

PEOPLE-ORIENTED PERSPECTIVES ON DESIGNING THE FUTURE ENERGY MARKET

INTRODUCTION

Australia, as elsewhere around the world, is undergoing a transition from a centralized utility-to-consumer electricity system to a decentralized system with many consumers also acting as producers. This is often referred to as Distributed Energy Resources however in this report, to foreground a more active version of this future (see section 6 below), we will refer to this as **Decentralized Energy Production and Distribution (DEPD)**. As a result of our expertise in Transition Design, the *UTS Design Innovation Research Centre (DIRC)* has facilitated workshops at the request of *Energy Consumers Australia (ECA)* and consumer advocates who are engaged with the *Energy Security Board (ESB)* on emerging use cases informing planning for the Post 2025 Distributed Energy System.

These workshops focused on particular use cases provided to DIRC with their built-in constraints and assumptions but aimed at exploring more general design-based approaches to managing Energy Transitions. Design-based approaches focus on the human side of transitions, both **likely reactions by diverse households and small businesses** to infrastructure, regulatory and market changes, and ways in which diverse households and small businesses could be encouraged to **develop new social practices that support preferable versions of the coming DEPД system**.

Participants were invited to participate in the workshops so included only those with capacity to opt in. There were representatives from the ESB and ECA, as well as representatives from a variety of customer advocacy organisations.

The workshop deliberately focused on use-cases that involved system management of household scale production or consumption of energy in order to protect the security of the DEPД system. Because these use cases imagined direct but occasional interactions between people and the energy system in ways that challenged expectations of households and small businesses being able to be passive in relation to the energy system, even as a small producer feeding in with their rooftop solar for example, these use cases provided a good way of testing the human-centered design-based processes that were being piloted.

The use cases concerned responses to imbalances in the electricity network when supply from roof top photovoltaics feeding into the grid can exceed energy demand by end-users. One use case concerned ways of encouraging households and small businesses to redirect or limit supply from their PV systems when supply was high and demand low, such as in the middle of the day. Another use case concerned households and small businesses allowing grid balancing service providers to engage household and small business appliances during periods when there were high levels of electricity supply from PV systems.

Many participants from the customer advocacy side represent consumers who may not engage with the specific use cases that were the focus of the workshop. While attention was paid to understanding and then reframing the problems underlying the use cases, participants from the customer advocacy side participated with the assumption that any coming transition toward a DEP results in a fairer system that ensures access to electricity for all households and small businesses as an essential service.

The aim of the workshop was to pilot **Human-Centred Design approaches** to managing the transition to a more Distributed Energy system. Human-Centred Design approaches entail moving **from Principles to People and their Practices**. It is a creative approach that tries to imagine how a situation would actually happen, at an everyday level for a particular type of person. **This kind of scenario-based thinking focuses participants on the kinds of products and communications that need to be designed for that situation to be acceptable and perhaps preferable for those kinds of people.** Without getting to this level of material practices, there is a risk that systems can be established that model as fine in principle, but which have unanticipated consequences at the level of lived experience.

PERSONAS

In this workshop, participants were asked to think through use cases using **Personas**. A *persona* is a richly descriptive picture of an individual who may represent a segment of people who will be impacted by design decisions. The emphasis is less on that person's abstract or espoused values and more on their everyday activities and preferred practice experiences. The personas selected for the workshop were not based on demographic or psychographic research but were fabricated to demonstrate the use of personas in decision-making and so represented crude worldviews toward energy production and consumption:



a household with an investment mindset



a household with a cost-saving mindset



a household with a sustainability-concerned mindset

Participants were asked to think through the conditions under which that persona could or would engage with that Distributed Energy System scenario. The workshop explored the practical side of those conditions; what kind of interactions with the different aspects of the Energy System would be involved in plausibly preferable versions of a scenario of interacting with a Distributed Energy System.

A key aspect to the workshop, **which proved a significant challenge for participants but was acknowledged to be crucial to consider moving forward, was to try to imagine that people will behave differently in different contexts**, that current habits and expectations will not be the ones that carry over unchanged into a very different kind of Energy System.

What follows extrapolates from the particulars of participants thinking through the use-cases in terms of the personas to principles and processes that could inform the wider design of the Post 2025 more distributed energy system. Feedback from the workshops indicated that the human-design processes **(persona-driven problem-reframing and not just solutioning)** were readily taken-up by participants, providing insights into new ways of approaching the management of the transition to a DEPD system. DIRC therefore recommends that these kinds of Human-Centered Design principles and processes be incorporated in the ESB's maturity plan.

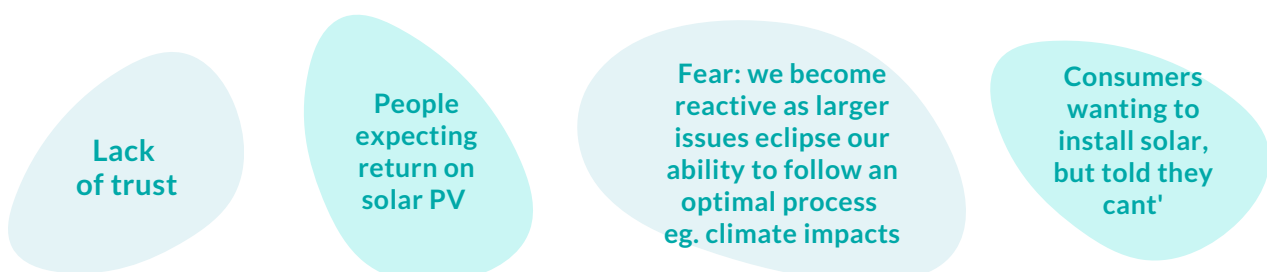
DESIGN PRINCIPLES

1 ACKNOWLEDGING CURRENT MOTIVATIONS

Many on the larger producer side of the Energy System are aware that, though they have lent their working lives and expertise to ensuring the establishment of an almost always reliable system of energy provision to a growing and changing society, there is nevertheless, rightly or wrongly, a significant level of distrust of, and/or disgruntledness with, the large producer side of the Energy System by the consumption side of the Energy System. Transitions demand engaging with these sentiments, even if they are uncomfortable, and there are design-based ways of ensuring that **existing attitudes and assumptions are tabled in productive ways that can inform participatory design of those Transitions.**

It is being argued that much of the reason for already emerging grid instability is the result of households deciding to install rooftop PV in an attempt to grant them some level of independence from utilities. Attempting to alter the current management of the production and consumption for those already with rooftop solar may run contra to many of those motivations, and may risk sparking a reaction.

These issues are not particular to the Energy System, or rather, they are part of wider factors. OECD governments for the last decades have been promoting individualism, household level responsibility for ensuring economic flexibility and resilience, and the power of entrepreneurial competitive behaviour to enable the most efficient common good. These same agendas have underpinned privatization, deregulation and unbundling of the Energy System, reforms aimed at cost efficiencies but carry expectations of consumers that may not fit the 2-sided nature of the DEPD system. If grid security of a Distributed Energy system requires households to collaborate with the system through the creation of new choices necessary to deliver collective benefits, convincing households of that may be complicated given the shift in agendas.



These, and all those following, are verbatim notes participants put on the online collaboration boards used during the workshops.

2 PEOPLE CAN AND WILL CHANGE (UNDER THE RIGHT CIRCUMSTANCES)

An assumption guiding any transition should be that people will change with the systems that they are in. The aim of planning for a transition should not be to fit necessary system changes around existing notions of what people will and won't do on the one hand; nor should it be predicting what changes people will make in reaction to system changes. Rather the aim should be to **work with people**, or at least with the people who do have the capacity to change, on the changes that will happen over time to both how they live and work and how the system enables their living and working.

The changing that people can and will do is a product of

- a) Consenting to undertake change
- b) Learning about necessary change
- c) Being helped make changes through the design of everyday products, communications and services
- d) Being allowed to make changes gradually

Needs to have boundaries as to how it works, when it would happen, how many times, etc

How might we collaborate together rather than control based paradigm?

3 PARTICIPATORY DESIGN

People will be more amenable to make changes that they have participated in designing. This is difficult because: the Energy System is technically complex, disenfranchising lay participants in decision making; the changes need to be made quickly, whereas participation takes time; the stakes are high and politics is hard to avoid.

The workshop involved customer advocates rather than customers themselves. Whilst advocates clearly understand those they advocate for, all would prefer to facilitate direct involvement by some of those they advocate for.

How might we increase people's altruistic motivation to help manage the situation?

Collaboration - encouraging community cooperation / collaboration to solve

Consumers can be rewarded for participation and contribute towards solving the problems

4 PUBLIC EDUCATION

Most consumers have had no need to understand the existing one-way electricity system. The workshop began foregrounding the way the existing system is a network that requires balancing. A Distributed Energy System depends on all participants in the system having shared mental models of how that system works.

Work to date has focused on Market Design based on current consumer habits, values and understandings. All of the latter can be modified with careful and concerted public education campaigns. Previous Energy Transitions, such as electrification, were accompanied by extensive communication campaigns and training – to ensure safety, but also maximum sense of benefit from major infrastructure investments.

This transition to Distributed Energy Resources, whether renewable generation and batteries, or other kinds of storage, like hot water or household pre-cooling, or demand management, like reducing or increasing higher loads like air conditioning or electric vehicle charging, requires extensive education, beyond the minimal electricity literacy levels involved in existing electrical power usage. Most households for instance do not have accurate mental models of the relation between electricity consumption, air conditioning settings, temperature and thermal comfort. This will make getting consensus around demand management of air conditioning difficult to achieve.

People don't know how to help/respond

The problem (balancing) is invisible ("not a problem") to most drivers of demand (consumers)

People see only risk and stick with status quo

5 LEARNING NOT MARKETING

Since the objective is cooperative behaviour to sustain a stable Distributed Energy System, offerings should be framed as something people learn about, preferably from trustworthy third parties, rather than something that people only ever hear about through advertisements.

Participating in a Distributed Energy System should be a **consensual outcome of a well-informed negotiation**, rather than something households or small businesses are sold-on. The latter framing suggests asymmetry if not exploitation, when the transition requires trust building.

Framing we're not talking about it in a way that consumers understand

Automation turns to marketing

Prefer word of mouth from trusted person (not door to door sale)

6 CAREFUL NAMING (AND SO FRAMING) OF PROBLEMS AND SOLUTIONS

The Energy System's scale and complexity has required it to be dominated by technical experts. Challenges facing the system are currently characterised using terms drawn from this supply-side perspective rather than in terms that would be inclusive of the perspectives of customers. Part of the Energy Transition involves developing new names for new kinds of interactions, ones that demonstrate openness to diverse non-expert worldviews and values.

For instance, moving to a Distributed Energy System means that consumers are no longer just consumers but also producers. The term 'prosumer' has connotations that do not suit all with actionable Distributed Energy Resources. Ideas such as a 'minimal demand' have a technical meaning, but can also be interpreted critically from the perspective of sustainable energy advocates. Managing energy production and consumption means very different things if understood as 'balancing,' or 'lending,' or even 'banking' or 'helping,' etc.

Frame not as a consumer problem but as a system problem

Using consumers could imply consumers think and behave the same way

The problem is only visible to a small number of technical people and the problem is invisible to most people

Understood as a community asset - our choices affect others

SOLUTIONING PRINCIPLES

7 AUTOMATION REQUIRES (REVOKABLE) CONSENT

There is an assumption that many households want, and so will continue to want, their relation to energy to be 'set and forget.' However, it takes trust to be comfortable with forgetting, and so that puts the onus of the way the setting is done.

People are more likely to commit to, and maintain, certain settings if they trust that they are allowed to revoke those settings should life circumstances make that necessary.

Part of trust-building is each party revealing their true intent toward each other. Currently, incumbent producers and those responsible for managing the stability of the grid would also like to see as many of those on the consumer-side of the system, especially those also producing, commit to settings that would allow the system to be both predictable and controllable.

How to
override
control

I do not want to have to be actively
involved, but I want to be able to
say no and I want to know in
advance what you are doing

8 NEGOTIATED MUTUAL CONTRIBUTIONS

Current planning for the Energy Transitions already underway tends to presume that people currently on the consumption-side of the Energy System will need to be convinced to modify their behaviour in order to ensure the stability of the coming Distributed Energy System. Questions are often framed as if the only party making changes are households and small businesses. **Perceptions of the process being one-sided can undermine trust and motivation to make change.**

To encourage households and small businesses to agree to levels (and/or times) of management of their own consumption and production, those negotiations need to be two-sided, with larger producers of energy and managers of the grid being seen to be genuinely making their own contributions to the mutually beneficial outcome of what gets agreed.

In a genuine negotiation, it should be clear that either party can make different kinds of contributions and for a diversity of reasons. The transaction need not be framed as monetary incentives for inconvenience, but can be a wide range of different kinds of delays, loans, sharing, gifts, sacrifices, rewards, etc.

Need more visibility
to understand the
purpose

Have flexibility in the
existing program

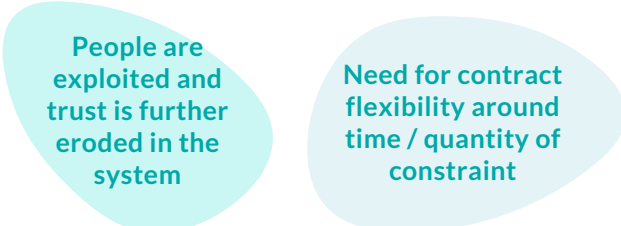
Assumption that it's the
customer that needs to
change their behaviour,
not the industry

9 NON-NEGOTIABLE CONDITIONS

To facilitate active participation by all parties in the transition to a Distributed Energy System, there should be the expectation that people can insist on some guaranteed aspects of the service as opposed to other variable ones.

These might be essential service guarantees, like minimal levels of service provision – the capacity "to at any time use this" or that device in exchange for allowing modifiability in usage of others. But they might also be other kinds of demand, such as ensuring that a household's energy supply is effectively only from renewables and part of the removal of fossil fuel based electricity generation. Or it might be demands that the direct beneficiaries of any energy management are local or a particular class of consumer (e.g., schools or social housing, etc).

Other conditions might involve providing warranties for any household or small business equipment whose use-life is impacted by consumption or production management. There should also be an acknowledgement that agreements made around Energy Management might impact other arrangements households or small businesses might have made, such as internet or the provision of other services that are energy dependent (e.g., working from home).



People are exploited and trust is further eroded in the system

Need for contract flexibility around time / quantity of constraint

10 CLARITY AND LAYERED DEPTH OF INFORMATION

Collective action is encouraged by transparency about inputs and the distribution of benefits. The Energy System has already recognized that consumer action, such as energy supply switching to encourage price responsiveness in suppliers, requires simple comparability.

However, simplicity should not be mistaken for clarity. On the consumer side, different people want different levels of detail and it can be frustrating when available information has only basic information to suit those who want to make quick decisions. Communication of offerings and agreements should allow those who need to dig deeper into further layers of information. For those who do not dig, knowing that digging is possible is a source of trust.

On the system side, comparability can restrict innovation in offerings, so committing to layered transparency allows new offerings to be developed that are nevertheless still legible to those on the consumer side and not taking advantage of structural inequalities in understanding of the energy system.

Committing to transparency about DEPD offerings should not only be at the beginning of any negotiated agreement. It should continue through the delivery of that setting; those on the customer side should see, and have the ability to dig deeper into, the ongoing benefit (whether to them, their community or to the system itself), of what they have agreed to. Such ongoing transparency promotes maintenance of those agreed to settings.

The notification itself is valuable even if I don't check it because it gives me confidence that they are giving me the right information

Greater visibility and access to data

Mechanism introduces complexity so I want to have confidence on how to validate that it's saving me money. Scanning old bills (baseline), wanting to know how I can verify ongoing that it's working and saving me money

11 PRACTICING NEW ENERGY-RELATED BEHAVIOURS (WITH DESIGN ENABLING)

A Distributed Energy System is fundamentally different to the Centralized Utility-to-Consumer Energy System that has been wired into dwellings for the last 100 years. The coming Distributed Energy System will have new kinds of devices and service providers to enable new kinds of interactions with the Energy System. Actions that seem undesirable, unlikely or even impossible now might develop and become widespread.

People adopt new behaviours when those behaviours are modelled for them and are then provided with designed assistance in acquiring those new behaviours. **Crucial to learning new behaviours is being given the capacity to try them out**, adjusting household or small business practices to allow those new behaviours to fit in. Such a learning-safe environment would for instance involve the capacity to withdraw without penalty if the behaviours prove incompatible with other everyday practices. Also crucial is giving people time to become expert in those practices, so that they are habitual but also modifiable as conditions change from time to time.

Learning how it works - does it match your needs

Learning by doing and understands the reasons for doing it; is ok for her solar to be turned off in critical times for the grid (may be only 5 minutes)

Persona would learn how to respond to the app after being alerted via text... Overtime increasing automation

12 PATTERNS AND EXPECTATIONS FOR COLLABORATIVE ARRANGEMENTS

Given that householders and small businesses will be asked to be more dynamic about their consumption and production of electricity, it will be appropriate if larger producers of electricity and managers of grid stability adhere to better standards for contracting arrangements with householders and small businesses:

- Giving consumers no penalty opt-outs as much as possible
- Giving consumers longer grace periods
- Giving consumers commitments to higher levels of notification
- Giving consumers some level of flexibility within agreements
- Giving consumers someone to speak to at any time

The water must be hot whenever I need it, I need to be told about when is likely to happen and a tip on when I might want to time family water use

I would like to be able to say no by sending a text back saying NO

Availability of help line

I can accept 30 minutes warning

13 INCLUSIVE DESIGN PRINCIPLES

Systems have tended to be designed for mainstream 'normality' with additions or modifications made for people or households who fall outside what is considered normal. Accessible design for example tends to provide supplementary options for people with disabilities.

Inclusive design reverses this approach, suggesting that designing for a diverse range of minorities not only ensures that systems better serve such people, but also tends to mean a more usable system for the majority, especially since everyone at some time or other tends to move through non-normal ways of living – e.g., temporary disability, such as a results from an accident or situational disability, such as being in a context that does not allow full use of all of one's faculties.

Distributed Energy use cases therefore should prioritise a range of minority conditions first – non-traditional families, renting rather than owning, frequent moving from household to household, being unemployed, apartments rather than suburban, gig work, etc.