Battery Storage and Grid Integration Program

An initiative of The Australian National University

Final report

Customer focussed distribution network management project

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Contents

Executive Summary

This report is the final output of the "*Building a customer-focussed plan for distribution network capacity management*" project, which we undertook from July 2022 to May 2023. It shares our methods and findings. This project is motivated by challenges observed as the electricity system is undergoing large scale transformation in Australia while also trying to work out ways to genuinely engage with energy consumer needs and perspectives.

We used Value Sensitive Design as a tool within a consumer-centric design process in this project. First, we explored values – both of consumers and of the energy industry - through document analysis of a rule change and through six focus groups. These focus groups included 42 participants in total. Then we used values identified to design five conceptual scenarios with creative assistance of 13 specialists from our own team. These scenarios, related through narrative approaches, described different ways values could be brought to the fore in decision making for energy change.

In analysing the scenarios, we found four key dimensions could be used to explore similarities and differences between them. These dimensions describe consumer involvement, activity level, responsibility, and influence. The dimensions can also assist with effective planning for resourcing engagement including identifying roles and responsibilities and accounting for care related activities and effort.

We took these scenario designs back to 32 consumers who attended earlier focus groups. There were many themes raised in these discussions. We have presented two key findings here extracted from these themes. These findings are:

- What are appropriate consumer engagement models during energy system decision making processes, and
- How consumers would like the energy system to respond to their needs.

Using these two findings, we can define how consumers would prefer to engage. Consumers described their need for more help navigating the energy system, leading to a lower position on the activity levels and responsibility dimensions. But consumers desired the energy system made decisions that better reflected their values and included their voice more. This led to a higher position on the involvement and influence scales.

Decision making model

Consumers desire a voice in decision making, but still envisage experts as leading these processes. They indicate that experts need to be more responsive to their values and asked for this to occur earlier in decision making processes. This means that consumer engagement processes need to evolve. Consumers should be consulted earlier, using tools such as values as a "neutral space" to explore what is important to consumers. This creates a space which focusses on consumers' expectations rather than proposed solutions to industry-defined problems.

We have retrofitted our proposed decision-making model to an existing energy system decision making process that we explored as part of our industry values stream. Our observation that solutions are significantly defined before consultation processes are started is important. These early discussions are a safe space where industry experts can discuss ideas, themes, and concepts outside of the formal and constrained regulatory processes. Our proposed decision-making model fits within these early discussions as shown in Figure 1. This model could also fit in other energy industry processes that require consumer input. For example, those run by DNSPs as part of their 5-yearly revenue determination processes.
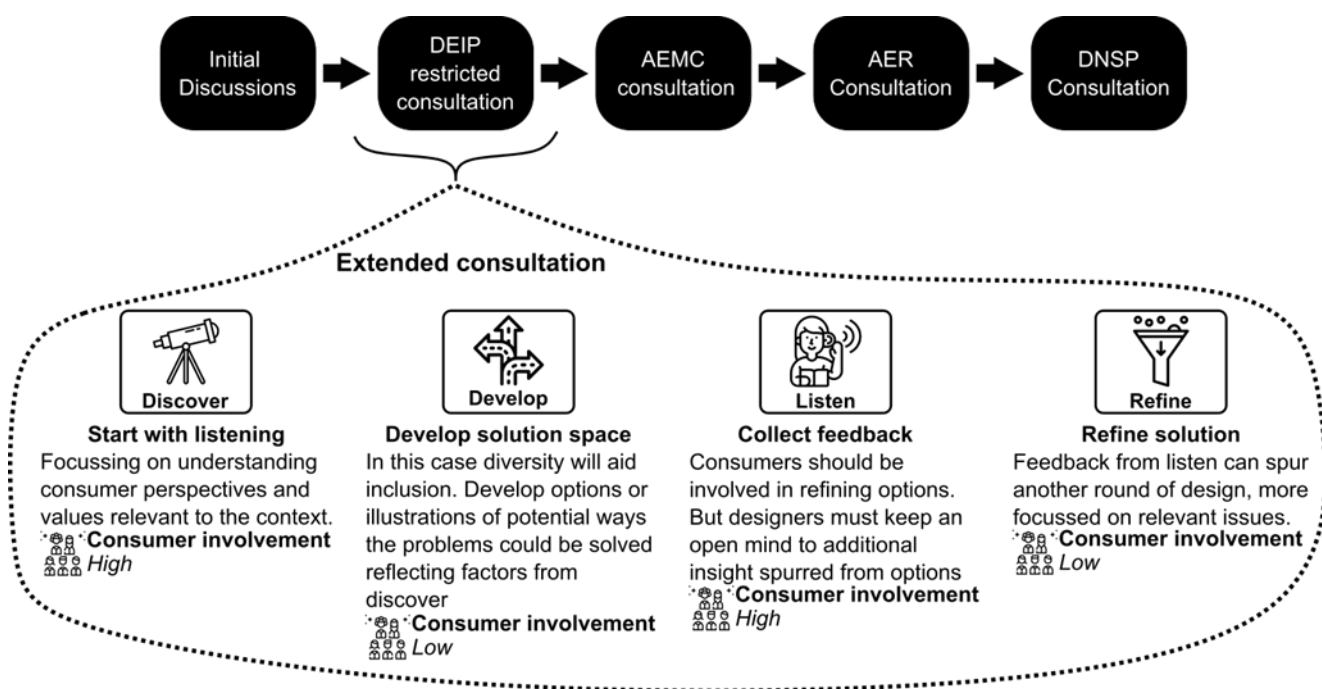
Figure 1 Proposed decision-making model

Responding to consumer needs

A recurrent theme from our focus groups was that consumers felt it challenging to make value-reflective energy decisions. For example, what technology to purchase, which providers to use, and how to respond to significant changes (such as increasing cost). Participants were attracted to scenarios which proposed community based, independent, or technology-based solutions to these issues. They desired impartial, (what we label) value-responsive support available to them.

The lack of support from the energy system can create inefficiency in the current energy system. Some basic quantification indicates the provision of support could create $2-10m of benefits in the ACT alone. Although these checks were basic, the possible expense indicates that an economic case based on efficiency could potentially be mounted to provide decision-making support to consumers.

Learning from the process

This project also trailed methods and processes as potential tools with which to understand values and support customer aware decision making. The main processes assessed in the report: explored values; built scenarios to illustrate values and elements of consultations to consider; and, developed overall findings with consumers. We made three main findings from our process described in Table 1.

Table 1 Process findings

Finding	Description
Industry values analysis	Industry perspectives provided significant insights. The industry values analysis usefully helped frame findings within the current context of the energy system. In particular it appeared that formal document analyses of rule change processes (or other public documents of decision making processes) are not commonly undertaken in the energy industry. These could potentially add fidelity to the rulemaking process.
Scenarios' focus on power	We found it was beneficial for our scenarios to focus on social compact and social power. It enabled participants and later us as the research team to think beyond technology to how people relate with each other and the industry, and how this might affect decisions.

Finding	Description
Vignettes	Vignettes acted as a basis for discussions. They were designed as possible visions or "for arguments sake" views of how the future could develop, designed to incorporate certain factors of possible futures. Participants had mixed reactions to them, therefore future projects could benefit from further thought about how they are framed.

What's next?

Our project has shown that VSD and examining decision processes have merit; consumers would like to be supported by expertise and involved in energy system decision making to some extent; and being deliberate about engagement processes is necessary. Based on our experiences in this project our recommendations for next steps are shown in Table 2.

Table 2 Recommendations

Recommendation	Specific actions
Develop mechanisms to include consumers earlier in decision making	We found consumers supported the role of experts in energy system design, but wished reforms were more responsive to their context and needs. We propose that a more responsible energy system design process would include consumers (using tools like values) early in conceptual design and again as solutions were being selected and refined. Therefore, we propose **design processes be reformed to include consumers early, using tools such as Value Sensitive Design**
Implement mechanisms to care for consumers	Consumers felt unsupported in energy system reform. We feel this leads to significant inefficiency and that expenditure on brokers can be justified to mitigate these inefficiencies. Participants gave us many ideas of what an honest broker could look like and they could range from software processes to people supporting complex decisions as communicated in our report. **As a first step, we recommend that the industry build a method to value and integrate this support in energy system planning and reform.** In the short term this could take the form of a project or trial, that aims to build a methodology and economic case.
Dimensions as communication and design tools	The dimensions we have described in this report are useful tools for understanding and defining how consumers are involved in energy decision making. Designers should consider their use to illustrate and define solutions.

1 Introduction

This report is the final output of the "*Building a customer-focussed plan for distribution network capacity management*" project. This project is motivated by recognition of the importance of consumer voices in energy system changes and concern about incorporation of these voices in energy decision making processes. It shares our methods and findings exploring this topic. It also shares findings from the project. We feel that that if these findings are taken up, could help build an inclusive energy system.

Energy system changes occurring in Australia– often called 'the energy transition' – are causing challenges. Electricity generation, supply, and use are currently undergoing significant change in Australia, in response to climate change related shifts and new lower-cost renewable generation. While changes are also happening elsewhere in the world, Australia is unique because of a significant about of renewable generation is sited in consumer homes [1]. This means that many of the changes needed to accommodate them directly impact consumers. As potential new solutions are explored, energy industry actors (including non-commercial energy organisations) are realising consumers' needs and voices are important and need to have much-expanded role in the design of energy system transition solutions. However, methods to engage with consumers effectively are still emerging. Consumers are not always consulted in a thorough way in technology projects. There has been growing awareness through numerous applied projects that householders were often underestimated or under considered in energy transition projects [2], [3].

The energy transition has necessitated evolution and exploration of how to manage network energy provision capacity. These changes provided us with a specific situation that triggered further motivation to undertake a project exploring how to better engage in customer-focussed ways in research. Currently energy provision capacity of networks is under pressure from both high demand and low demand. Electrification could increase peak demand, while rooftop PV could reduce minimum demand. This can already be clearly seen in South Australia, where peak demands of 1,400MW and minimum demand of 104MW can coexist on the same day [4]. Observations of solutions being developed, tested and applied to manage these impacts, such as dynamic operating envelopes (DOEs) [5], drove the development of this project.

This exploratory project aimed to understand how the industry could incorporate the point of view of customers as industry actors designed, solved for, and managed future energy needs. Starting from a base of seeing consumer voices as important, it explored customer expectations and values related to energy use, capacity and responding to capacity challenges, and what decision-making frameworks are appropriate for networks to apply as they manage the network. Its guiding research questions for exploration were:

> *"What are fair, just, and equitable decision making models around network capacity and allocation from the customer perspective"?, and*

> *"How does the future energy system build a model that manages network capacity in a way that aligns with customer values"?*

Through discussion, we found it most useful to focus on decision making models as these were more generally applicable.

This project assumes that better network capacity management models can be built when consumers are substantively involved in their development. Values are indicative of strong meaning and motives for people and underlie action taken [6], [7]. We therefore examine values to understand customer perspectives. Values give us an inclusive language to describe what is important to people [8]. Research (such as part of the community energy models [9] and VOICES [10] work undertaken by BSGIP) has shown that customers' expectations of the energy system are driven by their values. In this project we use values as a tool to understand what is important for the energy system to deliver, then use a participatory design process to

frame these values into terms that have meaning for the energy sector. It is also an underlying assumption of this work that by including better considerations of consumer needs and perspectives, energy system designs also have the possibility of being high quality, responsible and inclusive solutions [34].

The project approached this layered exploration using stages and key steps. First, current key values underpinning industry and energy consumer decision-making were identified. Values identified were then used to develop scenarios, which were then formed into "vignettes" or short stories. These vignettes were then presented to consumers in further focus groups. The results from these steps and insights from the final focus groups form the basis for our findings presented here.

This report is in 6 further chapters:

Chapter 2 summarises the methods we used in this project. Detailed descriptions of background theory behind these methods is included in **Appendix A**, while **Appendix B** describes our learnings from implementing the process. **Appendix D** includes the materials (such as agendas) we used in focus groups.

Chapter 3 describes the values we revealed through our process and insights from industry and first round consumer focus groups.

Chapter 4 describes the scenario development process and its findings.

Chapter 5 describes the findings from refining the scenarios in focus groups with consumers.

Chapter 6 relates implications of our findings for energy system design.

Chapter 7 concludes the report, summarises key findings, and proposes next steps.

When reading this report, we have used some words in certain ways. Below we have described them, to be used as a reference throughout the report.

Definitions

Consumer: Consumers are everyday people who consume or generate energy from the National Electricity Market. We do not focus on businesses in this report.

Energy system: Energy system is a general term that includes all energy sector organisations and regulators. We don't draw a distinction here as focus group participants often didn't.

Industry: We use industry here to refer to all energy sector organisations including government and non-government.

Power is *"the ability of an individual, group, or institution to influence or exercise control over other people and achieve their goals despite possible opposition or resistance."* [11]. In this project we have used the responses to the questions: *"what decision-making power do individuals have? What power do others have to make decisions that impact individuals?"* to define power.

Scenario is the output of the design stage of our project. It is a view of a world that emphasises the values used in its design

Social compact is "*A usually implicit agreement among the members of an organized society or between the governed and the government defining and limiting the rights and duties of each*" [12]. For this project we define it as *"society's expectations on people, communities, and the energy industry"*

Values are *"the principles that help you to decide what is right and wrong, and how to act in various situations"* [13]

Vignettes are the summaries of scenarios that we created for presentation to consumers in focus groups.

Acronyms

AEMC – Australian Energy Market Commission

AEMO – Australian Energy Market Operator

AER – Australian Energy Regulator

ARENA - Australian Renewable Energy Agency

DEIP – Distributed Energy Integration Program – a collaboration of multiple organisations that are in, or work with, the energy system to work towards maximising the benefits of distributed energy resources for the energy system in Australia.

DNSP – Distribution Network Service Provider

ECA – Energy Consumers Australia

NEO – National Energy Objective, which is a law that promote efficient investment and operation of electricity systems and is focused on long term benefits for consumers in relation to key factors.

RRI – responsible research and innovation. This report refers to key principles underlying RRI approached.

VSD – Value Sensitive Design.

2 Methods

Key Takeaways

We delivered this project in three phases. First, we explored industry and consumer values. Then, we designed five scenarios based on sets of two values each. Then, we refined the scenarios with consumers. There were three main takeaways we find from applying this process:

- Industry perspectives provided significant insights. The industry values analysis usefully helped frame findings within the current context of the energy system.
- It was beneficial for our scenarios to focus on social compact and social power. It enabled participants and later us as the research team to think beyond technology to how people relate with each other and the industry, and how this might affect decisions.
- Scenarios (framed as vignettes) acted as a basis for discussions in focus groups. They were designed as possible visions or "for arguments sake" views of how the future could develop, designed to incorporate certain factors of possible futures. Participants had mixed reactions to them, therefore future projects could benefit from further thought about how they are framed.

Multiple methods were used in this project, with key guidance from an approach called Value Sensitive Design, and examination of how decisions are, could or should be made. A document review, industry focus group (02/2023), two rounds of consumer focus groups and an internal researcher workshop all assisted with this exploration. Appendix A provides further background theory for our methods. Appendix B describes the application of the methods and Appendix D contains the materials we used in focus groups. Below methods are related in relation to the guiding theory – Value sensitive design.

2.1 Value sensitive design approach

This research was designed by a research team that had repeatedly seen projects with findings asking for consideration of consumer needs and drivers (for example [2], [3] and [10]). Indeed, including these needs and drivers was seen to both support smart solutions for energy industry challenges and ensure energy systems designs was ethical, responsible and inclusive (we elaborate on responsible innovation principles in chapter 6 and Appendix A) [34]. This led to an early decision to use methods that could elevate key consumer needs and drivers. We proceeded by basing our methodology on Value Sensitive Design (VSD), a method that had already been explored in our team and found potentially helpful. VSD is a tool established to help understand how values can be used to influence technology design, development, and application. It was first defined by Batya Friedman in the software development domain [14]. We developed our methodology from one proposed by Ibo Van De Poel titled "values hierarchy" [15]. A values hierarchy is what is generated using the VSD methodology and the process translates general values to specific design requirements. A view of a values hierarchy is shown in Figure 2.
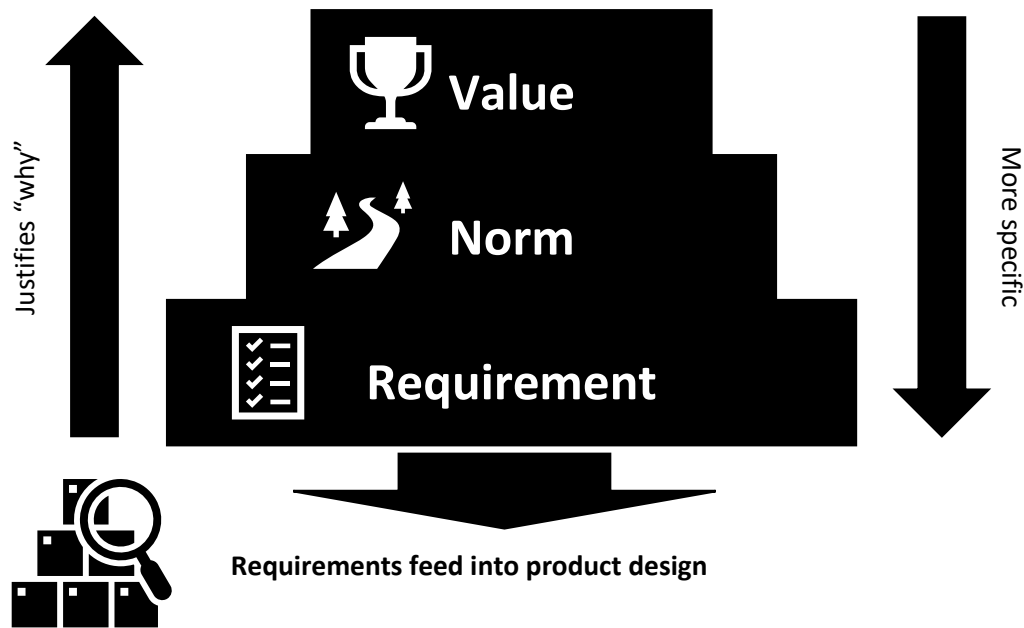
Figure 2 Values hierarchy

As can be seen, a values hierarchy as described by Van De Poel consists of three levels: Values, norms, and requirements.

In VSD, values are the factors which people hold important (such as "health" or "environment") [8]. They are general, so do not specifically refer to the problem at hand [14], [15]. The first phase of our process sought out participant values.

Norms in VSD have a specific purpose, to describe "prescriptions for or restrictions on action" [15]. These are more context specific than values in that they show how people might demonstrate (or wish to demonstrate) their values through behaviour. We considered norms in the second phase of our process.

Requirements in VSD are specific design points that are needed to realise the ultimate solution. They are derived from norms through addition of further context that is likely in an applied setting. We considered norms in the second phase of our process.

The third phase of our process aimed to refine our findings from the value sensitive design process we undertook in phase 1 and 2.

Values hierarchies can be discovered and crystallized from values first through to norms and requirements (top-down in figure 1) or with a reversed process (bottom-up in figure 1). We have built the hierarchies used for this research top-down. We have communicated findings from all levels of the values hierarchy here, but our specific recommendations from the project come from the requirements level of the hierarchy.

There is more detail on our process and its theoretical underpinnings in Appendix A, and our reflections on applying the process in Appendix B. The process we used in our project is in Figure 3. For our projects, the phases were 1) Values, 2) Design, 3) Refine. Phase 1 relates to the values level of the values hierarchy. The design phase completed the norms and requirements level of the hierarchy. The refine phase refined the requirements derived in the design phase.
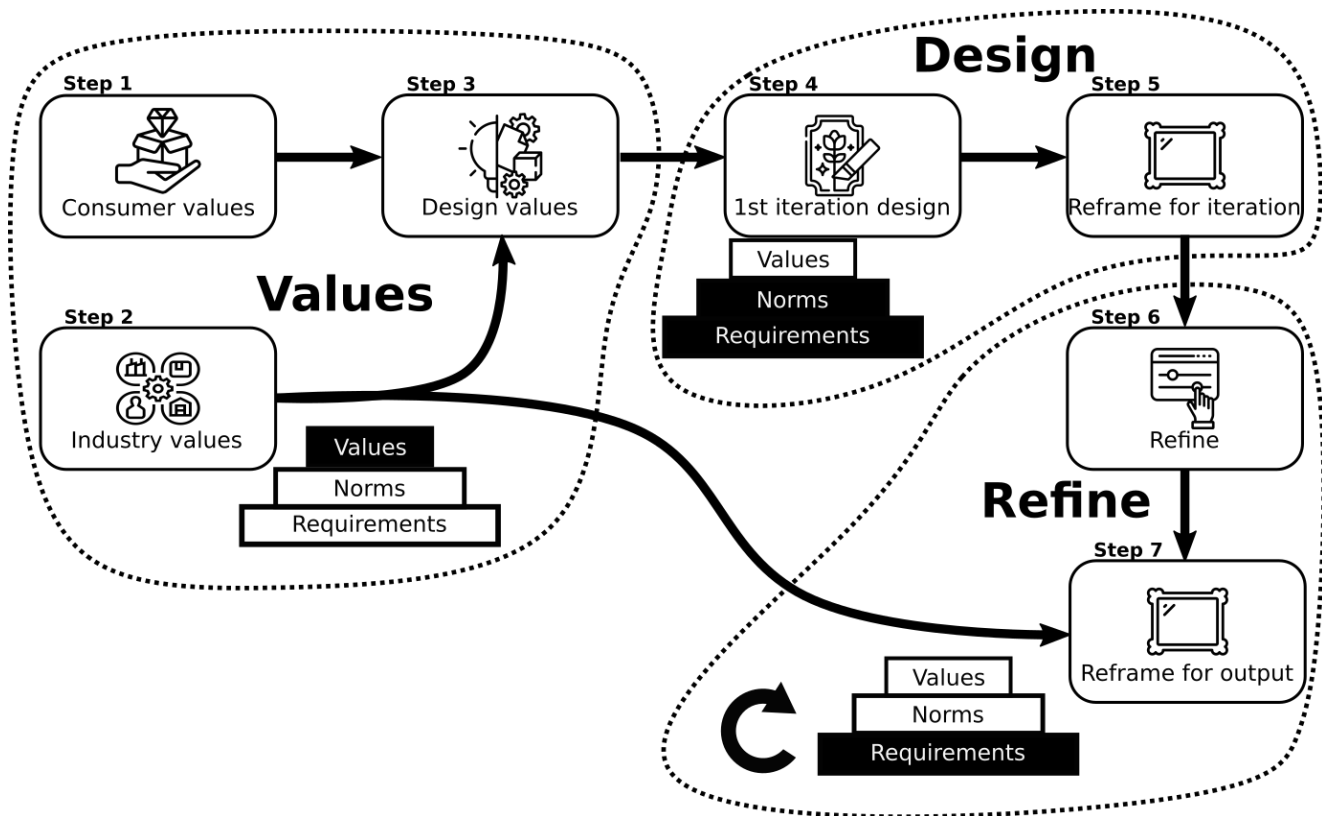
Figure 3 Project process and steps

The methods included nine steps over three phases, which are described below and are nested according to the three phases in Figure 3.

2.2 Identify values in decisions

As described above, values are in this instance seen as useful indicators of intention and are highly likely to also drive people's behaviours [16]. Our process first explored consumer and industry values expansively then refined to a short list of values for the design process. This phase identified the "values" level of the values hierarchy described above.

Designs were based on a small list of key values that emerged from this identification of value identification phase. Primarily these were consumer values, with industry values adding fidelity as required, after consultation with both consumers and industry.

Collecting values is not an uncommon part of understanding energy use motivations. For example, Monash Emerging Technologies research Lab's "digital energy futures" work understood consumer values and how they could influence digital energy futures [17]. We used focus groups to build our own picture of values. We did this because values are often context dependent [18]. Similarly, the insight we collected while discussing values was very important in the subsequent design phase of the project.

2.2.1 Consumer values

Consumer values provide perspective on what values could (and are likely to) be important in the future energy system. We developed understanding of these values through the first round of consumer focus groups. We conducted five focus groups with three cohorts of participants:

- Two focus groups of people with DER such as PV, home energy storage, and EVs (referred to as *"Early adopters group"* in this report)

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- Two focus groups with people who have barriers that prevent access to DER (referred to as *"Access barriers group"* in this report)
- One focus group with a community energy group (referred to as *"Community group"* in this report)

The dynamic in the groups ensured there were different points of views represented in collective conversations, and the groupings allowed conversation to still flow due to some alignment of experience.

In these focus groups participants were asked questions about (current) energy use, limitations on energy use, values that drove energy use and desired energy sector change. While it was a question-and-answer format, participants were reassured they were welcome to bring up other points they thought were important or relevant.

2.2.2 Industry values and decision making

Industry values were explored for two purposes:

- To understand what factors have guided energy system reform processes to date, and
- To contrast these with energy consumer values to help understand any disparities.

We identified industry values by:

1. Interrogating official industry documents (a rule change) using document analysis to understand current values underpinning a decision-making process used by the energy industry, and
2. Running a focus group with energy industry experts to check what we had found in the rule change and to refine and add fidelity to our findings.

As the first element of industry values exploration, we reviewed a deliberative sample of documents from the *"Access, pricing and incentive arrangements for distributed energy resources"* rule change[1]. In selecting documents, we selected from publicly released documents that were part of the rule change, choosing:

- Documents that were key to the rule change outcome: the original requests, consultation paper, final, and draft determinations,
- A cross-section of submissions from different types of submitters, and
- Key consultant reports.

The documents were read for content and meaning, with key themes identified and refined by the research team. An initial set of values were identified through this process.

These values and insights about decision processes were then presented to industry experts in a focus group. Industry focus group (02/2023) participants were asked to critique, add fidelity to, refine, and reframe these values based on their actual experiences as professionals in the industry. Some participants in the focus group had been involved in the studied rule change and were able to relate important background of decisions made. Insights from the industry focus group were used to further refine the set of industry values and to describe the framework they sit within.

2.2.3 Derive design values

The first round of consumer focus groups revealed many values. The number of values would have been too complex to design with at this stage. So, design was based on a subset of five consumer values. The diversity implicit in these values was captured by designing multiple scenarios, which were then presented to consumers in the "refine" phase.

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[1] https://www.aemc.gov.au/rule-changes/access-pricing-and-incentive-arrangements-distributed-energy-resources

Values were selected based on how regularly they were mentioned by consumers, the emphasis they were given, uniqueness, and by reading other literature. Where relevant, industry insights were used to add fidelity to these values. While in qualitative discussions of this nature we cannot identify likely occurrence/prevalence (that would require a large survey), emphasis in conversation of the importance can be identified. In this instance highest numbers of mentions indicated the emphasis of the value we heard in focus groups conversation, and reasonably indicated likely importance to participants.

The value descriptions we derived here were not designed to be complete descriptions of values: more they were designed to give designers enough of an idea of what they were designing to. Further details of the design stage are just below.

2.3   Design scenarios

In this important phase, values from the first phase were used to develop scenarios or stories that could be taken back to energy consumers to enable further discussion and scenario iteration. There were two steps in this phase, as described below.

The purpose of the scenarios was not to present good or bad outcomes. They were intended to enable more directed discussion in the focus groups in the "refine" stage. The enabled people to understand what the impact of values on everyday life could be.

2.3.1   1st iteration design

In this first step, the energy consumer and industry values were used to derive scenarios. These scenarios are used as a tool to help people understand the meaning of values and how they could influence people, society, and the energy system. They also assist to describe and to contextualise the impact of values, which is useful for further discussion and examination by a range of stakeholders. The intent is that scenarios developed can be used for planning and strategy in energy systems. Scenarios focus on three factors:

- Relationships of proponents of the scenario, which was about who related to who and in what way. E.g. was there a community actor? How did they relate to consumers and the energy system?
- Social compact(s) which was about the expectations and agreements on individuals, communities, society, and the world
- Societal power (dynamics) which relates to how decisions are made. E.g.: What personal influence and power do individuals have to make decisions that impact themselves and others? What influence and power do others have to make decisions that impact individuals?

Scenarios focus on these two factors to help people understand the impact of values on individuals, society, relationships and the energy system. This approach and the selection of certain values was also aimed to decentre technology from participant visions of potential energy futures. Scenarios were developed in a workshop with staff and PhD candidates from the Battery Storage and Grid Integration Program, who have in-depth experience in energy system transitions through their roles as social scientists, software developers, data scientists, communicators and innovators.

During the workshop, groups of two or three people were provided with a unique combination of two values. Participants then stepped through a series of critical thinking exercises to design and added fidelity to a scenario based on their allocated values. The workshop generated useful future scenarios and assisted us to test a values-based scenario generation method we are developing as a decision-making tool.

Scenarios were built using two values, a "main" and a "spice" value in which:

- The main value acts as the "guiding light" of the scenario. It is the primary value on which the future is built.
- The spice value adds dimension, fills blanks, and adds a secondary lens to the main value.

Having a main and a spice value was found to be useful. Using single values in test runs showed that commonly scenarios created questions which people had trouble answering. The spice value creates a set of principles that can be used to develop answers that reflected specific values. This creates a more diverse and higher fidelity set of scenarios.

2.3.2 Reframe for iteration

The next step in the project involved the project team further building scenarios to the point where they could be explored with consumers in the next step. This was a creative process, and involved prototyping, generating alternate frames, and experimenting with communication tools. Several fortunate meetings with external industry stakeholders helped refine frames.

The final design was a three-part poster for each scenario. These posters first gave a very high-level description of the future, presented a story as a comic, then showed an "influence map" that described how decisions are made. The comics were all of a consistent story of an end-user's experiences as a constraint in the local energy system is solved (via a variety of means). The influence map describes the relative influence of end-users, communities, and the industry in both high level planning and day-to-day timeframes.

We called these "vignettes" because it has less connotations than words like scenarios, futures, visions, and stories. When we used other words we found people expected detail that was not there.

2.4 Refine scenarios

The aim of the refine phase is to allow consumers further input through a second round of focus groups to help refine the scenarios developed in the previous step and in doing so help is move toward final findings of the project. The first part of this step involved taking scenarios to consumers in focus groups. The second involved reframing the outputs of the focus groups to terms that have meaning for industry, using the industry values analysis as a guide. This phase aimed to refine the "requirements" level of the values hierarchy.

2.4.1 Refine with consumers

In this step consumers were able to critique and build upon the futures that were ideated in the previous phase. The same participants that were in the original energy consumer focus groups were invited to participate in this step. Most returned for this second round of focus groups.

We used the vignettes we created in the design phase as the basis for discussion. These vignettes are described in chapter 4 below. We used a focus group schedule and planned words to structure information we provided. We also used a script to talk through the vignettes we presented.

2.4.2 Reframe for output

In focus groups we had a free-flowing conversation around what would be important and useful to participants. This step is where we reframed what they told us into a form that is useful for the industry. This involved modifying the industry values framework to integrate community values.

2.5 Process reflections

This project trialled an overall approach that built off value sensitive design with creative evolutions. It also examined how decisions should be made. This section describes what we learned about methods and process, and what we found useful. We have summarised salient points here in this section and offer more detailed and discussion in Appendix B. Process findings are described in Table 3.

Table 3 Process findings

Finding	Description
Industry values analysis	Industry perspectives provided significant insights. The industry values analysis usefully helped frame findings within the current context of the energy system. In particular it appeared that formal document analyses of rule change processes (or other public documents of decision-making processes) are not commonly undertaken in the energy industry. These could potentially add fidelity to the rulemaking process.
Scenarios' focus on power	We found it was beneficial for our scenarios to focus on social compact and social power. It enabled participants and later us as the research team to think beyond technology to how people relate with each other and the industry, and how this might affect decisions.
Vignettes	Vignettes acted as a basis for discussions. They were designed as possible visions or "for arguments sake" views of how the future could develop, designed to incorporate certain factors of possible futures. Participants had mixed reactions to them, therefore future projects could benefit from further thought about how they are framed.

3 Findings: Values and decision processes

> **Key Takeaways**
>
> Values analysis consisted of three steps. First two involved exploring consumer and industry values. The third involved developing a more limited set of values for design in the next phase. This phase developed the "values" level of the values hierarchy. We made the following findings:
>
> - The rule change process we studied mostly considered the value of efficiency, but that equity and agency were the values that drove the proponents to start the process.
> - Consumers raised many values, but 5 were most common. We designed to these 5 values, with industry values adding fidelity.
> - We designed to the values **self-care**, **environment**, **financial considerations**, **collective care**, and **self-determination**

This chapter discusses the outputs of the values identification phase of the project. In this phase we explored the energy related values of both energy industry experts and energy consumers using the methods described in chapter 2. As noted earlier, values are principles that guide us and provide potentially fundamental or broad drivers behind motives, decisions and actions [16]. We then describe in more detail the five values we used to design scenarios.

3.1   Industry values in a decision process

As discussed in the methods section 2.2.2, there were two steps to this process:

- A document analysis of the *"Access, pricing and incentive arrangements for distributed energy resources"* rule change[2]
- A focus group with energy industry decision makers to refine and add fidelity to our findings

The rule change increased the scope of services distribution network delivered to include "export services". Export services enable consumer owned generation to export that energy to the grid. While export services had been being delivered for a long time, this rule change meant that they would be explicitly planned for by distribution networks. Therefore, the aim was that with explicit planning, the level of services that DNSPs offered would be more efficient. It also enabled DNSPs to charge fees for export services. Fees served two purposes: to make the way DNSPs collect revenue fairer, and to encourage efficient use of the service. The rule change was contentious and generated over 200 submissions from a diverse cross-section of industry and consumers. We analysed this rule change because it was contentious and relevant to the energy system change occurring at the moment.

We undertook document analysis of the rule change at a major step in the process. The documents we analysed were part of a formal public consultation. Additionally, in our industry focus group (02/2023), stakeholders involved in the rule change process provided a more detailed picture of the process and its drivers. We found that this public rule change step was a step somewhere in the middle of the entire rule change process. This was apparent both from the rule change itself, and the focus group we held with industry in February 2023. The process that we derived from this analysis is shown in Figure 4. The dotted line in this

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[2] https://www.aemc.gov.au/rule-changes/access-pricing-and-incentive-arrangements-distributed-energy-resources

figure encloses the stage we conducted document analysis of. The later stages of this particular rule change process are still underway.
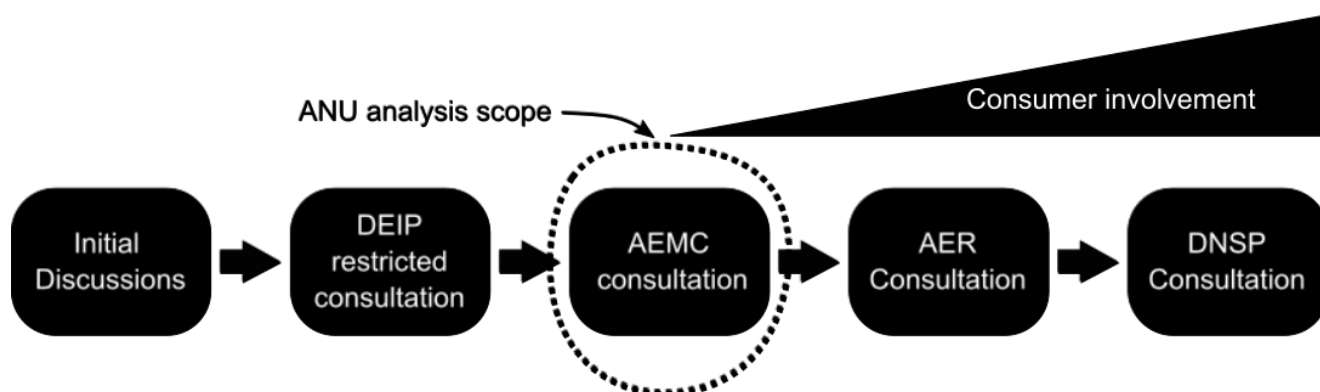
Figure 4 Rule change development and implementation process

In the industry focus group, participants told us that the AEMC rule change process sets clear boundaries on what values can be discussed and how. Some values and related factors were not explicitly discussed in the rule change, despite being key in the preceding discussions and DEIP process. The initial discussions and DEIP process before the AEMC process offered a forum to discuss issues and values more widely than the regulatory process and was key to the rule change's success.

The steps of the overall rule change process are described just below.

Initial discussions were held between key industry stakeholders for several years prior to the rule change process starting. The stakeholders involved were approached deliberately and these discussions set the scope and expectations for the rule change process as a whole and were therefore critical points in the decision making.

The next step expanded the stakeholders involved in discussions through the Distributed Energy Integration Program **(DEIP)** forum. The **DEIP forum** included a wider, but still limited set of industry and government stakeholders. DEIP involvement we were informed widened discussion around scope and expectations through a series of workshops [19].

What we call the **AEMC consultation** in figure 2 was the first official and public step in the rule change. Formal document analysis was undertaken on purposively selected public documents from this stage. This public step is arguably open to receiving submissions from all people who are interested. When reviewing the submissions and assessing the responses from the AEMC, it is clear that this process is still largely a consultation with industry and peak representative organisations. There were some submissions from consumers but largely consumer involvement was restricted to a small number of highly engaged people, mostly solar owners or with interest in renewables. Similarly, some consumer representative bodies also submitted such as Solar Citizens, Energy Consumers Australia, and the Public Interest advocacy Centre. After the AEMC process, the **AER** and **DNSPs** consulted on implementation factors. The AEMC expected these processes would explicitly engage consumers. The AER have completed some of their processes[3]. And some DNSPs are consulting with their customers on export charges[4]. We have not analysed documents relating to these processes.

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[3] https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/export-tariff-guidelines

[4] https://www.ausgrid.com.au/Industry/Regulation/Regulatory-Reset

Despite the restriction to mentioning key values, there were many more values discussed in rule change documents in a variety of different ways. Values were described both explicitly and implicitly in the text. Out of the overall values four appeared to have the largest impact on the decisions that ended up being made in the AEMC process. Agency and equity were key drivers of the initial submissions. Efficiency was the lens through which values were discussed. And trust was proposed as being key to supporting a successful change process. The main values identified in the documents are shown in Figure 3 and are also described in Table 1.
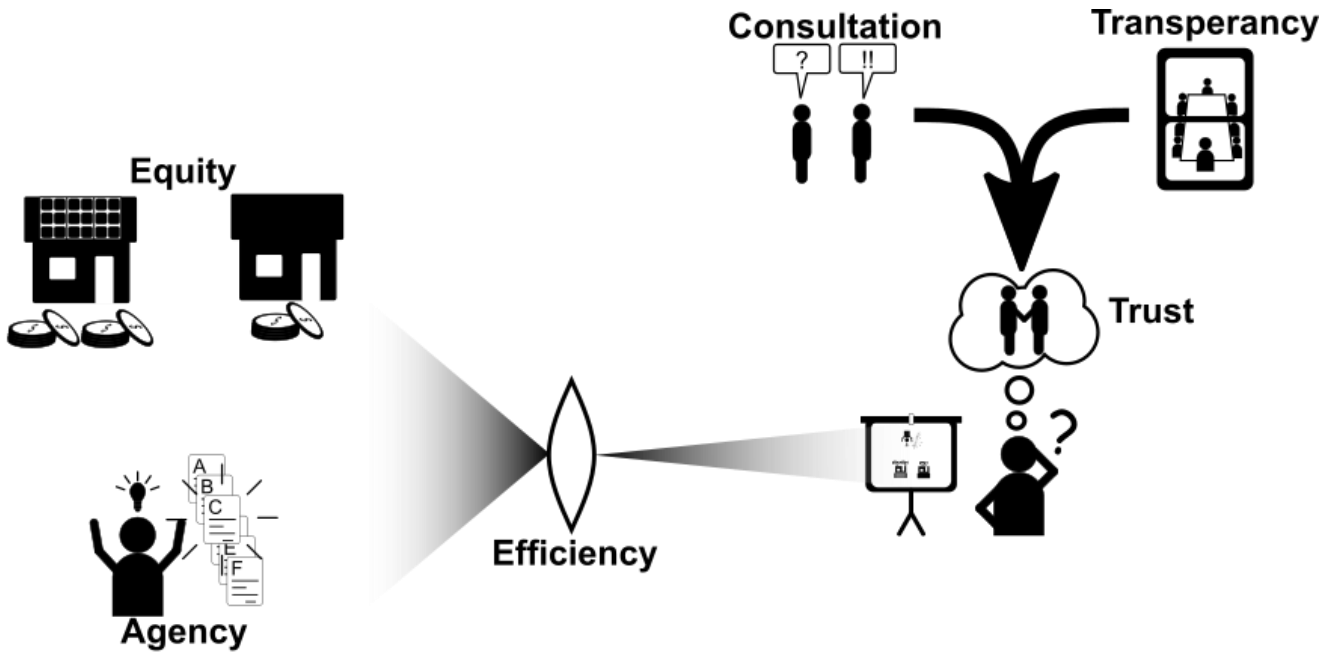
Initially the rule change was driven by a desire to resolve **inequity** and enable greater **agency** for energy consumers

Economic regulation dictates the regulator analyse the rule change with an **efficiency** lens

Trust was expected to be critical to energy consumers accepting the rule change. Trust was proposed to be built through **transperancy** and **consultation**

Figure 3 Decision maker industry values

Table 1 Decision maker industry values

Value	Description
Equity	Equity was one of the main drivers stated by the proponents of the rule change studied in this work. The proposers of the change were concerned that PV owners were receiving a greater share of the benefits of PV while paying a lesser portion of the costs of the distribution network. Submissions to the rule change stated sometimes clashing views on what would be equitable. Some noted existing inequities such as between those with air conditioning and those without. Others felt that PV owners were currently the ones subsidising those without PV because PV on the grid led to lower market prices for energy.
Agency	In our industry focus group, participants stated that agency was a key driver of the rule change. The rule change was proposed to increase agency because the rule change was expected to enhance choice for consumers. While previous reforms have similarly proposed to increase agency, this sometimes does not occur in practice [20], [21]. The rule change proposed that by increasing the available service offerings consumers could choose how to engage with DER. They could choose how export limits applied to them, what services they paid for, and how they used devices in their house to manage their costs. The rule change was seen to support agency for consumers therefore by providing: • Choice/a range of service offerings, and • Support for decisions around investment and operation of assets. Increasing the range of service offerings was seen as a way of enabling consumers to choose how they interacted with the distribution network (so that their engagement suited their needs). For example, PV owners could choose whether to have a lower export limit, lower cost service offering or a higher export limit with a higher cost offering. Energy retailers are envisaged as being key in repackaging these costs and helping consumers understand the impact of these costs on them, and therefore by association as key to realising agency for consumers. Price signals were also seen as an enabler of agency, as they would help consumers decide when and where they used energy to minimise their own costs. Price signals were proposed to create "cheap" and "expensive" times to encourage energy consumers to shift their energy use. For example, shifting appliance use to times of high PV generation which has a low price would reduce their energy costs. Agency related to costs and saving was also assumed to extend to new purchases such as home batteries, which could reduce costs as well. Although currently batteries do not yet have effective pay back periods.

Value	Description
Efficiency	The AEMC felt that efficiency was the "*fundamental objective of the energy market objectives*" [4]. There were two main impacts of the focus on efficiency: • It limited the scope of discussion and exploration to areas that could be directly related to efficiency of the energy grid, and • It conceptualised that there is a point where the energy system will be most efficient and that reaching this point should be encouraged through new and reframed incentives. The rule proposal and submission text we read indicated that other values needed to be understood through an efficiency lens to be relevant. Equity, fairness, affordability, and environmental impacts were all limited in scope by the efficiency value lens. For example, discussion of equity through the efficiency lens meant that most discussion focussed on how the costs and benefits of providing export services could be calculated and allocated. This includes factors such as: • How export energy could be valued in economic analysis by distribution networks, • How levels of service could be measured and audited, and • How these costs and benefits would flow though to pricing. In their determination, the AEMC described a new system of incentives and pricing that aimed to encourage efficient development and use of export services. This new system aligns with established norms of the regulatory framework which already has a complex landscape of incentives and pricing. Much of the follow-on process to be undertaken by the AER and DNSPs after this rule change was to be in setting the appropriate levels of these incentives and pricing to encourage the right behaviour.

Value	Description
Trust	The AEMC felt that "*building trust is key to long-term success. This requires openness and transparency, and ongoing consultation to understand and address stakeholder concerns*" [4]. The AEMC proposed that building trust requires openness and transparency also being prioritised as well, as they help achieve trust. Paradoxically, the tone of submissions highlighted that in many situations submitters to the rule change did not trust the AEMC or the energy system more broadly. For example, WATTEver stated *"The AEMC's apparent intention to hand another revenue stream to the networks with vague and weak controls looks a lot like offering Dracula another set of keys to the blood bank"* [22]. Openness and transparency, particularly via suggested tactics of public reporting and pricing, were seen to build trust, because people would be able to see the "inner workings" of the energy system and approach interactions accordingly. In this rule change, reporting would assist with assessing the performance of DNSPs against standards and each other and make investment opportunities apparent [23]. Instruments like annual planning reports and regulatory information notices (from DNSPs) would make public metrics around performance of energy export services, forming a "reputational incentive" [19]. Though there was much discussion around what information should be published in the rule change there seemed to be less discussion around how consumers were to engage and act on that information. Pricing reflecting energy systems needs was expected to create and /or support transparency and to communicate energy system needs to consumers. The logic appeared to be that by understanding the pricing structure, consumers could understand energy system's needs and reform their own actions to meet these while also saving themselves money. This logic aligns strongly with efficiency logics where pricing energises energy consumers to respond to energy system needs. **Consultation** was also noted as key to building trust. The AEMC process itself was intended to be consultative and public for this reason, although no specific actions appeared to be undertaken to engage consumers in the process. Instead, DNSPs were expected to consult with consumers widely in their pricing processes as they decided whether to apply export pricing in their networks. As noted earlier, public consultation occurs late in the rule change process, potentially after key decisions have been made.

Many submitters, particularly those who were not part of larger energy industry organisations, spoke less of the values described above, and more of other concerns, issues and opportunities. For example, submissions noted the impact on climate change action [24] and community energy [25]. Submitters also spoke of the impact on "care work" that was required for consumers to understand and respond to the reforms [26]. These concerns appeared to be speaking to different types of care (as an outcome of other actions). There were two common framings for this:

- That the rule change would make enacting care harder (for example, responding to climate change and community energy), and
- That the rule change creates additional care responsibilities.

Overall, the proposed rules were seen as making care responsibilities harder. Some of this concern about the rule change not allowing for care can possibly be attributed to a difference in scope of what was being considered and perspective. The rule change focussed specifically on distribution networks and how exports could fit within their scope, and arguably the rule was developed with a care for our public network as the purpose, as mentioned in the industry focus group (02/2023). Climate change though is a societal goal, which the AEMC felt was in the purview of governments:

"*The Commission acknowledges governments and the community are concerned about affordability and environmental issues. Achievement of such policy objectives is typically associated with a subjective value*

judgement that typically differs, depending on a particular view, and may potentially have broad societal impacts" [23]

Similarly, communities and local benefits were outside the scope of the specific question the AEMC were looking to answer. However, this was likely not clear to submitters. The AEMC was limited to the questions that were in the original rule change request. This potential difference in scope, perspectives and expectations is likely problematic moving forward, where climate change and community care are expected to both impact network activities in a significant way.

Other submissions spoke of the care responsibilities that the new rules could create. For example, for new proposed pricing and transparency requirements to lead to benefits, consumers needed to understand the information shared and the implications of pricing. There are some actors who commonly bear a lot of the care load for changes in the energy system, such as energy retailers, PV installers, communities, and advocacy bodies. While the issue of how much additional care would be required was raised by several in submissions, it appeared to have little consideration by the AEMC. We discuss this further in our findings, which relate closely to this theme.

3.2 Energy consumer values

Energy consumer values were identified through analysing the transcripts of the five consumer focus groups which consisted of three cohorts of participants as described in the methods section above (in section 2.2.1).

Our initial analysis of focus group transcripts identified 33 values discussed by our energy user participants, which are listed below, in Table 3.

Table 3 Energy consumer values

Financial management	Concern about climate change	Respect	Technology as solution
Environment	Time	Equity	Appreciating history
Self-care	Health	Efficiency	Reward
Collective care	Reliability	Beauty	Culture
Self-determination	Energy system	Flexibility	Conflict reduction
Frugality	Self-sufficiency	Optionality	Privacy
Care	Learning	Status	
Risk aversion	Virtuous cycle	Local scale	
Safety	Trust	Human rights	

As mentioned in section 2.2.3, we selected five of the most emphasised values to work with. These values are:

1. Financial management;
2. Environment;
3. Self-care;
4. Collective care; and
5. Self-determination.

Whilst there is some overlap between the high-level focus of prominent energy user values and key industry values, there was also substantial difference in the perspective taken of these values, and what was emphasised (including the scale of consideration). For example, energy consumers spoke of frugality in their lives, which is making the most of resources and consuming carefully. This is related but different to the energy industry value of efficiency which is around resource allocation and value maximisation at a distribution level.

We have provided a brief description of these five values in the table below, in no particular order (because arguably they can range across different scales and actions). As we chose to foreground energy consumer values (over industry values) in the scenario building workshop, more detailed explanations of energy consumer values and relevant quotes from focus group discussions are outlined in the below section (section 3.3) on values used to design scenarios.

Table 4 Five prominent energy consumer values

Value	Description
Self-care	The value of self-care incorporates a range of actions that contribute to people's physical and mental health and wellbeing in the home. This includes the need for warmer living spaces as we age; maintaining harmonious relationships within households and between neighbours; and the importance of simplicity in household energy management. This discussion highlighted the context-dependent nature of self-care, and how people's energy related needs differ greatly across lifespan and particular circumstances. Self-care was not mentioned in the rule change process or by industry, however, some submitters did imply this value in their submissions.
Collective Care	Focus group participants were strongly motivated by the value of collective care. A key element of this was supporting equity, based on the notion that all people (including those with limited resources) should be given the opportunity to benefit from clean energy technologies. Collective care was discussed both as something that influenced individual decisions as well as a factor that should underpin policy and decision making by governments and industry bodies. Care, as noted above in section 3.1 was also relatively strongly emphasised in rule change documents by submitters and AEMC.
Environment	Consumers' actions to reduce energy use or to increase efficiency of use were reported to us as being significantly influenced by their motivation to reduce their impact on the environment. This was discussed in terms of minimising resource use, sourcing renewable energy, switching to cleaner appliances, using an ecological lens broadly in life decisions, and taking various community focused actions (philanthropy, education, innovations) to address climate change. As notes above in section 3.1, environment was deemed outside of the scope by the AEMC but was noted by submitters to the rule change.
Financial Management	The way that consumers talked and thought about financial considerations in the context of energy use was complex and multi-faceted. Cost or affordability of energy or energy technologies was frequently raised as a necessary consideration in decision making, but it was generally paired alongside other, often more "chosen" values, such as the environment, health, or time. Financial management was also a significant consideration for industry, but from a different perspective and in relation to different details (see section 3.1).
Self-determination	People valued choice and control of their energy source, relationships, products, and everyday energy use. They were willing to trade some of this self-determination in specific ways, in service of other values, for example, environmental care, simplicity or harmonious relationships. Industry included choice for consumers in their considerations (see section 3.1). While choice is a component of self-determination, the presentation of choice by industry was relatively limited compared to the discussions about self-determination.

3.3 Values designed for in scenarios

The five values identified were those most emphasised by energy consumers and provided the critical building block for scenarios (see previous section 3.2). We designed scenarios based on different combinations of these five values. Industry perspectives were incorporated in the scenarios as well, particularly where these values overlapped with industry values. Our five values descriptions aimed to:

- Adequately describe the depth and breadth of the perspectives from the energy user and industry research, and
- Be specific enough to use to design scenarios.

The values summaries we used in our scenario design workshop are described below. Value descriptions were seen as useful in the workshop where they were used to develop scenarios. Synthesis of the details required a little time and workshop participants suggested some quotes did not align perfectly. Nevertheless, their suspected value was realised as the scenarios workshop progressed.

The scenario development process is described in 2.3 and the findings from this process are in chapter 4

3.3.1 Self-care

Life is hard and self-care is what makes it manageable. This looks different for different people, but can include actions like:

- Managing **temperature, noise, and amenity** of surroundings
- Allowing **time** for what is important
- Managing **conflict** in relationships
- Reducing **complexity** in life
- Making space for hobbies or activities that bring **joy**

Self-care is not always optional or a nice to have. For example, health problems can make managing temperature imperative. The line between what is necessary and what is nice to have is blurry.

Quotes

"And so sometimes I find myself saying, do you know what? I just want to be warm and careful too. I'm not excessive, but I find myself easing up a little bit to say it might just run that little heater in the hallway, 'cause you know what, you know I can have a little bit more comfort, so sometimes there is that little bit of easing up and not and not an extravagance."

– Early adopters group participant (round 1)

"For example, with transport in Canberra. So before from out the city I would have do it in 22 minutes by bus, now I need 40, 45 minutes. So how to say nicely when the government does something he has to think that people that are using that. Yeah, their time is important. Their money is important. Their health is important and that you know. So practically now you might want to be nice and go to city by the public transport. That means half an hour at least [or] more"

– Access barriers group participant (round 1)

"They're like just turn it on, it's more important to feel comfortable and cosy and walk around in shorts whereas that really didn't sit well with me. But obviously in a share house you have to keep things going with the flow so you can't just make a stand "

– Access barriers group participant (round 1)

3.3.2 Environment

People are worried about the environment. They want to ensure that the world remains liveable for themselves and others. There are several ways that people reduce their environmental impact:

- *Reducing consumption*, for example buying less things, using less energy
- *Consuming more carefully*, for example turning off lights, eating locally gown food
- *Consuming "greener" things*, for example EVs, PV, and batteries
- *Self-sourcing consumption*, for example using locally sourced wood for heating.

There was a lot of diversity around how much environmental drivers influenced everyday life. Some people were extremely focussed on reducing their environmental impact, others less so. Similarly, not everyone has the same capacity to respond.

Quotes

"I'm very much of the view that if we don't tackle everything with a consumption lens, everything including energy, we're doomed"

– Community group participant (round 1)

"I guess the first thing that springs to mind when I think how do I use energy day-to-day is that I'm a real tight-arse with it 'cause I'm really, really eco and like do I need to put this light on? Do I need to do that? So I try to really, really conserve and use as little as possible and that is a values-based decision because I'm worried about the state of the planet and our sources of electricity. Also partly financial, I guess, 'cause costs keep rising with electricity."

– Access barriers group participant (round 1)

"Just one thing we haven't mentioned and I don't know how important it is to anybody else but I take more of an ecological lens to pretty much everything and I guess for me it's not just about the energy network, it's also about the embedded energy, especially in food and the transportation of our food and that whole area."

– Community group participant (round 1)

3.3.3 Financial considerations

Both industry and energy users value the **careful management of finances and resources,** although they differ on terminology and nuance.

Energy users raised financial considerations in several ways:

- **(In)affordability** was identified as a factor that limited some people's ability to enact their values;
- Ongoing and upfront **costs were weighed alongside other values** (sometimes in tension and sometimes in addition); and
- A care about resource **conservation** (financial, material and environmental) and **avoiding waste.**

Within the **energy industry** this value was discussed predominantly as **efficiency** and powerfully frames and restricts industry decision making through its position in the Energy Market Objectives. Incentives and pricing are seen to encourage the energy system – including energy users – to be more efficient.

Quotes

"I'm thinking about the decisions I make about energy and there's a three-way tug of war. There's cost... there are the consequences for the environment of the decisions I make. That matters to me. Then the third tug of war is... my convenience"

– Community group participant (round 1)

"I try to really, really conserve and use as little [energy] as possible and that is a values-based decision because I'm worried about the state of the planet and our sources of electricity. Also partly financial, I guess, because costs keep rising."

– Access barriers group participant (round 1)

"Now I'm like well I'm still going to be relying on gas pretty much until my $3,000 hot water system breaks because I'm just not going to replace it for the sake of replacing it like it's a big outgoing"

– Access barriers group participant (round 1)

"Efficiency is the fundamental objective of the energy market objectives"

– AEMC draft determination

"the Commission is limited in its ability to consider notions of equity and fairness...otherwise than with reference to efficiency"

– AEMC draft determination

3.3.4   Collective care

Care for the wellbeing of others was an important value held by energy users in our focus groups. This sense of care underpinned a range of individual actions as well as expectations of the broader energy system, including:

- An attunement to the **energy needs and vulnerabilities of disadvantaged community members** (including higher energy use related to poor quality housing and/or health conditions) and a belief that these issues should be addressed;
- Wanting to **ensure everyone can access the benefits** of renewable energy;
- **Enacting social care through individual actions**– for example energy philanthropy, volunteering in community energy projects, staying connected to the grid to support resilience, and wanting to share solar energy with neighbours; and,
- An expectation that **the energy system should consider social consequences** and prioritise the interests of local community and environment.

Quotes

"So I am more or less single income family and not well off, but we were lucky enough to buy a house a couple years ago and for some stupid reason it doubled in value. So we borrow against that, you know, refinanced everything, and I thought, OK, well we can get a car. And it was always meant to be about cash flow and it's really sad that people who would benefit the most, the poor folk, they don't have the equity or their renters or whatever. And yet that's where so much of the benefit would be, you know, like in air pollution as well, new schools or whatever, so that's socialism and it might be difficult to sell that, but yes that's where it should go, you know?"

– Early adopters group participant (round 1)

"We've been going through a process of teaching each other and learning from each other. It's very much learning community, I'd say, I've learned heaps, I think everybody has."

– Community group participant (round 1)

"Agree that regulatory framework, which is based on economic regulation, makes it difficult for networks to justify investments that promote community values unless they can be linked to some quantifiable economic benefit - which is not always the case."

– Industry group participant

3.3.5   Self-determination

People valued **choice and control** of their energy source, relationships, products and everyday use although they were **willing to trade** some of this, in specific ways, **in service of other values**:
for example, environmental care, simplicity or harmonious relationships.

People also highlighted the **complexity of making thoughtful, values-based choices** around energy and identified the need for simpler and clearer options for householders around renewable energy.

It was recognised that **self-determination (or freedom) elicits a powerful emotive respons**e in public discourse and efforts to promote behaviour change should be sensitive to this dynamic.

Within **industry**, there is a related discussion around **consumer agency** woven around discussions of changing relationships with prosumers and enabling choice and equity for all, including those unable or unwilling to obtain rooftop solar.

Quotes

"There should be flexibility to make different decisions and choices. I mean, if people want to be profligate, that's fine if they're covering the cost. Ideally with renewable energy yes. I don't think that we want to become more policed."

– Early adopters group participant (round 1)

"If I get a domestic battery then that requires rare earths and where are we going to get all the rare earths? From the DRC where human rights abuses are taking place. There's a whole matrix of decision-making that can make these choices very complex sometimes when you're trying to do the right thing."

– Access barriers group participant (round 1)

"I'm really happy with the idea of network operators being able to turn my air-conditioning up and down, being able to moderate my cooktop.... What I can't have becoming unstable is things where I've actually got something that is power-sensitive like the computer which is going to crash and actually break"

– Early adopters group participant (round 1)

"I want to either be able to plug into a system that works efficiently and reliably for me and has minimum negative impact on the environment or I want to be able to be independent of that and have a system, my own which has minimal impact on the rest"

– Community group participant (round 1)

"What you want is a platform for the future where 1000 flowers might grow"

– Industry focus group participant

4 Findings: Design and dimensions of scenarios and vignettes

Key Takeaways

The design phase developed five scenarios that illustrated how values could become apparent in the energy system today. The scenarios focussed on social compact and power. Each scenario was based on two values. These scenarios completed the norms and requirements parts of the values hierarchy. We found that scenarios had four main dimensions of difference:

- **Involvement** describes when, how and how often consumers are involved in planning or decision-making processes
- **Activity** describes the degree of work or load required of consumers to fulfil their involvement obligations
- **Responsibility** describes the types and levels of responsibility that consumers are being asked to assume
- **Influence** describes whether the engagement process enables consumers to meaningfully influence energy system decision-making and outcomes.

This chapter outlines the findings and outputs of the "design" phase of the project. In this stage we developed scenarios that supported exploration of the norms and requirements steps in the VSD hierarchy. Using the structured problem-solving development steps based on "six thinking hats" [27] values definitions were developed into a set of five scenarios. As described in detail in 2.3, this phase began with a creative design workshop, in which energy system researchers were instructed to create speculative energy system scenarios based on two allocated values. These scenarios explored the impact of values on energy system design by narrating plausible "visions" of how the energy system could develop, which were written as scenarios. The five scenarios focused on the relationships, social compacts and power dynamics that would underpin diverse futures driven by two key values each. Three elements we sought (and were produced) were:

- Relationships of proponents of the scenario, which was about who related to who and in what way. E.g. was there a community actor? How did they relate to consumers and the energy system?
- Social compact(s) which was about the expectations and agreements on individuals, communities, society, and the world
- Societal power (dynamics) which relates to how decisions are made. E.g.: What personal influence and power do individuals have to make decisions that impact themselves and others? What influence and power do others have to make decisions that impact individuals?

The scenarios were then reframed and contextualised as vignettes by our research team for use in focus groups with consumers in the refine phase.

In this chapter we describe our process, and also use three tools to describe the scenarios:

- First, we describe vignettes, or frames, that we used to illustrate scenarios in focus groups in the "refine" phase. We developed these last but present first here because they help understand the rest of the chapter.
- Second, we describe the values hierarchies, showing how values became apparent in our design
- Third, we describe four metrics that illustrate differences in the scenarios

4.1 Contextualising scenarios for focus groups as vignettes

As described in 2.3, the design phase of the project developed a series of five scenarios that described how values could become apparent in energy system design. The scenarios went through a series of refinements and iterations before we presented them in focus groups. Here we present the view of these refined scenarios we created for focus groups. We have called these views "vignettes". Presenting vignettes first means that readers can understand the other findings in subsequent sections more easily.

Vignettes are reframed and contextualised scenarios. They are intended to be in a form that could be used in focus groups. Vignettes contained three elements:

- A high-level description of the key elements of the vignette
- A comic
- An "influence map"

The comic described how the vignette might manifest from the perspective of a fictional energy consumer "Jane" when her local energy system faces a constraint. The comic describes Jane's experiences with the constraint and how the solution is defined and implemented.

The influence map is a diagram that aims to communicate each scenario's approach to three factors of energy system decision-making: **who** is involved in decision-making (individual consumers, communities and/or industry); what their relative levels of **influence** are in these processes; how this differs depending on what **type** of decisions are being made (system goals or day-to-day management). They aim to present an alternative view of decision making.

These posters are included in Figure 5 - Figure 9.

We also had a short script that we read at the start of the focus group to further describe the scenarios. This script is included in the focus group materials in Appendix D. The vignettes presented in the focus groups follow.

Vignette 1: A New Democracy

This scenario implements **collective care and self determination**
through new forms of democracy and increased roles for communities.

It's great I can now put my air conditioner on without guilt. Particularly as Dexter gets sick if it's too hot. We have our community to thank for that!

Our community is especially busy now as we have a problem in our network. We're getting together to solve it. It's my job to develop options this time.

I'm not alone though. We are practiced at working together. There are lots of issues to think about. We settle on 4 options to take to the wider community

Most people come along to the discussion. Participation is really important. We decide to do 3 of the options in some form. Plus a few things we didn't think of.

We decide to expand our community solar farm and put insulation in some of the less energy efficient houses in our community. A bit of automation helps too.

Now this is over I finally get some time for what's important. It feels good to work together.

Vignette 1

Who has a say?

Communities define the overarching goals of their grid. Industry supports communities in designing local energy systems that meet their identified needs and values. People are deeply involved in their communities.

Energy system goals

Communities monitor and manage their own grid. There are defined standards that govern how they engage with community members to manage and resolve issues as they arise.

Day-to-day management

Who has a say?	Energy system goals	Day-to-day management
Individuals	Some	Some
Communities	Lots	Lots
Industry	Some	None

Figure 5 Poster: Vignette 1 (A New Democracy)

Vignette 2: Community Solutions

This scenario implements **care for the environment and collective care** through strong community involvement and an energy system centred on care.
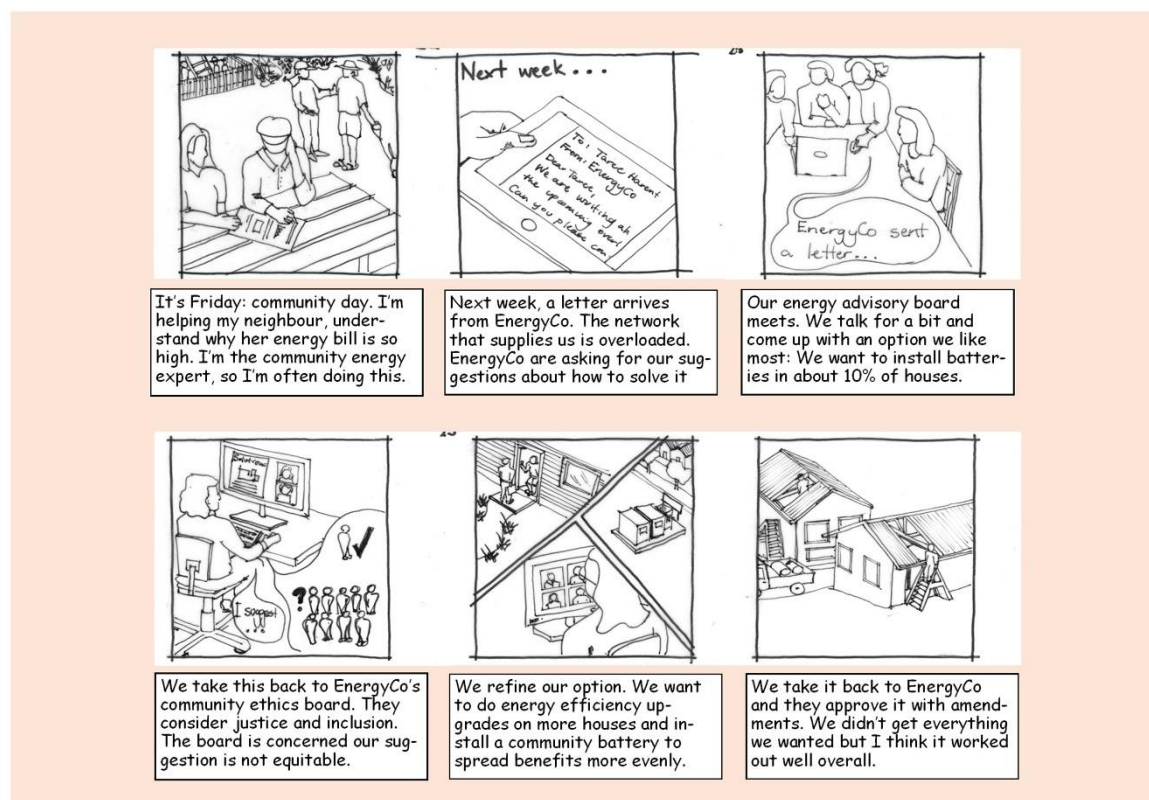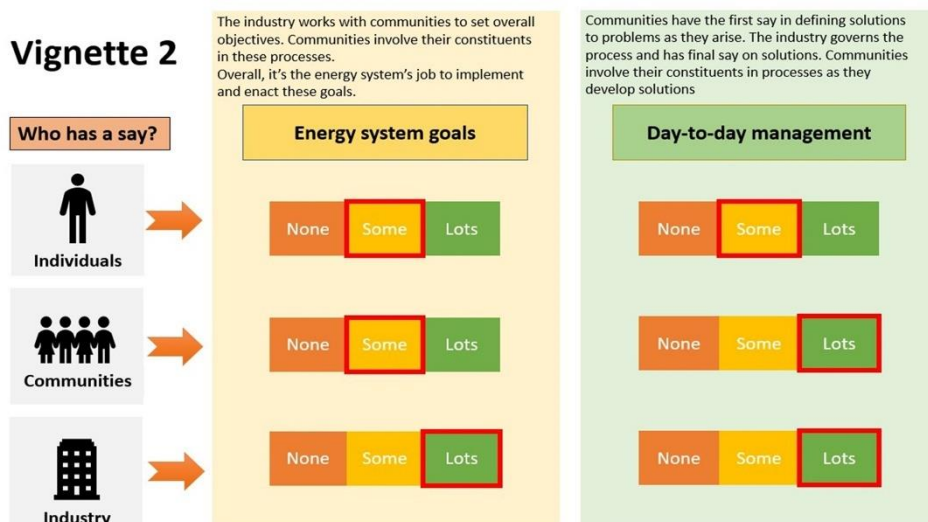
Figure 6 Poster: Vignette 2 (Community solutions)

Vignette 3: Caring For a Clean Grid

This scenario implements **self care and care for the environment.** Taking action to help the (mostly renewable) grid is seen as an act of self care and is made simple to do.

It's a warm day so I have the air conditioning on. My son Dexter, is really sensitive to the heat. I'm happy the grid is 98% clean energy now so I feel less guilt.

My phone dings with a message on my EnergyCo app. "*The energy network nearby needs you! Become an Energy Wizard: get discount tech to help the grid*"

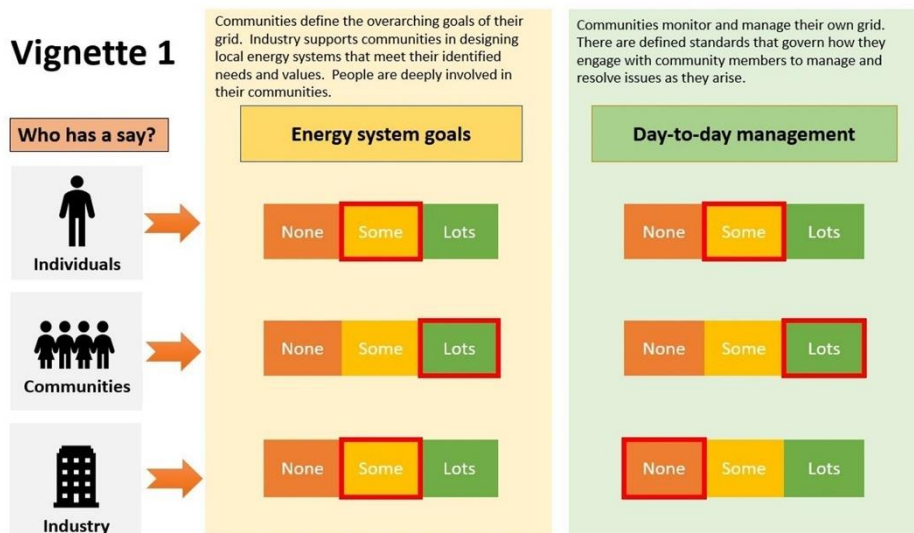The app shows a list of energy products, prices and rebates. Batteries are expensive, plus we rent. But the "home automation" package is ok. I press "Buy".

It arrives pretty quickly and takes 10 minutes to install myself. It's great! Now I can turn my air conditioning on before I even get home.

The next hot day my phone pings. "*Wizards unite! The grid needs you today*". I set my help to a third. Dexter is my primary care but the grid matters too.

The rebates go straight to our savings jar. We want to visit the Sepik River in Papua New Guinea to see the rainforest we helped protect from logging.

Vignette 3

Who has a say?

The industry works with individuals to understand their values. Overall it is the industry's job to design the energy system and set its goals and people are not directly involved in that process

Industry is responsible for the managing the energy system. Industry provides households with information and clear options to enable individuals to support the grid if they choose to.

Who has a say?	Energy system goals	Day-to-day management
Individuals	None / **Some** / Lots	None / **Some** / Lots
Communities		
Industry	None / Some / **Lots**	None / Some / **Lots**

Figure 7 Poster: Vignette 2 (Caring for a clean grid)

Figure 8 Poster: Vignette 4 (Enhancing Efficiency)

Vignette 5: Power of choice

This scenario implements **self determination and financial management.** Price signals and commercial offers enable households to save money and demonstrate their values.
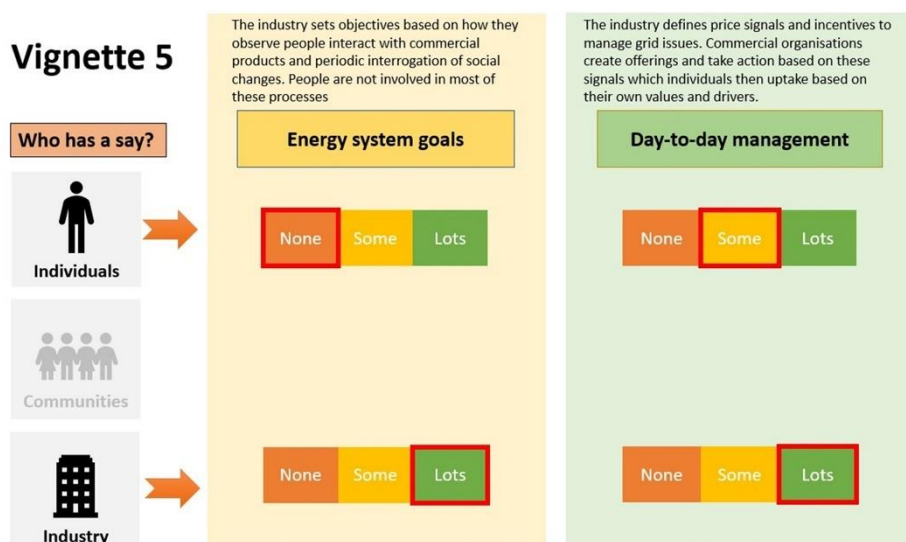
Figure 9 Poster: Vignette 5 (Power of choice)

4.2 Values hierarchies

One of the main objectives of this phase of the project was to explore the use of values hierarchies to develop values-based energy solutions. Values hierarchies are promising because they offer a way to visualise the way that values become apparent in design. This section describes the values hierarchies we developed and how they influenced the scenarios we designed to take into the refine stage.
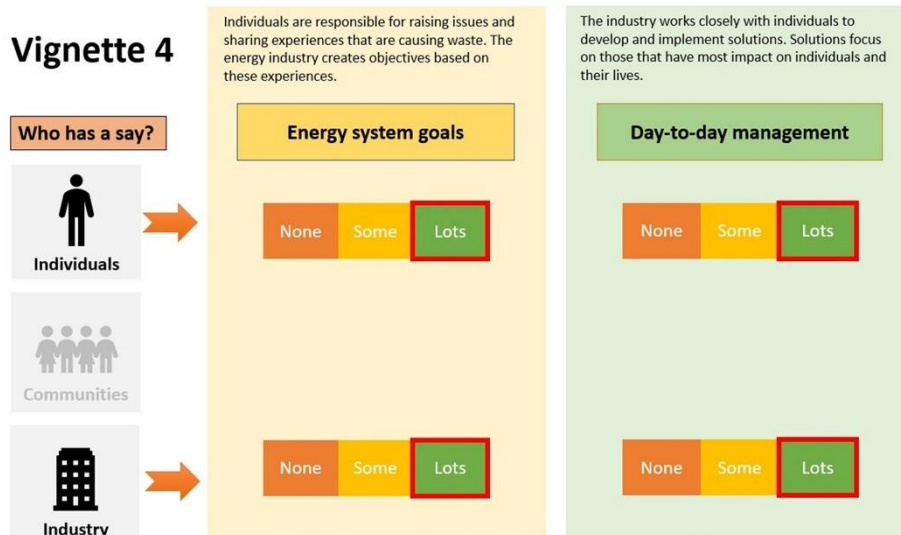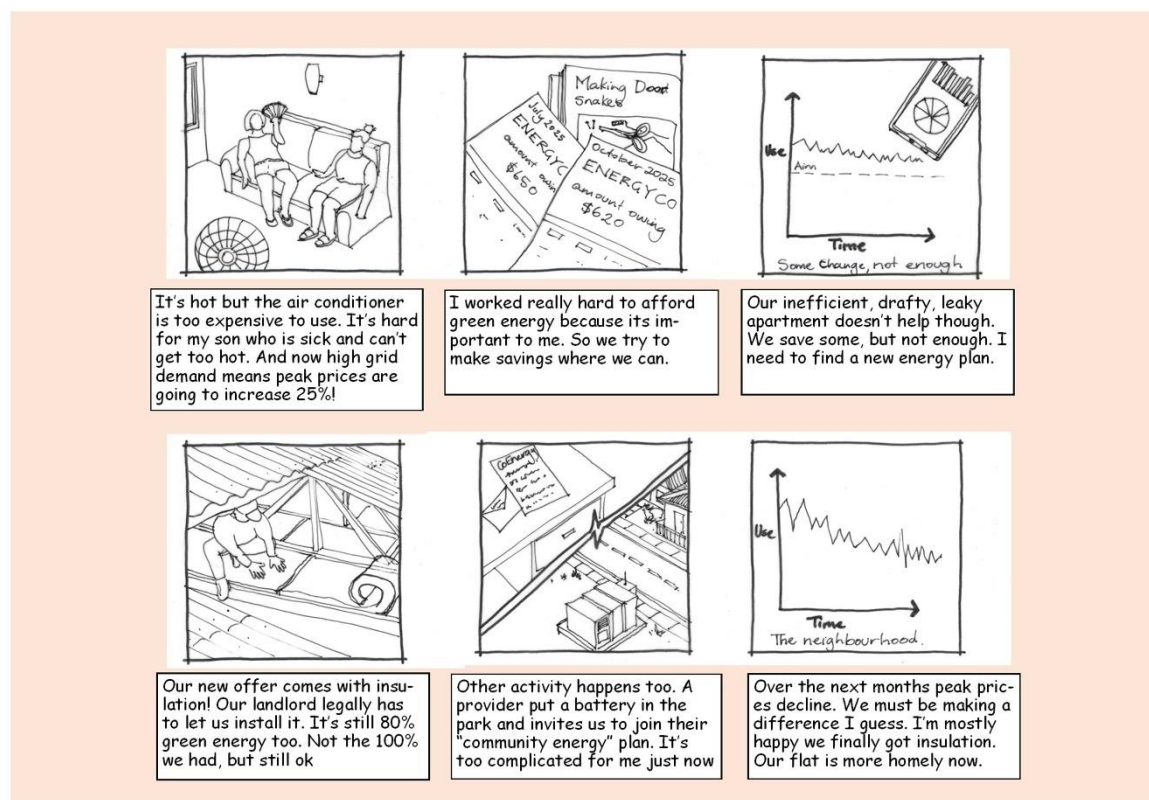
This phase considered the relationship of norms and requirements to values. Hierarchies were derived by workshop participants indirectly. We did not ask participants explicitly to build out the values hierarchy, instead we asked questions that enabled the hierarchy to be assembled from the outputs of the workshop. The workshop findings were used to build the scenarios for the next stage.

Each scenario was ideated by a different group. This means that the same values can have different norms depending on which scenario it is a part of. Norms are context dependent, as described by De Poel in their paper which introduced values hierarchies [15]. Therefore, some diversity is to be expected.

The hierarchies that were generated are below in Figure 10 - Figure 14.

Figure 10 Scenario 1 hierarchy

Scenario 2: Community solutions

Values

Environment   Collective Care

Norms

| Use sustainable transport | Advocate for carbon reduction | Avoid waste | Coordinate and build communites | Minimise addiotnal cost | Help others | Consider future genrations |

Requirements   **Social Compact**   **Power**

- People and the energy system avoid waste
- People contribute to collective action
- Energy system constructed to minimise impact
- People devote time to help community
- Governments fund communities

- People coordinate action
- Communites call out waste

Figure 11 Scenario 2 hierarchy

Scenario 3: Caring for a clean grid

Values

Self-care   Environment

Norms

| Make life confortable | Take time | Connect with others | Avoid conflict | Ensure self-care is not too impactful | Care for valuable environments | Provide ample clean energy |

Requirements   **Social Compact**   **Power**

- Understand and advocate for own care needs
- Energy system provides cheap energy
- Care for others to care for self
- Consider care of future generations

- Influence by framing actions as self-care
- Avoid influencing others

Figure 12 Scenario 3 hierarchy

Scenario 4: Enhancing Efficiency

Values

- Financial management
- Self-care

Norms

- Consume carefully
- Substitute time for cost
- Strive for financial independence
- Take pride in taking care
- Ensure self-care is not too impactful
- Care for valuable environments
- Provide ample clean energy

Requirements

Social Compact
- Only use energy when really needed
- Don't rely on others for basic needs
- Help others to increase their efficiency
- Be aware of other's needs/share resources equitably

Power
- Monitor other's usage
- Respect resources

Figure 13 Scenario 4 hierarchy

Scenario 5: Power Of Choice

Values

- Self-Determination
- Financial management

Norms

- Do own research
- Make individual choices
- [Energy system] remove barriers to choice
- Be responsible for choices
- Choose lowest cost option
- [Energy system] Create price signals
- [Energy system] Offer tailored products

Requirements

Social Compact
- People are willing to make choices
- People take full responsibility for the outcomes of their choices
- People understand their own drivers and values and what they are willing to pay for them
- People expect others are similarly empowered to make their own choices
- People expect the energy system will reflect the values embodied in the choices they pay for (e.g. cheap, reliable, resource conservative)

Power
- People can choose and change their choices at any time
- People's ability to make choices is governed by their financial resources
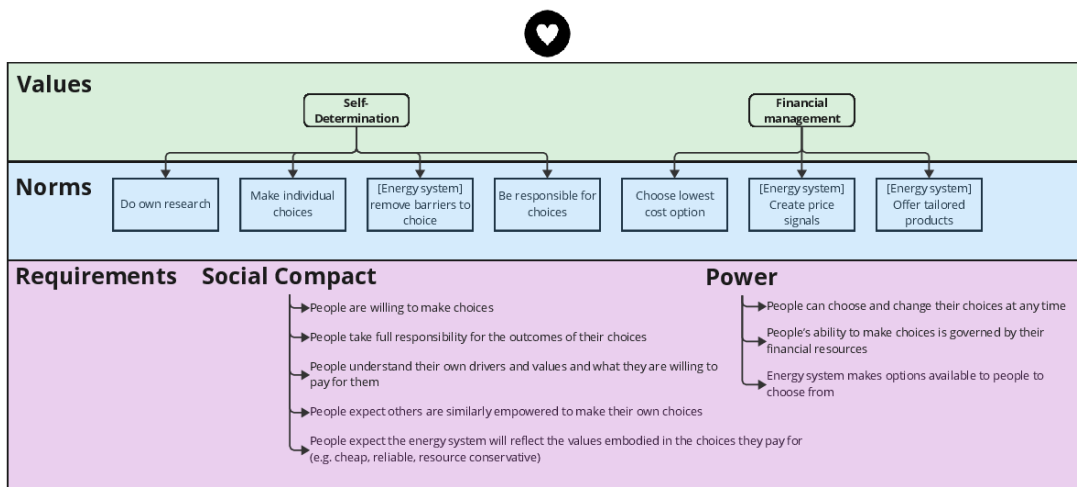- Energy system makes options available to people to choose from

Figure 14 Scenario 5 hierarchy

4.3 Dimensions of consumer involvement in decision making

The values hierarchies above helped us explore how values could come through to requirements in the context of energy decision making. In this section we explore differences and similarities between them through the four dimensions outlined in Table 4: consumer involvement, consumer activity, consumer responsibility and consumer influence. The dimensions we describe here focus on how consumers are involved in energy – both their involvement in energy system decision making, and the energy system's involvement in theirs. These dimensions highlight that defining the appropriate role for consumers in energy is not simple. The dimensions we present here can act as a tool to understand and strategically design consumer engagement in energy.

Table 4 Four salient dimensions in energy system relationships and decision making

Dimension	Indicative Considerations
Involvement	How many touch points with consumers are there and what does each entail? What stage of the planning and/or decision-making process are consumers involved in? What sort of involvement types are envisaged?
Activity level	What level of time, energy and resourcing is being asked of consumers throughout the engagement process? And/or of organisations involved?
Responsibility	What levels of responsibility are we asking consumers to assume? Who is ultimately responsible for making the decisions? Who is ultimately responsible for the operation and management of the system? What sort or level of decision are we asking of the community or people?
Influence	Does the engagement process enable consumers to meaningfully contribute and influence energy system decision-making and outcomes? What types of decisions are able to be influenced (operational vs strategic)?

In the subsequent sections we compare and describe how these dimensions became apparent in our five scenarios of energy system futures.

4.3.1   Consumer involvement

The degree and type of consumer involvement was one of the salient dimensions in relation to energy system relationships and decision making that emerged in our scenarios. Figure 15 compares how the five scenarios include consumer involvement in energy system decision making by positioning them on a broad scale from limited to extensive involvement. Further descriptions of what consumer involvement looked like in each scenario are detailed in Table 5.
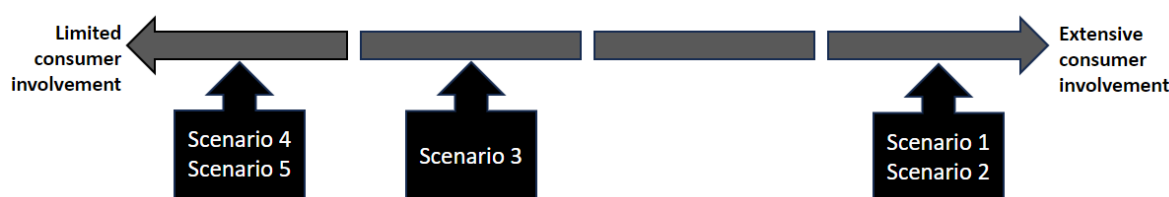

Figure 15 Mapping levels of consumer involvement across scenarios

Table 5 Consumer involvement in scenarios

Consumer involvement	Scenario Description
Limited	**Scenario 5:** There is no coordinated involvement. Industry aim to understand consumers' (profitable) energy needs to design attractive products and services.
Limited	**Scenario 4:** There is no formal consumer involvement. Individuals are responsible for raising issues with the network. "Consultants" are provided to create personalized solutions and may feed back consumer issues to industry.
Some	**Scenario 3:** Consumer consultation is limited but attempts to capture consumers' high-level values and expectations of the energy system and feed these into service offerings.

Consumer involvement	Scenario Description
Extensive	**Scenario 2:** Industry works with community bodies to define goals and manage issues. Community bodies conduct regular and in-depth consultations with their constituents.
Extensive	**Scenario 1:** A community organisation manages the local energy system, and the broader community is deeply engaged in decision making. Industry is consulted when support and advice is needed.

Just like the energy system of today, our scenarios depicted a range of types and degrees of consumer involvement. During our focus group sessions, a number of participants indicated they would like the opportunity to have energy system issues and proposed solutions explained to them and their responses and ideas be listened to by industry:

> *"The idea that there's a great deal more communication back and forth between industry and I think government and the individual power consumers sounds wonderful as well.*
>
> *-Early adopters group participant (round 2)*

It was clear that brief letters informing of an issue and the solution chosen with no means to engage more deeply on the matter was seen as frustrating and inadequate:

> *"one thing in my mind is … being informed that in July the electricity bill could be up a bit over 30%. [The] clear and awful impact that could affect consumers like me and some of my friend make us want to know and to understand why and how and what?"*
>
> *– Access barriers group participant (round 2)*

4.3.2 Consumer activity level

This dimension captures the activity levels required of consumers (as individuals or as community representatives) by the energy system. The degree of consumer activity demanded in our five scenarios are depicted on a spectrum in Figure 16. In Table we provide more detail regarding what these activity obligations entail.

Figure 16 Mapping levels of activity across scenarios

Table 6 Consumer activity in scenarios

Activity level	Scenario Description
Few obligations	**Scenario 3:** Individual consumers are provided information on actions they can do to help the grid. Individuals are responsible for assessing and making choices. Industry tries to simplify this through an App
Few obligations	**Scenario 4:** Individuals have few activity obligations. They can opt in to working with a consultant who will provide practical, tailored advice and hands on support.

Activity level	Scenario Description
Moderate load	**Scenario 5:** The energy system is designed to promote individual choice and self-determination, which means individuals are often assessing and managing transitions to new products and services
Extremely high activity load	**Scenario 1:** A community organisation manages the local energy system so is responsible for the operation and strategic activity related to the grid. The broader community is deeply engaged in decision making, agenda setting
Extremely high activity load	**Scenario 2:** Some individuals have an extremely high activity load as local energy experts or on the community energy board. Citizens are regularly engaged in collective decision making and other consultation processes

Focusing explicitly on levels of activity required of consumers enables an accurate assessment of the feasibility of a particular approach to energy system roles and decision making. It is a means to account for the often-hidden effort needed and care work that underpins energy system activities within a system, and the appropriate levels of resourcing that would be needed to sustain these essential roles. Our scenarios highlight both the extremely high activity demands of community scale organising, as well as the significant demands implicit in systems that require individual assessment and reassessment of choices without adequate external support. This mental workload was reflected on by a focus group participant:

"But seriously we didn't have to think too much about this before, you had the power on or you did something else and somebody managed all those lines and all those transformers. So now I got inverters and solar panels and I'm thinking about a battery and I'm learning all about kilowatt hours. Why would I go and buy a battery when there are much smarter people than me about this who could manage that thing?"

– Early adopters group participant (round 2)

4.3.3 Consumer responsibility

A third salient dimension of energy system engagement relationships is the degree and type of responsibility consumers hold for their local energy system. Figure 17 positions the five scenarios on a broad scale of increasing consumer responsibility. Table 7 provides further detail on what this consumer responsibility looks like in each of our five scenarios.
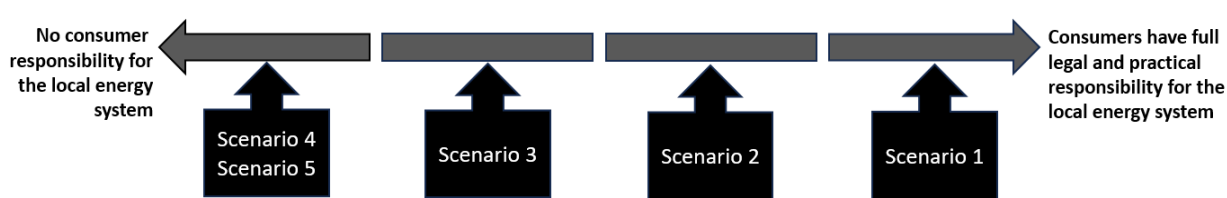

Figure 17 Mapping levels of responsibility across scenarios

Table 7 Consumer responsibility in scenarios

Responsibility for Energy System	Scenario Description
No responsibility	**Scenario 4:** Individuals are responsible for their own energy use and raising issues with Industry. Industry takes greater responsibility in supporting consumers to reduce energy use
No responsibility	**Scenario 5:** Individuals are responsible for their own energy use and making decisions about moving to new products and services
Some responsibility	**Scenario 3:** Individuals are responsible for choices and actions about own energy use. They are encouraged to take ethical responsibility for helping the grid, but this is optional.
Moderate responsibility	**Scenario 2:** Communities are responsible for creating viable, locally supported options for dealing with energy system issues. Industry is ultimately responsible for decision making and implementation
Full responsibility	**Scenario 1:** Communities are legally and practically responsible for operating their local energy system and for facilitating collective decision making.

Exploring the multiple threads of responsibility adds another layer onto considerations of activity demands on individual consumers and community actors. The scenario descriptions differentiate between ethical, practical and legal responsibility for a local energy system. Participants were wary of overburdening poorly resourced community representatives:

> *"[The] two community-orientated ideas are really lovely however I actually think they suffer from the same problem, that if you're looking at a spread across the whole community the people who probably can benefit the most from having community organisation to do that are the ones who've got the least spare time and the least capacity to do it... So perhaps having a system which actually supports a network of people doing that."*

> *-Early adopter group participant (round 2)*

Additional roles and resourcing needed for energy system transitions can be considered as responsibility is identified.

> *"You really need that support from the energy providers, don't you? Linking with the people, whether it's community or not, even if it's individual, that support is really important."*

> *-Early adopters group participant (round 2)*

4.3.4   Consumer influence

Consumers' level of influence is the fourth and final dimension of decision-making approaches that has emerged from our scenario design and analysis. Consumer influence within the five scenarios has been mapped out in Figure 18. In Table we describe types of influence and impact consumers may have in energy system decision making in our scenarios.
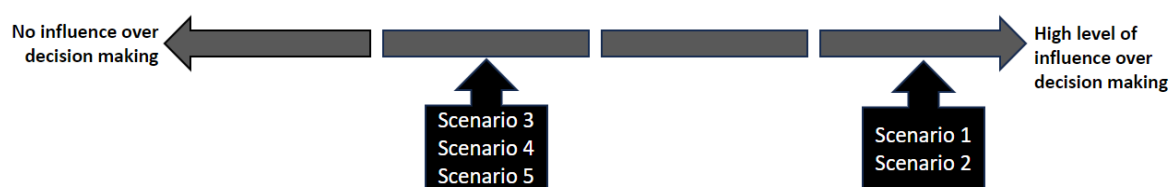
No influence over decision making

High level of influence over decision making

Scenario 3
Scenario 4
Scenario 5

Scenario 1
Scenario 2

Figure 18 Mapping levels of influence across scenarios

Table 8 Consumer influence in scenarios

Influence over decision making	Scenario Description
Some influence	**Scenario 5:** Individuals influence is limited to their purchase choices - as consumers in a commercially driven system.
Some influence	**Scenario 3:** Individual consumers have some influence over energy system strategy as the industry attempts to understand and design for consumer values.
Some influence	**Scenario 4:** Individuals have some influence through proactively giving feedback issues of waste in the energy system, which is taken seriously by industry
Extensive influence	**Scenario 1:** The community body has full influence over decision making. Individuals can meaningfully contribute and influence through collective processes.
Extensive influence	**Scenario 2:** The community board and individual consumers have extensive influence over energy system decision making, although industry has the final say.

As outlined above, there are a range of ways consumers can and do influence energy system decision making as well as differing degrees of influence. One type of influence that this research project explored was the explicit embedding of consumer values into the foundations of energy system design and decision making. Our community focused scenarios also described more extensive forms of consumer influence, including where consumer bodies had full control over both strategic and operational decision making. Focus group participants had much to say about the desirability of seeing their values incorporated into energy system design and decision making and suggested the creation of new roles and expertise that would facilitate this. This was a key finding of our research and is outlined in detail in Sections 5 and 6 of this report.

4.3.5   Dimensions as tools for planning and exploration

Whilst the four dimensions examined above are not exhaustive, they provide a starting frame for making informed judgements about the types of relationships and decision-making approaches that may be most appropriate and desirable in a specific context. The dimensions can also assist with effective planning for resourcing engagement including:

- Identifying roles and responsibilities, and
- Accounting for care related activities and effort.

Roles and responsibilities include considerations like how consumers are involved in decision making, the role of communities, and who is ultimately responsible for managing the energy system.

For example, Scenario 1 illustrates a world where consumers and communities take on most responsibility for managing their local energy system. This can be contrasted to scenario 2 where communities still have a large

role in the energy system, but responsibility for it rests with the energy industry. Both scenarios have a significant role for communities, but responsibilities and activities undertaken are different. Scenario 1 vests responsibility in communities, scenario 2 in the energy industry. This can be seen in the consumer responsibility dimension.

Scenarios 4 and 5 also offer a contrast in responsibilities. Scenario 5 shows a world where consumers are wholly responsible for their own decision making. Contrast to scenario 4 where the energy industry is more responsible for ensuring that consumers are supported and make better energy decisions. These two scenarios illustrate different views on the balance between industry and consumer responsibilities for decisions that influence consumer's own energy lives. This can be seen in the activity level spectrum.

In making decisions about engagement levels and associated responsibility and activity levels, we see the lens of care as useful. Care, as explained above is something that is noted as important but is often a neglected consideration in the energy system. Here we are referring to "care work". Care work has been defined by Fisher and Tronto in three dimensions:

- **Caring about** refers to an attentiveness to the continuity, maintenance, and repair required by our world,
- **Taking care** of refers to taking the responsibility for and accountability of caring for something, and
- **Care giving and receiving** refers to the giving and receiving of care between actors [28].

Scenarios 2, 3, and 4 offer opposing views on how the care dimensions described above are realised. Scenario 2 presents a world where communities take most care roles, caring for energy solutions adopted in their local area, while also giving care to community members. Scenario 3 is a world where the energy industry takes care of consumers' comfort and offers easy ways for consumers to improve their lives. Scenario 4 is a world where the energy industry takes care of consumers through provision of consultants, but consumers must care about their energy use in real time. This can be seen in the activity level and consumer responsibility dimensions.

These five narrations are clearly not a comprehensive analysis of all nuances and options regarding a particular dimension. Indeed, focus group participants generously shared multiple other scenarios and vignettes they thought would increase the inclusiveness of the narratives in the refine stage of the project (discussed in the next chapter). Despite the potential to describe further dimensions, the ones related here are a means to open up exploration of what is possible and what is desirable.

An important note is that these dimensions must be considered in the context of the scenario itself. Two scenarios can be in similar locations on the dimensions presented here but have different ways the location on the dimension becomes apparent. For example, scenarios 3, 4, and 5 have similar levels of consumer influence but describe very different views that this influence manifests.

5 Findings: Refining scenarios

Key Takeaways

The refine phase was the second time that we had focus groups with consumers. In these focus groups we refined vignettes defined in the previous phase. This step aimed to refine the "requirements" level of the value hierarchy. We found two key requirements:

- Participants felt that they were being insufficiently supported in energy system decision making today. They proposed various physical, software, or community means of providing them an "honest broker" who could dispense impartial trusted advice that was reflective of their values.
- Participants value the role of experts in energy system decision making. They just wish that they were consulted more, and experts were more responsive to their needs.

This chapter relates findings from the further refinement of scenarios with energy consumers. It first relates input focus group participants provided about the scenarios and their expression as vignettes during the second round of focus groups with consumers (section 5.1). The feedback provided in these focus groups underpinned the design of the new, consumer-guided scenario (expressed as two vignettes). This chapter therefore then presents a consumer guided scenario (as vignettes with comics) produced using consumer feedback about the earlier vignettes (section 5.2). Finally (section 5.3), the new consumer guided scenario (expressed as vignettes) are compared to the initial five using the four critical dimensions of consumer engagement to describe how the new participant guided vignettes are positioned on the consumer engagement dimensions.

5.1   Energy consumer feedback on scenarios

Much feedback was provided in the second round of focus groups via reactions to and discussions of scenarios. Our scenarios, communicated as vignettes in the focus groups (as was described in chapter 4), focussed on factors of decision making and change, in line with the research questions. As described in chapter 4, scenarios ranged from models where communities took over most energy system planning and management functions to those where consumers were largely uninvolved in decision making. They also related how consumers make (or could make) decisions, and how they are supported, or not, when making them. Focus group participants had wide ranging discussions that both directly critiqued and discussed the vignettes presented and explored related, broader topics. Even with such a diverse range of responses, there were some consistent themes that emerged across the focus groups as they responded to the vignettes.

Two main themes arose as consistent through responses. These related to decision-making approaches and relationships in the energy system. In relation to these themes, participants reported:

- Wanting support for consumers and communities to navigate energy decision making, and
- Wanting energy system design and decision making to be responsive to consumer's needs, broader issues, and community feedback

Because of the importance and dominance of these themes, they were used to guide the development of the of customer guided vignettes below in section 5.2. The following two sections describe the perspectives of focus group participants on these two key themes to provide important background to the new vignettes.

5.1.1   Supporting consumers through energy system change

In our second round of energy consumer focus groups there was much discussion about the challenges of making household energy decisions, and community energy decisions in the context of a changing and often impenetrable energy system. This was a consistent response across the focus groups. This response is in the context of the current energy system defining and reinforcing specific ways that consumers can be supported. The energy system expectations of consumers are set against a broader backdrop of extensive and ongoing energy system change and assumptions about consumers wanting, and being capable of exerting, increasing choice in their household energy management. For example, the AEMC's "Power of choice" review was *"designed to increase the responsiveness of the demand side to evolving market, technological developments and changing consumer interests over the next 15 to 20 years"* by *"Provid[ing] consumers with information, price incentives and technology"* [29]. In our previous work (for example [3]) we observed that these changes have made energy decisions harder for consumers. This finding was reinforced in focus group discussions in the current project:

> *"I'm sitting there with my little table trying to work out the kilowatts and all that kind of stuff and it was so hard to pull apart what was these differences in these calculations and things like that. I'm not good at that [so] I just minimise usage 'cause that's the simplest way to control the fluctuations of energy prices, I feel, the way things are going at the moment"*
>
> *–Access barriers group participant (round 1)*

Considering personal values in the decision-making process makes it even more challenging for consumers.

> *"It's ActewAGL, Origin and then one other one, I think, are the only ones that provide electricity and gas in the ACT so that's also hard to decipher from their marketing whether they're actually committed to sustainable sources of energy"*
>
> *– Access barriers group participant (round 1)*

And when decisions are made about system set up in houses, only some members of the household may be competent in managing them.

> *"My wife worries if I fall off my perch she won't be able to cope with the system. I don't think it's that complicated but then…"*
>
> *– Early adopters group participant (round 1)*

The above factors combine to make energy decision making hard. There is a vast array of offers, products, and organisations that purport to help consumers with their electricity, but they are very difficult to understand and compare. This is in line with our previous work (for example [3]).

Participants were attracted to scenarios where consumers were supported in energy decision making, such as scenarios 2, 3, and 4. The "Energy Wizard" app in vignette 3 was attractive, in particular to technology adopter and community participants.

> *"But this bit over here about the energy wizard behind that where I'm turning down my demand… I mean something's happening somewhere in the system that then sends a signal to my hot water to turn down. Man, that's pretty impressive."*
>
> *–Community group participant (round 2)*

But an attraction of the "Energy Wizard" app over the similar use of apps in scenario 5 was that it was seen to be impartial (that is, freer of commercial drivers). Many participants also mentioned consultants- or brokers- who could help them too, as described in the exchange below:

"It might be easier to make a choice if you're confused by everything if there's a consultant"

"That consultant doesn't have to be the community or the industry, it can be somebody in between"

"Even desirable to be so."

"You want an honest broker"

– Early adopter group participants (round 2)

Brokers needed to be skilled in the art of understanding people and their values, rather than simply advising on cost:

"The thing that excited me about some of these is just imagine if someone could come to your house and really help you to figure out what the next thing that you might do would be and they listened to what your values were. Okay so I really, really want to reduce pollution or I really want to have a lovely healthy house for my kids or I really value light or I don't know, whatever those values are and I want to be able to turn down my energy bill now if the network needs, I don't know but I like that bit. Whatever it is but that person comes to your house and talks to you and they've got resources and they can help you and should I put in the insulation here or should I automate my whatever?"

–Community group participant (round 2)

The quote above describes a need for support. The idea of having someone visit your house is one method of support. However, providing support wouldn't necessarily mean that the energy system must appoint consultants for everyone, or to visit directly in homes. There are numerous support structures available today that could be leveraged, and new efficient support structures that could be developed. The Energy Wizard app in an example of a possible support device. But also, community members can (and do) provide support to people today, and could provide more with some additional assistance:

"I'm the community energy expert in vignette 2 so that's a role that we see at [community group] which we're kind of edging into that kind of territory. So that's people talking to people about gosh, I don't know, should I upgrade my hot water service or put insulation under the floor? I just don't know what to do. How do I even work that out? People are confused. It's difficult and that's some of the complexity for the individuals."

– Community group participant (round 2)

This is a good system [to] bring like that, like train the trainer. They can do with you together. Produce more knowledge and dedication. Then they friendly and come together and sharing [knowledge].

– Access barriers group participant (round 2)

Clearly participants described a desire for more help during current and near future energy transitions. Support and help can be provided in several ways (with Scenarios 2, 3, and 4 providing good examples). This finding is a point raised in other research as well, and so has confirmation elsewhere. In section 6.1 we describe how this could be related to the energy system's current structure.

5.1.2   Making better decisions in the energy system, that consider the consumer

The inverse of consumer decision making is how the energy system makes decisions. Participants reported they wanted energy system design and decision making to be responsive to consumer's needs, broader issues, and community feedback. In most cases participants did not speak of any specific organisation, apart from splitting "industry" from "government". Therefore, when we refer to "energy industry decision making" or "energy industry designer" we are not referring to any specific extant or new energy system organisation.

Overall participants wanted to be involved in energy industry decision making:

"What we're doing today is now is exactly we are hoping. Two words on working together: Co-design, co planning"

– Access barriers group participant (round 2)

"Cause I really like the idea of the community being asked instead of the solutions being imposed on us like right now we're being whispered that our solar energy may be clipped, stopped going into the grid at certain times. Well what's the problem? Why is there a problem? I mean I've got some ideas why there's a problem but no-one's actually consulted us or said what do you think or how would we make that work? I reckon that's a great idea because then people would have a better idea of what the problem is and maybe they can come up with some solutions"

– Community group participant (round 2)

The scenarios we presented to participants presented several views on how consumers could be included in energy system decision making. This is discussed in chapter 4. People appeared to react to the vignettes presented based on their experiences. For example, for the community group participants, who were already working with their community, reactions to Vignette 1 included:

"The new democracy sounds like a kind of hell to me, it's far too much responsibility on the community and it would just mean that some people would get into it and then carry a whole lot of responsibility and get really tired and exhausted, I just think."

"When it didn't work they'd get blamed."

"Yeah and then they'd get blamed. That looks like a disaster waiting to happen."

– Community group participants (round 2)

This vignette was particularly relevant to the community group, as they were members of a community group considering energy system decisions today and were making significant efforts to bring about change on behalf of their community. Focus group participants were in general wary of democratic processes because they could lead to slow decision making, but some participants felt these democratic processes were very important and were worth the effort:

"So I feel like there would have to be quite a lot of groundwork in setting up expectations and community roles like I saw in one of them Jane's the local energy expert or something like that. So setting up those roles, setting up those responsibilities, getting people out of that individualistic mindset. But I would imagine this would have positive flow-on repercussions throughout other aspects of community living, I would imagine 'cause people get out of their blinkered mindset of their own life and look and think about their neighbour or the person across the street."

– Access barriers group participant (round 2)

Overall, participants felt that expert design was important and was needed no matter what approach was used. However, they were sceptical that existing design processes were responsive enough to their needs as consumer and also important macro trends (such as climate change):

"But also 2 and 3 which I also prefer have a lot of input from industry and less from individuals and community and I guess I don't disagree with industry having the responsibility but I guess what I don't see happening here is industry changing. I don't see a transition in this"

– Community group participant (round 2)

So, even though participants didn't desire to lead energy system design they did want designers to more actively tackle the large problems they felt were important. Similarly, as consumers, they wanted more input into design than they had today:

> "By the way, I have been thinking we are seeing a solution come straight from the industry without the co-design with the consumer and the community. Plus, the government. And will we as consumers and communities we are living in got the choice over the response?"
>
> – Access barriers group participant (round 2)

Participants felt existing consultations that have occurred had unaddressed decision-making related power imbalances. Imbalance and skew participants thought was apparent in how industry experts can (and could be) frame(ing) consultation approaches to get a desired outcome:

> "Yeah, you need extra because if they talk to me [and] I'm not an expert in that field, they can say anything that sounds nice. And if they send someone friendly and nice and that people forget about everything."
>
> – Access barriers participant (round 2)

Communities were a mechanism seen as offering pathways to participation on more equal terms. But only if the appropriate expertise exists in the community:

> "You need a lawyer. You need an architect. You need an energy expert. You need a gas expert. You need those people. So how do you build in one community that stuff? So we need… some money from government of course, to support this activity."
>
> – Access barriers participant (round 2)

Clearly participants felt strongly about what was "good" energy system design. A good design process involved them at key points and was undertaken by experts who were cognizant of and responsive to their needs. Because these two aspects are so important in our focus group contributions, we discuss their implications further in chapter 6.2. In the following pages, we now present a new scenario based on the above consumer feedback.

5.2   New, participant-guided scenario

The previous section reported the wide-ranging consumer perspectives on the themes of supporting energy consumers and undertaking responsive energy system design. Guided by these discussions in the second round of focus groups, we have built two new vignettes. which we present in this section. The first, in line with the original framing for scenarios, describes a householder - Jane's - experience as a network overload is resolved. This vignette with a comic is shown in Figure 19. The second, adding a perspective focus groups attendees felt was important, describes the experiences of Sara and is shown in Figure 20. Sara is an energy system analyst who works for a regulatory body (in this instance). We do not specify which existing body (or bodies) Sara's role maps to. Sara is responding to the uptake of electric vehicles, with its potential to cause grid impacts. We have included Sara's story because focus group participants felt it was important for us to discuss the industry perspective alongside the consumer perspective.
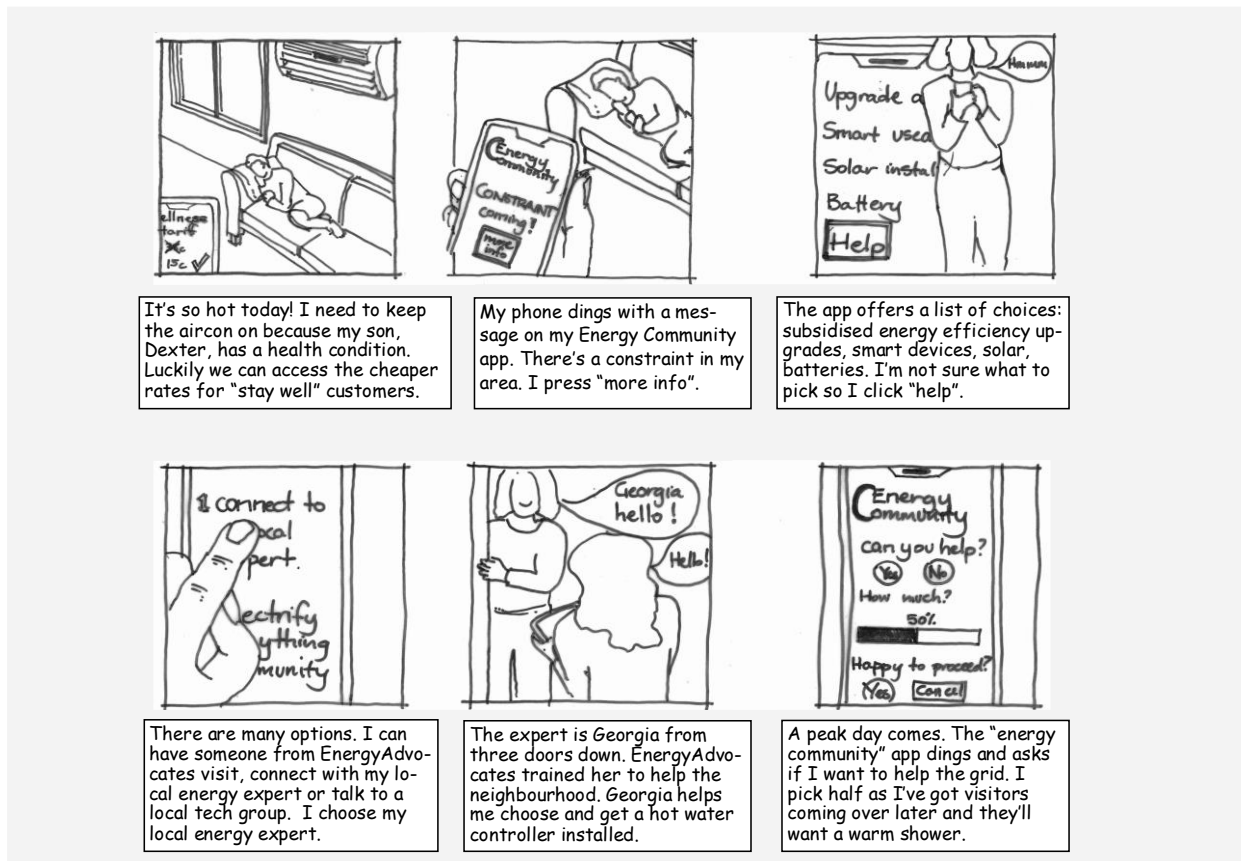
Figure 19 Comic for participant designed vignette – consumer perspective
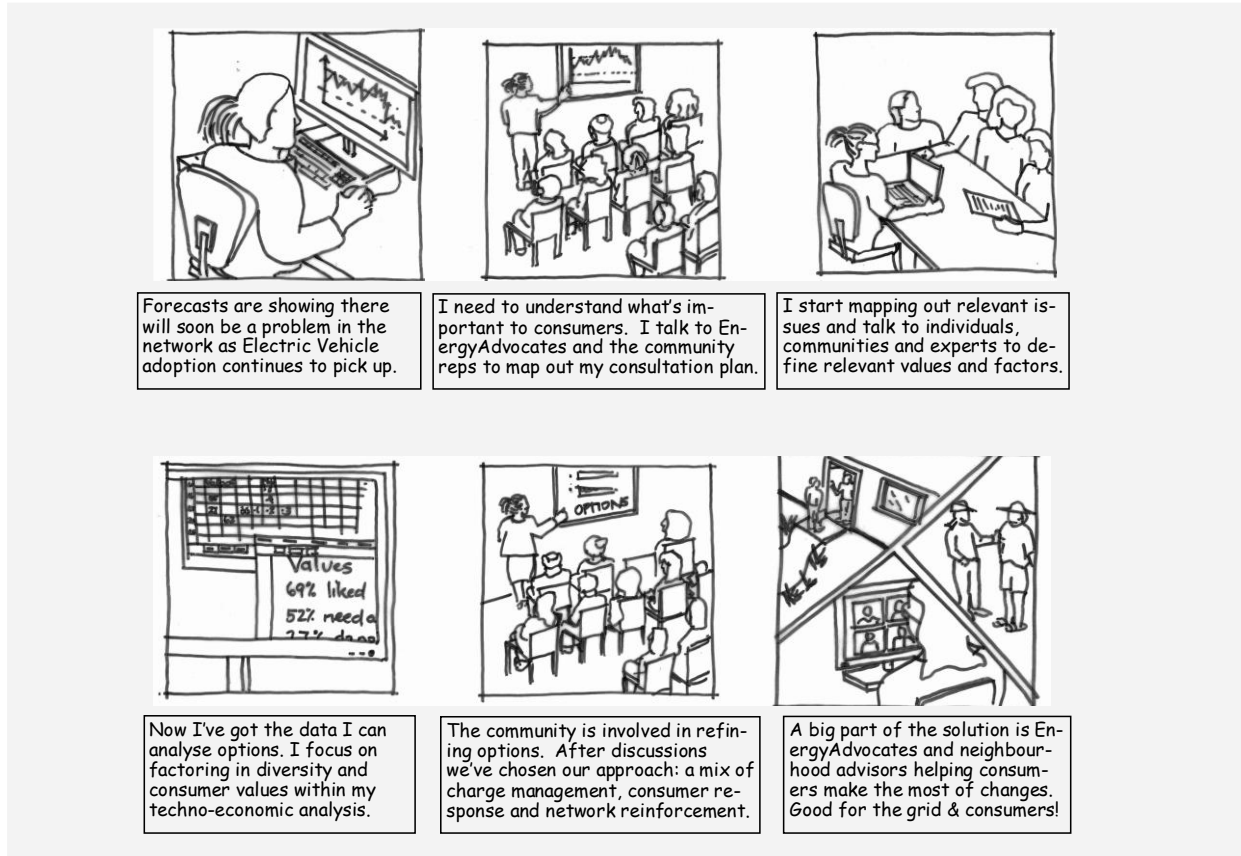

Figure 20 Comic for participant designed vignette - industry perspective

In keeping with our exploration of using vignettes to engage diverse audiences in meaningful discussion about our future energy system (within our consumer focus groups), we have developed and included the above refined vignettes to make our findings more broadly accessible. In Appendix B we discuss in detail our process findings regarding the use of energy system vignettes as discussion and communication tools. In the following section, we continue our analysis of the refined scenario by mapping its narrative onto the consumer engagement dimensions highlighted in Section 4.3.

5.3 Critical dimensions in participant-guided scenarios

The new scenario above in 5.2 relates participant preferred aspects of the previous scenarios and demonstrates key dimensions of consumer engagement discussed in section 4.3: consumer involvement, consumer activity, consumer responsibility and consumer influence. In Figure 21- Figure 24 below, we compare the participant designed scenario to the initial five scenarios on each of these dimensions. Underpinning this scenario's unique combination of positions on the four scales, are two main requirements, which we have framed here as roles. These are:

- An assistance role that supports consumers as they responding to change, connects communities, and equips people with skills, and
- A designer role that is responsive to consumer's needs, broader issues, and community feedback.

These roles are informed by the extensive participant discussions detailed in sections 5.1.1 and 5.1.2 above. The implications of these suggested roles in terms of the current energy industry are discussed further in chapter 6.

In what follows the participant guided scenario (related in Figure 19 and Figure 20) is compared and contrasted to the initial five vignettes on the four key dimensions of consumer engagement outlined in Section 4.3.

5.3.1 Consumer involvement

In the new scenario, consumers are expected to have moderate levels of involvement in energy system planning and decision-making processes as indicated below in Figure 21. It indicates a comprehensive consultation program that is built on strong relationships with diverse consumers and community organisations and obtains feedback on both day-to-day energy concerns as well as broader community values and changing needs. This set up for consultation is more extensive than the values focused consultations envisaged in Scenario 3 but less involved than the collective decision-making and community grid management processes detailed in Scenarios 1 and 2.
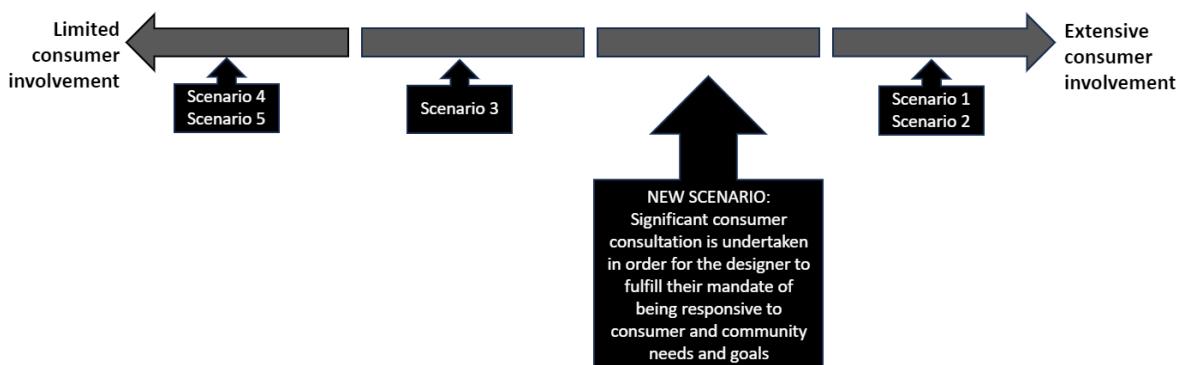

Figure 21 Participant designed scenario on the consumer involvement scale

5.3.2 Consumer activity

The participant guided scenario aims for a relatively low level of activity required of consumers in terms of both their household energy management and their contributions to energy system planning and decision making, as seen in Figure 22. Like scenario 4, consumers can choose to access personalised support to make values-based decisions about their household's energy use, energy services and technologies. This scenario also includes a range of optional consultation activities which imposes some activity demands on consumers.
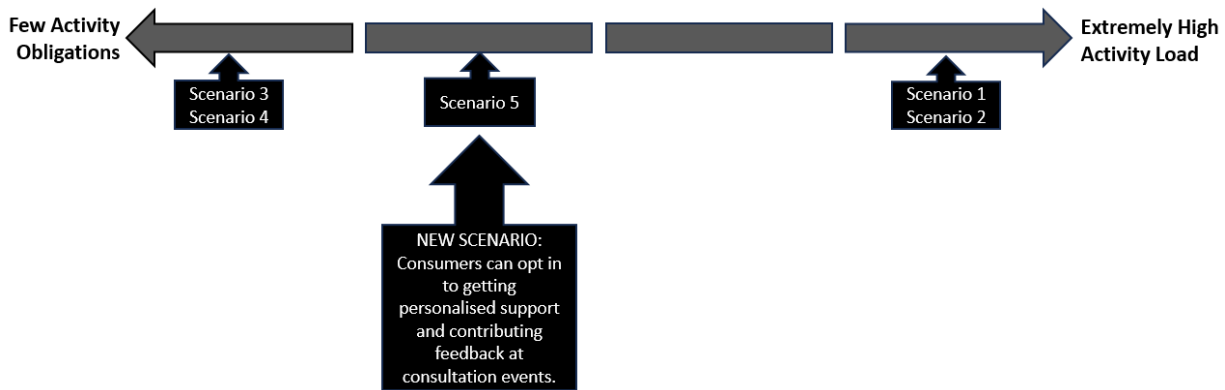

Figure 22 Participant designed scenario on the consumer activity scale

5.3.3 Consumer responsibility

As depicted in Figure 23 consumers hold little responsibility for the local energy system in the participant guided scenario. Similar to Scenario 3, consumers are not at all responsible for the energy system in legal or practical terms, however may be supported to enact their sense of ethical responsibility towards the energy system (as proxy for the environment and/or society) by reducing energy consumption.
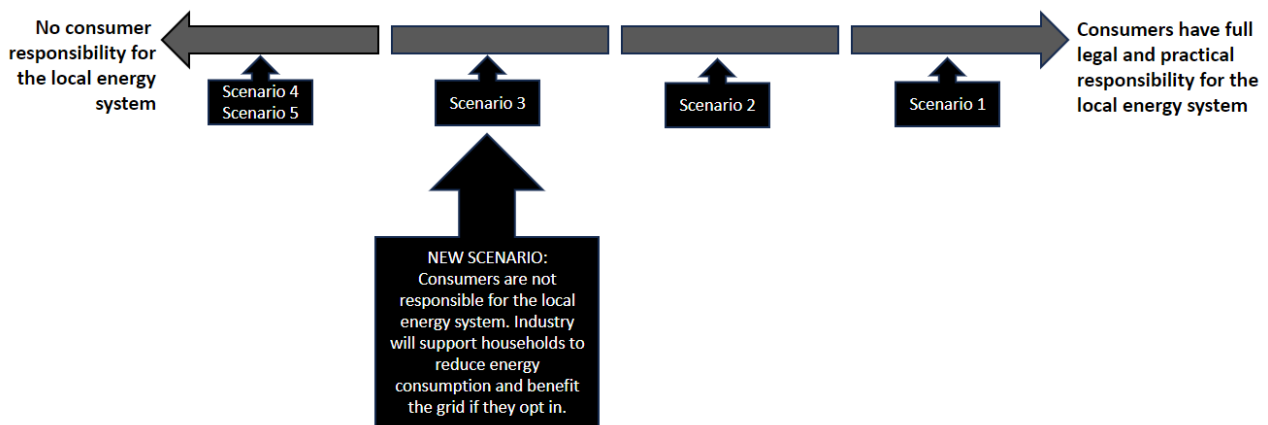

Figure 23 Participant designed vignette on the consumer responsibility scale

5.3.4 Consumer influence in our participant designed vignette

Our participant guided scenario describes consumers as having moderate levels of influence over energy system decision making (see Figure 24).   The mechanisms which enable this consumer influence are quite distinct from the 'purchase power' style influence of scenarios 3 and 5 and the 'community organising' type influence of scenarios 1 and 2. Instead, consumer influence is based on strong connections between consumers and people fulfilling two new industry (or industry adjacent) roles: one based on supporting consumers and the second based on consumer centred design. We describe the implications and opportunities these roles might signify for our current energy system in the chapter below.
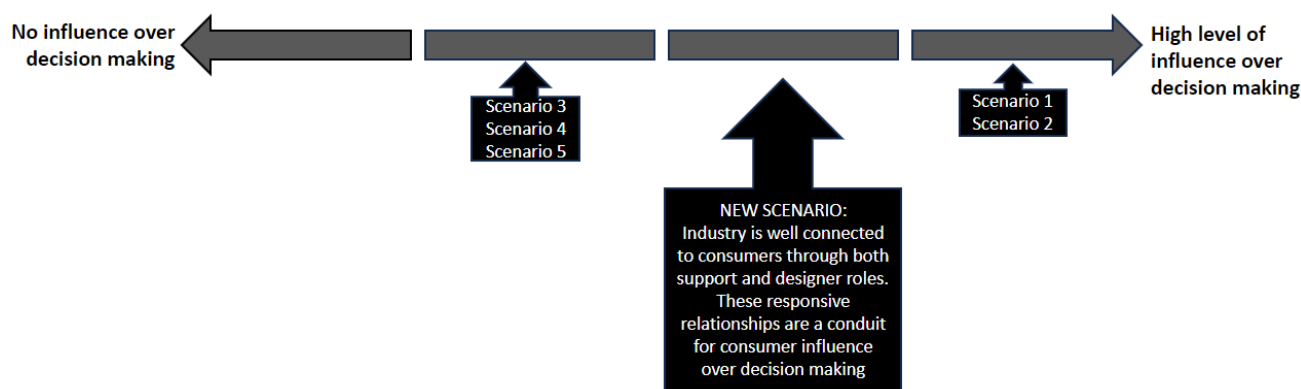
Figure 24 Participant designed vignette on the consumer influence scale

6 Implications of our findings for energy system design

> **Key Takeaways**
>
> This section translates our findings into terms that more closely relate to the energy system decision making process we observed. We make two recommendations from it:
>
> - There is a "care gap" in the industry now that is potentially causing inefficient network expenditure. We recommend that the industry build a methodology for valuing and integrating supported decision making for consumers in energy system planning and reform.
> - Participants value the role of experts in energy system decision making. They just wish that they were consulted more, and experts were more responsive to their needs. We recommend that design processes be reformed to include consumers early using tools such as Value Sensitive Design.

Our findings in chapter 5 show that there are two key roles that focus group participants felt would be helpful: a "honest broker" and an increased role in decision making processes (see 5.2). This chapter relates the chapter 5 findings, and key findings from chapters 3 and 4, back to the energy system of today. It aims to make these findings more specific and actionable by making clearer the link to *how* these findings could be implemented. The analysis in this chapter is not the only way that these findings could be actioned but form a starting point for further discussion. In this chapter we develop two key findings:

- That the lack of "honest brokering" could be causing inefficient network investment, and
- That consumers should be included in energy system design processes.

We discuss these findings in turn below. Our recommendations from these discussions are:

- A more detailed analysis of funding models for care brokerage is undertaken, and
- Industry design processes are reformed to involve consumers earlier.

6.1 There is a need to help consumers navigate the energy transition

In every focus group we ran as part of this project, participants explained that currently they feel unsupported in their energy decision making and expressed interest in having access to "honest brokers" they could trust to support them. This project is not the first time we have been told this. Our previous work has also shown this [10], [30]. Participants described several ways that this support could be provided (these are discussed in chapter 5). In this section we discuss these findings and the principles, pricing and economics that might demonstrate the strategic and economic cases for providing this support capacity. We have presented these findings in relation to financial factors to contextualise them in terms that relate more closely to how we observed energy system decision making occurring. The "honest broker" is arguably a role that could be described as undertaking necessary "care work" [31]. Care work here is the work that people must expend to understand, respond to, and maintain technology and practices that the energy transition has created, but in a way that is ethically/morally sound. Concepts that map back to a value of care were raised in submissions to the AEMC's rule change we studied, as related in section 3.1. above. For example, Enova stated that *"The messages re timing, flexibility, consultation, minimal impacts, ability to earn, and variable outcomes according to distributor, class of customer, and jurisdiction etc are already too complex to be explained clearly to the general public"* [32]. It was unclear how these "care work" concerns were brought through to the final AEMC determination. We see the honest broker as a way to engage in care work during energy transitions.

Pricing is a favoured mechanism in the energy industry for encouraging change and came through in the rule change studied as a way AEMC could exchange value, and perhaps even provide a form of care. Focus group participants were not only driven by price. In fact, they specifically suggested that any support that was provided to them should reflect their values and not only focus on price. Therefore, our focus on price and finances here is not meant to suggest financial concerns should be the only solution. But it is clear that if care work is to be provided, it must have its basis in economics. This chapter uses existing price signals as an initial indicator that there is an economic cost to the lack of care work, but is not intended to imply that price signals are the only signals to which consumers could respond.

Price is a factor in the rule studied and stepping through this a little provides useful background. The rule change we studied is a step in a long reform journey the energy system is undertaking. The "power of choice" reforms were an earlier, and pivotal, step that significantly modified how the network is priced to make it more cost reflective [29]. These reforms have meant a move from volumetric pricing to more dynamic models (such as demand and time of use energy pricing). The rule change we studied extends these reforms to export pricing. The justification for these reforms was that consumers would respond to these price signals, shifting consumption and generation out of peaks and thus making the network overall more efficient. Obviously, achieving outcomes from these reflective pricing shifts depends on consumers responding. This requires them to seek out commercial offers, alter their consumption practices, and install technology. Whether this is occurring is arguable [20], [21]. These pricing shifts have created a complicated environment. Participants in our focus groups discussed the complexity of these price related decisions at length and a significant group of participants felt they were simply not able to make decisions related to pricing.

An "honest broker" can assist with these complicated reflective price decisions but would require specific funding to be effective. Focus group participants felt it very important that this role was filled by an organization that was free from commercial drivers. They generally did not trust energy retailers, and to a lesser extent networks, to be impartial actors in broker style initiatives. This means that there needs to be a specific way to fund this role. Our suggestion is that if consumers have trouble altering practices, finding appropriate commercial offers, and selecting and maintaining technology, then they will consume in a way that creates inefficient network investment.

Appendix C details a simplified series of calculations that explore the potential financial benefits of having "honest brokering". Although at this stage we have not explored costs, merely identified that there are potential benefits. The calculations describe the potential impact of consumers taking one year longer to change practices to enhance network efficiency. Some basic quantification indicates the provision of support could create $2-10m of benefits in the ACT alone. These simplified calculations provide an indication of the potential cost of not having brokers involved and leads to the first key recommendation:

♥	**Implement mechanisms to care for consumers**	Consumers felt unsupported in energy system reform. We feel this leads to significant inefficiency and that expenditure on brokers can be justified to mitigate these inefficiencies. Participants gave us many ideas of what an honest broker could look like and they could range from software processes to people supporting complex decisions as communicated in our report. **As a first step, we recommend that the industry build a method to value and integrate this support in energy system planning and reform.** In the short term this could take the form of a project or trial, that aims to build a methodology and economic case.

6.2   Energy system design for consumer inclusion in decision making

One of this project's main aims was to determine how consumers could be included in energy system design processes. In 5.1.2 we described focus group participants' perspectives on what good design would look like. In this section we relate these findings to the AEMC rule change process we analysed in 3.1. Our findings are also generally applicable to other types of energy system decisions. We have used the rule change process as an example because our analysis of it enables us to be more specific in our findings.

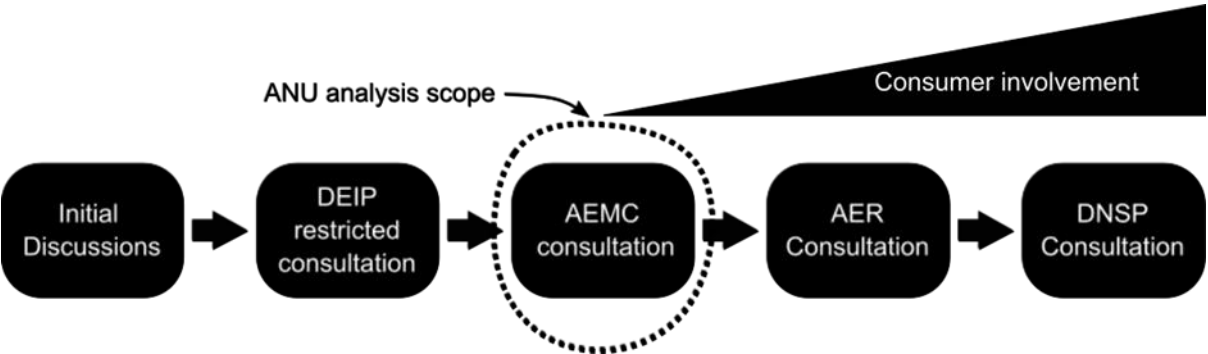An overview of the AEMC process, and the preceding and subsequent steps is shown in Figure 25.

Figure 25 Rule change process and ANU analysis

The AEMC consultation that we analysed was only a small part of the overall process but it was important in that it was the first time that (some) energy consumers were able to see, analyse, and respond to the rule change. However only particularly engaged consumers were likely to realise that the consultation was happening. Prior to this, there were several years of initial discussion in which the concept and its proposed solutions were ideated and developed. From our analysis of the rule change and industry focus group it became apparent to us that the bulk of the design was done during the initial discussion and a restricted consultation process by DEIP. This happened before the (limited) AEMC consultation process occurred.

In our consumer focus groups participants validated the role of "expert designers" to do the bulk of design work, but desired to be involved earlier in design and that designers were more responsive to their needs. This

means that to align with their expectations, consumers should be given a voice in early discussions like the DEIP consultation process.

The Responsible Research and Innovation (RRI) framework provides a tool that can help describe what good consultation and solution design looks like. We have a more detailed discussion on RRI in Appendix A, but key in this discussion is what RRI advises about how innovation should occur for it to be responsible. Stilgoe et. al. described RRI through four dimensions [33]:

- **Anticipation** which asks us to anticipate the outcomes of innovation. It encourages us to ask "what if" questions and consider contingency, what is known, what is likely, what is plausible, and what is possible.
- **Reflexivity** which encourages us to "hold a mirror" up to ourselves. It asks us to analyse our own commitments, assumptions, and activities. It asks us to understand our own roles, assumptions, and activities and the limits of our own knowledge.
- **Inclusion** which tells us that we need to include space for participation in innovation process. It especially asks us to understand how power is distributed and shared within processes such as undertaken by this project.
- **Responsiveness** requires us to we need to change direction when things indicate our direction is wrong. Fundamentally this underpins the other dimensions: what is the point of anticipation, reflexivity, or inclusion if you don't act on what they tell you.

These tenets provide a useful way of framing our findings on process. However, in our analysis we found that the AEMC appeared to engage more deeply with industry submissions. This may be related to industry submissions often more directly answering the questions posed in the AEMC's consultation. Whether or not this is the case, having industry submissions more attended to is a barrier to the AEMC effectively engaging with the concepts shared in non-industry submissions. For example, several submitters spoke of care ethics (indirectly) but this did not seem to be discussed in detail by the AEMC. In the context of RRI, this could be considered as a lack of reflexivity and responsiveness. Although not a direct answer to the AEMC's questions, care ethics was a new frame that could have added dimensions to the rule change analysis, and (as described in 3.1) neglecting care ethics could be a challenge to achieving an efficient outcome. Reflexivity could have led the AEMC to understand that there were alternate frames in which to understand the change, and responsiveness would have helped the AEMC evolve their process.

We acknowledged earlier, and note here again, that the process that was adopted by AEMC was done with good reason. For example, an industry focus group participant stated:

"Through the DEIP process, we were actually able to consider a lot of the things that couldn't be in the draft determination or final determinations in the way that I think everyone wanted."

- Industry focus group participant

It is critical to create a safe space for the industry to discuss large scale changes like this. But this process could coexist with processes that ensure consumers are considered and included. For example, the bulk of the discussion in our first-round focus groups did not specifically talk about energy system issues or proposed solutions (see our focus group materials in Appendix D). The values and insight it revealed however helped create designs that were more reflective of consumer needs. This reduces the risk of damaging discourse becoming public too early. This means that a process such as this could be used early before specific solutions are designed.

Being deliberate and specific about consultation steps, as social researchers have had to learn to do over time, may assist to ensure high quality consultation in the energy sector. As a final finding of this research we describe the energy system design processes we tested and developed into frames as shown in Figure 26.
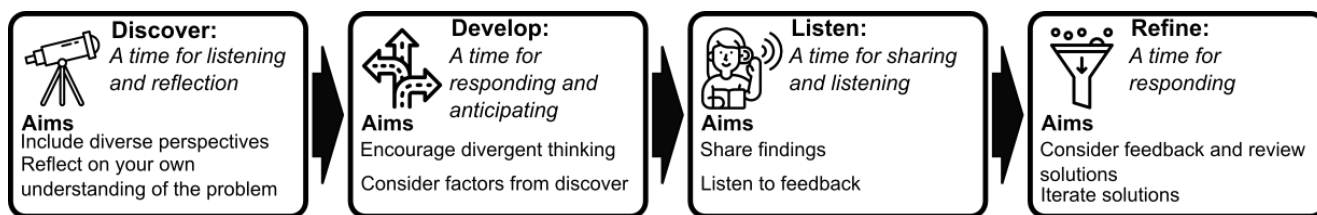
Figure 26 Energy system design process

These steps can be mapped back to the RRI framework described earlier:

- Discover helps build **inclusion** and helps designers be more **reflexive**
- Develop is where designers **anticipate** outcomes of reforms to increase the fidelity of planning
- Listen helps designers **include** more voices in their design, and enables designers to consider conceptual designs **reflexively**
- Refine is where designers **respond** to the findings from listening to consumers

When considering how to translate our findings here into practical possibilities, it is useful to consider these steps in the context of the rulemaking process of today. Our observations in chapter 3.1 were that many key design decisions were made in the initial "safe space" forum of the initial discussions and DEIP process. That three simultaneous rule change requests were made to the AEMC with broadly similar objectives indicates how useful and important these initial discussions and the DEIP process were. We therefore propose that a consumer engagement process is undertaken and fits within these early activities as is show in Figure 27. The DEIP process in this instance was an event that formalised initial discussions and could have included consumers (as we have proposed here).

Figure 27 Revised rule change process
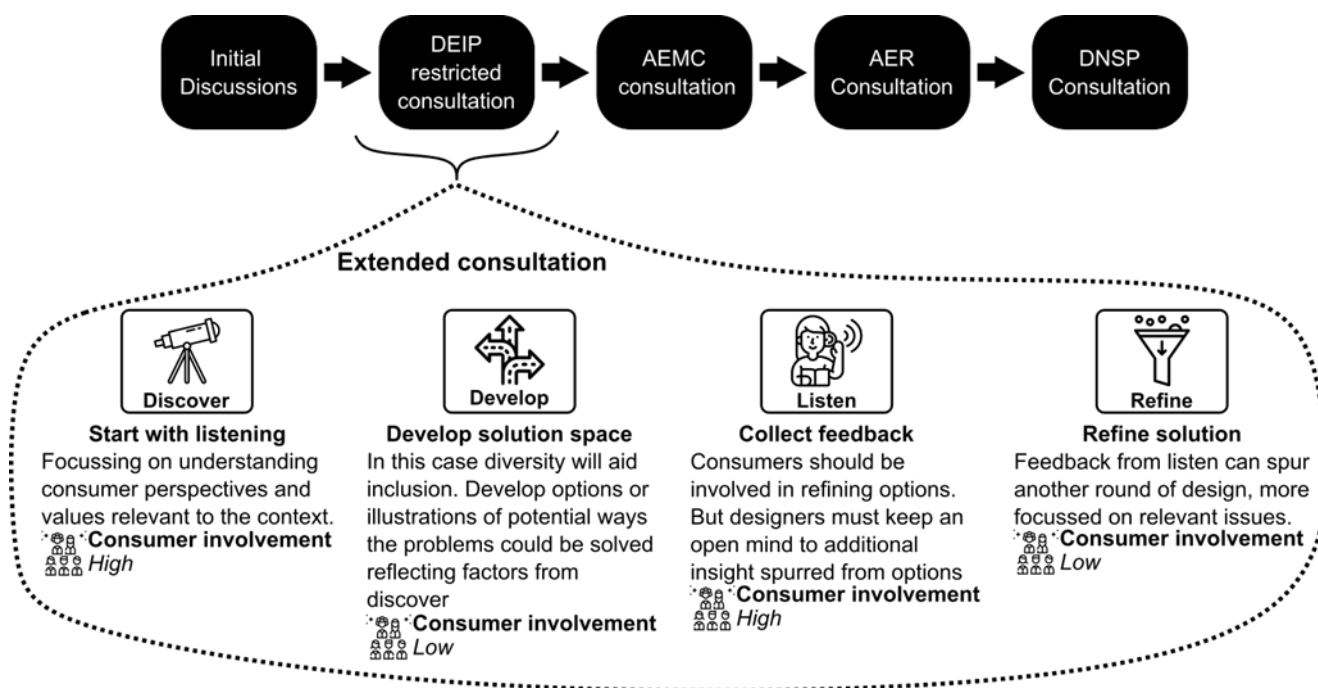
Our suggestions in Figure 27 does not mean that early design processes need to be significantly longer. The project we describe in this report took 11 months, including the steps required to define the process. This appears to be similar timespan to the DEIP process. These similar timings create opportunities for these processes to run in parallel.

The changes we propose are relatively small:

- Engage with consumers early in the design process. This early consultation aims to understand what is important to consumers relevant to the topic being considered. For example, the rule change we studied could have asked what the role of energy export from consumer's perspectives was.
- Relevant system and process designers could be trained on responsible design practices.
- The AEMC's efficiency remit is still valuable but could potentially be augmented with additional objectives as emerge through consumer consultation.
- Alteration of existing consultation processes so that they are more accessible for consumers, and so consumer input is more obviously registered. It would be beneficial for regulators to create separate, parallel consultations for consumers. These processes should specifically consider (social related) power imbalances between industry and consumers.

This project was spurred by considerations around distribution network capacity management. As an example, we can map the values that were raised by consumers back to capacity management. These can act as principles that can help energy system designers create models that align with values:

- **Environmental values:** Consumers value environmental action
- **Support for others in need:** Participants had a strong desire to support those less fortunate
- **Measured efficiency:** People support frugal solutions that make the most of what we have
- **Community:** Where communities exist and there is desire, they should be given a voice in defining and implementing the solution
- **Agency:** Agency is important but needs to be considered within the context of decision making. Particularly thought should be given to how consumers can navigate the web of service providers and stakeholders who might be critical to the successful implementation of the solution

These suggestions lead to a second recommendation:

Develop mechanisms to include consumers earlier in decision making	We found consumers supported the role of experts in energy system design, but wished reforms were more responsive to their context and needs. We propose that a more responsible energy system design process would include consumers (using tools like values) early in conceptual design and again as solutions were being selected and refined. Therefore we propose **design processes be reformed to include consumers early, using tools such as Value Sensitive Design**

7 Conclusion

This exploratory project aimed to understand how the industry could incorporate the point of view of customers as industry actors designed, solved for, and managed future energy needs. Our explorations in this project were guided by two questions:

"What are fair, just, and equitable decision making models around network capacity and allocation from the customer perspective?", and

"How does the future energy system build a model that manages network capacity in a way that aligns with customer values?"

These questions were broad and allowed us to discover pathways to identify customer expectations and values related to energy use, capacity and responding to capacity challenges, and what decision-making frameworks are appropriate for networks to apply as they manage the network. We responded to our exploratory research questions in multiple ways. In particular we:

- Identified processes that considered bringing lesser-heard or unheard voices forward in an effort to be more just, fair and equitable.
- Used values as a critical signal of what needed to be included in energy system designs and solutions.
- Explored ways to engage with industry, researchers and consumers to identify consumer centric style processes.

We responded to our overall aim by describing and recommending actions and processes for a future energy system to assist them to manage network capacity in a way that aligns with customer values.

Through these actions we have provided further insight into how the industry can incorporate the point of view of customers as industry actors design and solved for managed future energy needs.

We step through the key conclusions below.

Bringing consumer voices forward with an underlying intent to support responsible and inclusive solutions for the energy industry, we used Value Sensitive Design as a guiding tool, within a consumer-centric design process. We have described the related consumer engagement methods we used in this report so they can be used by others. First, we investigated values and decision contexts – both of consumers and of the energy industry. Then we designed five conceptual scenarios that described different ways these values could be brought to the fore. We took these designs back to consumers and they helped us generate two key requirements for a customer-centric future. These requirements relate to:

- What are appropriate consumer engagement models during energy system **decision making processes**, and
- How consumers would like **the energy system to respond to their needs.**

The response to these two points are further related below.

Decision making processes

Consumers desire a voice in decision making, but still envisage experts as leading this process. They wish these experts were more responsive to their values and asked them earlier in decision making processes.

Our industry values stream helped us build a picture of how decisions are made. Our focus was on a large rule change, which redefined the role of distribution networks to encompass export services. This was a major change as it also introduced the possibility that export services would attract a network charge. Industry experts anticipated the divisiveness of this change and "front loaded" in-depth discussions with a cohort of major industry and government organisations before the official rule-change process started. These enabled

the industry to present a more considered case for the rule chance. But also had the impact of excluding consumers from this process, where many critical decisions appear to have been made.

We understand that it can be challenging discussing early ideas with consumers because there is a risk that early ideas influence public narratives. Value sensitive design offers the opportunity for early engagement to focus on values instead of proposed solutions. This means that discussions can occur without needing to have designed a solution.

This attention to the whole solution process is a shift from our initial research question focus on capacity management. We engaged with a broader lens because when we talked to consumers, they suggested that they would prefer to influence decision making at a values-based level, and more broadly.

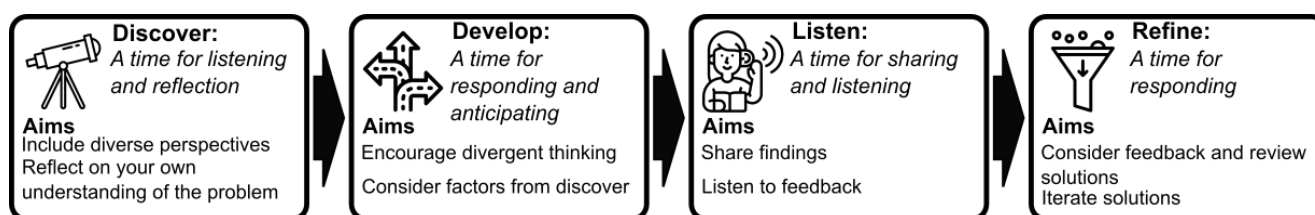Our proposed decision-making model is shown in Figure 28

Discover: *A time for listening and reflection*
Aims
Include diverse perspectives
Reflect on your own understanding of the problem

Develop: *A time for responding and anticipating*
Aims
Encourage divergent thinking
Consider factors from discover

Listen: *A time for sharing and listening*
Aims
Share findings
Listen to feedback

Refine: *A time for responding*
Aims
Consider feedback and review solutions
Iterate solutions

Figure 28 Proposed decision-making model

Relating the values that were raised by consumers back to capacity management we can derive principles that can help energy system designers create models that align with values:

- **Environmental values:** Consumers value environmental action
- **Support for others in need:** Participants had a strong desire to support those less fortunate
- **Measured efficiency:** People support frugal solutions that make the most of what we have
- **Community:** Where communities exist and there is desire, they should be given a voice in defining and implementing the solution
- **Agency:** Agency is important but needs to be considered within the context of decision making. Particularly thought should be given to how consumers can navigate the web of service providers and stakeholders who might be critical to the successful implementation of the solution

Responding to consumer needs

Participants in our focus groups spoke at length about the complexity of their decision making in the energy system of today. They felt that there was not enough impartial, value responsive support available to them. They liked that people were supported in scenarios 2, 3, and 4.

This lack of support could be framed as an inefficiency in the current energy system. Some basic quantification indicates the provision of support could create $2-10m of benefits in the ACT alone. Although this calculation was simplified, it indicates that further investigation may be warranted. Either way it is an indication that current support mechanisms are ineffective.

Dimensions as a way to engage with decision making models

We defined four dimensions (described in 4.3) that offer a way to explore how decisions are made. These dimensions describe consumer involvement, activity level, responsibility, and influence. The findings above come from a scenario with high consumer involvement, lower consumer activity levels, lower consumer responsibility, and higher consumer influence. These factors can be seen in the recommendations in chapter 5. Consumers described their need for more help navigating the energy system, leading to a lower position on the activity levels and responsibility dimensions. But consumers desired the energy system made decisions that better reflected their values and included their voice more. This led to a higher position on the

involvement and influence scales. These factors align with understanding of the types of consumer engagement and involvement needed from other projects.

Where consumers sit on these dimensions is context dependent. With a different context, the position may be different. Dimensions offer an opportunity to explore factors more explicitly and build a better understanding of the appropriate ways of including consumers in different types of decision making.

What's next?

Our project has shown that value sensitive design has merit. We have also described how consumers would like to be supported and involved in energy system decision making. Based on our experiences in this project our recommendations for next steps are shown in Table 9.

Table 9 Recommendations

Recommendation	Specific actions
Develop mechanisms to include consumers earlier in decision making	We found consumers supported the role of experts in energy system design, but wished reforms were more responsive to their context and needs. We propose that a more responsible energy system design process would include consumers (using tools like values) early in conceptual design and again as solutions were being selected and refined. Therefore we propose **design processes be reformed to include consumers early, using tools such as Value Sensitive Design**
Implement mechanisms to care for consumers	Consumers felt unsupported in energy system reform. We feel this leads to significant inefficiency and that expenditure on brokers can be justified to mitigate these inefficiencies. Participants gave us many ideas of what an honest broker could look like and they could range from software processes to people supporting complex decisions as communicated in our report. **As a first step, we recommend that the industry build a method to value and integrate this support in energy system planning and reform.** In the short term this could take the form of a project or trial, that aims to build a methodology and economic case.
Dimensions as communication and design tools	The dimensions we have described in this report are useful tools for understanding and defining how consumers are involved in energy decision making. Designers should consider their use to illustrate and define solutions.

8 Bibliography

[1]   R. Egan, E. Kallmier, O. Ashby, L. Koschier, and R. Passey, 'National survey report of PV power applications in Australia', International Energy Agency, 2019. Accessed: Aug. 03, 2021. [Online]. Available: https://iea-pvps.org/wp-content/uploads/2020/09/NSR_Australia-2019.pdf

[2]   L. Nicholls, P. Arcari, A. Glover, R. Martin, and Y. Strengers, 'Engaging households towards the future grid: experiences, expectations and emerging trends', RMIT University, Melbourne, 2019. [Online]. Available: www.energyconsumersaustralia.com.au

[3]   Victorian energy and Water Ombudsman, 'Report Summary Victorian Energy and Water Ombudsman's Investigation of Consumer Experiences (VOICES)'. Accessed: Apr. 12, 2023. [Online]. Available: https://www.ewov.com.au/uploads/main/Reports/Other-reports/EWOV-voices-summary.pdf

[4]   Australian Energy Market Operator, 'Negative electricity demand in South Australia', *Negative electricity demand in South Australia*, Nov. 23, 2021. https://aemo.com.au/newsroom/news-updates/negative-electricity-demand-in-south-australia (accessed May 17, 2023).

[5]   The Australian National University and ZepBen, 'Evolve Project Knowledge Sharing Report Milestone 5 DER Impacts on Operational Technology', Mar. 2021. Accessed: Nov. 04, 2022. [Online]. Available: https://arena.gov.au/assets/2021/04/evolve-project-der-Impacts-on-operational-technology.pdf

[6]   N. Mouter, A. de Geest, and N. Doorn, 'A values-based approach to energy controversies: Value-sensitive design applied to the Groningen gas controversy in the Netherlands', *Energy Policy*, vol. 122, pp. 639–648, Nov. 2018, doi: 10.1016/j.enpol.2018.08.020.

[7]   C. Cuijpers and B.-J. Koops, 'Smart Metering and Privacy in Europe: Lessons from the Dutch Case', in *European Data Protection: Coming of Age*, S. Gutwirth, R. Leenes, P. De Hert, and Y. Poullet, Eds., Dordrecht: Springer Netherlands, 2013, pp. 269–293. doi: 10.1007/978-94-007-5170-5_12.

[8]   K. E. H. Jenkins, S. Spruit, C. Milchram, J. Höffken, and B. Taebi, 'Synthesizing value sensitive design, responsible research and innovation, and energy justice: A conceptual review', *Energy Res. Soc. Sci.*, vol. 69, p. 101727, Nov. 2020, doi: 10.1016/j.erss.2020.101727.

[9]   Marnie Shaw, Bjorn Sturmberg, Chathurika Mediwaththe, Lachlan Blackhall, and Hedda Ransan-Cooper, 'Implementing Community-scale Batteries', Australian Renewable Energy Agency, Final Report, Dec. 2020. [Online]. Available: https://arena.gov.au/knowledge-bank/implementing-community-scale-batteries/

[10] H. Temby and H. Ransan-Cooper, '"We want it to work": understanding household experiences with new energy technologies in Australia', Final report of the VOICES project (Victorian Energy and Water Ombudsman's Investigation of Consumer Experiences), 2021. Accessed: Mar. 07, 2022. [Online]. Available: https://www.ewov.com.au/reports/voices

[11] K. Bell, 'power definition | Open Education Sociology Dictionary', Apr. 2013, Accessed: Mar. 17, 2023. [Online]. Available: https://sociologydictionary.org/power/

[12] The free dictionary, 'social compact', *TheFreeDictionary.com*. https://www.thefreedictionary.com/social+compact (accessed Mar. 17, 2023).

[13] Cambridge Dictionary, 'values', May 24, 2023. https://dictionary.cambridge.org/dictionary/english/values (accessed May 28, 2023).

[14] B. Friedman, 'Value-sensitive design', *Interactions*, vol. 3, no. 6, pp. 16–23, Dec. 1996, doi: 10.1145/242485.242493.

[15] I. van de Poel, 'Translating Values into Design Requirements', in *Philosophy and Engineering: Reflections on Practice, Principles and Process*, D. P. Michelfelder, N. McCarthy, and D. E. Goldberg, Eds., in Philosophy of Engineering and Technology. Dordrecht: Springer Netherlands, 2013, pp. 253–266. doi: 10.1007/978-94-007-7762-0_20.

[16] A. Miles, 'The (Re)genesis of Values: Examining the Importance of Values for Action', *Am. Sociol. Rev.*, vol. 80, no. 4, pp. 680–704, Aug. 2015, doi: 10.1177/0003122415591800.

[17] K. Dahlgren, Y. Strengers, S. Pink, L. Nicholls, and J. Sadowski, 'Digital energy futures: review of industry trends, visions and scenarios for the home', Monash University, 2020.

[18] A. Tversky and I. Simonson, 'Context-Dependent Preferences', *Manag. Sci.*, vol. 39, no. 10, pp. 1179–1189, 1993.

[19] AEMC, 'consultation paper - der integration - updating regulatory arrangements 1, Consultation Paper, stage Initiation'. 2020.

[20] S. Chandrashekeran, 'From responsibilization to responsiveness through metrics: Smart meter deployment in Australia', *Geoforum*, vol. 116, pp. 110–118, Nov. 2020, doi: 10.1016/j.geoforum.2020.07.014.

[21] H. Lovell, 'The promise of smart grids', *Local Environ.*, vol. 24, pp. 580–594, Jun. 2019, doi: 10.1080/13549839.2017.1422117.

[22] WATTever, 'WATTever, Submission, stage Draft'. 2021.

[23] AEMC, 'Draft Determination - ERC0311 and RRC0039 - Acces, Submission, stage Draft'. 2021.

[24] evelyn jansen, 'evelyn jansen private submission 1, Submission, stage Draft'. 2021.

[25] enova, 'enova, Submission, stage Draft'. 2021.

[26] EnergyAustralia, 'Access, pricing and incentive arrangements for distributed energy resources'. 2020.

[27] E. D. Bono, *Six Thinking Hats*, 2nd ed. Penguin random House UK, 2000.

[28] B. Fisher and J. C. Tronto, 'Towards a feminist theory of caring', in *Circles of care : work and identity in women's lives*, E. K. Abel and M. K. Nelson, Eds., Albany, N.Y. : State University of New York Press, 1990. Accessed: Oct. 21, 2021. [Online]. Available: http://archive.org/details/circlesofcarewor0000unse

[29] Australian Energy Market Commission, 'Power of choice review Final report and recommendations information sheet', Australian Energy Market Commission, Information sheet, Nov. 2012. Accessed: May 11, 2023. [Online]. Available: https://www.aemc.gov.au/sites/default/files/content/54d4b4bd-33ab-46e7-9367-aa4288399181/Final-report-Information-sheet.pdf

[30] P. Watson, H. Lovell, H. Ransan-cooper, A. Harwood, and V. Hann, 'Project Final Report Social Science - CONSORT Bruny Island Battery Trial', Apr. 2019. [Online]. Available: http://brunybatterytrial.org/wp-content/uploads/2019/05/consort_social_science.pdf

[31] K. Lucas-Healey, H. Ransan-Cooper, H. Temby, and A. W. Russell, 'Who cares? How care practices uphold the decentralised energy order', *Build. Cities*, vol. 3, no. 1, Art. no. 1, Jul. 2022, doi: 10.5334/bc.219.

[32] enova, 'Access, pricing and incentive arrangements for distributed energy resources Submission: enova'. 2021.

[33] J. Stilgoe, R. Owen, and P. Macnaghten, 'Developing a framework for responsible innovation', *Res. Policy*, vol. 42, no. 9, pp. 1568–1580, Nov. 2013, doi: 10.1016/j.respol.2013.05.008.

[34] C. A. Miller, A. Iles, and C. F. Jones, 'The Social Dimensions of Energy Transitions', *Sci. Cult.*, vol. 22, no. 2, pp. 135–148, Jun. 2013, doi: 10.1080/09505431.2013.786989.

[35] D. McCauley, R. J. Heffron, H. Stephan, and K. Jenkins, 'Advancing energy justice: the triumvirate of tenets and systems thinking', *Int Energy Law Rev*, vol. 32, no. 3, pp. 107–110, 2013.

[36] R. Kark and A. Carmeli, 'Alive and creating: the mediating role of vitality and aliveness in the relationship between psychological safety and creative work involvement', *J. Organ. Behav.*, vol. 30, no. 6, pp. 785–804, 2009, doi: 10.1002/job.571.

[37] D. R. Castro, F. Anseel, A. N. Kluger, K. J. Lloyd, and Y. Turjeman-Levi, 'Mere listening effect on creativity and the mediating role of psychological safety', *Psychol. Aesthet. Creat. Arts*, vol. 12, pp. 489–502, 2018, doi: 10.1037/aca0000177.

[38] A. Bryman, *Social research methods*, 4th ed. Oxford ; New York: Oxford University Press, 2012.

[39] K. Jenkins, D. McCauley, R. Heffron, H. Stephan, and R. Rehner, 'Energy justice: A conceptual review', *Energy Res. Soc. Sci.*, vol. 11, pp. 174–182, Jan. 2016, doi: 10.1016/j.erss.2015.10.004.

[40] K. Bell, 'system definition | Open Education Sociology Dictionary', Jan. 2017, Accessed: Mar. 21, 2023. [Online]. Available: https://sociologydictionary.org/system/

[41] S. Darby, 'THE EFFECTIVENESS OF FEEDBACK ON ENERGY CONSUMPTION', Environmental Change Institute, Apr. 2006.

[42] The Australian Energy Regulator, 'National Electricity Rules Version 166', The Australian Energy Regulator, National Electricity Rules, Mar. 2021. Accessed: Jun. 03, 2021. [Online]. Available: https://www.aemc.gov.au/sites/default/files/2021-06/NER%20v166%20full.pdf

[43] Evoenergy, 'Schedule of electricity network charges 2022/23', evoenergy, Jul. 2022.

[44] M. Shaw, B. Sturmberg, L. Guo, X. Gao, E. Ratnam, and L. Blackhall, 'The NextGen Energy Storage trial in the ACT, Australia', in *Proceedings of the Tenth ACM International Conference on Future Energy Systems*, in e-Energy '19. New York, NY, USA: Association for Computing Machinery, Jun. 2019, pp. 439–442. doi: 10.1145/3307772.3331017.

[45] Evoenergy, 'Evoenergy (ActewAGL) Network information - RIN responses', *Australian Energy Regulator*, Mar. 10, 2015. https://www.aer.gov.au/networks-pipelines/performance-reporting/evoenergy-actewagl-network-information-rin-responses (accessed May 15, 2023).

[46] Australian Energy Regulator, 'AER - Final decision - Evoenergy distribution determination 2019-24 - Overview - April 2019_0.pdf', Apr. 2019. Accessed: May 15, 2023. [Online]. Available: https://www.aer.gov.au/system/files/AER%20-%20Final%20decision%20-%20Evoenergy%20distribution%20determination%202019-24%20-%20Overview%20-%20April%202019_0.pdf

Appendix A   Background literature

This appendix describes the frameworks that were applied in this project to integrate values and to guide research method choices.

The energy system is built on values, encoded into the National energy Objectives (NEO) of the AEMC and otherwise constructed in energy system discourse. Our conjecture is that these values have lost touch with those held by customers. This is particularly important given the changes that are proposed in the energy system in the coming years.

Values are relatively well researched with projects and explorations having occurred on values across an array of fields. There is therefore broad guidance available that can assist us to examine values in this instance. The approach used in this project is inspired by the framework presented by Jenkins et. al. in their paper "Synthesizing value sensitive design, responsible research and innovation, and energy justice A conceptual review" [8]. This paper describes and interrelates three approaches to understanding and managing social and ethical issues in energy: Responsible Research and Innovation (RRI), Value Sensitive Design (VSD), and Energy Justice (EJ).

Responsible Research and Innovation (RRI) tells us that it is important to take care of the future through collective stewardship in the present. Stilgoe et. al. described RRI through four dimensions [33]:

- **Anticipation** which asks us to anticipate the outcomes of innovation. It encourages us to ask "what if" questions and consider contingency, what is known, what is likely, what is plausible, and what is possible.
- **Reflexivity** which encourages us to "hold a mirror" up to ourselves. It asks us to analyse our own commitments, assumptions, and activities. It asks us to understand our own roles, assumptions, and activities and the limits of our own knowledge.
- **Inclusion** which tells us that we need to include space for participation in innovation process. It especially asks us to understand how power is distributed and shared within processes such as undertaken by this project.
- **Responsiveness** requires us to we need to change direction when things indicate our direction is wrong. Fundamentally this underpins the other dimensions: what is the point of anticipation, reflexivity, or inclusion if you don't act on what they tell you.

In this project, RRI serves two purposes:

- Impetus: This project is an anticipatory look at how distribution network capacity can be managed.
- Process: To advance the energy system discourse, the project must be responsible which includes taking into account all the dimensions of RRI.

Value sensitive design (VSD) is a tool established to help us understand how values can be used to influence technology design, development, and application. It was first defined by Batya Friedman in the software development domain [14].

This project uses a framework proposed by Ibo van de Poel in their paper "Translating Values into Design Requirements" [15]. Ibo proposed a methodology that translates the general values to specific requirements using a values hierarchy, as shown in Figure 29.
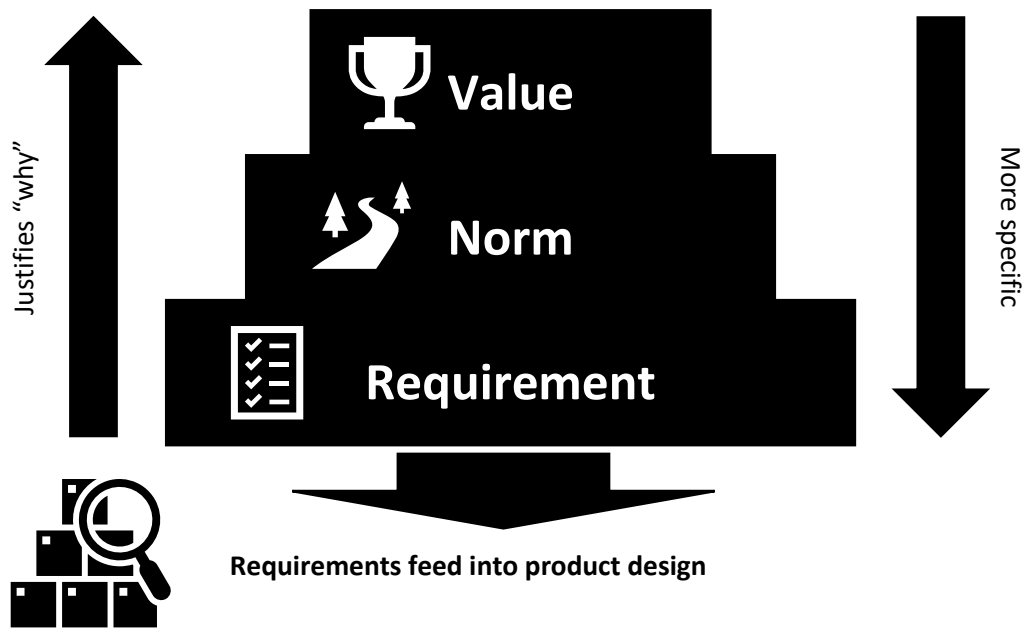
Figure 29 Values Hierarchy

There are three levels to a values hierarchy:

- **Values** are the top level. These are what people consider important in life.
- **Norms** are prescriptions for, and restrictions on actions
- **Requirements** are specific requirements

Each level in the hierarchy is more specific than the one above. Values are difficult to apply to a specific design by themselves. For example, efficiency was important within the regulatory process we considered in this project, however of itself it is not specific enough: *what sort of efficiency?* The addition of norms such as "economically efficient network investment" and "efficient price signals and rewards" enables analysis of who and what. Networks apply economically efficient investment. Consumers are rewarded using efficient price signals and rewards. These can be further broken into specific requirements: How are the rewards built? How do we know if an investment is efficient?

Energy fairness, justice and energy equity are active discussions in the Australian energy landscape because there is recognition that a significant proportion of people living in Australia are disadvantaged in relation to energy provision and use. While we cannot hope to talk to everyone who may be impacted by the energy system change that we are studying in this project, there are ways to consider energy equality and fairness as we proceed. The Energy Justice (EJ) framework provides us guidance in relation to this as is seeks to address "equitable access to energy, the fair distribution of costs and benefits, and the right to participate in choosing whether and how energy systems will change" [34]. The EJ framework uses three tenets to describe a just energy system [35]:

- **Distributional Justice** represents a call for to distribute the benefits and ills on all members of society
- **Procedural justice** is a call for equitable procedures that engage all stakeholders in a non-discriminatory way
- **Recognition Justice** states people must be fairly represented and must have complete and equal political rights.

These principles are core values that will be used as metaphorical guard rails during this research to ensure our suggested solutions consider energy users basic needs and how decisions and systems can be fairer and more equitable.

Responsible Research and Innovation, Value Sensitive Design, and Energy Justice frameworks all have a role to play in this project. RRI gives us impetus and sets direction. VSD gives us process and transparency. EJ gives us guard rails and principles which our findings must respect. Chapter 0 of the report describes how the project will be delivered.

Appendix B   Process learnings

The process that we developed during this project was a mix of established processes and new ones. This chapter describes what happened and what we learned doing the project. This chapter serves two purposes:

- It opens up our process to enable others to replicate it, and
- It helps create a reflexive and inclusive dialogue around how processes such as ours should be done.

This appendix can be considered as our project team's account of process and is included in this appendix with the intent of opening up our process to improvement and refinement.

This project applied a "value sensitive design" approach. We used a specific framing of a value sensitive design called a "values hierarchy". We used this method because it was methodical and visual, which we felt would resonate better with the primarily technical audience in the energy sector. In creating our values hierarchy we used several methods including document analysis, focus groups, and creative thinking.

We can't understate how important psychological safety and trust is in undertaking creative processes such as these for all parties involved. The link between these factors and creativity is well-documented [36], [37]. From a process perspective this enabled the project to take an iterative, creative approach, which led to better outcomes overall.

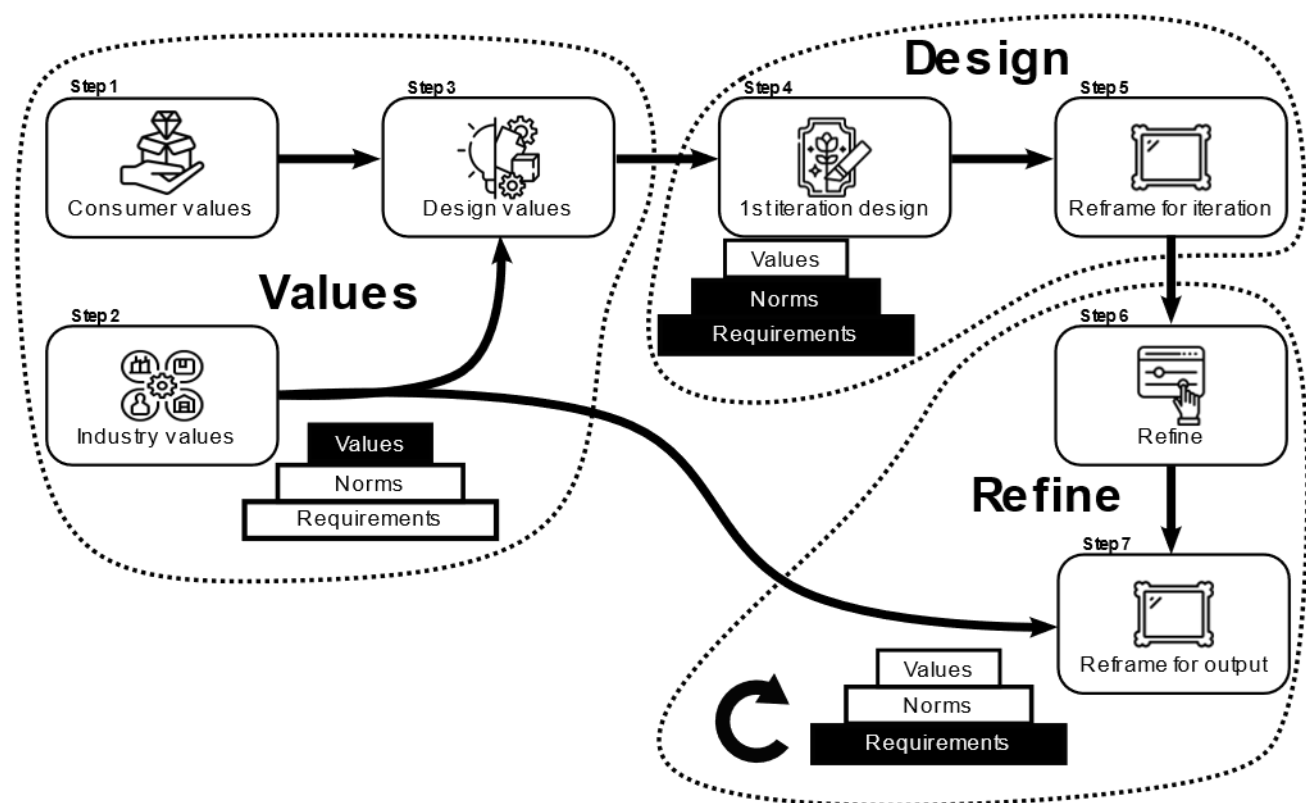We will describe these findings in line with our overall process, repeated in Figure 30.

Figure 30 Project process and steps

B.1 Values

The first phase of our project was to understand values. Values are obviously important in value sensitive design, and the link between values and desire/expectations is well established outside of VSD literature [16]. So this phase was critical to the rest of the project.

We undertook three steps as part of this phase. The first two explored consumer and industry values respectively. The last summarised these values to five for the purposes of design in the next step.

B.1.1 Consumer values

A picture of consumer values was built using focus groups. We did five focus groups. Two with early adopters of technology. Two with people who had barriers that made access to technology difficult. And one with a community group. We chose focus groups because they enable participants to create meaning collaboratively [38]. In these focus groups we started asking generally about values, then more specifically asked participants for advice on how to manage demand capacity issues being experienced in the energy system in the near future.

Participants engaged well in these focus groups agreeing and disagreeing providing us with useful critique of the groups' discussion and our ideas and processes. They spoke of many factors around energy from cost-reflective tariffs to cooking fires. In the second stage of the focus group where we presented the current questions facing the energy system, participants often spoke of factors the energy system should use to make decisions rather than specific solutions that should be adopted. They expressed a desire to be consulted. But not to do the design themselves. So they had a value to be consulted and have influence via inclusion of their values, but they valued capable and knowledgeable designers and/or 'experts' in the system. This correlates with the overall project findings where the solution generation process participants felt was better left to experts.

B.1.2 Industry values

This project was unique in that we had a specific step to understand industry values. We used two tools to do this: document analysis and a focus group.

The application of document analysis to an Australian energy rule change process was unique, we had not observed this sort of process being undertaken publicly previously. Although submissions to the rule process were made with a specific purpose (to influence the outcome of the rule change) there was still significant depth of issues and considerations discussed within them. The considerations aligned relatively well to those that were raised in focus groups. The findings from the document analysis were important in helping frame our outcomes. It enabled us to identify and compare the current processes with what we recommend. We analysed 33 documents from a cross-section of stakeholders, as shown in Table 10.

Table 10 Submissions analysed

Submitter type	Number analysed
Charity	1
Consultant	2
Education	1
Government	1
Individual	5
Industry	2
Media	1
Network	4
Regulator	5

Submitter type	Number analysed
Representative group	7
Retailer	3
Think Tank	1
Grand Total	**33**

One of the more important insights that emerged in our industry values process was how the rule change had emerged and continues to be discussed. The AEMC rule change process that we reviewed documents for was not the beginning of the process, it was toward the end of the overall process. In the industry focus group (02/2023) participants added fidelity to these initial steps. They also described why this was so. They felt it as important for the industry to understand the problem and proposed solutions before they started public processes. As one of our key findings relate to process, it was important for us to understand how rules are made today. Also, beyond the mechanistic process, why they are made that way.

Industry focus group (02/2023) participants spoke about the mental impact that the divisive rule change process had on them. These themes we recognised were important. We hope that what we have proposed from this project are mechanisms that enable consumers to be consulted earlier while reducing the divisiveness of rule changes such as these.

Document analysis we feel could be a useful tool for rule makers to engage more deeply with submissions. It could enable more nuanced thematic analysis, particularly submissions that area not directly related to the questions that are being asked.

B.1.3 Design values

There were many consumer and industry values derived in the two values discovery steps. It was impossible for us to design to all of them, so we had to select a subset. We decided to foreground consumer values in our design and ones they most emphasised in discussions. We did this because the purpose of the project was to understand consumer values, plus the energy system was already built to energy system values. We selected the top 5 consumer values using the frequency and emphasis with which and emphasis with which they were mentioned.

Consumer and industry values were related. For example, the industry's conception of efficiency in some ways related to consumer's desires to be frugal. We added these dimensions where they were apparent as they added dimension and synergy to values.

B.2 Design

The initial design of scenarios was undertaken with our larger research team, because of their deep exposure to energy system transitions. The purpose of value sensitive design was to explicitly show how values could influence design. This phase was about implementing the mechanics of this design. This project aimed to design potential energy futures, so this step was important. This step was very iterative for the project team. We prototyped workshops and findings several times during their design before we settled on the outcome.

B.2.1 1st iteration design

This step generated the designs we took into second round focus groups. This design was done in a workshop with staff and students from the ANU Battery Storage and Grid Integration Program.

There were three critical decisions in this step:

- What were we designing?
- What values were we designing against?
- What were the mechanics of the design process?

The first decision relates to the outcomes of the design process. This was discursive and focussed on how and why people in the scenario might be making decisions. We felt it important to step back from technology in the outcomes because we observed that many industry design processes were focussed on technology. We based our designs on our feeling that an issue with many industry design processes was consumer's lack of power in them. This relates to procedural justice, which *"concerns access to decision-making processes that govern the distributions outlined [in distributional justice]"* [39]. We also considered social compact. A social compact is *"The interconnected relationship between individuals, groups, and institutions with shared behaviours, norms, and values that combine to form society"* [40]. We included this because it directly related to action (norms) and why these norms were occurring.

There were multiple values that could be applied and considered. But it was too challenging to expect designers to design with all of them in a workshop. We selected 5 values: Self-care, Environment, financial considerations, collective care, and self-determination. Two values were used to design each scenario: a "main" value and a "spice" value. This was a pragmatic solution. In our tests, we found designers struggled to design with one value, so we added a second value to enable designers more flexibility. The role of the two values is below:

- The main value acts as the "guiding light" of the scenario. It is the primary value on which the future is built
- The spice value adds dimension, fills blanks, and adds a secondary lens to the main value.

In practice, the main value defines what is important, the spice defines how this value becomes apparent. For example, consider Scenarios 1 and 5. Both have self-determination as a value (spice and main respectively). But they were completely different when designed because of the other design value. We selected the two values in each scenario randomly, ensuring each value was main once and spice once. The values underlying each scenario are shown in Table 11.

Table 11 Scenarios and values

Scenario	Main value	Spice value
Scenario 1 (A new democracy)	Collective Care	Self determination
Scenario 2 (Community solutions)	Environment	Collective care
Scenario 3 (Caring for a clean grid)	Self-care	Environment
Scenario 4 (Enhancing efficiency)	Financial management	Self-care
Scenario 5 (Power of choice)	Self determination	Financial management

The design process we used was based on "six thinking hats" [27]. Six thinking hats is a common creating thinking process we have been exposed to in our work. It guides participants through a series of rapid creative thinking exercises. We used a 'Miro' board online that is like a virtual and expansive white board.

Some workshop participants found the sessions challenging as they were designing for values that they did not hold. For those participants, steps 4 and 7 were useful ways to express the elements that were uncomfortable and propose ways they could be remedied. Overall though we and participants found the discomfort a valuable part of the creative process. It allowed participants to explore what really was important.

Outputs from the workshop were a series of elements related to each scenario. They required further analysis and framing for use in focus groups. In the short time we had in the workshop we couldn't expect to generate a refined scenario. We instead created a series of moments and themes, which we subsequently constructed into a scenario. An example of the output from one of the activities in one of the scenarios is shown in Figure 31 for illustration of the outputs.
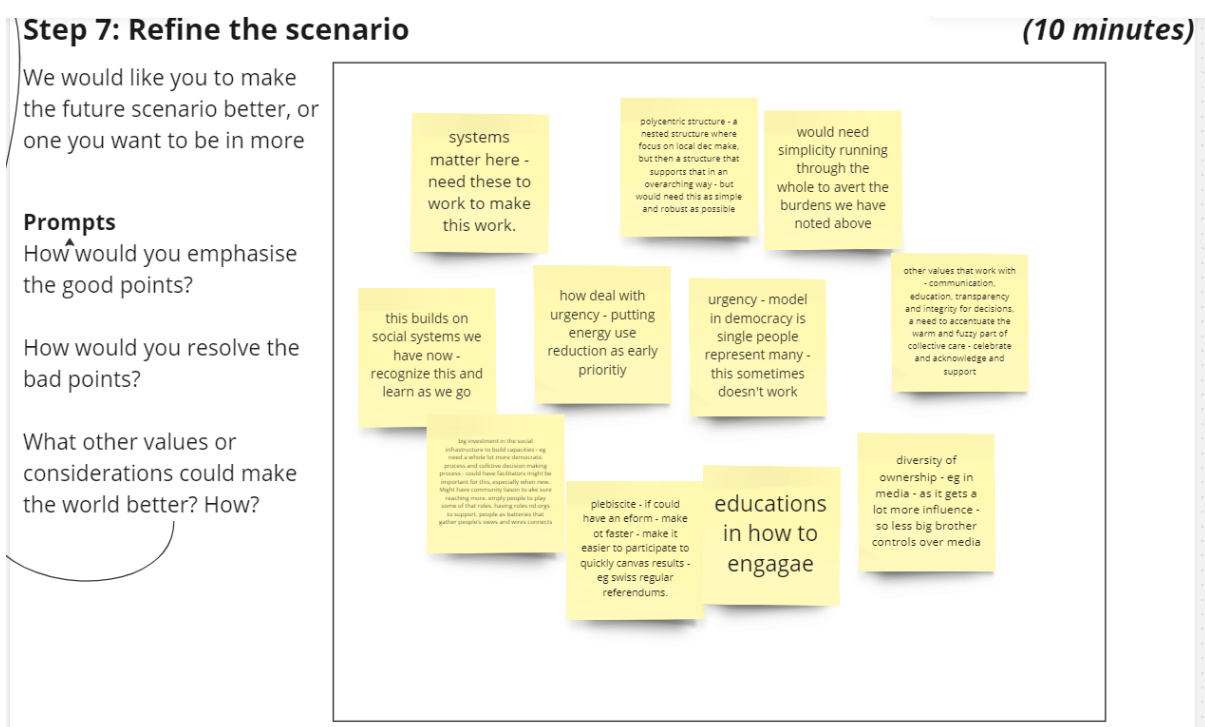
Step 7: Refine the scenario (10 minutes)

We would like you to make the future scenario better, or one you want to be in more

Prompts
How would you emphasise the good points?

How would you resolve the bad points?

What other values or considerations could make the world better? How?

[Sticky notes:]

- systems matter here - need these to work to make this work.
- polycentric structure - a nested structure where focus on local dec make, but then a structure that supports that in an overarching way - but would need this as simple and robust as possible
- would need simplicity running through the whole to avert the burdens we have noted above
- this builds on social systems we have now - recognize this and learn as we go
- how deal with urgency - putting energy use reduction as early prioritiy
- urgency - model in democracy is single people represent many - this sometimes doesn't work
- other values that work with - communication, education, transparency and integrity for decisions, a need to accentuate the warm and fuzzy part of collective care - celebrate and acknowledge and support
- big investment in the social infrastructure to build capacities - eg need a whole lot more democratic process and collctive decision making process - could have facilitators might be important for this, especially when new. Might have community liason to also sure reaching more, simply people to play some of that roles, having roles ivl orgs to support, people as batteries that gather people's views and wews connects
- plebiscite - if could have an eform - make ot faster - make it easier to participate to quickly canvas results - eg swiss regular referendums.
- educations in how to engagae
- diversity of ownership - eg in media - as it gets a lot more influence - so less big brother controls over media

Figure 31 Outputs from a scenario building activity (Scenario 1)

B.2.2   Reframe for iteration

This step was where we analysed the findings of the workshops so that we could use them to design whole scenarios. The workshops produced several "elements" or factors that required further analysis and reframing for presentation in the "refine" stage.

This was an exploratory, iterative process. We experimented with several ways of understanding and presenting our findings. Our aim was to communicate the scenarios with enough fidelity for them to be constructively discussed in consumer focus groups in the next step of our process.

In the end we used "vignettes" as a narrative tool to describe the scenarios. Vignettes had three elements:

- A very short description of the scenario
- A comic that describes an example of decision making
- An "Influence map" that describes how decisions are made

Comics were drawn for the vignettes and related a consistent story: the experiences of Jane with the resolution of a network constraint in her area. It aimed to show how she came to understand there was a constraint, and her experience in its resolution.

The influence map described how much consumers, the community, and the energy industry could influence the outcomes of discussions at both a "planning" and "day-to-day" domains. This aims to illustrate how people are (or aren't) involved in these processes simply and visually.

The vignette posters are shown in 4.1. There were a few key decisions that we made in framing these:

- We foregrounded the contextualised narrative, rather than alternative frameworks for understanding an energy system (for example models or statistics)
- We presented positive stories that focussed on one consumer in the operational timeframes.
- We mentioned the influence maps but did not emphasise them as much as the comics.

Our choice to utilise narrative for instigating feedback and discussion on energy system design was driven by our commitment to engaging diverse individuals in meaningful discussion about an often opaque energy system. Whilst participants did not engage with each vignette in the way we had planned, the thoughtful and nuanced discussions on multiple components of the vignettes demonstrated vignettes coupled with visuals do have value as an inclusive engagement tool.

These decisions also foregrounded one story, which we felt was pragmatic due to the limited time we had for participants to engage with them. But it also meant that some themes (such as how strategic decisions are made, and other consumer experiences in other locations) were less discussed than they could have been.

Reflecting on our process, there were ways that these visualisations could have been presented that may have elicited different discussion in focus groups. For example:

- Relating vignettes to each other may have enabled more discussion on differences and similarities between vignettes,
- Reframing Jane's story to focus on an industry expert's decision making instead may have extracted different themes and considerations,
- Relating Jane in other environments, such as rural and regional spaces, and
- Describing vignettes as elements rather than stories may have enabled participants to discuss the parts of the vignettes in more detail.

Not all of these could have been done at once as it would have been overwhelming for participants. Selecting the appropriate tool for the job depends on the questions being asked and the people being included in the discussion. Focus group participants were able to engage with the vignettes as they are, but some expressed that they found it challenging. Our main finding from this was that the appropriate presentation tool needs to be selected deliberately to achieve the desired outcomes with a particular audience in mind.

B.3 Refining scenarios

Key in our process was letting consumers help us refine and distil scenarios to learnings. In this step we presented the scenarios as vignettes to consumers, collected feedback, then analysed and presented them (in this report). There were two steps: first was a series of five focus groups, second we analysed the transcripts to extract the findings from the project overall.

B.3.1 Refine

We refined through a series of focus groups with consumers. Most participants were the same as those we spoke to in the values phase of the project, although there were two new participants. Similarly, some first round participants did not come to the second-round session. There were two aims to this focus group:

- Understand perspectives on the vignettes
- Gather perspectives on the process we had followed

Our agenda and methodology evolved throughout these focus groups because we found each group engaged with the content differently. Some participants struggled to understand the content of the vignettes in the short timeframe of the focus group. Others felt they were easy to engage with. We responded to this by shifting discussion to process when we found that participants had insights to share, and reframing discussion where appropriate.

There were several themes that relate to process and presentation relevant to future similar projects:

- Participants were often hungry for more diverse stories than the one we presented,
- Participants sometimes felt they did not have enough time to engage with the vignettes to provide useful feedback,

- Participants sometimes felt they were a "special case" and others would have different decision-making perspectives, and
- Participants sometimes felt the lack of technology focus made vignettes harder to deal with.

We deliberately presented a single, consistent story. Our hope was to help ground the vignettes and help participants draw out differences. Sometimes though this meant participants were hungry for more perspectives. For example:

- Stories set in different areas (e.g. rural),
- Stories without a happy outcome, and
- Stories from the perspective of a grid designer.

Obviously, there wasn't space in vignettes for all these things, particularly given that participants already sometimes felt the vignettes were overwhelming to synthesis in such a short space of time. Potentially future uses of this process could consider developing some of these stories and keeping them in reserve in case participants find them useful.

We found that every focus group engaged with vignettes differently. This tells us that we had not fully explored participant reactions to the style of presentation we used. Some participants found vignettes overwhelming, particularly within a short focus group:

"I'm a bit lost, I'm afraid. I'm not coping with your presentation technology but if I had this to look at for a few days I'd be up with you and able to talk about it but it's been presented to me, I've been looking at it while you were talking at me and I'm afraid I really haven't got a grip of what should be next. I apologise but obviously other people are coping better than I am"

- Community group participant

But others found them easy to engage with:

"Yeah, really good ways of making a discussion clear like getting scenarios is quite good. It's a good idea"

- Early Adopters group participant

In response to early findings, in later focus groups we allowed more time for participants to read and understand the vignettes, which helped significantly. Overall, there may be benefit in considering how scenarios could be presented to consumers more deeply. We have discussed some of these themes in B.2.2.

Several participants, particularly those in our early adopter and community groups, felt that their decision-making processes were different to most:

"I think there's a lot more credit given to individuals here that might not generally be valid across the community as a whole, for example, in the very first sketch in the very first vignette, I can put my heater on without any guilt. I think the second part of that is often not even there. We overestimate a lot of people that they might have a guilt or the second one so helping my neighbour 'cause his energy bill is high. It's probably not thought through to that depth in many cases. I'm hot, I put the air-conditioner on. But that's the end of that rather than I don't feel guilt now or because I've put in insulation or because this or something. No, I'm hot, I put the air-conditioner on."

- Early Adopters group participant

This response aligns with previous explorations for us as researchers – there certainly are a myriad of ways that people engage in energy use. This diversity is now well examined in Australian energy research and the point that there are early adopters, engaged communities and disengaged energy users in the spectrum is well supported. In future engagement, this diversity of relationship could also be considered.

As described in B.2.1, our vignettes did not focus on technology, although it did feature in some of them (notably Vignette 3). Some participants had an affinity for technocentric visions such as those proposed by Saul Griffith (and his well-known ''electrify everything approach) and expected vignettes would align more closely with those presented in his work. Similarly, some people were attracted to simple, technology driven solutions such as the "Energy Wizard" app in Vignette 3. But similarly, they weren't attracted to the technology-based solutions in Vignette 5.

Overall, the refine stage focus groups were valuable and constructive. They helped us determine what aspects of the vignettes were broadly supported and which ones weren't. Future uses of the process we describe in this project may benefit from more consideration of

B.3.2   Reframe for output

The focus groups produced a lot of themes and insights. For the project to have impact we needed to distil the findings into terms that make sense to the energy system. Our process to do this had two main elements:

- Coding and analysis of the interview transcripts, and
- Relating themes back to the energy industry values analysis.

There were many themes people discussed. Many more than we have had space to discuss in this report, or time to analyse in detail. The industry analysis had an important role to help ground our findings and direct our analysis. We wanted to be able to propose practical, real changes to this process to enable the industry to better understand and (hopefully) implement our findings.

Much like B.2.2, this was an iterative process. As a project team we prototyped several outcomes and framings before we derived the framing presented here.

We chose to use a new vignette as part of our outcomes frame. We found that it was a useful communication tool and enabled us to make findings easier to engage with.

Appendix C   Indicative justification for "honest broker": Methodology

The aim of the calculations related to inefficiencies in Chapter 6 of this project was to provide some initial quantitative dimension to the consumer support findings. As described in 5.1.1 and 6.1, participants desire more support than they are receiving today. We have called this having an honest broker. We propose that not providing support creates inefficiency in the energy system.

Our calculations are based on the premise that consumers are more likely to respond to the incentives the industry is offering them if they had help (in the form of an "honest broker" or similar). Similarly, such honest brokerage may make it easier for energy retailers to begin offering more dynamic pricing products, and for energy users to make more confident decisions related to this pricing.

The calculations undertaken here proposes that the lack of an honest broker leads to people delaying action. In this case, we have modelled action as either a shift in consumption or a reduction. Studies indicate that direct feedback (from an in-home display for example) could result in saving 5-15% of energy, while general feedback could result in 0-10% energy savings [41].

From the point of view of efficiency, we have proposed that the lack of honest brokerage is an inefficiency – or could lead to more network investment due to lack of consumer action. Here we have used energy price as an indicator. According to the pricing principles in the National electricity rules, cost-reflective network prices should be set to reflect the long run marginal cost of the network [42]. Although there are other drivers for network pricing and its structure which means this is inexact, it is likely adequate for this simplified analysis. We have used the evoenergy "Residential TOU" tariff for our analysis [43]. Note that this benefit exists whether the consumer is on the cost-reflective price or not as it relates to network cost drivers.

We have use the ACT Government "NextGen" trial as source data [44]. This consists of 473 residential properties. We have considered where consumers shift a portion of their consumption and where consumers make overall reductions in consumption, as shown in Figure 32 and Figure 33 respectively. ACT-wide impact is calculated by multiplying the individual consumer impact by the number of residential consumers in the ACT (190,094 [45]). We have used the NextGen trial as an example because we have access to consumption data from it, but not other states. This data exclusively comes from consumers who have installed solar and/or batteries therefore likely skews to a technology early adopter cohort. This will bias findings, however this analysis is very simplified therefore this bias is acceptable. We realise that some consumers will already have maximally adopted techniques that an honest broker could provide. But similarly, some will likely take many years. We feel that in the absence of more credible numbers an average of 1 year acceleration of action spurred by honest brokers is reasonable.

The results from this analysis is shown in Table and Figure 34. Based on this simplified analysis, the total impact could be in the order of $2-10m in the ACT. This is a significant value, even though on a per consumer basis the impact is low. It indicates that at a society wide level there could be justification for taking action to provide services such as an "honest broker".
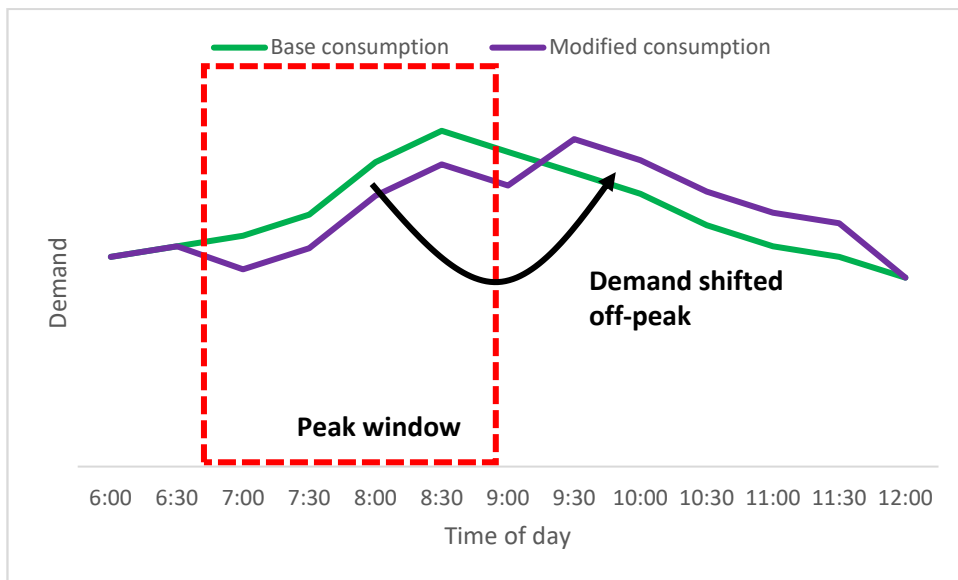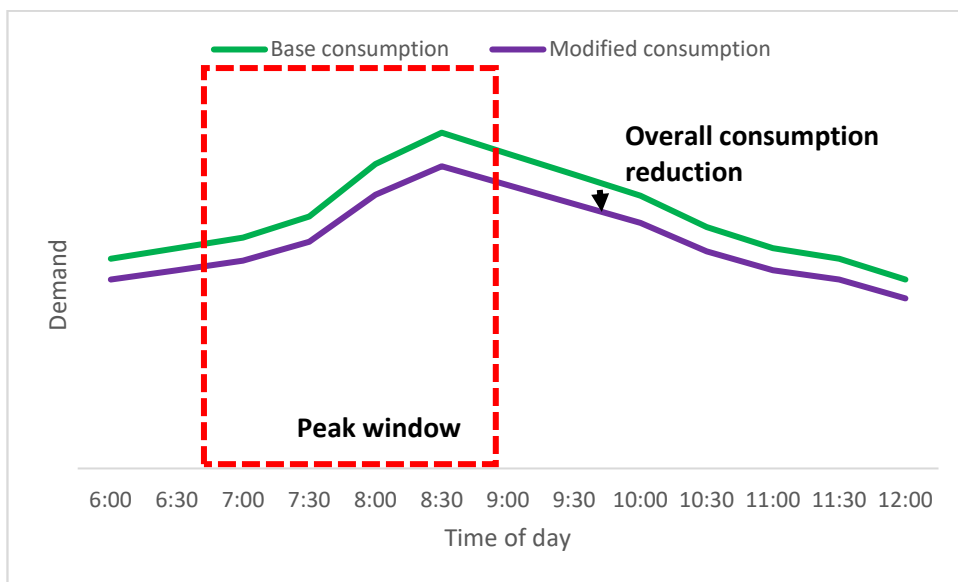
Figure 32 Energy shift case

Figure 33 Energy reduction case

Table 12 Economic analysis results

Case	Per-consumer saving	ACT wide saving
5% Shift	$12.26	$2,330,459
5% Shift, 5% Conserve	$38.18	$7,258,375
10% Shift	$24.52	$4,660,917
10% Shift, 5% Conserve	$50.44	$9,588,834
15% Shift	$36.78	$6,991,376
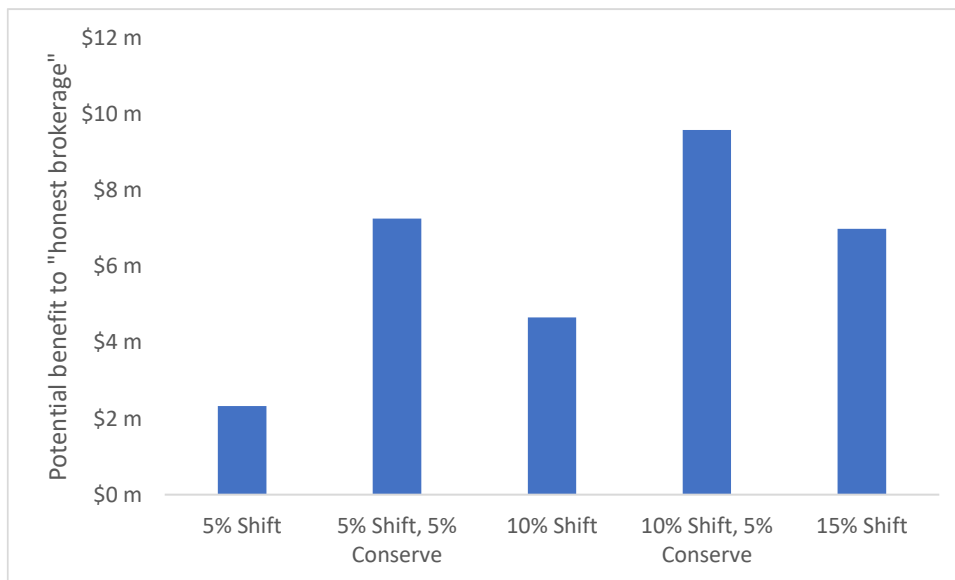
Figure 34 Economic analysis results

Appendix D   Links to supporting documents

Focus group materials

https://bsgip.com/wp-content/uploads/2023/05/Focus-group-materials.zip

Participant information sheets

Energy users: https://bsgip.com/wp-content/uploads/2022/11/Information-Sheet-energy-users-focus-groups.pdf

Industry: https://bsgip.com/wp-content/uploads/2022/11/Information-Sheet-industry-focus-groups.pdf

Project website:

https://bsgip.com/research/customer-focused-network-management/