Community perspectives

ON MICROGRIDS AND RESILIENCE IN THE EUROBODALLA

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Battery Storage and Grid Integration Program
An initiative of The Australian National University

SμRF

ACKNOWLEDGEMENTS

We acknowledge, respect and celebrate Aboriginal people of Yuin country as well as the Ngunnawal and Ngambri people (ACT), on whose land this research was conducted and pay our respects to Elders, past and present.

There were many contributors to this report. Firstly, we would like to thank the research participants for their time and hospitality. We are grateful for how generously people shared their perspectives and experiences. We want to acknowledge that shortly after data collection, one of our research interviewees sadly passed away. We express our deepest condolences to the participant's family.

We would also like to thank the Eurobodalla Council and the Southcoast Health and Sustainability Alliance (SHASA) for support with participant recruitment.

We want to acknowledge Dr Sophie Adams from the University of New South Wales for her role in the analysis of Royal Commission submissions.

Finally, we extend our thanks to our other SµRF partners, Essential Energy and Zepben, and to our funder, the Department of Climate Change, Energy, the Environment and Water (formerly the Department of Industry, Sciences and Resources).

The ANU team involved in the SµRF project includes:

- Dr Bjorn Sturmberg, Project Co-lead (with Dr Hedda Ransan-Cooper)
- Dr Kathryn Lucas-Healey, Research Fellow
- Dr Wendy Russell, Research Fellow
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A PARTNERSHIP BETWEEN

Australian National University

essential energy

SHASA

zepben

CONTENTS

Executive summary

In 2023, islandable microgrids are not a standard feature of our energy system. The SμRF project aims to uncover the potential risks, challenges and opportunities of islandable microgrids so that decision-makers and communities can better understand whether islandable microgrids could or should be part of our future energy system.

On the surface, one of the biggest benefits of grid-tied microgrids is that they could provide power in an emergency scenario (such as a major bushfire). As one part of exploring islandable microgrids and resilience, this report specifically focuses on the experiences and perspectives of the Eurobodalla shire community. The Eurobodalla is located on the coast of south-east New South Wales (NSW), in Australia.

To answer the question '*How do householders and small business owners view microgrids and their potential to increase energy resilience*?', we interviewed 40 householders and business owners in the Eurobodalla. We also analysed NSW submissions to the 2020 Bushfires Royal Commission to understand the experiences and impacts of energy outages during the 2019–20 Black Summer fires and how they might have shaped people's expectations and hopes for energy futures.

Our analysis revealed that there is significant enthusiasm for new solutions to energy needs, and for future-proofing energy systems, including the idea of microgrids. However, many participants still have questions and concerns about whether microgrids can deliver on their specific energy needs (including resilience).

IMPACTS OF THE BLACK SUMMER BUSHFIRES ARE ONGOING

The Black Summer bushfires impacted all our participants in significant ways and left an enduring impression. Importantly, specific impacts varied and the experiences were not uniform. But we heard that electricity was central for people as the fires were unfolding (to pump water and put out spotfires, and for telecommunications), and in the aftermath of the fires (to buy food and other essentials and stay cool). As such, it is unsurprising that since the fires, some participants are already prepared for future events with strategies like installing solar and batteries on their homes and purchasing generators.

Interpretations of whether fires like this would occur again were often, but not always, correlated with desire for changes to energy infrastructure. Most people who perceived the bushfires as a one-off event did not necessarily wish to change things radically because of the fires. In contrast, most participants who interpreted the Black Summer bushfires as the first direct and large-scale impact of ongoing climate and environmental change saw bushfires as an opportunity to reset and change things.

Image: Eurobodalla Coast Tourism ©

DRIVERS OF PEOPLE'S INTEREST AND ATTITUDES TOWARDS MICROGRIDS

People's readiness and interest in microgrids – whether it feels feasible to them and whether it could deliver resilience – is influenced by:

1) specific needs and expectations of energy services/systems into the future
2) socio-economic backgrounds and previous experiences
3) the physical environment around their town and home.

Electricity price increases is one of participants' main concerns. People see rising prices as a symptom of structural problems in energy system design and governance. In addition, many participants were disappointed with a lack of leadership, discussion and support for energy efficiency and other options for reducing energy consumption in their homes and businesses.

Motivations for purchasing solar panels and batteries include that it increases a sense of control (e.g., over price) and sense of security (e.g., resilience to extreme weather events), that it reduces bills and provides access to green energy. While short-term outages are only described as a serious problem for a minority of householders, they represent a bigger problem for some businesses (like cafes) that cannot run without power. Business owners were also concerned about price increases and desired greater price stability. While they were generally enthusiastic about the prospect of community energy resilience projects, they also wondered whether such initiatives would suit them and whether a system that services only businesses might be more appropriate (for example in parallel with such projects).

INTEREST IN MICROGRIDS

General responses to the idea of microgrids can be roughly grouped as:

1. open and happy to learn more yet cautious about any changes to current arrangements
2. enthusiastic and ready to start the conversation now.

Those who were highly cautious about the concept had many questions and concerns about the real benefits of a microgrid for the community and the environment, and about how it would be financed and work in practice. For those who were very enthusiastic, the main appealing aspects were community ownership, increased resilience, and environmental benefits. Interestingly, some people were so excited by the prospect of a community run microgrid that they would consider deferring investment in their own solar systems. Yet others, equally enthusiastic, preferred to push on with plans to install their own system.

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EXPECTATIONS AND FEATURES DESIRED IN A POTENTIAL MICROGRID

Most participants stressed that any microgrid would ideally provide continuous access to electricity during a prolonged outage. If a fire is spotting on the property, a microgrid that only provides electricity for part of the day would not resolve resilience concerns (though a generator could). For many people, resilience was not seen as the only priority for microgrid design. Other competing priorities were equally if not more important. Many also did not see how a microgrid would be the best solution for resilience in their community and that other more practical solutions exist.

Among the expectations that people had of microgrids is that they would provide fair, equitable and universal access to electricity for the whole community. At the same time, people had different expectations of what a fair and equitable system is and what this would mean in practical terms of regulation, infrastructure and mechanisms in a future microgrid.

In terms of ownership, most participants shared a relatively high level of confidence in fully or partially government-controlled ownership, as people believed them to be more transparent and accountable. The other important organisation seen as trustworthy to be involved in microgrid design and operation was Local Progress Associations. Private companies were only deemed appropriate owners of microgrids by one participant. Among other things, private companies were criticised for their profit motives and lack of transparency.

While ownership was important to people, equally, or possibly even more important, were the principles underpinning the operation and organisation of the microgrid. We heard that reducing energy bills, increasing sharing capacity and local control were the top three operational priorities, followed by maximising local energy supply and finding out how to reduce energy consumption.

RESPONSES TO 3 MICROGRID SCENARIOS

To illustrate the different options and high-level design features of microgrids to participants, we provided three different scenarios as an interview prompt to tease out the important design and operational features:

SCENARIO 1

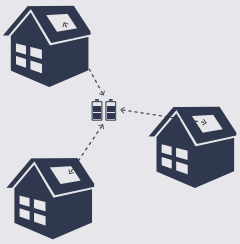
Comprised an energy refuge; a town hall with enough energy to power an evacuation centre in an emergency.

The least attractive because most people did not necessarily feel the need for such infrastructure outside of extreme weather events, which do not occur frequently enough to warrant the investment.

SCENARIO 2

Would only provide power for several hours a day for a neighbourhood, powered by rooftop solar and a battery.

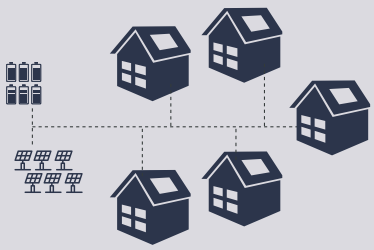
Potentially the most divisive because roughly half the participants saw it working, as compared to another half who were concerned that it would exclude people or not provide enough power.



SCENARIO 3

The largest and most expensive option – would provide electricity for a longer period but would require generator infrastructure (like a solar farm) and storage.

Clearly the most attractive as it was perceived to increase energy resilience, reduce environmental impact, provide a future-proof technology and increase generation and storage capacity.



The physical geography of where the participant was located was an important factor in which scenario could be viewed as feasible. For participants located in towns surrounded by national park, which are common throughout the Eurobodalla – they struggled to see where a solar farm could be located (i.e., Scenario 3).

IMPLICATIONS OF OUR FINDINGS

There are additional messages from our research that emerged from participant interviews that have higher-level implications including:

- The public would like more communication about the energy transition and how it affects them. People would like this communication to be two-way so that decision makers are accountable to concerns they raised. A clarity around roles and responsibilities in the transition between the market bodies, federal and state government, and local council, civil society and businesses like networks and solar installers would help significantly with this work. Our findings, in line with other research in Australia[1-3], indicate that there is public support for a different approach to system design and governance.
- A lack of interest by particular types of demographics early on should not be taken to mean that these groups will not be impacted. An implication of this is that microgrid proponents will need to take particular care to engage some types of users, especially young people, women and those unfamiliar with energy technologies. It is important to recognise that engaging with difficult to reach groups requires a specialised skill set that is different to conventional market research and survey methods expertise.
- For householders where resilience is the key concern, it is very possible that microgrids may not resolve this key concern. It would be ideal to understand what resilience gaps remain for these householders and businesses and how they could be resolved before the next major event. As things stand, people do not have a clear sense that there is an entity that is responsible for coordinating and ensuring resilience.
- The expense and complexity of microgrids mean that many values that household expect (like 100 per cent 'green') may not necessarily be easily delivered by islandable microgrids. The results of other SμRF analysis will allow us to explore these different values and see how they align with community understanding and expectation.
- In introducing possible new energy infrastructure, it will be important to recognise, and respond to, existing inequalities between people with their energy access who are all – to different degrees – interested in improving their energy needs and values (whether for stability, comfort, affordability or environmental values). It points to the need for solutions that consider whether individual responsibility for improving access is appropriate or will lead to new types of inequalities between households.

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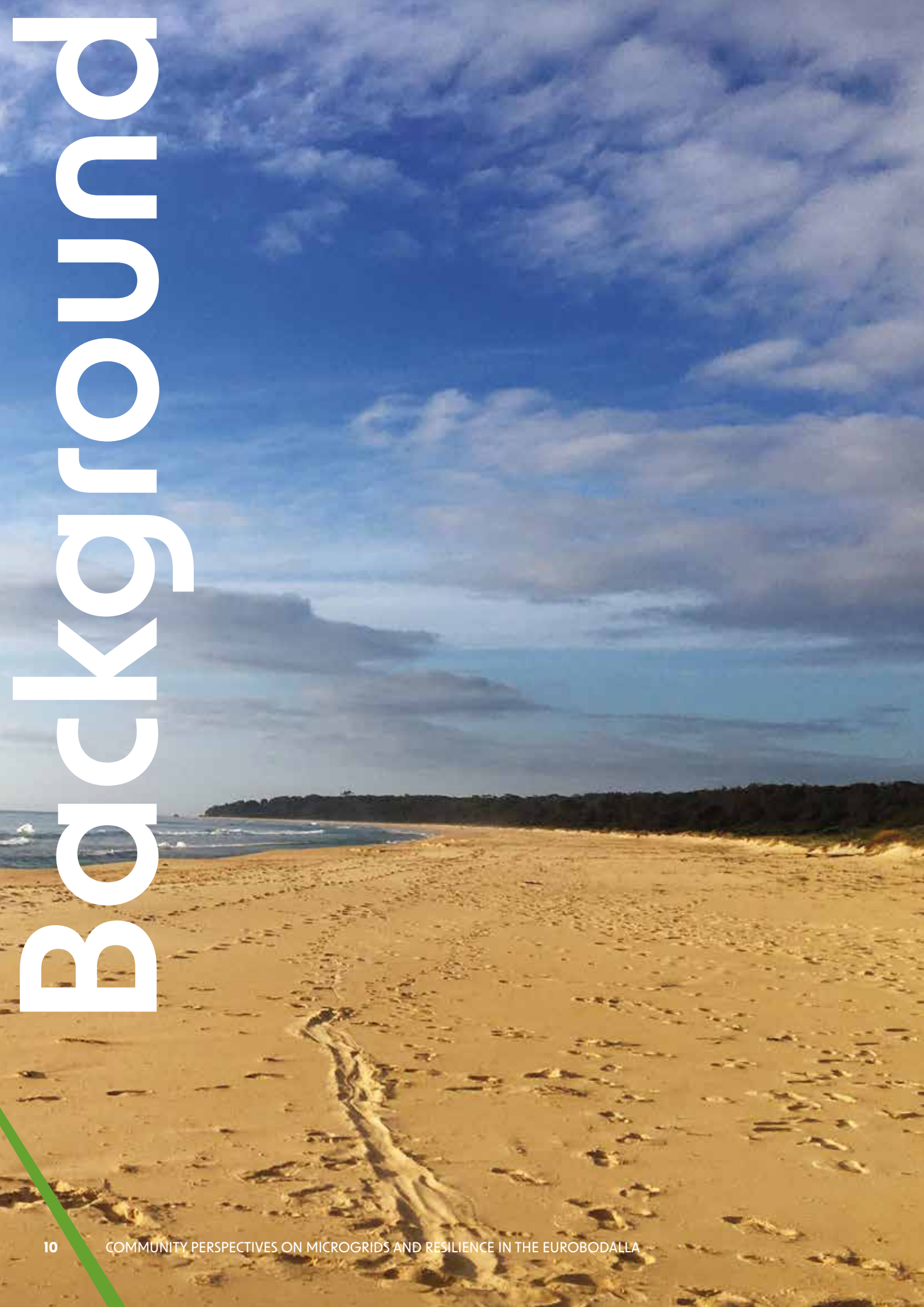
Background



THE SOUTHCOAST MICROGRID (µ-GRID) RELIABILITY FEASIBILITY (SµRF) PROJECT

The Southcoast Microgrid (µ-grid) Reliability Feasibility (SµRF) project is a trans-disciplinary[4] and community-based research project that explores ways to bolster the energy resilience of the Eurobodalla shire on the NSW south coast. The south coast was one of the regions badly affected by the devastating black summer bushfires in 2019–2020.

The SµRF project focuses on islandable microgrids as a potential means of boosting the resilience of electricity infrastructure to extreme weather events (e.g., bushfires). Extreme weather events are set to increase in intensity in the future all around Australia. As such, while our focus is on the Eurobodalla, we hope findings from this project will be of relevance to many other regional areas.

Microgrids act as mini electricity grids, capable of keeping local energy networks powered when they are cut off from the main system. As opposed to Stand Alone Power Systems (SAPS) that operate independently of the main electricity grid, islandable microgrids are usually connected to the larger grid but can also operate independently when needed, ensuring a local community has independent power supply if or when disaster strikes.

In 2023, islandable microgrids are not a standard feature of our energy system. While they show considerable promise, all new types of infrastructure bring potential risks as well as opportunities. The SµRF project aims to explore these and provide insight and analysis for decision-makers and communities to better understand whether islandable microgrids could or should be part of our future energy system, and if so, what design and operational considerations are important to people.

As part of the SµRF project, the specific aim of this piece of work is to understand the Eurobodalla community's perspectives on

1. their energy needs, concerns and expectations,
2. whether they see microgrids as part of their energy future, and
3. what specific values and expectations they hold around microgrids (including resilience).

Image: Pierrick Chalaye ©

METHODS

This report presents new insights on a little-known topic: *How do householders and small business owners view microgrids and their potential to increase energy resilience?* To answer this question, we draw on two sources. The first is a text analysis of publicly available submissions to the 2020 Bushfires Royal Commission. The text analysis provides insight into people's perceptions of energy resilience during and immediately after the 2019–20 bushfires. The second data source is 40 interviews with community members from the Eurobodalla shire conducted by ANU researchers (and authors of this report), Dr Pierrick Chalaye and Dr Hedda Ransan-Cooper, in the Spring of 2022.

Throughout the report we have used pseudonyms for participants' names. This research has received approval through the Australian National University Human Ethics process (protocol number 2022/102).

Royal commission submissions

The analysis of 140 submissions to the 2020 Bushfires Royal Commission provided an understanding of:

- the extent of bushfire impacts on the energy system including varying degrees of power cuts and disruption to all related services (e.g., access to water, fuel, food, telecommunications), and
- people's experiences and perceptions of immediate and long-term organisational responses to the impacts.

The 140 submissions were from individuals (not organisations) and selected based on location (New South Wales only).

Interviews and householder demographics

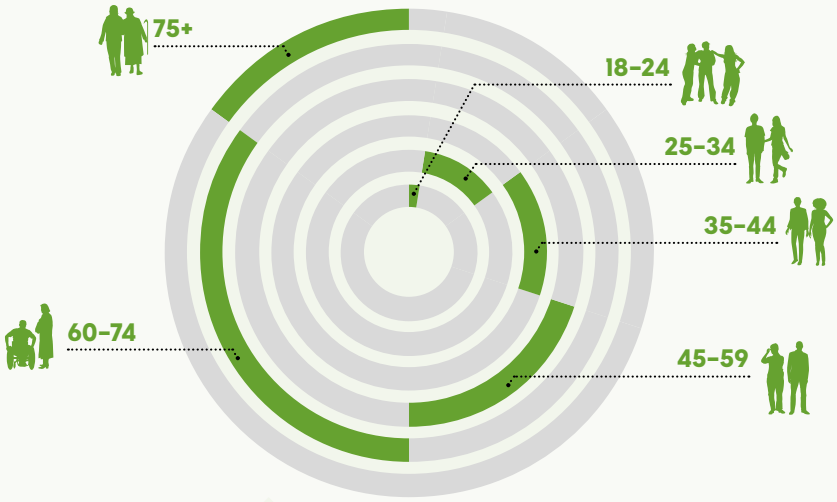
In total, we conducted 40 interviews with a wide range of householders and small business owners from different parts of the Eurobodalla including Tuross Head, Nelligen, Congo, Bodalla, Bingie, Rosedale, Mossy Point, Moruya, Potato Point, and Mogo. The following map shows these different sites.

Figure 1: Map of the sites in the Eurobodalla region

Map data from OpenStreetMap

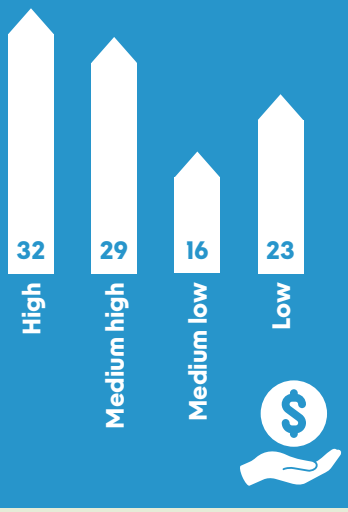
The purpose of these interviews was to explore people's concerns and expectations about the current and future energy system. The participants were selected on the basis of demographic representativeness of the Eurobodalla.[5] The following graphs show the diversity of participants with regards to age, type of household, income level, education level, housing situation, house occupancy and customer/distributed energy resource (CER/DER) or infrastructure (e.g., solar PV or household batteries). While we tried our best to include diverse demographics, there were still some groups that were under-represented (e.g., people under the age of 24, and householders whose home in the Eurobodalla is a secondary residence).

AGE OF PARTICIPANTS (%)

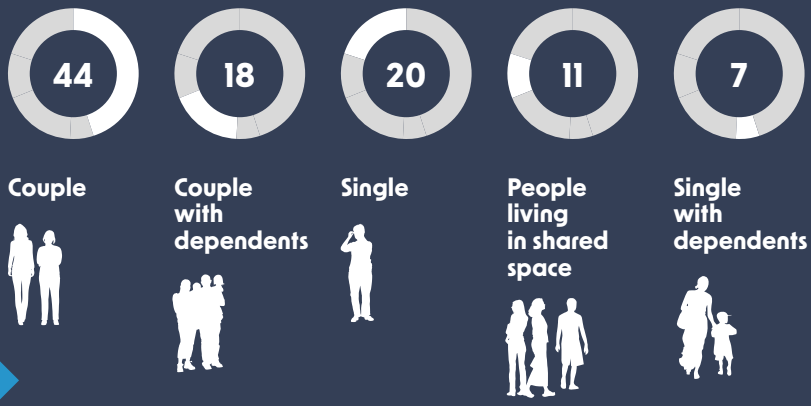


HOUSING SITUATION

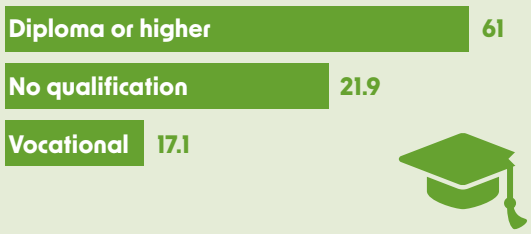
LEVEL OF INCOME (%)



TYPE OF HOUSEHOLD (%)

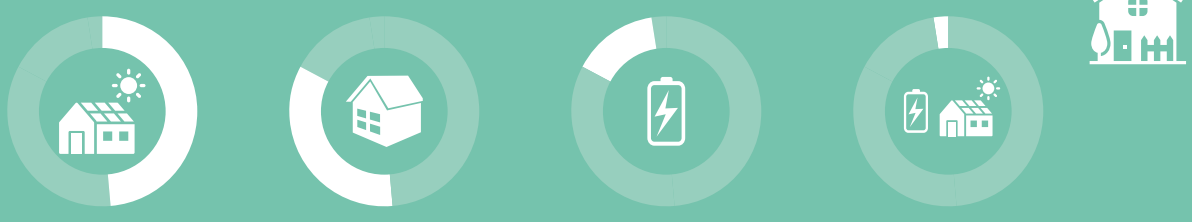


LEVEL OF EDUCATION (%)



HOUSING SITUATION

DER INFRASTRUCTURE



The interviews were semi-structured. This means we had the same set questions for each participant but that we also allowed space for a free-flowing conversation, led by the issues participants themselves wanted to talk about. The interviews covered key questions, such as:

- What electricity problems and or opportunities exist in your community?
- What does an ideal electricity supply system look like given these problems and opportunities?
- How do microgrids fit into your vision of a future energy system in your community?
- How could microgrids be established, governed and regulated?
- What functions/services do you value in a microgrid (e.g., can it power a large number of people, should it support key infrastructure, keep the power on for everyone, other or emergency infrastructure only)?

Ahead of the interview, we sent participants an interview prompt which provided some visuals and descriptions of three broad scenarios of possible microgrids as a basis for exploring design needs and expectations. After a series of general questions about people's perceptions of energy needs and concerns, we then covered the three possible microgrid types and their pros and cons (see Appendix 1 for the Interview Prompt).

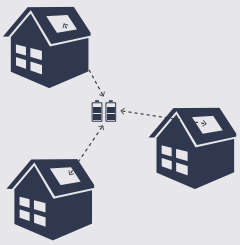
The biggest distinction between the three scenarios was the length the microgrid could provide power in an islanded state with subsequent cost differences (scenario three which provides power for longer durations being the most expensive). Throughout the scenarios we offered a different range of possible ownership and operation considerations (see Appendix 1 for all the details).

SCENARIO 1

Energy refuge: comprises a small amount of generation coupled with a modest sized battery is installed on a town hall (or RFS or emergency shelter, etc.) (this is not necessarily a microgrid)

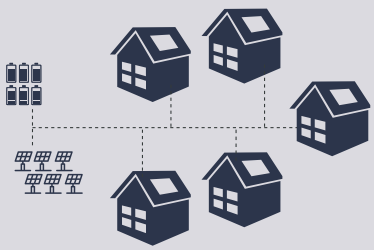
SCENARIO 2

Modest-sized microgrid for neighbourhood: comprises of household solar throughout the community which powers a modest sized battery connected to the distribution network. It enables the electricity supply to remain operational within the community when disconnected from the main grid (during an outage etc.)



SCENARIO 3

More substantial microgrid for township: contains not only a (likely larger) grid connected battery but also significant grid connected power generation (e.g., a solar farm). This generation, together with the rooftop solar and home batteries, is sufficient to allow the community to run independently of the main grid for a period of days (still dependent on resident usage and generation conditions).



Interpreting our results

Qualitative research is the research design approach used in this study. This approach is suited to topics that are emerging or poorly understood. It provides researchers with a lot of detail to understand the meanings that people ascribe to their experiences and perspectives. While qualitative research can give a fairly good sense of the prevalence of particular views (through 'saturation'), it does not claim to be statistically representative. However, unlike surveys that can be biased towards people who are literate and have time to answer, interviews can be a more inclusive method if done thoughtfully.

Note, that many groups were not covered in depth or at all in this report. First nations' perspectives will be explored in a different piece of work. Young people and people who live in the Eurobodalla part-time, as well as the broad range of businesses are not well covered in the findings of this report. These are important limitations to be aware of as you read through the report. Finally, if you are new to qualitative research and would like to better understand this type of research approach, please get in touch with the authors who can recommend further sources.

The biggest distinction between the three scenarios was the length the microgrid could provide power in an islanded state with subsequent cost differences...

Image: Pierrick Chalaye ©

The 2019/20 bushfires:

EXPERIENCES AND IMPACTS

SUBMISSIONS TO THE 2020 BUSHFIRES ROYAL COMMISSION FROM NEW SOUTH WALES

According to the Royal Commission submissions, the experience of losing electricity varied widely, from people losing electricity for a few days to situations where power was not restored to people's homes for weeks, with varying degrees of impact on people's material lives and on their physical and mental health.

People's wide range of experiences makes it difficult to paint a simple picture, but it allows us to draw important lessons about what people experienced, what it meant to go without power, alternatives people put in place and how they perceived the short- and medium-term responses of key organisations (RFS, council, State government etc). Regardless of the duration, the loss of electricity during and after the bushfires had major impacts on people's lives, including:

- the inability to keep spaces cool, including houses and even evacuation centres,
- reducing access to drinking water (to supply the needs of people who rely on the centralized water supply (i.e., the mains) and private pumps on properties), or even water for general use such as cleaning clothes,
- limiting access to food and other basic supplies such as clothing and to money through cash or card, and
- limiting access to health services and medical supplies for permanent or temporary needs.

The loss of electricity was crucial not only for everyday life, but also for making decisions, staying in touch with services, and defending properties. Those making the decision to stay and defend were relying on power (mains, or generators) to activate water pumps for sprinklers or garden hoses. In most cases, as the bushfires were unfolding, the power outage left people in the dark, both literally and figuratively, due to the loss of telecommunications. People struggled to make sense of what was happening and make response decisions as they could not access bushfire information, news about when the power would be restored and updates about relatives and friends elsewhere.

People drew on different strategies to access essential services, including services that rely on electricity. Some people used 'alternative homes' in the form of a caravan or camper van that can provide basic services. Others used customer energy resources (CERs), whether they were batteries or battery-powered devices, such as a radio and portable charger, or diesel-powered generators.

Image: Eurobodalla Coast Tourism ©

But the most common way of accessing essential services was for community members to work together to provide services to people after they had evacuated (e.g., food and clothing in shelters/evacuation centres).

One of the main points raised was the centrality of energy to accessing all other essential services of daily life. The negative side of this reliance (i.e., the fragility of the system) was evident when a power failure of this magnitude happened. One illustrative and common example was a reliance on bank cards for paying for goods and service, a service with limited alternatives (as people are not used to carrying cash). This created a situation where people found themselves with no other means to access a key service (e.g., food or petrol).

Another related, yet equally important theme in the submissions was the level and forms of vulnerability people experienced and the conditions that determined these vulnerabilities. People raised different and interrelated dimensions of vulnerability, and, conversely, of adaptive capacity both in the immediate response to the bushfires but also in the recovery phase.

Given the centrality of electricity to access basic services, the submissions make very clear that access to electricity will continue to be very prominent in people's minds when thinking more generally about bushfire preparedness and resilience.

Table 1. Dimensions of vulnerability/adaptive capacity

Dimension	Examples
Physical, geographical	Low to high exposure to fire risk, and resilience of housing stock to fire Location in the network (with some parts of the network being more likely to experience an outage)
Social and economic	Low to high levels of: • social cohesion and local social connections • individual and collective financial capacity to fund recovery projects • familiarity with the local area • familiarity with administrative procedures (including financial support) and capacity to access these
Historical	Low to high levels of previous experience of bushfires and other extreme weather events
Environmental	Low to high levels of capacity of the local environment to recover
Emotional	Low to high capacities to articulate and regulate emotions such as anger, helplessness, feelings of abandonment and eco-anxiety[6]

THE BLACK SUMMER EXPERIENCES OF EUROBODALLA RESEARCH PARTICIPANTS

Our interviews echoed much of what we learnt from the submissions to the 2020 Bushfires Royal Commission. All research participants were affected by the fires, materially (e.g., loss of electricity, loss of food) and or psychologically (e.g., stress, anxiety, sadness, and feeling of abandonment but also willingness to move on).

Some of our participants have been displaced several times, sometimes for a long period. Some lost their homes, some of whom were still living in temporary accommodation at the time of the interview. For instance, one of our respondents from Cadgee/Nerrigundah area indicated:

> **"[The] entire house, everything was wiped out, and so was everything else around here in the neighbourhood. This whole area was all very severely burned out by bushfires. (...) there's no house, it's a temporary cabin that I live in."**
>
> Andrew, Householder, Cadgee/Nerrigundah area

Some householders suffered damage to part or all of their house and or garden. Others had a limited direct material impact, other than the loss of electricity for a few days. Although there was not necessarily a correlation between the degree of direct material impact and feelings about the bushfires, the vast majority of our respondents felt a strong emotional impact from the bushfires, particularly because of their size, duration and the fact that they or people they knew closely were directly affected.

In our interviews carried out two years after the bushfires, interpretations of the megafires varied widely between two poles:

- those who interpreted the event as an isolated case that is unlikely to recur, and
- those who saw it as linked to climate change and therefore something that will recur in the near future, a perspective that aligns with climate science modelling.[7]

Image: Eurobodalla Coast Tourism ©

Interpretations of whether fires like this would occur again were often, but not always, correlated with desire for change. Most people who perceived the bushfires as a one-off event did not necessarily wish to change things radically as a result of the fires. In contrast, most participants who interpreted the Black Summer bushfires as the first direct and large-scale impact of ongoing climate and environmental change saw bushfires as an opportunity to reset and change things:

> **If you've been through something like the bushfire, you become more aware of that so you feel like you ave to take some responsibility. But I've also noticed that for a lot of people it's just we want to put back what we had so we can get on with our lives. And as I say, an opportunity to change something that's actually missed.**

Andrew, Householder,
Cadgee/Nerrigundah area

Nonetheless, there were common future-proofing responses among all participants, regardless of whether they felt more devastating bushfires would occur again. First of these was that most respondents with solar installations at the time of the interview either acquired their systems since the bushfires or have increased their capacity since then. This triangulates available data on solar adoption in the region, which shows that the number of individual solar installations and the size of installations have increased significantly since 2019–20.[8]

In addition, all our participants who additionally installed home batteries linked it to bushfire resilience:

> **Since the fires we've made quite a few changes at home to be a bit more resilient for different disasters, because we also got flooded straight after the fires as well.**

Rebecca, Householder,
Mogo area

Second, many people living in impacted areas are now a bit more aware of potential power outages and have acquired individually or together with their neighbour a petrol or diesel generator:

> **I think there was a huge take-up in generators up in the fires, practically everybody I think along here would have a generator.**

Gary and Judith,
Householders, Nelligen area

Third, regardless of views on whether the Black Summer fires were directly related to climate change preparedness (or lack thereof), most people did not believe that the existing electricity infrastructure was 'future-proof' and have already begun looking for ways to increase their own resilience in the home. An account from Sam, from the Tuross Head area, is particularly telling in this regard.

Sam has always been interested in more self-sufficient lifestyles. He and his wife left the city just under 20 years ago for a regional lifestyle.

Although Sam, his wife and their three teenagers were not physically impacted by the bushfires of 2019–20 (no direct damage to their property), the chaos generated by this event (notably as a result of the electricity supply being cut off to access basic needs such as water, or concern about potential of thefts occurring in town shops) has been decisive in their path towards greater self-sufficiency in water provision and electricity.

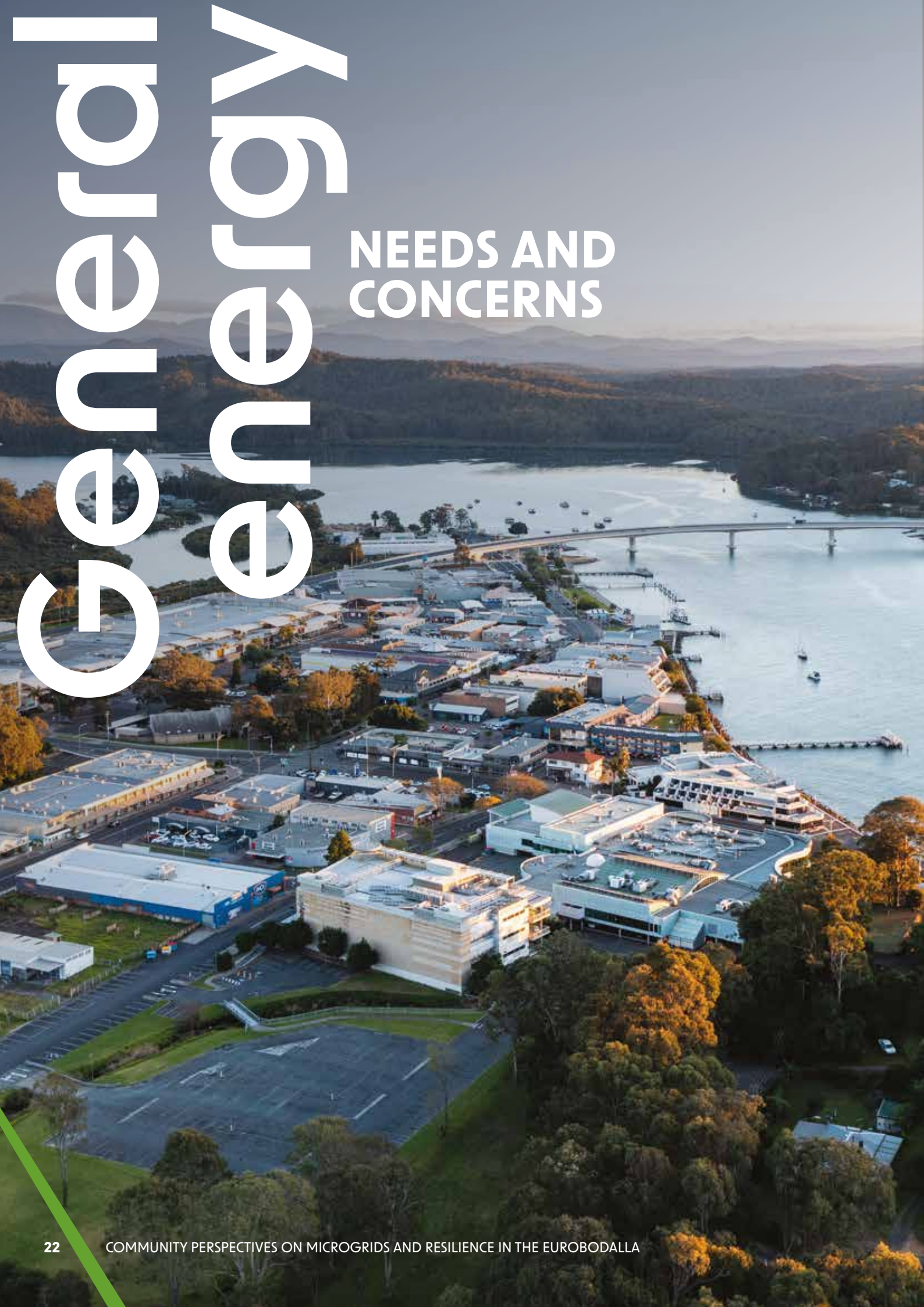
Sam is now doing all he can to ensure that there are back-up systems for electricity (solar installation, generator and some degree of storage target), water access and food security. With regard to electricity, Sam is particularly inspired by one of his neighbours, who has acquired a large solar generation capacity together with a home battery.

Alongside setting-up such infrastructure at the individual level, Sam would feel even safer if such an infrastructure (including a microgrid) – combined with a clear plan – existed at the neighbourhood or community level.

However, Sam does not generally trust large companies or government institutions. The community (for instance through the local progress association, the local RFS and the SES) must therefore oversee any new development in this regard, so that the benefits remain at the local level and the community is better prepared to fight the next extreme climate event.

Image: Watt A Lot on Unsplash

NEEDS AND CONCERNS



Given the extent of the impact of bushfires, and how important energy is to people's ability to survive and limit bushfire impacts on their everyday lives, it is unsurprising that our interviewees expressed a lot of concern about energy throughout the interviews.

We also know from other social research in Australia, that there are consistent values that householders expect from energy in their everyday lives such as: affordability, security/safety/resilience, control and choice, convenience, social connection, and comfort[9] as well as values about energy transition planning process and infrastructure such as environmental stewardship, long-term planning, accountability/transparency, fairness and efficiency.[10] We now provide more specific detail about how people view their current and future energy needs in the Eurobodalla.

...there are consistent values that householders expect from energy in their everyday lives such as: affordability, security/safety/ resilience, control and choice, convenience, social connection, and comfort[9]

HOUSEHOLDERS' PERSPECTIVES ON EXISTING ENERGY SERVICES

Views on what energy needs are or should be vary greatly among our respondents. At the individual level, most respondents could be considered 'energy conscious', meaning that to varying degrees and for various reasons, they generally think carefully about their energy needs, and actively try to reduce consumption.

Common actions include living in a small(er) house, prioritising energy efficiency features (including the electronics and appliances they purchase), limiting heating and cooling where possible, and managing their demand (for example, monitoring to various extents how energy is used on an everyday basis).

Image: Eurobodalla Coast Tourism ©

“The cabin I’m living in is quite tiny but it has an electric hot water system. Everything is electrical. It runs on the electricity pump; pump for the toilet, pump for the shower, pump for the – it’s one of those self-contained pods. (...) It uses a fair bit but I don’t personally use a great deal. Through winter it would be the electric heater. It’s got a little electric fan heater; that produced a fair bit. But it’s how would you say, it’s very small [space]; it doesn’t take that long to heat up.”

Andrew, Householder, Cadgee/Nerrigundah area

“I think I’ve really grown up being someone who can live minimally and off-grid and so that’s really normalised to me.”

Sarah, Householder, Mogo area

“I’m very close to [self-sufficiency] now and I’ve got the discipline to do that, I don’t have a freezer, I don’t have two fridges and so it’s the energy consumption but there again we’re only two people, we don’t have a family of five or something like that.”

Adrian, Householder, Bingie/Congo area

At a community level, some respondents expressed concern about the current unsustainable level of energy consumption. These people were particularly worried about the lack of clear rules to help save energy, from the neighbourhood/town scale to the national and international scale. What these participants found frustrating is that energy saving topics are not regularly debated and discussed by decision makers, particularly on questions around which uses of energy should be prioritised (over others). For example, many people expressed concern and frustration about the energy inefficiency of buildings, including the lack of clear standards, regulations and government support for home insulation.

In line with the submissions to the 2020 Bushfires Royal Commission, many participants stressed the importance of energy for other essential services such as access to water (including pumps and sprinklers) and suggested that these services should be considered holistically rather than separately. Some participants raised the heavy reliance on private cars in regional areas, which to them represents a major energy issue, especially as petrol is increasingly expensive and the potential shift towards more electric vehicles will require additional energy needs and new infrastructure locally.

In addition to general energy needs, people also raised issues more specifically related to energy governance, including the grid itself. Changes in energy prices are one of the main concerns. The current rise in energy prices, especially at a time of rising prices in other basic services such as petrol, rents and property, is increasing the general sense of insecurity, uncertainty and lack of control over people’s daily lives and future plans. People also feel that this energy insecurity goes beyond the issue of price and is related to structural problems in the energy sector.

These include:

Privatisation of the energy sector and the resulting market volatility and confusion around the choice of suppliers and dominance of profit motives (over public goods)

Concerns and questions about the types of energy technology that governments prioritise, with many taboos or unknowns such as the potential of nuclear power, governments' continued support for harmful energy sources (e.g., coal), or the potential for combining alternative local energy options (e.g., hydro and tidal power)

The unsustainability of the energy system, caused in particular by the lack of future-proof infrastructure and a self-sufficiency strategy, which leaves many questions unanswered such as:

- What lessons have been learned from the 2019–20 bushfires?
- What infrastructure and procedures have been put in place since then?
- If such an event were to happen again, would people be better protected?

A reluctance (or inability) on the part of the energy sector to share knowledge and educate people about energy issues to enable a more open and dialogic conversation with people about how to manage and make energy related decisions.

For instance, regarding privatisation of the electricity sector, one participant said:

> **"I believe in safety nets for virtually everything and if you live in a wealthy nation which Australia is you should have safety nets for everything. All the safety nets here have actually been sold off, the electricity, naively they sold all the generation and all the grids and then they think that the person who buys it doesn't want to make a profit? Come on, it doesn't work that way."**
>
> Adrian, Householder, Bingie/Congo area

On a more practical level, people also mentioned, depending on where they live, that there are more or less frequent short-term cuts, both planned and unplanned. However, this phenomenon varies greatly from place to place in the Eurobodalla and people's reactions also vary from person to person. For most people (33 out of 40), these outages, however frequent, are only a minor inconvenience. For others (7 out of 40), whose jobs depend directly and instantly on energy services such as internet access or a connected appliance, it is a serious negative impact.

Outages are a minor inconvenience for

82.5%

of people

With regard to the issues raised about energy governance, people also shared what they saw as the main drivers and barriers to a scaled-up uptake of local energy generation and storage technology (e.g., solar panels, home batteries) at the individual level:

DRIVERS

- Sense of control (over price, for instance)
- Sense of security (resilience to extreme weather events)
- Environmental motivations (access to 'greener'energies)
- Affordability (compared to more expensive sources)

BARRIERS

- Precarious housing situations (e.g., tenants, people in the process of moving)
- Unstable or unpredictable social situation
- Instability of renewable energy regulation and standards
- Market and price instability
- Rapidly changing technologies

BUSINESS OWNERS' PERSPECTIVES ON ENERGY SERVICES

The 11 interviews we conducted with local business owners revealed that uncertainty and instability of electricity prices or infrastructure is one of their main challenges. Some business owners also mentioned that frequent power cuts affect their business without compensation for these losses.

Predictability is one of the most necessary requirements to run a business and if a major pillar of expenditure such as energy costs is unstable, it becomes very difficult to plan. Despite or sometimes because of this instability, some business owners have installed solar panels and batteries and are interested in going further by investing in, for example, an electric car. However, price is often a major barrier for many business owners, particularly small ones. Large businesses on the contrary have a greater capacity to invest in new technologies, particularly where the return on investment is risky. Because of this situation, some business owners pointed to a lack of regulation and support from public authorities for reliable ways to reduce their energy bills.

Power cuts, especially those lasting more than half a day, are another major problem for businesses. Short power cuts have a major impact on small businesses such as coffee shops, which rely on instantaneous electrical appliances for their entire activity.

They often have to close their doors every time there is a power cut, even for a short time. According to the participants, there is no financial compensation for the loss of income due to a short or medium-term power cut. Some business owners also mentioned that power cuts are so frequent in their area that they have invested in back-up generators to continue their activities when they occur. They all emphasised that for them the electricity supply must be reliable, whatever the conditions. As one business owner from Tilba region said:

> **We've got to have – it's just got to work. (...) So I can't make things too complicated, it has to all be pretty seamless if I'm running a [tourist accommodation] business.**

Nicole, Business owner,
Tilba region

In this context, business owner participants expressed some enthusiasm for community initiatives around local energy projects that could increase reliability at a reasonable price. However, they told us that they were generally aware of their specific energy needs. As such, they wondered under what conditions a community scale project would suit them, or whether a system that services only their business might be more appropriate.

Image: Tim Mossholder on Unsplash

...business owner participants expressed some enthusiasm for community initiatives around local energy projects that could increase reliability at a reasonable price.

PEOPLE'S INTEREST IN MICROGRIDS FOR THE EUROBODALLA

People's enthusiasm for microgrids often matched and reflected their general energy needs and concerns. Some people were very cautious about the concept of microgrids, and while they did not reject it entirely, they were cautious about considering such a system for themselves. Others, on the other hand, were very enthusiastic about the idea of running a microgrid in their neighbourhood or town.

Those who were highly cautious about the concept had many questions and concerns about the real benefits of a microgrid for the community and the environment, and about how it would be financed and work in practice. For those who were very enthusiastic, the main appealing aspects were: community ownership, increased resilience, and environmental benefits.

Table 2 summarises people's concerns and questions as well as their motivations and drivers for microgrids according to various dimensions: social and economic, resilience, environment, financing and accountability, and operation.

An interesting finding was that even though microgrids are not even in the planning stage in their community, some participants were sufficiently interested in a community solution such as a microgrid that they would defer their own private assets and instead enjoy the benefits of a microgrid. Yet others, while remaining enthusiastic about the idea of a microgrid, still intended to install a private system regardless of whether the microgrid would go ahead or not.

An interesting finding was that even though microgrids are not even in the planning stage in their community, some participants were sufficiently interested in a community solution such as a microgrid that they would defer their own private assets and instead enjoy the benefits of a microgrid.

Table 2: People's concerns and motivations for microgrids

	Concerns and questions (sceptics)	Motivations and drivers (enthusiasts)
Social and economic	• Would it (and how) bring the community together and create value for the community?	• Greater energy security • Greater control on price and infrastructure • Cost and benefit sharing (e.g., reduced risk of individual investment, and ability to share with neighbours)
Resilience	• Would a microgrid increase resilience in face of a catastrophic event? • Would it actually provide long-term backup?	• Capacity to face events like bushfires and floods with greater security
Environment	• Would a microgrid be useful at all if the whole energy system was to move towards entirely renewable system in an affordable way?	• Maximising local energy supply capacity, especially from renewable energy
Financing and account-ability	• Who would pay for the infrastructure and operating costs? • Would people who already own private property (e.g., solar panels) benefit as others do? • Would it help reduce energy bills?	• Potential to reduce energy bills, such as by paying only one connection fee for the cluster/ community (i.e., an embedded network) to the main grid as opposed one connection fee per household
Operation	• Is there physical space for the infrastructure in our town? • Would it even be feasible and if so, what would be the right scale? • Who would operate it?	• Interest in the conversation about collective energy solutions • Other examples such as Mallacoota and Yackandandah to learn from

What do people want

AND EXPECT FROM MICROGRIDS

MICROGRIDS AND ENERGY RESILIENCE

Understandably, most participants stressed the importance of having continuous access to electricity. However, for many people, resilience was either not seen as the only priority or even necessarily solved by something like a microgrid.

As we mentioned in the beginning of this report, the 2019–20 bushfires are still fresh in people's minds, and they do not want to experience such an impactful long-term power outage again. As one participant said:

> **"I definitely think we are in need of it [a microgrid] where we live because after going through the bushfires it was a big downfall to not have power. I think a lot of people around the Bodalla area and probably right up to Nerrigundah have changed their reliance since then on how they do it. One of the main things to have power for during the bushfires is to pump water, it's really important to be able to pump water onto places when there's a fire coming."**
>
> Susan, Householder, Bodalla area

Some people also pointed to the high cost of regular or long-term power cuts. As one participant said:

> **"Even the money lost on meat defrosting in the freezer, there's a lot of poor people down here who you lose $60 worth of meat, that's your food for the next couple of months gone because the power's out and you don't always feel like you're going to be the priority that they're going to send someone straight away or that people will know what they're doing. So if a microgrid was established 'cause there will still be issues but if you knew that you could rely on someone being quick to respond and actually cared about fixing it quickly that would be a relief to a lot of people."**
>
> Amanda, Householder, Tuross Head

Image: Eurobodalla Coast Tourism ©

However, for many people, other competing priorities, such as reducing household energy bills or increasing investment in greener and local energy sources, were just as important, if not more so, than resilience. The point, then, is to compare these priorities and see if they are mutually exclusive or, instead, can coexist and be integrated into a microgrid design. For example, some people expressed a desire to see a system where energy independence, affordability, and resilience are all considered. One respondent from Tuross Head stated:

> **So it's not an unknown or unexpected possibility of an event going forward as well. So I think we don't know what weather is going to do to us and if we've got an opportunity to create both an independence and also a survival-type infrastructure then I think they should be considered seriously.**

Julie, Householder,
Tuross Head

Some people also made the point that microgrids are not the only solution to resilience, or if they are, it may only be so under very specific conditions. For emergencies, for example, most people mentioned that they already have generators, which they often purchased after bushfires, and that this solution is sufficient for most emergencies. Many people also mentioned that microgrids may not have enough supply and storage capacity to provide essential services for long periods of time, so generators would be a better alternative. Others expressed concerns about energy consumption rules (or lack thereof) and the type of behaviours or mechanisms that can be put in place to switch to emergency mode and limit energy consumption when necessary. For example, one interviewee in the Nelligen area mentioned:

> **The only thing, in a situation like that, if you had some sort of commercial interest in the area which is a big user of power, like the café would be one, everyone would understand that, because he would use a fair bit of power down there for his cookers and so forth, and the freezers. But anyone else, like if a bloke had a little welding shop or something like that, which would draw a fair bit of power, he might have to curtail some of his activities, or some other little shop.**

Stephen and Leanne,
Householders, Nelligen area

FAIRNESS, EQUITY AND ACCESS

Among the important expectations that people have of microgrids is that they will provide fair, equitable and universal access to electricity for the whole community. At the same time, people have different expectations of what a fair and equitable system is and what this would mean in practice, in terms of the regulation, infrastructure and mechanisms in a future microgrid.

Most participants were clear that the current energy system is unfair and that problems of inequity arise at different levels and in different ways. This inequity manifests itself, for example, in connection fees or in flat-rate electricity prices that do not take into account the level of energy consumption (i.e., the difference between small and large users). There is also uneven capacity to improve circumstances, such as access to solar panels, improved energy efficiency or household batteries. An interviewee in the Moruya area summarised this situation in relation to on-grid and off-grid access:

> **My theory is the more people go off-grid or go on microgrids the more the people that are still grid-connected will get charged more by the energy companies 'cause they still want to have the same profit margins. Grid connection's never going to go down from where we are now.**
>
> Michelle, Householder, Moruya area

While fairness and equity were seen as major characteristics of a good microgrid by most people, they did not have a single definition of a fair microgrid design. Some participants already equipped with solar panels (and home batteries) emphasised equity in terms of the possibility of financial return on their initial investment in the equipment. For example, they could sell for a small fee excess energy to their neighbour(s) instead of wasting it or selling it back to the main grid for a small reward. Other participants were more concerned about the ability of microgrids to directly address socio-economic inequalities, for example by ensuring access to solar energy or energy efficiency for those who cannot afford it, or by implementing energy tariffs based on the level of energy use (i.e., large users pay a higher rate than small users). Very often these two concerns (for financial return on investment and for addressing inequalities) merged in people's understanding of an equitable system.

As Sun, from Bingie/Congo area put it:

> **My question about it is how do we make it equitable? For example, as somebody with a solar system who has invested a lot of money, how does that work if we're feeding out energy fairly across the village when say another household hasn't invested? But then also I'm in a bit more of a financially comfortable position than others so do I have a moral obligation in terms of supporting infrastructure like this in a village context? How do we figure that out? (...) Somehow there would have to be some sort of scheme through whatever company you do it through that could offset the cost or somehow maybe donate extra panels to people who can't afford it.**

Sun, Householder,
Bingie/Congo area

Finally, some people also mentioned that trust between members of a community is an essential ingredient of a fair system, regardless of its model for distributing costs and benefits.

How can a microgrid be considered fair and equitable?

If it rewards those who have invested in energy infrastructure more than others	**E.g., Rate or credit system that reflects people's individual investment in infrastructure such as PV**
If it takes into account local socio-economic inequality (income and wealth)	**E.g., Governments could provide solar panels to people who can't afford it OR people who own PV could share energy with them**
If it takes into account the level of energy use of households in similar conditions (similar demographics)	**E.g., Financial and legal mechanisms to reward/ penalise low/ high consumption (apart from people with special needs)**
If participants trust each other	**E.g., Government-owned power generation and storage infrastructure to encourage cooperation between participants**

A respondent from Tuross Head summarised these tensions well in the context of neighbourhood batteries:

> **“Look, you're always going to have the people that go well I've spent this much on a solar system and then you got all these people without solar systems and why should they benefit from my solar? But again you're part of a community. I mean I guess it would be like the battery I have at home in Canberra, all the power's going into that, it comes back, it's being used by the house and when I need more it comes from the grid. When the battery's empty it comes from the grid. When I get more sun it puts it back in, I'm taking it back out again so you might go okay well a community battery's like that house battery and it's being fed into by all the community and then it's going back out to all the community. So it reduces all their usage from the broader grid in terms of what their costs and their expenditure as long as that community battery retains enough for your backup emergency outages. So I guess that's kind of what I kind of imagined from a community battery. I don't know if that quite fits the micro-grid concept.”**

Mickael, Householder,
Tuross Head

Image: Eurobodalla Coast Tourism ©

FINANCING, OWNERSHIP, AND REGULATION/OPERATION

There is obviously a strong correlation between the fairness and equity of a system discussed above and the ways in which a system would be financed, owned and regulated/operated. Indeed, the way in which a system is financed, owned or regulated (e.g., participatory financing, collective ownership, and community self-regulation) determines the extent to which it can be fair, equitable and accessible. Similarly, the type of financing, ownership and regulation also reflects the values (e.g., sharing principles) that are embedded in the system.

Participants had very different views on this issue. Possible arrangements revolved around one or more key actors, including individuals, the community, non-profit organisations, government, private corporations (grid operators, energy suppliers). Participants trusted groups closest to them (neighbourhood, community) the most, with private companies being least trusted to own and operate a microgrid.

Equally (if not more) important as to who funds, owns, and regulates a microgrid, most people mentioned that their key values should be reflected and embedded in operations. Key values included transparency, accountability, being not-for-profit, providing local benefits, long-term sustainability and affordability.

The strongest, most common sentiment shared by our respondents was undoubtedly the lack of trust in energy companies, especially large companies:

> **"We've probably all had our fingers a bit burnt by electricity suppliers. Are they doing it for us or are they doing it for themselves? What is a price today is not necessarily a price in two, three, four years' time. That's the sort of lack of confidence we have in those big organisations."**
>
> Gary and Judith, Householders, Nelligen area

Unless private companies are well intentioned and regulated, our participants indicated they could not be viable partners trusted to operate publicly funded energy infrastructure.

This lack of trust in large companies was matched by a strong interest and trust in community supervised, financed, and managed microgrid models, wholly or partly owned by the community and or by a non-profit organisation. For the participants, the main advantage of such models is that most of the direct and indirect benefits (e.g., educating the community on energy issues or creating local jobs) accrue to the community. Local organisations and associations were particularly well regarded as actors promoting the general interest of the community.

At the same time, some interviewees raised concerns or reservations about models of community ownership. Questions that people raised were:

- Does the local community have the technical, regulatory and administrative capacity to manage complex energy infrastructure?
- Community groups are already stretched resource-wise, so how will they be able to take on a new project like this?
- Is there sufficient interest and investment in the idea from all community members?
- Does a community-owned system run the risk of creating or exacerbating existing tensions in the community?
- Does such a system have to rely on infrastructure being put on private property and what are the implications for property owners (e.g., maintenance cost but also compensation for potential disturbance)?
- Doesn't such a model risk increasing inequalities between communities or parts of a community that have the capacity (i.e., financial, administrative, regulatory, technical and social) to manage it and those that do not?

In light of these concerns, most participants also shared a relatively high level of confidence in fully or partially government-controlled ownership, as people believed them to be more transparent and accountable. In such a model, governmental actors (e.g., local council, state and the federal governments) or public companies (e.g., a distributed network service provider such as Essential Energy) would finance and manage the infrastructure, especially for emergency procedures in case there was an outage. A respondent from the Bodalla region made an interesting comparison between emergency measures for water and energy:

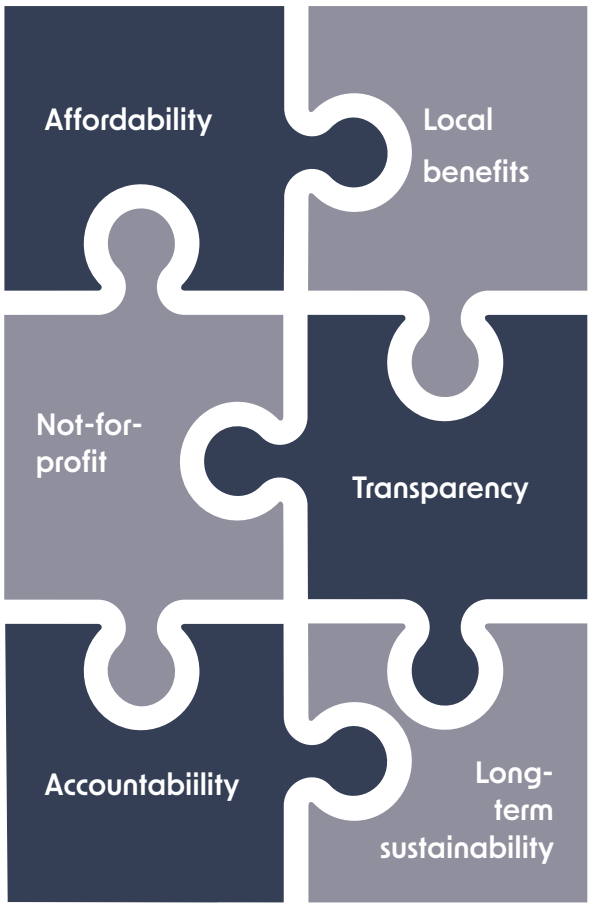
> **"Well the council do very well with water, councils generally do really well by saying well water restrictions, we now have level whatever water restrictions and things change and you can now not use your sprinkler or whatever. So can't we do the same thing? Couldn't council have the same regulations? Maybe a regulation that cuts in if there's a disaster, that that comes in and they send a message to you saying hey, we're now on energy restrictions and you can't use this, that or the other."**
>
> Susan, Householder, Bodalla area

Nonetheless, even while many participants trusted government ownership, there were still several concerns, namely:

- The current trend among government actors (including the council) to sell public assets to reduce spending or to replace increased spending in one area with a decrease in another.
- Governments have had a tendency to invest in specific areas or regions and neglect others. In the Eurobodalla context, this sentiment was particularly strong in Nelligen.
- Changes in government tend to create instability in terms of commitment or support in specific projects (e.g., an incentive scheme for the installation of rooftop solar panels introduced by a previous government and stopped or reduced by a new government). These changes could affect a microgrid if it is partly owned by the government and if the funding partnership between the government and the community is not established beyond the mandate of the government in place at a given time.

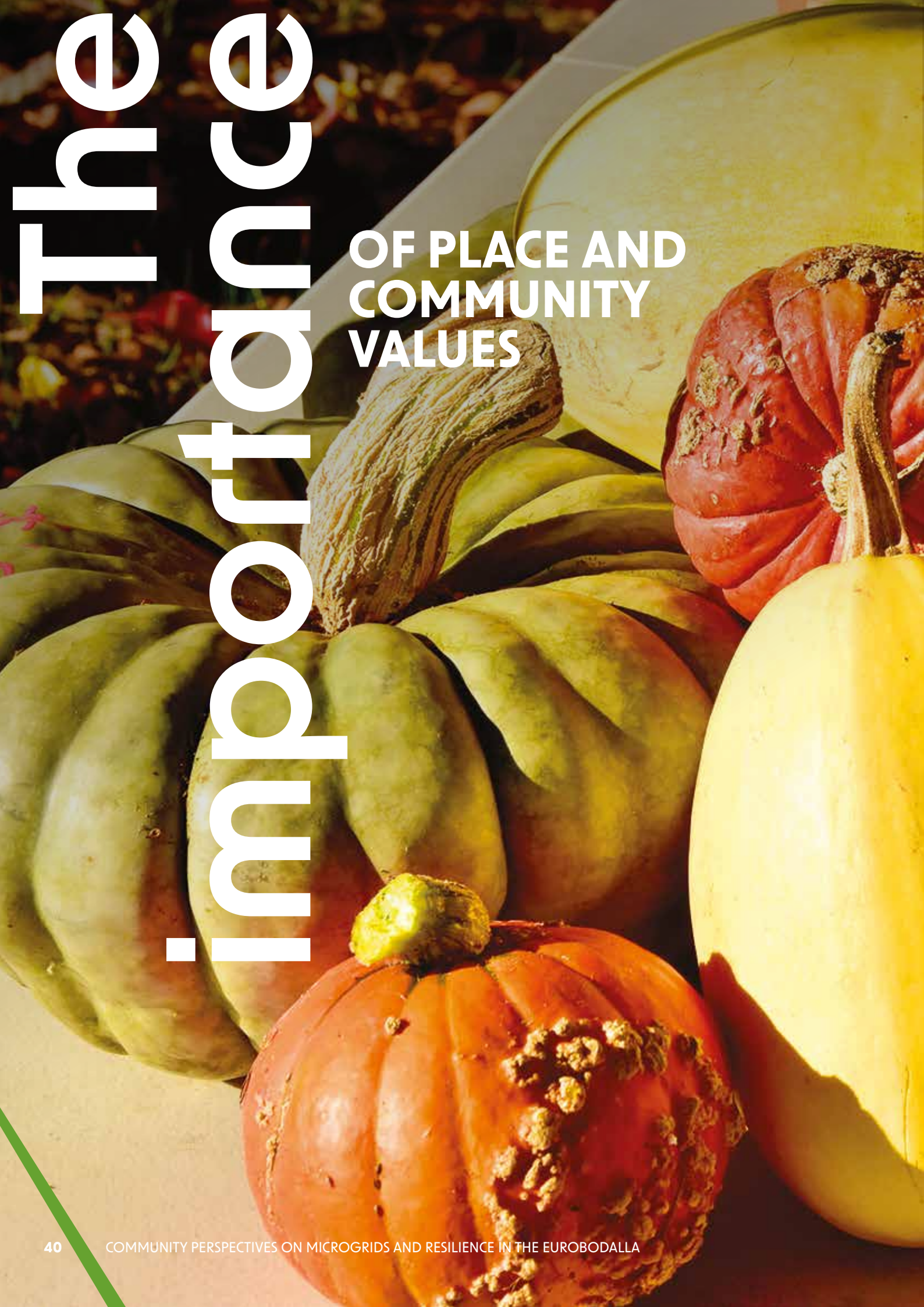
In addition to, and sometimes instead of, the ownership question, most participants mentioned that the priority lies above all in the values embedded in the microgrid. These values are shown in the following figure.

Figure 3: Values to be embedded in a microgrid



The following diagram shows the relative priority of each operational value for people, from 0 (low priority) to 4 (high priority). This rating was given according to mentions inside the interview context in which there was a free-flowing conversation, led mostly by the participant themselves. As such it's important to interpret the findings with this context in mind. People often change their views in a deliberative discussion context when they hear other points of view and are exposed to new information. As such, this analysis is provisional and would need to be further explored. What it tells us is that, when first thinking about this question, these are the values and operational issues that most often emerge for participants. We heard that reducing energy bills, increasing sharing capacity and local control were the top three operational priorities, followed by maximising local energy supply and finding out how to reduce energy consumption.

Figure 4: People's prioritisation of issues



The importance OF PLACE AND COMMUNITY VALUES

PHYSICAL GEOGRAPHY AND INFRASTRUCTURE

In imagining what a microgrid would look like and how it might be feasible in their own local context, many people raised important issues related to existing and future energy infrastructure (e.g., power lines and transformers) and physical geography (i.e., opportunities and constraints related to their local environment).

Most of the infrastructure issues raised by people were about the current and future state and purpose of community infrastructure. These included:

- the presence (or not) of a town hall or a community building,
- the existence of local network infrastructure (e.g., power lines and transformers) which may (or may not) be reallocated as part of a microgrid,
- the potential need for new infrastructure due to future population growth, or
- the poor state of public transport infrastructure which puts further pressure on lower income population because of their dependence on private cars.

Other related issues concerned housing. These included the energy inefficiency of existing buildings, the large distance between each property and the large distance between some properties and main power lines. To some participants, energy inefficiency represented a significant waste that should be addressed before making any major changes to energy infrastructure. On the other hand, some participants raised the issue that low density of dwellings makes the creation of a microgrid more complex, especially if the microgrid aims to minimise power losses in transmission lines.

People think about infrastructure and design (of potential microgrids) in sophisticated ways. Existing and future infrastructure is indeed embedded in people's personal stories that involve their sense of place and the values they associate with that infrastructure. As one interviewee explained:

> **"[T]here was a timber mill out here in the 1960s and seventies. There was high voltage power, runs all the way out crisscrossing the country in quite long distances. And most of the people who live in houses around here are connected up with their own separate transformers just about on every property. (...) And for a long time, even though it runs across the front of the property, I didn't want to be connected to the tower particularly, the inconvenience and [high] costs."**
>
> Andrew, Householder, Cadgee/ Nerrigundah area

Image: Eurobodalla Coast Tourism ©

In addition to infrastructure issues, many people expressed concerns about the characteristics and requirements of their local environment, at the household, neighbourhood, or township level:

Table 3: People's concerns about their geographical context

Type of concern	Examples
Risk exposure	• Town or infrastructure located in or adjacent to a bushfire-prone area • Potential damage to energy infrastructure because of coastal environmental conditions (mould, salt air, etc.)
Unequal distribution of energy generation	• Uneven distribution of sun exposure and available land between towns (i.e., some towns may be suitable for microgrids while others are not)
Environmental imperatives	• Land that cannot be cleared because it has essential socio-ecological functions (e.g., guaranteeing shade for poorly insulated houses during heatwaves and providing wildlife habitat)
Aesthetic integrity of the landscape	• Impact of potential new infrastructure on the landscape • Local regulations for landscape development in certain areas (e.g., clusters and provisos in Tuross Head)

Some participants used their own town or geographical context as potential models for microgrids, highlighting their advantages and the benefits that such systems could have, particularly on the local economy or the resilience of the area.

> **"if there was like a microgrid and people were open to investing in it then the opportunity to have other collective community projects or things that would come out of it, that would then also I guess benefit people economically"**

Emily, Householder, Bingie/Congo area

> **"I don't know of any other hamlets (...) up and down the coast that have everything there that Tuross has in the one place so therefore can support the needs of a lot of surrounding areas without people having to travel large distances. So I guess I'm thinking of it more as an urban hub for the surrounding rural area as well so not cutting it off on the highway"**

Julie, Householder, Tuross Head area

PEOPLE AND CULTURE

In determining what a microgrid might look like, physical geography and infrastructure are essential but not sufficient. In addition to these two elements, participants stressed the importance of incorporating people's perspectives and local culture into any project.

Generally, many participants saw that local energy solutions of this type would be of great interest to people in their community. However, people also raised concerns that their communities are diverse; made up of people with different needs, expectations and capacities. They raised the issue that possible tensions could arise over decisions of design and operation (including benefit sharing).

Generally, most participants felt that people would be interested in microgrids and other community energy projects. They generally explained this by pointing to a fairly vibrant community spirit in their area, which they attributed to, among other things:

- historically active local community organizations (e.g., local progress associations)
- numerous collaborative initiatives (e.g., food cooperatives, farmers' markets), and
- a sense of solidarity reinforced by recent extreme weather events.

Strong community spirit means that potentially controversial projects, such as renewable energy projects, may be more likely to be accepted by the local community if they are community-based projects, where local benefits are maximised and the expectations of local people are met.

> **"I think people are (...) becoming more comfortable with renewables and they're starting to understand that they can work, and it's probably a lot of how the media's portrayed it for – like it's taken a long time to get comfortable. But I do think there's a bit of like a – so like a green thumb type culture down here... like there's farmers markets and stuff that from properties just out of town that do really well and people like to buy local and be that sort of independent type person. And I think renewables is a part of that as well."**
>
> Daniel, Householder, Batehaven/Bateman's Bay area

Despite a strong interest and connection to local community, close attention to participants' perspectives shows that this was not uniform across all Eurobodalla townships. Several participants mentioned that there was a stronger distrust of government and large businesses in some communities. These more distrustful communities often feel 'left behind' and or have been scarred by a complex institutional history of unwanted 'development projects'. Yet other communities do not have such a fraught history and concern over future development proposals.

Among our participants, we found some differences in views on energy transition issues according to gender and age. There were also obvious differences according to social class and length of residence in the Eurobodalla.

Previous research has raised significant concerns about a lack of awareness in the energy sector about the gendered implications of different energy technologies and policies (e.g., flexible tariffs). Homes (and businesses) are often deeply gendered spaces where work, care, technology management and household responsibilities are unequally distributed between men and women.[11] Previous research in Australia has found that men are more likely to do the work involved in setting up, maintaining, using or responding to technologies in the home.[11] Among our participants, we also observed differences in interest and enthusiasm for the topic of microgrids with overall more men being interested.

Among our participants, we found some differences in views on energy transition issues according to gender and age. There were also obvious differences according to social class and length of residence in the Eurobodalla.

In some cases, the women in the household actively chose not to participate in the interview, despite being at home, because they were either not interested in the topic or felt or described themselves as less competent and confident to express their ideas. This is a significant finding because if microgrid community engagement only targets enthusiastic householders, the discussion of microgrids and its design considerations could exclude women's perspectives with implications for women's concerns and needs being met in the final design[12] (a problem that has occurred in other energy technology areas such as demand response and smart energy appliances).

Across ages, we found slight differences in the sense of urgency around addressing environmental and climate issues. While many older participants expressed the same concerns for these issues, a sense of urgency and anger at inaction was much stronger among younger participants. In particular, young people articulated a concern that the most significant impacts of current environmental changes will occur within their lifetime.

Differences were significant between respondents living in precarious socioeconomic and housing situations (e.g., low-pension retirees, unemployed, or renters) and those living more comfortably (e.g., those with high incomes and assets, homeowners, or multiple homeowners). Key differences we observed were not necessarily in the desire for greater energy efficiency or access to solar PV, but rather differences in the capacity to imagine, plan, and invest in individual or collective solutions in the energy domain.

Another important difference we observed was length of residence in the Eurobodalla. There were differences in understanding and concern about the fragility of the current energy system between people who had experienced bushfires (and the resulting long power cuts) and those who have not. Long-term residents also expressed some mistrust of newcomers, temporary residents, tourists and people with holiday homes. For example, they claimed that the latter may not be sufficiently interested in microgrids and community energy projects, a claim that our interviews disproved, given the enthusiasm for a microgrid among the majority of our newcomer and temporary resident respondents.

Image: Eurobodalla Coast Tourism ©

There are also potential tensions in the communities that affect all parts of the population, regardless of gender, age, social class and length of residence in the area. The two main tensions relate to the desire for changes in energy production and consumption patterns (i.e., more or less localisation of energy production and reduction/rationalisation of energy consumption patterns) and the perceived level of appropriate action (individual or community).

In terms of desire for change, while some support total change in the energy system (both in terms of production and consumption), others support more marginal and or incremental changes or no change at all. In terms of the perceived level of appropriate action, some believe that if change is to take place, it should be up to individuals to fund and manage it, while others favour more collective, community-wide approaches. Many fall somewhere in between, calling for a mix of individual and collective action.

It is important not to dismiss these tensions, as they can be very helpful in finding common ground in community-based projects. It is also important to consider these tensions in their complexity, as they reveal the heterogeneous nature of communities and potential inequalities in influencing decisions in such projects. For these purposes, these tensions can be integrated into established frameworks (e.g., in deliberative procedures) in which conflicts within and between communities are not exacerbated and which promote equal access to collective decision making.

It is important not to dismiss these tensions, as they can be very helpful in finding common ground in community-based projects. It is also important to consider these tensions in their complexity, as they reveal the heterogeneous nature of communities and potential inequalities in influencing decisions in such projects.

Finally, among the participants, perceptions of the behaviour and attitudes of others varied. These perceptions have major implications for design. In addition to the possibility of prior consensus on the need for a microgrid in a community, people's perceptions of each other influence the community's ability to share resources such as solar energy (and how that sharing should occur) and the desire to establish common rules (e.g., reducing energy consumption temporarily or permanently).

Image: Eurobodalla Coast Tourism ©

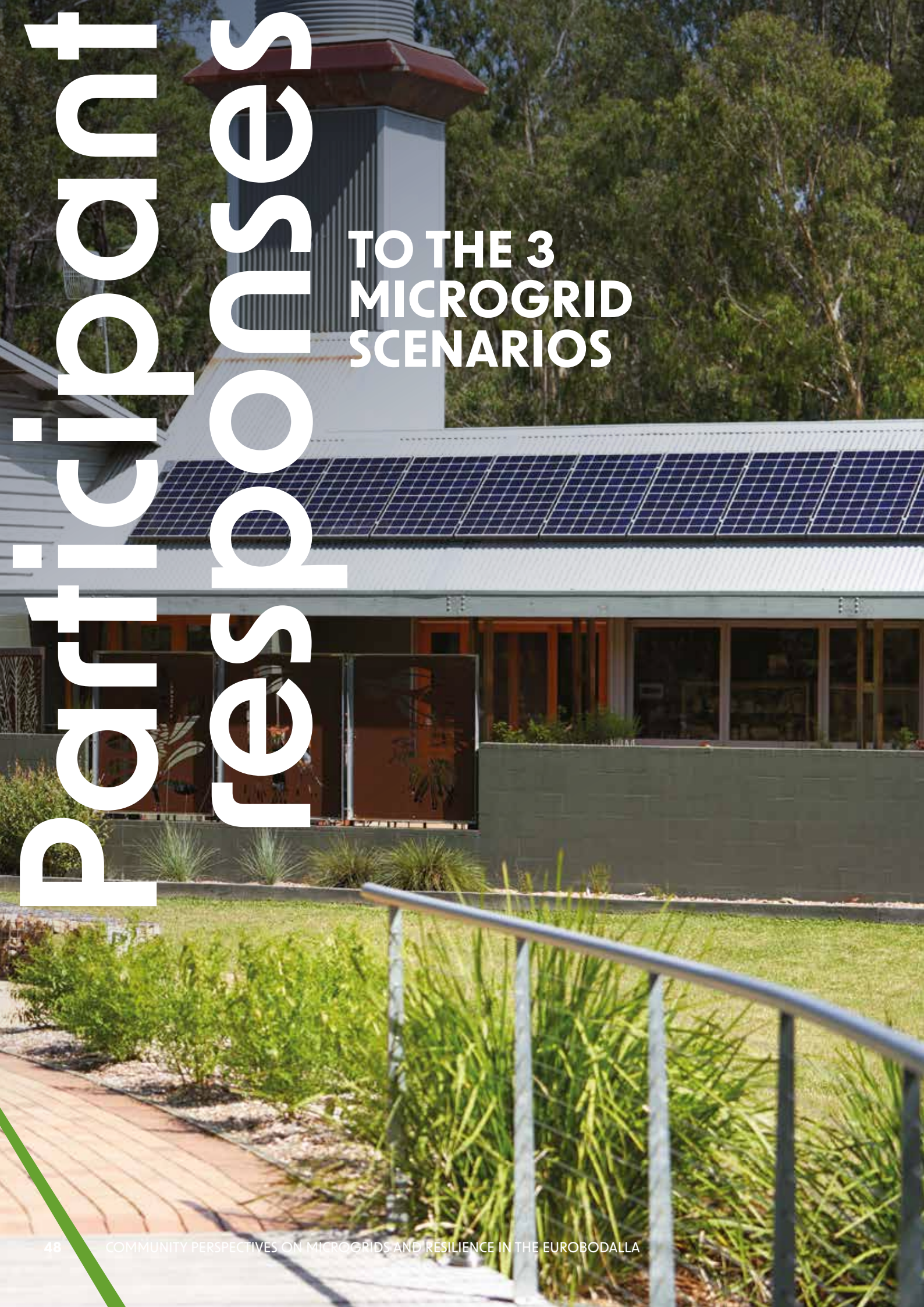
Participants perceived others as either not very concerned by community issues (including but not limited to energy) or, on the contrary, as very committed to action. They explained that people think and act as they do according to their own ethical and moral standards and concerns, which people often described as 'common sense' (e.g., using little energy out of environmental awareness) or their cultural habits and or childhood (e.g., growing up with little available energy).

They added that these can be changed with specific means, such as:

- economic mechanisms (e.g., regulation, incentive, price/cost, fees),
- education and communication campaign (e.g., promoting greener energies and behaviours),
- learning from other experiences/ examples (e.g., Yackandandah),
- consultation mechanisms,
- more or less active governments, and
- more or less active local organisations.

Participant responses

TO THE 3 MICROGRID SCENARIOS



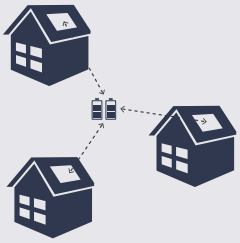
In addition to asking general questions about energy needs and expectations from microgrids, we also asked participants to reflect on three different scenarios of microgrids that we described in an interview prompt (see Appendix 1 for the Interview Prompt):

SCENARIO 1

Energy refuge: comprises a small amount of generation coupled with a modest sized battery is installed on a town hall (or RFS or emergency shelter, etc.) (this is not necessarily a microgrid)

SCENARIO 2

Modest-sized microgrid for neighbourhood: comprises of household solar throughout the community which powers a modest sized battery connected to the distribution network. It enables the electricity supply to remain operational within the community when disconnected from the main grid (during an outage etc.)



SCENARIO 3

More substantial microgrid for township: contains not only a (likely larger) grid connected battery but also significant grid connected power generation (e.g., a solar farm). This generation, together with the rooftop solar and home batteries, is sufficient to allow the community to run independently of the main grid for a period of days (still dependent on resident usage and generation conditions).

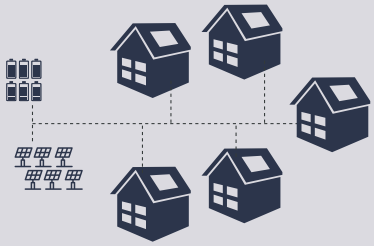
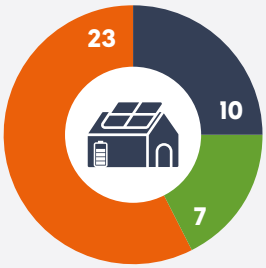


Image: Eurobodalla Coast Tourism ©

Below is our analysis of how participants responded to these three scenarios. The following table represents the level of interest in each of them. The level of interest does not necessarily mean that people are totally in favour or against a scenario, they may have reservations even if they expressed an interest. People's initial reactions range from 'interested', 'not interested' and 'no opinion'.

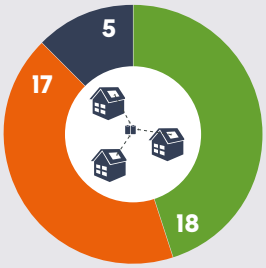
SCENARIO 1

Energy refuge



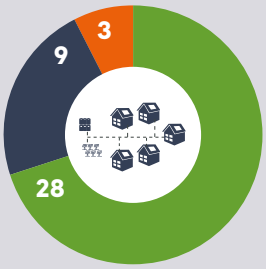
SCENARIO 2

Modest-sized microgrid for neighbourhood



SCENARIO 3

More substantial microgrid for township



Interested Not interested No opinion

Of the three scenarios, Scenario 3 was clearly the most attractive as it was perceived to increase energy resilience, reduce environmental impact, provide a future-proof technology and increase generation and storage capacity.

Scenario 2 is potentially the most divisive scenario. It is of interest to just under half of our participants, particularly because of its flexibility and potential ease of implementation. However, an equal proportion of participants saw that this scenario could exclude some parts of the community (notably those without solar panels or batteries). The prompt did not provide any specific information about tariffs for solar and non-solar owners. But this demonstrates the complexity of integrating new energy solutions into an already unequal context of solar haves and have nots.

Finally, Scenario 1 was the least attractive because most people did not necessarily feel the need for such infrastructure outside of extreme weather events, which do not occur frequently enough to warrant the investment.

Of the three scenarios, Scenario 3 was clearly the most attractive as it was perceived to increase energy resilience, reduce environmental impact, provide a future-proof technology and increase generation and storage capacity.

SCENARIO 1: AN 'ENERGY REFUGE' ESSENTIAL IN EXTREME CONDITIONS BUT NOT APPEALING FOR MANY

ADVANTAGES/OPPORTUNITIES

- **Powered shelter during emergencies (e.g., bushfires, floods)**
- **Powered shelter for the most vulnerable in difficult times (e.g., heat, cold snaps, high electricity prices)**

DISADVANTAGES/RISKS

- **No public buildings in their township**
- **Existing common building not suitable for (many) people or not legitimate or known by people**
- **Only rare occasions when such an investment can be made worthwhile**

Most respondents did not see the need for a system such as Scenario 1 in their own town or region. Many people pointed to problems with the existing public infrastructure in their town, including:

- There are no such public facilities in their town (e.g., Congo).
- The existing communal building is not suitable for (many) people in an emergency because of facilities such as limited toilets, because it is in a fire-prone area, or it is a heritage building.
- The existing public infrastructure is not known to the local people.

Others mentioned that the rare occasions when such a building is needed (e.g., a flood, a bushfire) does not justify a significant investment in the building.

Despite its limited appeal, some people considered Scenario 1 to be very useful in some places where a common facility such as a town hall and an emergency building exists and is perceived by all as an important building or where the need for such a facility is clearly identified. On a temporary basis, they believed that such an electrically powered building could be a site for energy generation and storage during emergencies when there is a power cut. On a more permanent basis, such a building could provide the most vulnerable people with a refuge or electrical shelter. This may include people living in precarious conditions or housing (including homeless people) who need to find shelter during episodes such as heat waves, cold weather and also during bushfires, but also people who cannot afford to pay the electricity bills. Some participants felt that such a system should be a minimum requirement for every village. As one participant put it:

> **"So I guess what I think is what each area needs is the sort of thing that we have in Moruya at the Red Door hall, a place where – that will have energy during blackouts to which people can go whether for refuge or just for recharging phones or making a cuppa."**
>
> Lisa, Householder, Moruya area

SCENARIO 2: AN EASY MODEL FOR 'LIKE-MINDED NEIGHBOUR-HOOD' BUT WITH NOTICEABLE ISSUES WITH EQUITY

ADVANTAGES/OPPORTUNITIES

- Flexible (in context and time) Valuation of existing individual infrastructure
- Possibility for like-minded people to share electricity
- Easy to set up (no large infrastructure) and coordinate
- Intermediate step before moving to a larger microgrid

DISADVANTAGES/RISKS

- Risk of increasing energy and technology inequalities
- Risk of increased tensions in the neighbourhood/community
- Insufficient power supply in the event of a long-term blackout
- Increased pressure at very local level

Scenario 2 is perhaps the most divisive option, since, leaving aside those who have no opinion on the subject, roughly half of our respondents perceived such a model as a great opportunity and the other half as a potential threat.

For those who perceived Scenario 2 as a potential threat, one reason frequently mentioned was that it could increase inequalities between the solar and battery haves and have-nots, and exclude the least equipped part of the population from technological progress. In addition, some people mentioned that it could also exacerbate tensions in the neighbourhood, particularly because of the small size of the infrastructure. As one respondent from the Mogo area put it:

> **"I wondered how that would work. And I think it's all too common to end up being in some sort of crazy neighbourhood – not neighbourhood, but neighbour fight over a fence, or the tree that's meant to be pruned on one side and then the other, such small scale things always seem to end up in some sort of – so I just wonder how can you make that process work so it's not relying on goodwill and other kind of unreliable human traits?"**

Sarah, Householder, Mogo area

Others mentioned that such a system would not be able to provide power during a long outage during an event such as a bushfire and would therefore not be very useful. Finally, some complained that there was a risk of putting a lot of pressure back on the very local level (i.e., the neighbourhood level), instead of taking more responsibility at a higher level (community, local council, state or even federal scales).

Among the positive features, people mentioned that Scenario 2 is easier to implement for many reasons. Firstly, it would not involve major planning changes such as a large new piece of infrastructure, especially in towns that do not have available land. Second, it would be easy to coordinate during an outage by going door to door and asking everyone to reduce their energy consumption at the same time. And third, it could also be an intermediate step towards Scenario 3, although with questions about how things like initial investment, agreements with suppliers or infrastructure needed for Scenario 2 could be useful for Scenario 3.

To justify the relevance of such a scenario, people also often referred to their own context (e.g., their street or suburb). In their justifications, they mentioned that their neighbourhood has:

- the right number of households in the street
- many people with renewable energy generation and or storage equipment, and
- many people with a common mindset (e.g., an interest in sharing energy with neighbours)

As a respondent from Rosedale/Guerilla Bay area sums up these local features:

> **“The scale looks about right, for example in our street we've got say 12 properties in our street and I could imagine that there'd be quite a lot of interest in a communal arrangement amongst the property owners because they just seem that type of people that they're interested in environmental and climate change matters.”**

Jason, Householder, Rosedale/Guerilla Bay

SCENARIO 3: THE 'PROPER WAY' TO DO A MICROGRID BUT REQUIRES CONSULTATION AND COMMUNAL LAND

ADVANTAGES/OPPORTUNITIES

- Increased resilience
- (More) reliance on renewables
- Future-proof technology
- Land availability in some areas
- Scaling-up capacity

DISADVANTAGES/RISKS

- Potentially significant infrastructure change is required
- Risk of not being accepted by the community
- Limited supply during a long outage
- Land required
- Decreased resilience (ie with large infrastucture located outside town, it could burn down first, and therefore not provide any resilience in a bushfire)

By far the most attractive scenario to our participants, the large microgrid was often seen as 'the proper way' to achieve a microgrid that is fit for purpose and future. For example, one Tuross Head participant said:

> **"It seems apparent to me that if you're going to do it then you use model 3 because it's doing it properly and it solves the problems that I mentioned with loss of power to vital industry."**
>
> Mark, Householder, Tuross Head

Despite this enthusiasm, some people expressed concerns about the potential risks associated with the size of the infrastructure that would be required in such a system. The size of the infrastructure could be a point of conflict and such a large microgrid would therefore need to be built in a participatory way with a long consultation process. On this point, a respondent from Broulee/Mossy Point said:

> **"The third one seems like a very, very big project and I don't know that it would be appropriate for an area like here. (...) the infrastructure that would be required."**
>
> Lisa, Householder, Broulee/Mossy Point

As for Scenario 2, some people also raised concerns about the limited amount of energy available in such a system if another event like the 2019–20 bushfires occurred. In addition, because the infrastructure would likely need to be located outside of town, some respondents, with the experience of having the fires actually come into town, wondered if it would actually increase the resilience if the infrastructure (e.g., a large solar farm outside of town) burnt down during the fires.

These few risks did not prevent a large majority of our respondents from thinking that this model was the most favourable for several reasons, including:

- Improved resilience (short to long term outages)
- Environment (renewable sources)
- Future-proof (adaptive technology)
- Land availability in some area
- Scaling-up capacity

A respondent from the Bingie/Congo region said, summarising most of these benefits:

> **Model 3 is obviously the ideal one where basically you're covering the resilience of the area and looking to environmental issues but possibly some different type of time shift technology, instead of batteries maybe thermal storage.**

Paul, Householder,
Bingie/Congo area

By far the most attractive scenario to our participants, the large microgrid was often seen as 'the proper way' to achieve a microgrid that is fit for purpose and future.

Summary

This report has provided in-depth analysis on a topic that has previously not received much attention. That is, what do people in bushfire affected areas think about the feasibility of islandable microgrids for themselves and their community.

For others asking this same question, it will be of interest to know that people's readiness and interest in microgrids – *whether it feels feasible to them* – is influenced by 1) their specific needs and expectations of energy services; 2) their socio-economic backgrounds and previous experiences and 3) the physical environment around their town and home. This means that every regional area in Australia will have slightly different to potentially very different results to what this report outlines. Importantly, Aboriginal and Torres Strait Islander perspectives (not included in this report) may also have their own distinctive set of needs and expectations.

A key finding of this research is that people are worried about the future of their electricity infrastructure. Even those who do not believe climate change is a significant future problem still see energy service delivery as fragile and uncertain. People see and experience the energy system as changing, but also see and experience very little communication about what is happening and why. Increasing prices only contribute to a lack of faith in the current governance of energy. Many also do not understand why obvious measures to improve things (like building codes and energy efficiency) are not being more actively pursued.

The public would like more communication about the energy transition and how it affects them. This communication needs to be two-way so that decision makers are accountable to concerns raised by people. A clarity around roles and responsibilities in the transition between the market bodies, federal and state government, and local council, civil society and businesses like networks and solar installers would help significantly with this work. Our findings, in line with other research in Australia,[1–3] indicate that there is public support for a different approach to governing the energy transition.

Image: Eurobodalla Coast Tourism ©

While participants in this research were open to the idea of new energy solutions – such as a microgrid – the number of questions and concerns they raised should also alert us to the importance of ensuring that any future developments respond to, and resolve those concerns. A lack of explicit interest in microgrid technology by some people (for instance, some proportion of women) at this early stage also alerts us to the importance of finding ways to ensure those groups are involved in any future discussions, since they – like everyone in the community – will be impacted by any new energy infrastructure.

A lack of interest early on should not be taken to mean that these groups will not be impacted. An implication of this is that microgrid proponents will need to take particular care to engage some types of users. It is important to recognise that engaging with difficult to reach groups requires a specialised skill set (that is different to conventional market research and survey methods expertise).

While it is clear that some participants can see microgrids fulfilling their needs, including to provide backup during long outages, others cannot see any scenario where a microgrid would provide resilience benefits to their home.

There are many other values that people expected of microgrids such as enabling local energy sharing and local economic benefits.

The expense and complexity of microgrids mean that many expected values may not necessarily be easily delivered by microgrids. The results of other SμRF analysis will allow us to explore different values and see how they align with community understanding and expectation.

A microgrid scenario which intends to draw on household solar (scenario 2) raised a lot of confusion and many questions for a large number of participants. This scenario raised the issue of solar 'haves' and 'have nots' in a way that is rare for people to get a chance to think about. It was not immediately obvious for people how solar owners could benefit from the system but not at the expense of energy access to non-solar owners.

BIOGRAPHIES

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Dr Chalaye is a post-doctoral researcher in the Battery Storage and Grid Integration Program (BSGIP) at the Australian National University. He works on the social implications of energy decentralisation (microgrids). He holds a PhD in comparative environmental politics/policy from the University of Canberra, Centre for Deliberative Democracy and Global Governance. His research interests include energy and environmental sociology/politics, deliberative democracy theory and qualitative research methods.

DR HEDDA RANSAN-COOPER
SENIOR RESEARCH FELLOW

Dr Ransan-Cooper is an environmental sociologist with an interest in the governance of emerging energy technologies, with a focus on distributed energy. She leads the social science research activity within the Battery Storage and Grid Integration Program (BSGIP). She is particularly interested in the formatting of different energy publics and social movements and their role in energy transformations. She is also interested in how innovation is defined and the politics associated with the emergence and governance of distributed energy technologies.

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4 'Transdisciplinary' refers to research that responds to and seeks to address a 'real-world' problem or question by integrating knowledge from different disciplines and from the broader context (e.g., community, government or industry knowledge).
5. Note that First Nation community members in the Eurobodalla (and if determined appropriate, beyond) will be engaged with through a separate, culturally appropriate method.
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APPENDIX:
THREE SCENARIOS/MODELS OF MICROGRIDS

SCENARIO 1: TOWN-HALL EMERGENCY BACKUP POWER (NOT A MICROGRID)

Household sized batteries are installed in town halls (or RFS or emergency shelter, etc.).

Their operation differs under three conditions:

1. **During normal conditions** – the battery would keep the network stable and in good working condition. This may increase the amount of solar that can be installed in the town.
2. **During short power outages** – the battery would provide power to the premises (e.g., town hall) for a few hours.
3. **During prolonged outages** (such as natural disasters) – the battery may run out of power, unless there is sufficient solar to recharge it. (Note that solar systems in the community do not function during an outage).

Ownership and operation

- A third party (could be local government or utility) owns the assets
- The assets are operated for the benefits of the property owner/occupier
- During an outage there will not be electricity in homes – even rooftop solar systems will not operate unless they have a backup enabled battery. Residents will need to go to the community property with the battery (townhall or emergency shelter).

SCENARIO 2: MICROGRID FOR ESSENTIAL RESIDENT NEEDS

A modest sized battery is connected to the distribution network. It enables the electricity supply to remain operational within the community when disconnected to the main grid (during an outage etc.)

This will allow rooftop solar systems to remain operational, however the modest size of the battery means power will be lost across the community unless all residents greatly reduce their electricity consumption.

Microgrid operation differs under three conditions:

1. **During normal conditions** – the battery would keep the network stable and in good working condition. This may increase the amount of solar that can be installed in the town.
2. **During short outages** – the microgrid will sustain the local electricity system for a limited period, ranging from minutes to a few hours. The duration will depend on how much local solar is being generated and the degree to which residents reduce their electricity consumption.
3. **During prolonged outages** (such as natural disasters) – the microgrid would power off after the battery is drained, which would likely occur within a short time period (up to a few hours). After this point all rooftop solar would also switch off. The operation of the microgrid may be extended to run for days if residents switch off all but the absolute essential appliances (e.g., fridge and internet router) and there is good sunshine.

Ownership and operation

- Generation assets (eg rooftop solar PV) are largely pre-existing and privately owned (i.e., have been paid for by private individuals).
- The grid battery may be owned by a wide range of actors, such as the network operator, the council, a community organisation or a third party.
- The operation of the microgrid when disconnected to the grid is yet to be determined. What is clear is that customers' energy use behaviour will play a dominant role. This may be influenced through many means, including social agreements of expectations and norms.

SCENARIO 3: MICROGRID FOR EXTENDED ENERGY SUPPLY

The microgrid contains not only a (likely larger) grid connected battery but also significant grid connected power generation (e.g., a solar farm). This generation, together with the rooftop solar and home batteries, is sufficient to allow the community to run independently of the main grid for a period of days (still dependent on resident usage and generation conditions).

Microgrid operation differs under three conditions:

1. **During normal conditions** – grid power can be used to charge the battery and support the microgrid in long cloudy periods
2. During short outages – the microgrid is able to cover residents' typical power needs for a period of a few hours (depending on power generation conditions).
3. **During prolonged outages** (such as natural disasters) – the microgrid is able to cover residents' essential service needs for a period of days, presuming there is reasonable daily sunshine or wind.

Ownership and operation

- Some generation assets (eg rooftop solar PV) will be pre-existing and privately owned (i.e., have been paid for by private individuals). How their generation is recognised during extended periods of disconnected operation is an open question.
- Added generation (solar) and storage (battery) assets may be owned by a wide range of actors, such as the network operator, the council, a community organisation or a third party.
- Electricity supply wise, not much changes during outages except that availability may be a bit more limited – making rules for restricted/prioritised useful. This may be influenced through many means, including social agreements of expectations and norms.
- The possibility of extended operation separated from the grid raises the importance of considering the financial and governance models that are in effect during these periods.
- Whilst power is available for landline operation and mobile phone charging, the microgrid may not cover (all of) the external telecommunications infrastructure such as phone towers needed to maintain mobile coverage.

Synthesis table

	Scenario 1	Scenario 2	Scenario 3
Normal electricity services during a short outage	✗	✓	✓
Normal electricity services during a long outage	✗	✗	✓
Restricted (emergency) electricity services during a long outage	✗	✓	✓
Normal electricity services during ormal conditions	✓	✓	✓
Potential income streams created during normal conditions	✗	✓	✓
Cost and (new) infrastructure needed	$	$$	$$$

Battery Storage and Grid Integration Program

An initiative of ***The Australian National University***

SμRF