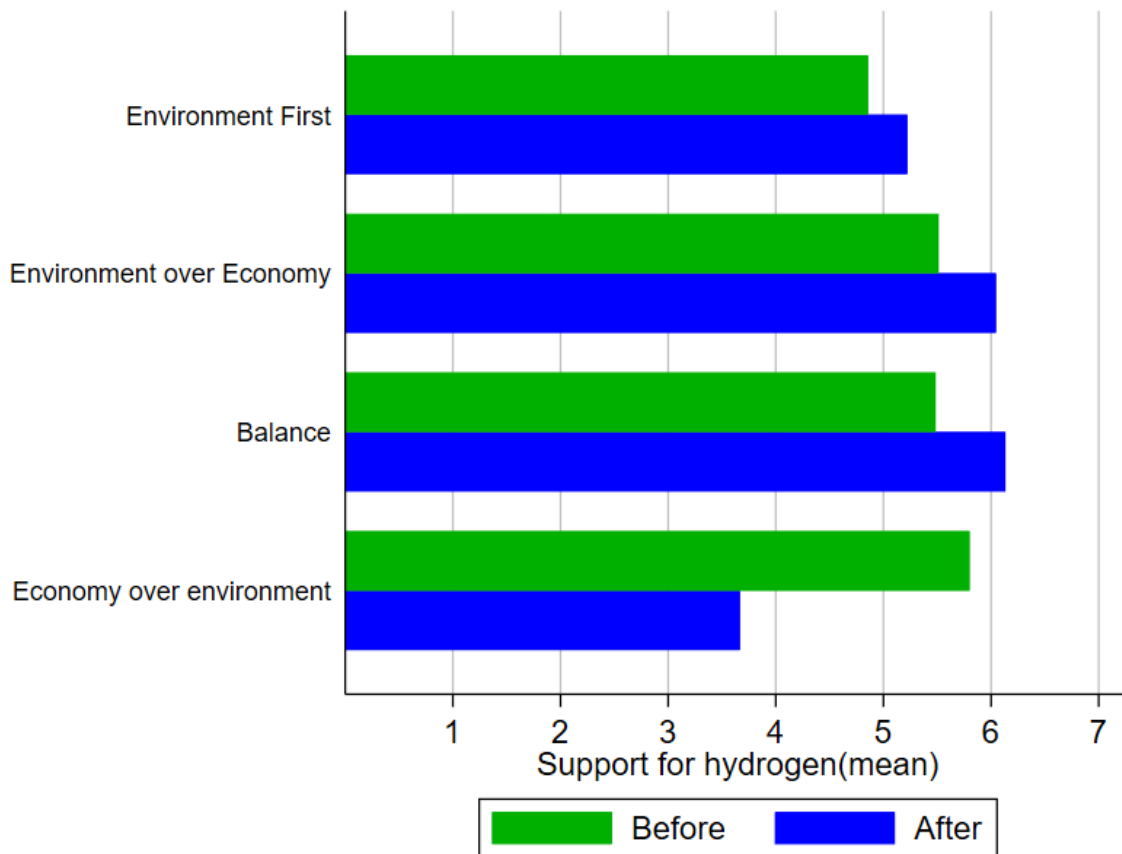


Figure 17: Bar graph showing support for hydrogen fuel by participants' view on trade-offs. Scale - 1 very unsupportive to 7 very supportive

6.5. MEAN COMPARISON BETWEEN THE PANELS WA VS NYP

To compare the responses in the two panels, variables where the difference in mean values were statistically significant, were identified against data collected before and after the panels through the online surveys.

It is interesting to note that before (Table 33) the panels, the NYP are significantly less happy in general; and with the environment around them than the WA panel. After the panels, NYP mood lifts and shifts slightly to a more hopeful outlook (Table 34), yet they retain their reluctance to be inspired and doubt that hydrogen would be good or beneficial for Australia when compared to what the WA participants believe.

Secondly, NYP are overall less trusting than the WA participants. Although after the panels, NYP's levels of trust grow marginally. Both panels have more faith in local government than state or federal government. Media comes off the worst in NYP's perception. The NYP come across as a more discerning lot than their WA counterpart and although they have responded overall positively to the citizens' panels, there is room to mull over these results and ascertain how industry can engage with a panel who have trust issues to begin with.

Thirdly, when asked to rank considerations that Australia needs to make now to transition towards a low carbon energy future (1 - most important to 7 - least important), NYP have given slightly lower importance to behavioural considerations in comparison to NYP. NYP have given higher importance to technological considerations.

Table 33: Variable with significant mean difference before the citizen panel

Variables	WA		NYP		Difference
	N	Mean	N	Mean	
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?					
Hydrogen	33	5.667	34	5.353	0.314
Solar	33	6.636	34	6.118	0.519**
If hydrogen were available today, how willing would you be to use it in your home for the following uses?					
Willingness to use for space heating	33	5.303	34	5.912	-0.609*
When you think about the use of hydrogen in Australia, please indicate how it makes you feel:					
Proud	33	1.485	34	0.794	0.691**
Inspired	33	1.697	34	0.912	0.785**
Happy	33	1.394	34	0.853	0.541*
If a hydrogen economy was to be developed in Australia, to what extent do you agree or disagree that the following groups would act in the best interest of the consumer?					
Trust in organization: Federal Govt.	33	4.242	34	3.441	0.801**
Trust in organization: State Govt.	33	4.515	34	3.824	0.692*
Trust in organization: Local Govt.	33	4.606	34	4	0.606*
How happy are you with the environment around you (0-100)?					
	33	66.67	34	56.18	10.490**

Table 34: Variables with significant mean differences after the citizen panel.

Variables	WA		NYP		Difference
	N	Mean	N	Mean	
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?					
Oil	33	2.727	34	3.618	-0.890**
Nuclear	33	3.970	34	4.853	-0.883*
There are several considerations Australia needs to make now to transition towards a low carbon energy future. Please indicate the importance of the following considerations. Rank your answer from 1 (most important) to 7 (least important)					
Behavioural	33	4.182	34	4.912	-0.730*
Technological	33	3.667	34	2.941	0.725*
How much do you know about the following?					
The use of hydrogen fuel cells in vehicles	33	1.606	34	1.324	0.283**
Overall, do you think using hydrogen for energy in Australia would be:					
Beneficial	33	2.364	34	1.853	0.511*
Good thing	33	2.545	34	2.088	0.457**
When you think about the use of hydrogen in Australia, please indicate how it makes you feel:					
Inspired	33	2.182	34	1.471	0.711***
If a hydrogen economy was to be developed in Australia, to what extent do you agree or disagree that the following groups would act in the best interest of the consumer?					
Trust in organization: Local Government	33	5.061	34	4.206	0.855**
Trust in organization: Media	33	4.364	34	3.500	0.864**
How happy are you with the environment around you (0-100)					
	33	71.21	34	60.15	11.065**

6.6. THE MOST IMPORTANT CONSIDERATIONS FOR AUSTRALIA'S TRANSITION

Next, we asked participants: *There are several considerations Australia needs to make now to transition towards a low carbon energy future. Please indicate the importance of the following considerations. Rank your answer from 1 (most important) to 7 (least important) – behavioural, cultural, environmental, economic, political, social and technological.*

The results are summarised in Figure 18 and Figure 199. Both panels have placed environmental, technological, and economic considerations as being the most important. Both panels have ranked political considerations to be the least important.

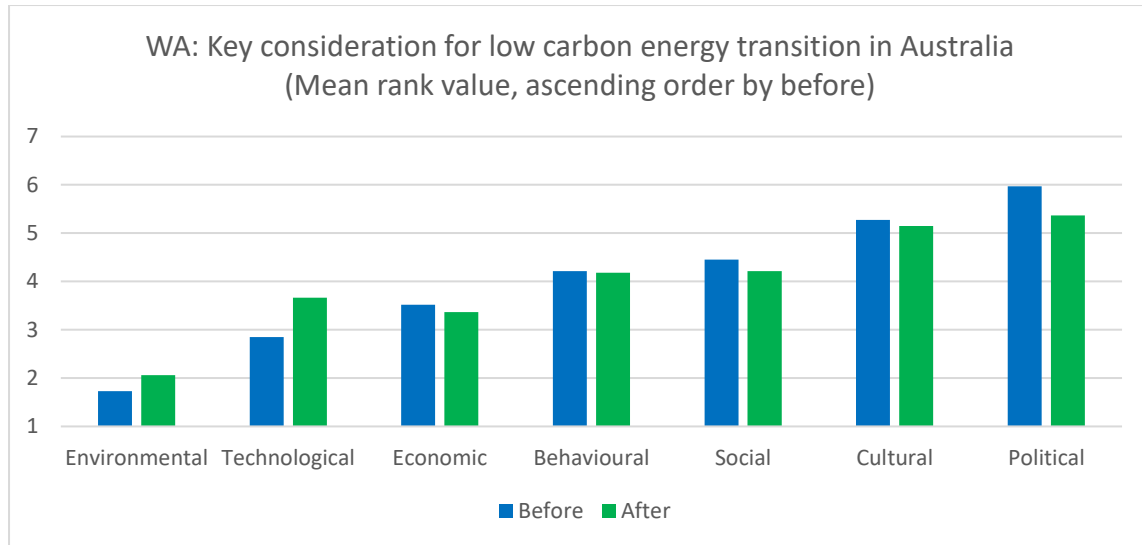


Figure 18: WA's key considerations for Australia's transition

These results indicate that positive perceptions towards hydrogen will only be sustained amongst the WA and NYP crowd, in the long term, if environmental benefits are amply evidenced and demonstrated alongside techno-economic benefits. NYP chose 'social' and WA chose 'behavioural' considerations as the fourth most important consideration to make. The point that comes home is that the industries that will remain viable in the public eye are those who embrace environmental values on one hand and those who show up in society as someone who actively translates environmental values into behaviour and practice.

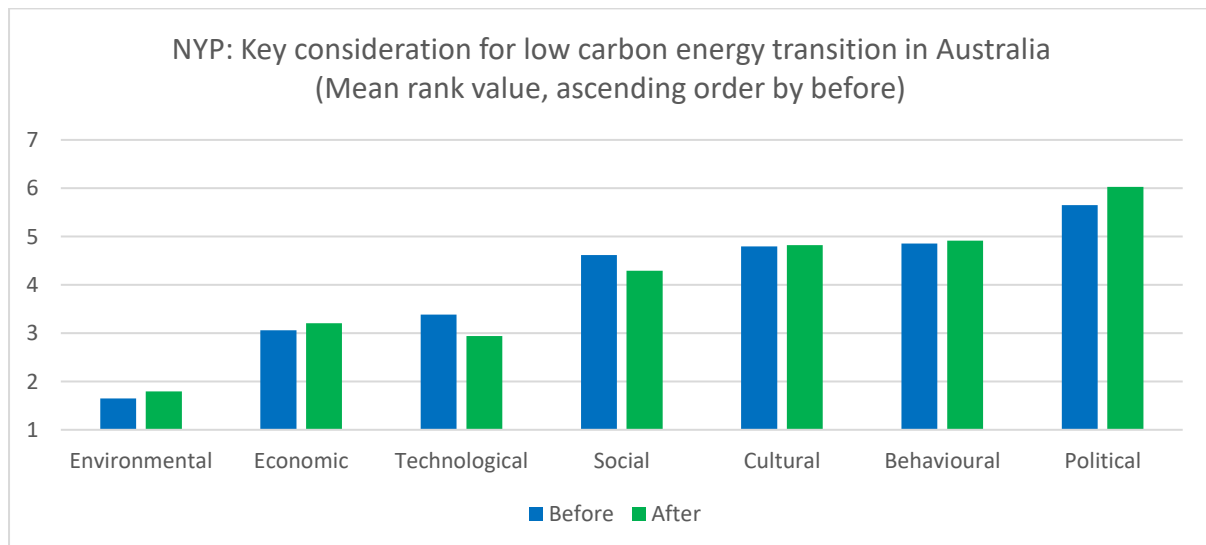


Figure 19: NYP's key considerations for Australia's transition

6.7. SOCIAL LICENCE CONSIDERATIONS – TRUSTWORTHY ENTITIES

To determine which entities participants trust the most when it comes to managing risks leading to the ultimate benefit of the community, we asked the question: If a hydrogen 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? Responses were on a Likert scale of 1=*Strongly disagree* through to 7=*Strongly agree*.

Both panels chose CSIRO, environmental NGOs and universities as the most trustworthy entities when it came to keeping consumers' best interests in mind (Table 35 and Table 36). Fuel/ gas supply companies came at the bottom of the pack. This result once more brings home the fact that future fuel gas companies can expect better outcomes with regards to establishing and building their social licence to operate, so long as they can broker effective partnerships with CSIRO, environmental NGOs and universities as was amply demonstrated in our method. Project governance was balanced through the contribution of the IAP and information-provision was rendered to objective third party reviews before being shared with the lay public (Chapter 2).

Table 35: Groups trusted to act in the best interest of the consumer (WA panel)

WA	Before		After		Difference
	N	Mean	N	Mean	
CSIRO	39	5.872	35	5.771	0.1
Environmental NGO	39	5.744	35	5.629	0.115
Universities	39	5.59	35	5.571	0.018
Local government	39	4.59	35	5	-0.41
State government	39	4.487	35	4.514	-0.027
Media	39	4.128	35	4.314	-0.186
Electricity generation companies	39	3.872	35	4.057	-0.185
Car/appliance manufacturers	39	3.897	35	4.057	-0.16
Federal government	39	4.231	35	3.914	0.316
Fuel/gas supply companies	39	3.282	35	3.429	-0.147

Table 36: Groups trusted to act in the best interest of the consumer (NYP panel)

NYP	Before		After		Difference
	N	Mean	N	Mean	
CSIRO	39	5.538	36	5.5	0.038
Environmental NGO	39	5.744	36	5.472	0.271
Universities	39	5.333	36	5.417	-0.083
Local government	39	4.051	36	4.306	-0.254
State government	39	4	36	4.278	-0.278
Federal government	39	3.564	36	3.944	-0.38
Car/appliance manufacturers	39	4.051	36	3.917	0.135
Media	39	3.59	36	3.611	-0.021
Electricity generation companies	39	3.718	36	3.5	0.218
Fuel/gas supply companies	39	3.154	36	3.389	-0.235

7. Process evaluation

To understand how participants responded to the citizens' panel from start to finish we asked them a series of questions to evaluate the process overall. Results are as follows:

7.1. PARTICIPANTS' EXPERIENCE WITH THE PROCESS

At the end of each week, participants were asked to evaluate their experience with the citizens' panels using a Likert scale (1=not well at all through to 5=extremely well). Participants were asked to indicate the extent to which they experienced a change in their views about the low-carbon energy transitions and the possible pathways as a result of this week's sessions. Figure 20 below, shows the range of responses across each of the weeks for each of the panels. A large number of participants in the WA panel changed or broadened their views 'to a great extent'. Fewer participants in the NYP panel selected this option. On the other extreme, three

participants in the WA panel selected the option 'not at all' across the three weeks. Whereas in NYP, by the end of week 3, no one selected this option of 'not at all'.

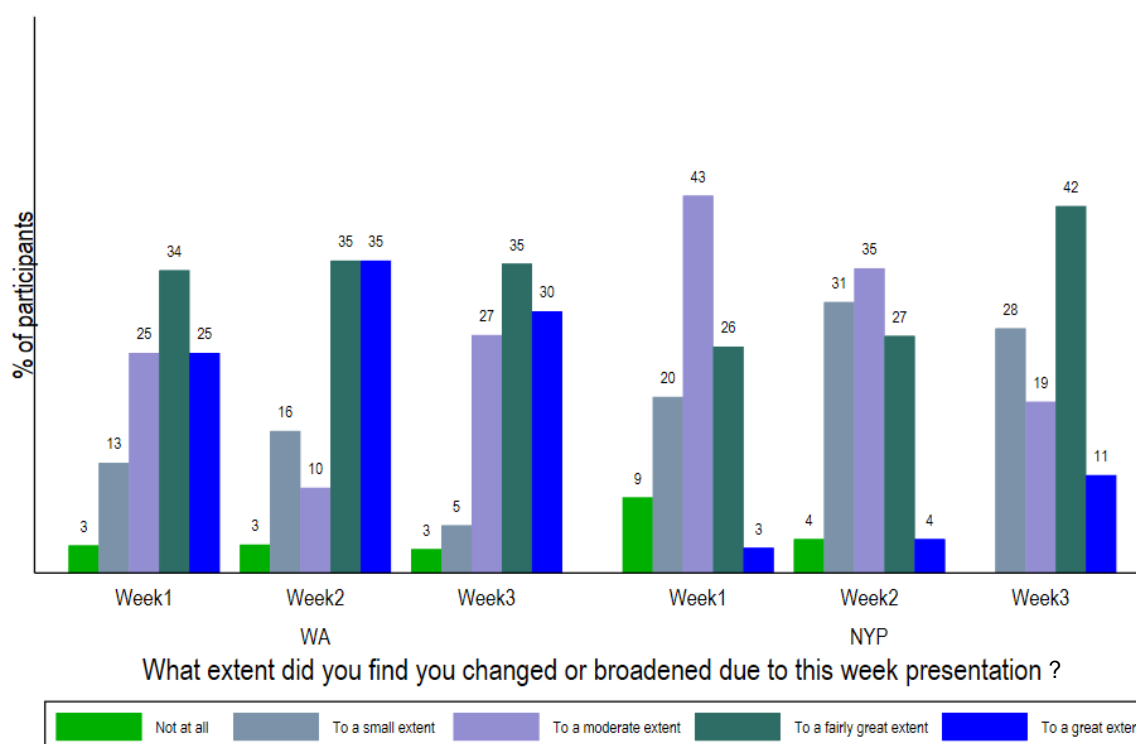


Figure 20: The extent to which participants' views changed over the course of the panels

Next participants were asked to evaluate other aspects of their experience using a Likert scale (1=not well at all through to 5=extremely well). The question was: *How well did you feel you were able to:*

- 1) Understand the purpose of the research
- 2) Understand your role in the research
- 3) Understand the key issues under discussion
- 4) Learn about the issues that were discussed in the break-out rooms
- 5) Listen to what others in your break-out room have to say about the topics under discussion
- 6) Express your own views on the topics under discussion in the break-out rooms

The results are summarised in Table 37. The mean value of participants' ratings of their experiences over the three weeks grew from week 1 to week 3. Significant differences between week 1 and week 3 values were noted for some variables as shown.

Using a Likert scale of 1=not at all through to 5 = definitely, the next set of questions asked participants *How much do you believe that:*

- Your participation was encouraged by the break-out room facilitator
- Your contribution was valued and respected by the other participants in your break-out room
- The discussions in your break-out room resulted in useful conclusions and outcomes

Table 37: Mean difference in participants' experiences with the process between

Variables	Week1		Week2		Week3		Difference
	N	Mean	N	Mean	N	Mean	Week1-Week3
Your view changed	67	3.28	57	3.44	73	3.6	-0.319*
Understand the purpose	67	3.79	57	4.05	73	3.97	-0.182
Understand your role	67	3.73	57	4.18	73	3.93	-0.2
Understand the key issues	67	3.88	57	4.09	73	3.95	-0.065
Learn about the issues	67	4.02	57	4.07	73	3.92	0.097
Listen to others' view	67	4.3	57	4.28	73	4.06	0.244*
Express your own views	67	4.18	57	4.02	73	4.07	0.111
Participation encouraged	67	4.51	57	4.28	73	4.45	0.055
Contribution was valued	67	4.57	57	4.39	73	4.32	0.252**
Discussion was fruitful	67	4.4	57	4.46	73	4.36	0.047

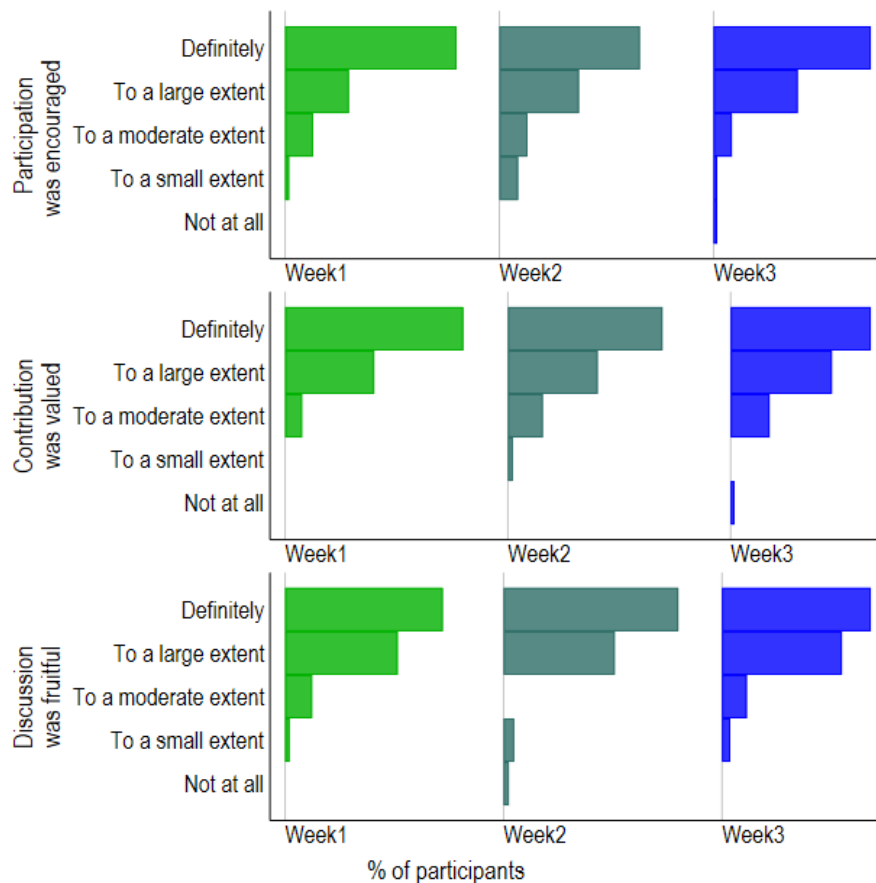


Figure 21: Participants' experience of the breakout rooms during the citizens' panels

7.2. SOCIAL GROUP IDENTITIES – COMPARING MAIN ROOM TO BREAK-OUT ROOMS

Social identity theory is a psychological theory that is focused on the study of intergroup relations and how individuals within groups relate to one another. An individual's level of self-identity within a group can strongly influence their overall attitudes and responses to different situations and information shared amongst group members. That is, if people consider themselves to identify strongly with a group, they are more likely to agree with what is being put forward and even change their viewpoint to align more strongly with the group.

To further understand how participants viewed their position within their groups as part of the panel process, we asked them to rate how they viewed their relationship with others in the Zoom meeting as well as with their Break-out room (break-out rooms) participants. Self-identity and dissonance often influence how people respond to discussions is an important consideration to understand. We hypothesised that because the break-out room discussions were smaller and facilitated by a moderator, an individual's identity would most likely be expressed more confidently in the smaller group. It was hypothesised, that their overall identity with the larger Zoom group would grow over the three-week period. How the question occurred in the questionnaire is detailed below in.

If the circle on the left represents you and the circle on the right represents all the people in the Zoom meeting, select the diagram that best describes your relationship with other fellow citizens that attended the Zoom meeting today:

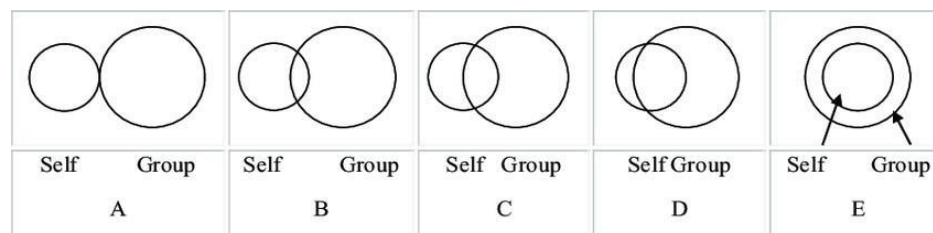


Figure 22: Identity and connectedness circles

The spread of responses by region are shown below in Figure 23 and Figure 24. On the whole participants seemed to relate well although it was observed that in Week 2 there were a number of participants who obviously found it harder to relate than in the other weeks (Table 38). This trend was also observed in the 2021 panels. Similar to the 2021 panels, in 2022 also, there was a dip in participants choosing options 'D' and 'E' (WA panel) and 'D' (NYP panel). However, between week 1 and week 3 participants relationships and identity had grown as can be seen by the high values against options 'E' (WA panel) and 'D' (NYP panel). However, when we consider option 'A' in Figure 23, both panels behave differently. In the NYP panel, no one selected option 'A' in week 3 – implying that cohesion increased by the end of the panels within the break-out rooms. Whereas, in the WA panel, percentage of people choosing option 'A' increased in break-out rooms (Figure 23) but decreased in the large group Zoom meeting (Figure 24). Further exploration is warranted to understand why this trend emerged, and how it sits in relation to 2021 panels, since both groups were exposed to the same content in Week 2 learning sessions. Week 2 presentations were also conducted by the same experts and content (hydrogen and biogas) as the 2021 panels. However, the deliberation in week 2, which forces participants to make choices about the principles can be somewhat frustrating – because there is a need to try and build a consensus, which in the limited time available, not everyone would have felt they agreed with the final wording perfectly. However, with all processes like these, where there is only so much time that can be dedicated to such activities this is not surprising. This is why the % of agreement with the final principles varies with one or two not always agreeing.

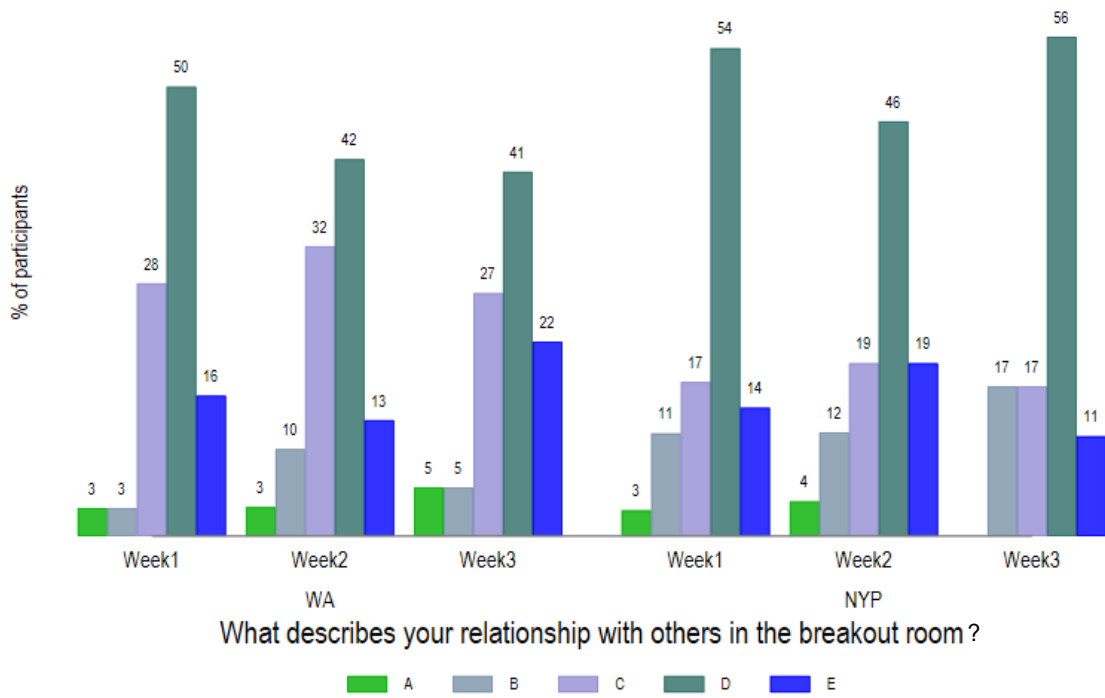


Figure 23: Categories of responses to how participants viewed their relationship with others in the breakout groups

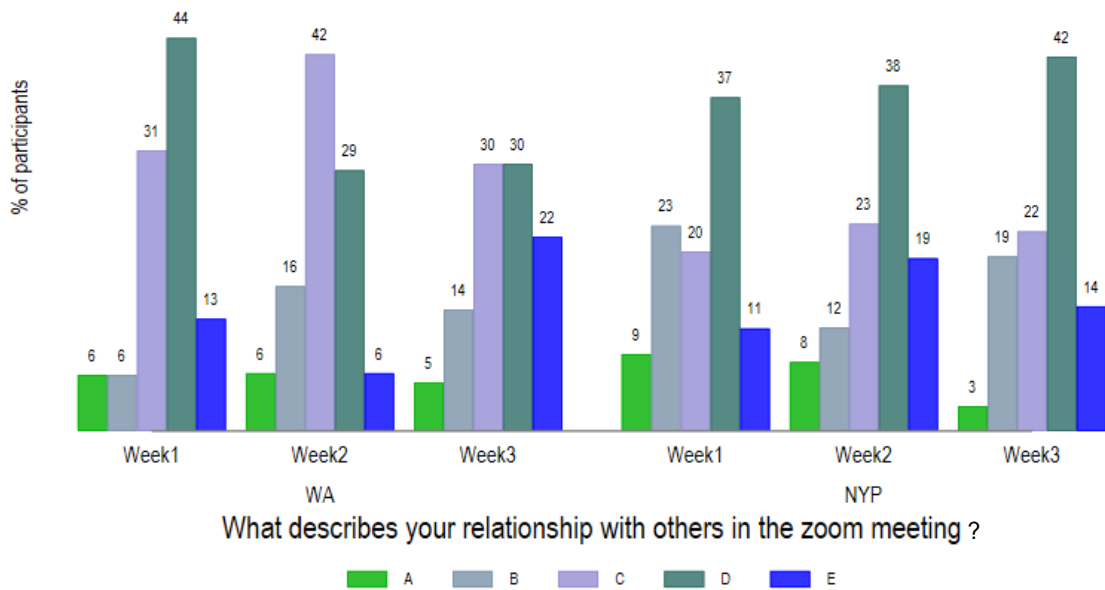


Figure 24: Categories of responses to how participants viewed their relationship with others in the Zoom meetings

Table 38: Mean value of participants' sense of identity between week 1 and week 3:

Variables	Week1		Week2		Week2		Difference
	N	Mean	N	Mean	N	Mean	Week1-Week3
Break-out room	67	3.69	57	3.58	73	3.64	0.043
Zoom Meeting	67	3.34	57	3.3	73	3.47	-0.122

8. Discussion

In both panels, the most valued characteristic of the current energy system that is expected to continue is reliability. Reliability of supply underpins a high standard of living that people have come to expect. As such energy is regarded as a basic necessity that everyone should have access to and be able to afford. Not having to think about (let alone worry about) the safety and reliability of the current energy system was also valued and people described the privilege of being able to take for granted access to safe, reliable, affordable energy.

Having the basic necessity of reliable energy satisfied, people are then able to move onto more sophisticated aspirations such as comfort, communication and connection, education and employment or business, entertainment, hobbies and interests. Participants described how they would struggle if changes to the energy system threatened their acquired lifestyle and lessened these values.

Diversity and choice (Section 5.1) was also highly valued in the current energy system and was thought to be an important characteristic to preserve in a decarbonised system. Therefore, communications about energy transition should not be limited to either/or scenarios of future fuels or full electrification but instead focus on the range of research and development the industry is investing in to improve renewable fuel choices for the public. (Section 5.6.2.2 and 5.6.4.2). People value being able to choose their energy source and the flexibility and freedom to be able to express their personal preferences and values in their energy consumption choices and behaviours (Section 5.1.1.3 and 5.1.2.1). In this regard, decarbonisation pathways that include future fuels were preferred as they are seen to provide more flexibility and freedom of choice than an all-electric pathway.

Comparing the qualitative (particularly Section 5.6) and quantitative results (particularly Section 6.4), it is indicated that communication strategies from industry must bring home how gas infrastructure is being repurposed for renewable fuels. Honest, proactive disclosure on what proportion of the gas is 'renewable' and what limits industry faces in the short and long term in improving upon this proportion, will be appreciated.

Future fuels were also seen as creating valuable opportunities to manage waste (especially waste to energy alongside biogas) and create new types of skills and employment opportunities. Avoiding waste (no matter what technology suite is in question – Section 5.6) was seen as important by participants in both panels. If industry is able to demonstrate how old and redundant infrastructure and/or appliances may be reused, recycled and/or reinvented in some way, this would be well received by the Australian public.

A key observation made by participants fresh out of their COVID-19 experience was that the government took fast and coordinated action when public health and safety was seen to be threatened. Participants were curious why climate change and energy were not attracting similar levels of concerted response.

There was concern about the impacts of energy transition on jobs (this was higher among young people) in losing/gaining jobs and the struggles and challenges relating to retraining and reskilling (Section 5.3 and 5.4). If there is going to be a mass transition within the workforce, whose responsibility is it to retrain and reskill workers and who puts up the cost for that re-education. Participants asked, is it up to the individual to pay for retraining so they may be job-worthy? Or should job-worthiness be the responsibility of an education system? Who funds the education required – a government who believes in welfare of its citizens or an industry who needs capable workers? Perhaps this is a shared responsibility that each party has to make an equal and sincere commitment towards. In a deliberative democracy sense, the question of 'how' can be settled over a process of dialogue where 'resolution' equates to imagining "*solutions that offer an acceptable balance between desirable and undesirable aspects, keeping the worst at bay while achieving as much good as possible.*" (Hartz-Karp & Marinova, 2021, p. 2)

Generally, the conversations landed on the issue of cost and cost-effectiveness of renewable gases (Section 5.6.1.2 and 5.6.3.2). The information that is currently readily available on this topic is both difficult to locate and

access and has also been openly debated. Since there is no clear vision on what the costs of energy transition will be, how affordable this technology suite is, where investments and funding will come from, there is a gap in the public's understanding. In light of this gap, the public remains non-committal to the technology suite. There is a need for clearer information, communication and some creativity needed to resolve issues in relation to cost, affordability and social welfare. Again, reflection-in-action offers a huge potential to creatively approach the solution-finding process (Schon, 1992) over any deliberative forums that ensue as a future intervention warranted by the work done so far.

A cooperative attitude is welcomed and also innovative funding schemes must emerge, and it was expected that government and industry would collaborate and form public-private partnerships in funding and development. While the government is seeking to see what position the public hold, a start is made in collating an evidence base that is open to question and query at will. However, if the government makes a move to intervene on behalf of the public, an industry mindset that is genuinely concerned about environmental care and social responsibility ought to have an advantage over a mindset that is purely focussed on profit and income (Section 5.1.1.6, Section 5.1.1.7, Section 5.1.2.7, Section 5.2.1.11, Section 5.2.2.10 and Section 5.4.2.6). Interpretations and expectations for 'sustainability' appear to be a highly dependent on personal moral construct. The premise of the panels has been to construct principles via deliberation over values that participants can agree on, which can then form the basis for envisioning a future fuels transition, where Australia is thriving.

The Australian public values resilience. When it comes to natural disasters and hard times, the desire is that the energy system is resilient in extreme weather conditions and other events. A resilient household is seen to be one which can be self-sufficient — with affordable options for off-grid living and home energy storage for example (Table 26). A resilient nation on the other hand is seen to be one with secure and reliable access to self-made fuel (Table 23) The Australian public have also demonstrated that they can follow clear and coherent directions in a calm and orderly manner (as evidenced by the response to state and federal restrictions and guidelines during the COVID pandemic). Each of these attributes – spirit, gusto, calm and orderliness – are a rare and powerful in combination and must not be taken for granted. The calm and orderly public has made a spirited call for brave leaders (Section 5.4.1.3, 5.4.2.4). It may be inferred that the success of the renewable gas industry now rests upon brave leaders who can connect well with a spirited yet calm, determined and yet orderly public.

Throughout the panels there were consistent calls for strong leadership. In the Australian public's minds, in the context of renewable gases, brave leaders don't necessarily occupy a politician's seat nor hold a CEO's stature – but rather sit 'independently' somewhere at the interface of government and industry. These brave leaders embrace values such as those enumerated by the citizens in their principles (Section 5.5) – transparency, accountability, equity. They can equally understand complicated issues of environment and economics. Most importantly, it is expected that these brave leaders can listen – equally well - to older and younger Australians, as well as urban and rural, Indigenous and non-Indigenous and the wealthy and vulnerable. Growth of the renewable gas industry will need to be overseen by benign, fair and unbiased 'independent' entities (Section 5.2.1.6, 5.2.2.4). Such entities will demonstrate a willingness to listen, are committed to understand, and who are able to communicate the belief that everyone is included and considered along on the transition journey.

To reach the concerned younger audience (concerned for environment and for social-justice), engaging through non-traditional channels such as social media have more impact for governments and industry. The Australian public want to see a commitment to a long-term plan, not necessarily the fine detail of regulations and policies (Section 5.2.1.4 and 5.2.2.8). The panels show that in general, the public are willing to support climate action (Section 5.4.1.5 and 5.4.2.1). The public are willing to learn new energy behaviours (Section 5.2.1.3, 5.2.2.9) and are actively seeking out information and guidance and want to understand who the trusted sources are.

From an industry perspective, communicating not only about the project and the product is important. The public are looking to understand how projects and products align with social and environmental values, how they fit in to an overall plan for decarbonising and how they are safe and equitable. The biggest benefit the public sees in continuing with gas and embracing renewable gas, is the job opportunities (compared with the relatively few permanent jobs created by solar and wind farms), and the prospect of an alternative (to fossil fuels) yet still lucrative export industry to support the Australian economy. Also, the new skills and training for both an existing and future workforce, so that people can be prepared for new roles that are going to be needed (Section 5.1.2.5, 5.2.1.7, 5.4.1.4, 5.4.2.5)

9. Conclusion and implications

This report describes the findings from two deliberative engagement activities with citizens' panels from Western Australia and a nationally representative sample of young people (aged 18-35). The findings from these two panels add to insights derived through previous deliberative engagement processes held in South Australia, Greater Melbourne and regional New South Wales (Illawarra).

The citizens' panels provided insights into the factors the Australian public prioritise when considering the transition to low-carbon futures, with or without future fuels. Benefits and challenges were identified when the participants considered the energy transition. Participants were interested to preserve the mix in Australia's energy choices, adding to the diversity in Australia's fuel types over time. Both WA and NYP panels are seeking government and industry to work together to deliver a just, affordable and equitable transition; keeping our options open; allowing for research and innovation to continue; and aspiring to see Australia emerge as a global leader in renewable energy. However, participants' raised a range questions when considering differences between a future fuels scenario and an all-electric scenario. Some of these included:

- Which pathway will be more affordable for consumers?
- Will all Australians (including regional and remote inhabitants) have equitable access to new renewable energy options?
- How will the workforce be prepared?
- What are the long-term environmental effects/impacts of new energy pathways?

The quantitative results showed that as the panels concluded, participants' self-rated knowledge of hydrogen and biogas (the future fuels of focus) improved over time. Their support towards, willingness to use, and experiential responses or feelings towards hydrogen, shifted towards the positive end of the scale, as the panels progressed.

A set of principles that should be considered in pathways for decarbonisation was developed by each panel. The principles reflect what participants value most about the current energy system and what they believe are important characteristics of future energy systems. Reliability of safe energy supply was most valued by participants in each of the panels. Reliability of safe energy underpins a high standard of living that participants have come to expect and would "struggle" to adapt if it were to be compromised. Therefore, pathways to decarbonisation should not disrupt reliability of supply or be less safe than the current energy system.

Affordability of energy is also highly valued. Both panels emphasised the need for financial support, incentives and rebates so that the costs of new infrastructure or technologies as part of the transition should not land too heavily on consumers, and particularly the vulnerable. This applied also to new household appliances and fittings if either a transition to future fuels or electrification is required.

Citizens also value having choice in the source of energy they can use and in the provider of energy services. Both panels thought that there should be more diversity in the current system and were welcoming of new, cleaner energy technologies. For many participants, energy choices and behaviour is an expression of their personal identity, morals and values (such as driving an EV or cooking with gas) and so it was important for them to keep the freedom of choice. This was one reason that a decarbonisation pathway that included future fuels was generally preferred over an all-electric scenario. It was pointed out however, and particularly by the young panellists that the freedom of choice is significantly limited for those renting and they would like to see policies aimed at landlords and body corporates that encourage transition and more efficient energy use.

The current energy system was described as something that most people could take for granted, and not have to think or worry about. While recognising that this is a relatively privileged position to be in (compared to other countries and remote areas), the "hidden" or 'behind the scenes' nature of energy infrastructure was also a valued characteristic of the system. For young people especially, throughout the deliberations, concern as voiced about the visual impacts and scale of new energy infrastructure such as wind turbines and transmission lines, which would detract from scenic amenity and bring the energy system abruptly into the everyday consciousness of energy consumers. This was another reason that panellists preferred the future fuels pathway over all-electric as gas infrastructure is generally less visible.

Both panels wanted to see emissions reductions and a transition to cleaner energy sources. For young people, the sense of urgency was much greater. Perceived challenges were around providing factual, trustworthy

information to all citizens in a non-politicised and inclusive way. CSIRO, Environmental NGOs and Universities were seen as trustworthy institutions whereas gas companies were least trusted. The information thought to be needed was beyond project and technology specific but includes broad public education about “where energy comes from”, the need to transition and the collective action required (suggested to be aimed at school children), how people could make changes in their own households, as well as general factual information so people can make form their own opinions and make informed choices about the energy they consume.

While many of the core values were similar across both panels, young people emphasised an urgency to act on climate change by transitioning to cleaner energy, a desire to protect the environment (including visual and scenic amenity), social justice for children, renters, vulnerable and economically disadvantaged and First Nations people, the need to maintain jobs and the opportunities provided by a future fuels pathway to create new types of skills and employment, as well as opportunities to create a valuable export industry.

In both panels, the decarbonisation pathway that included future fuels was preferred over the all-electric pathway. Future fuels were seen to provide innovative opportunities for waste management and to crate less waste than an all-electric pathway. Future fuels preserve the value of providing choice and diversity in the energy system. Future fuels create opportunities to reskill the existing fossil fuels workforce, and to create new skills and types of employment, especially if an export industry is also created.

The future fuels pathway was also favoured over the all-electric in its potential to create economic benefits, particularly in relation to the development of an export hydrogen industry. Indeed the deliberative processes have unveiled the existence of high expectations for economic benefits from the continued use of gas in the form of future fuels, particularly in relation to jobs, reskilling the current fossil fuels workforce and the potential development of an export future fuels industry. Communication around these expectations is beyond the scope of individual project communications and will require industry-wide and government collaboration.

The main challenges identified for future fuels were in public education and social acceptance. The core value of honesty and transparency in information and communication was a consistent theme. This also relates to the responsible communication of expected benefits and management of expectations as noted previously.

The panels also show the benefits of deliberative approaches to engagement in that levels of understanding and support for future fuels (and some other energy types) increased as a result of participation. There may be challenges however in sustaining the attention and high levels of engagement among younger people, as self-evaluations show that some appeared to struggle with the group dynamics and level of participation required during the panels.

Bearing in mind the methodological approach of ‘listening-in’, rather than deduction or construction of findings, as is appropriate in the analysis of deliberative processes, some recommendations and implications are outlined below:

9.1. RECOMMENDATIONS

During the deliberations, participants expressed the need to consider the perspectives, rights and interests of two specific groups of society: children and First Nations peoples. It was suggested that this was required not only to develop a sense of what these groups think of future fuels, but what the groups can architect and contribute in terms of vision and direction. If decarbonising is to be a social policy objective, then truly inclusive, democratic approaches are required. It is therefore recommended to engage with:

- A. School children – as they will eventually become the workforce and decision makers in the future, and who can now, in their youth, offer uninhibited and unhindered creativity whilst debating future energy systems and pathways.
- B. First Nations leaders and communities – particularly where new energy infrastructure may effect access to land and water. Respecting culture and cultural practices, recognising rights to negotiate and hearing the indigenous voice in Parliament (if it is introduced), is vital to establishing an equitable foundation to the transition.

From a topical perspective, a clearer understanding around issues in relation to cost and affordability of changing the current energy system is needed. With a focus on integrative thinking, it may be prudent to deploy future deliberative democracy forums as ‘solution-finding’ interventions (Hartz-Karp & Marinova, 2021), where the

problems of cost, and specifically the distribution of cost and effective incentives and disincentives is explored in finer detail.

For a more generalised and comprehensive picture, it makes absolute sense to

- C. Revisit the notion of a national hydrogen survey to see what the latest movements and trends are at a broader grain and to evaluate the effectiveness of information provision and communication to date.

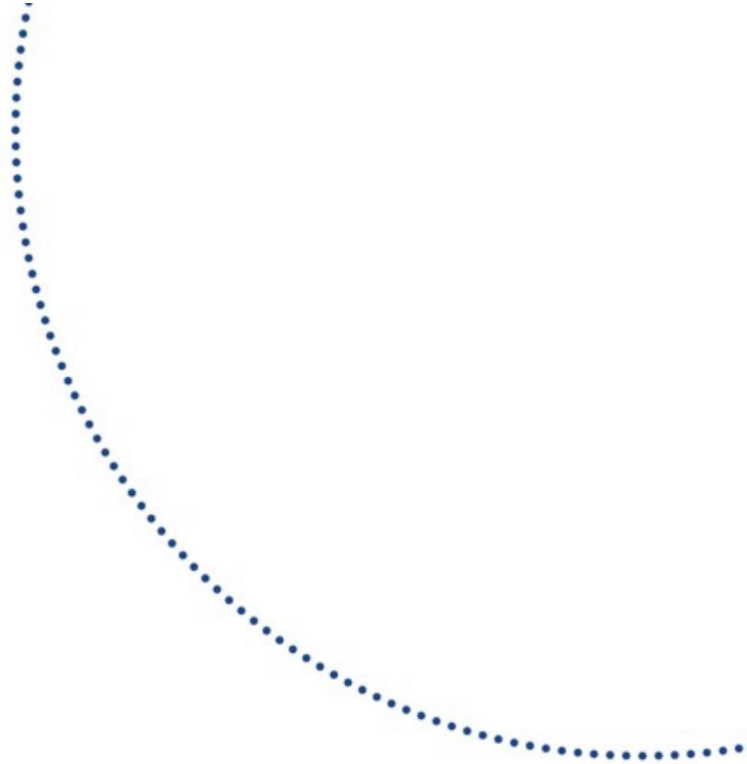
9.2. NEXT STEPS AND FUTURE WORK

This report has reported on the proceedings and outcomes emerging from the 2022 Citizens' Panels. Next,

- A concluding report will collate key take-away points comparing and contrasting all five panels and report on any tangible differences and significant similarities in the various panels.
- Publications and conference presentations will also follow on.

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