Australian National University

ANU Centre for Energy Systems response to AEMC pricing review:

Electricity pricing for a consumer-driven future

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Executive Summary

We strongly support the AEMC's detailed review of electricity pricing. This pricing review activity, from our perspective (as researchers of energy futures, VPPs, DER and CER), is a critical and necessary action if we are to have a smart and inclusive energy system in Australia. It is evident in the thought already invested in the terms of reference and the pricing review document that the AEMC has invested a lot of effort in thinking about the issue of consumer pricing and are intending to evolve (improve) their methods related to thinking about consumers and pricing. We agree that a refreshed, evolved, and/or completely new approach is required for such an important and fundamental issue as consumer pricing.

We understand that the AEMC needs to toe a fine line between prescriptiveness and flexibility in rulemaking. We feel the principles-based approach is suitable. Throughout this submission we have provided our thoughts on how the principles proposed by the AEMC could be expanded and improved. The energy system is complex, and as energy system designers it is important that we can embrace this complexity so we can design a system that responds to it.

The feedback provided in this submission aims to help the AEMC take their thinking and analysis further. Our feedback is intended to be critically constructive and provide practical advice, tools, information and methods that can help ensure this important process of reform results in real, positive change for Australian consumers, energy users, households, and communities.

Our key recommendations are as follows:

- Be reflexive about your process, assumptions, and analytical frames as you proceed and utilise frames and insights that already exist to check your process.
- Build on a larger evidence base than is noted in Appendix B of the consultation document, so that AEMC can anticipate a broader set of possible futures.
- Build a richer picture of Australian energy users, consumers, households, and communities to broaden the existing archetypes and vignettes.
- Include the voices of all impacted by this change by explicitly seeking genuine input through dedicated engagement processes.

Our team at the ANU Centre for Energy Systems (ACES) has included relatively lengthy responses below for your consideration with the intention of being as supportive of the AEMC process as possible. We feel this is a very important review and our hope is that the information we have provided here can help make better reform outcomes.

We are happy to discuss any of the themes in this submission further with the AEMC or other organisations involved.

Question 1: Do you consider that we should make any changes to our proposed approach to this review?

We applaud the approach as a rethinking of the current difficulties with electricity pricing. In general, we see much merit in this AEMC approach. We list further suggestions related to your approach in our response to this question below.

- Responsible innovation can provide process inspiration

We suggest, as an overarching piece of feedback, that the AEMC focus on further understanding and questioning the implicit assumptions embedded in the terms of reference and consultation paper. Often assumptions are part of the way people and organisations think about problems and require specific analysis to reveal.

We suggest tools within the responsible innovation approach may help the AEMC understand assumptions better. The UK government's AREA approach and PAS440 guidance standard are industry-focussed methods based on responsible innovation frameworks that could provide inspiration for how the AEMC could do this. Responsible innovation is a principles-based approach. There are several frameworks (three of which are linked above), but generally they ask innovators to anticipate, reflect, deliberate, and respond.

Anticipation asks innovators to anticipate the many potential futures that could be created through the changes proposed. Often these are driven by questions such as "what if" or "what else might happen". No reform brings only positive impacts. An important part of anticipation is opening up discussion to the diverse set of outcomes that a change could bring. The AEMC has made a good start in this consultation paper, using a diverse set of tools including vignettes, personas, and principles. As noted in our response to other questions though, the ones currently presented in this paper have some significant limitations. For example, the focus on positive outcomes only provides a simplistic view of consumers' relationships with energy and each other.

Reflection is about understanding designers' biases, expectations, and norms and how they impact the innovation in question. We have noted several times in this submission areas where we feel the AEMC may be making implicit assumptions. We note some assumptions in other points in this response.

Deliberation asks innovators to "open up" to diverse perspectives in innovation processes. The AEMC appears to be relying on consultation processes such as these for collecting feedback on proposals. We feel consultation processes such as these are not the complete answer. They are not forums in which most Australian energy users are able to engage, and they are driven by a closed set of highly technical questions which require significant experience to understand and respond. There are however tools used in the submission (vignettes, principles, and personas) that could form the basis of specific engagement with a broader set of people.

Response is the most important part and relates to how innovations are directed by anticipation, reflection, and deliberation. Although we are not certain how the AEMC currently responds to feedback, we call to the diverse set of tools within the social science domain that are specific to remaining responsive to diverse qualitative data that underpin complex processes such as these. The review approach proposed by the AEMC appears to have an underlying expectation of a particular set of outcomes. For example, that products, services, and pricing structures are the main outcomes that will be generated from this reform. A pragmatic approach is to allow additional space for unexpected outcomes that may be generated from this process.

Our customer focussed network management project derived an approach to apply responsible innovation to regulatory reform using value sensitive design. This project may provide inspiration to the AEMC around the process used in the reform discussed in this consultation paper.

- Justice and inclusion

There has clearly been significant thinking behind the approach proposed by the AEMC in this process in respect to considering consumers. We argue it would also be useful to consider the overall approach and plan from the perspective of climate, energy, and social justice. A productive question for the AEMC moving forward may be *Are all the people who are impacted by this change given a voice and power in this process?*

Regulatory reform processes that the AEMC has previously run generally haven't created forums for all consumers (for example, householders) to engage on their own terms. It appears that direct engagement with consumers is not within the plan presented in this consultation either.

Similarly, intermediaries like solar installers and energy efficiency experts have a significant role in how consumers make changes and respond to pricing. As we have observed change and innovation in energy systems over many years, we have noticed that smaller scale intermediaries rarely have the time or space to have a substantial say in rule changes. In addition, reform processes such as this one rarely create specific space for them to provide input either. Intermediaries are often too busy to get involved or share their valuable experiences in any detail. Like our feedback above about consumers, specific engagement with intermediaries will help reveal lived experience through the perspective of solutions providers.

For a reform as formative and important as the one being suggested by AEMC for pricing, an important overarching recommendation is that the AEMC undertakes specific engagements with consumers and intermediaries as part of their processes. Effort by the AEMC will likely be needed to design consultations that support consumers and intermediaries to attend and contribute constructively.

For this submission, in lieu of this kind of direct, wide-ranging engagement with consumers, we are drawing on extensive research conducted with consumers across a range of jurisdictions and contexts. The extensive feedback we have received during research with consumers – including intermediaries, other stakeholders and energy consumers in homes and businesses - helps us to understand the needs, capacities and goals of everyday people in the context of our changing energy system. We have referenced this work at relevant points in the submission.

We considered how more diverse voices can be included explicitly in rule change processes in our customer focussed network management final report. This particular project built an engagement model with consumers that enabled them to engage in regulatory processes on their own terms. This type of engagement model can be used by the AEMC to explicitly give voice to groups traditionally excluded from regulatory processes. Some of the techniques used in that project (e.g. the use of vignettes) is similar to the approach used in the AEMC consultation paper. We suggest further evolution of the vignette approach proposed by the AEMC in our responses to other questions below.

- DER overlaps with CER, affecting actions of consumers.

The consultation paper indicated that it is focusing on CER in particular. We would argue that there are important overlapping effects of DER, such as neighbourhood located batteries. For example, householders we spoke to about engaging in VPPs with their CER considered the presence of local DER in weighing up their involvement. Other DER in their context affects their perceptions and decisions. Additionally, consumers also consider other external factors, such as local, state and national incentives. So, we suggest that during this pricing review key DER, and indeed key related influences, will need to be considered in conjunction with behind-the-meter CER devices and systems.

- Connecting and understanding consumers as a fourth focus.

We suggest that there is a fourth focus that needs to be added to the three AEMC have proposed (market, role of distribution, role of retailers). As this review is about better considering consumers, we argue AEMC needs to better consider consumers as actors in this system. Connection (communicating) with consumers and consumer comprehension will matter in this AEMC review process. Understanding how to connect with consumers, what consumers are experiencing and thinking and why they are acting/not acting with respect to energy systems will be important. Additionally, the detail of consumers' situations will matter as you progress the design of a new consumer centred system.

Question 2: What are your views on our proposed Consumer Preference Principles?

- *Are you aware of additional existing research that could help us refine the CPPs?*
- *How might the CPPs help us in assessing whether our decisions will lead to good consumer outcomes*

We appreciate the use of a more nuanced set of principles by the AEMC in this review than has traditionally been used for rule decisions. Utilising principles here seems an excellent strategy. Our response to this question is in three parts:

- Other research that could be referenced by the AEMC,
- The use of principles in the review, and
- The need to ensure assumptions are made explicit.

Other research

The AEMC has clearly sought insights from external sources in developing the principles proposed in this review. Broadly, the proposed principles align with some existing available research. Research produced at our centre and by other energy system social scientists can provide additional nuance to the definitions in this paper and may also provide additional principles. Given the importance of this review, we recommend that the AEMC undertakes a detailed literature review. Potentially methods such as content analysis may ensure both that nuance and meaning is captured fully, and that the AEMC remains responsive to findings from research that don't align with existing ways of thinking.

Examples of research that has considered values (and broader consumer responses to various CER and DER solutions) include the Digital Energy Futures work, Future Grid project, the customer focussed network management project, Project Converge, Project Symphony, the CONSORT Bruny Island Battery Trial, New Energy VOICES, among others. A pragmatic way to increase the level of academic research input would be for the AEMC to engage with the energy research social science community. There are several ways consultations with this community could be undertaken, and the authors of this submission are open to assisting you to establish this connection.

Use of principles as the pricing consultation progresses

Principles in this instance are a form of codification of values that underpin AEMC's proposed approach and in our opinions are extremely useful. It is important to note that the way a person may interpret and mediate between principles (and therefore different intentions) depends on many factors. We think it will be important for the AEMC to be clear about how principles have influenced the design, both during intermediate steps and during final rule making, so that the Australian community can understand how decisions are made. One useful tool in this context could be "value sensitive design", which is designed to make explicit how values (or principles) influence design processes. In the customer focussed network management project we used "values hierarchies" to ensure there was a direct, explicit link between values and the overall designs.

Including background explanation of assumptions

We noted under question one that further checking of and explaining of assumptions will be important moving forward. The principles in the consultation paper appear to be an area where there are implicit assumptions. Here we elaborate a little further on that point in relation to AEMC's principles approach. An example of a key assumption in the consultation paper is the simplistic way people are assumed to engage with the energy system. Engagement, as described by the AEMC in principle focuses on simplicity in interactions with their service providers.

Engagement with energy is often a multifaceted affair with several stakeholders involved, and many of the concepts to be discussed are difficult to describe in a simple interaction. A more productive question may be to ask how relationships and engagements intersect and combine to produce a whole that is trustworthy and has an acceptable level of complexity. These assumptions about engagement come through in the vignettes the AEMC has described in section 3.2.1 which consider how individuals engage with energy.

The examples of people dealing with the energy system present extremely limited types of consumer realities and therefore consumer engagement contexts. For example, none of the individuals described appear to have a family/household affecting their decisions, or any family/household dynamics at play that influence the way they engage with energy (for an example of household dynamics, see Gabriel et al). Similarly, the vignettes describe the way people engage with energy only, when we know that energy is just one factor in the complexity of day-to-day life (and therefore the way they use energy). The Monash household energy glossary provides some good examples of additional factors that the AEMC could consider (for example regarding the different ways in which the energy sector and consumers understand key terms like 'cost' and 'control').

One way to explicitly explore assumptions underpinning the AEMC's existing principles is to use a method such as the WPR framework, by Bacci, to work backwards from the documentation to the assumptions and frames that underpin it.

- Simple versus understandable

We note that the principles include an aspiration to provide simple information to consumers**. From years of research and the understanding gleaned from it, we caution that what consumers require is *understandable* information the *covers all important points*, rather than just simple or simplified information.** Consumers want information that tells them clearly about the impacts of involvement in a system or technology. If information about impacts cannot be reduced to simple statements, consumers have indicated that actually, they need to know the information. We understand that there are many people who would rather not have to pay any attention to energy changes. But the reality is that the changes the energy system are asking people to become involved with can have serious impacts that people need to be informed about. The evidence is that when people are concerned about impacts from changes to their energy systems, they try to seek out information to understand those impacts. If the information they have is too simplified or of a poor quality, this leads to negative reactions and a diminishing of acceptance of the energy system or technology under consideration.

So, it is important that information is not abstracted down to simple if this simplification obscures important information. For example, it is emerging that being involved in some programs that remotely manage technologies behind private meters, may use techniques that can limit or void warranties of personally owned technologies. While this is not necessarily easy to explain, transferring information about this impact is critical to understand, nonetheless.

Energy systems change is known to be complex. There are going to be instances therefore where information shared will not be that simple. **What we advocate for is that consumer specialists are involved to designing communications so they are the simplest they can be, rather than providing simple-but-obfuscating information.**

The concept of understandable also involves certainty. For example, the remote access technologies as described above will have an impact on consumer devices. As well simple explanation of impacts, what is the concrete contractual dimensions of this control? For example, the product in question may be an electric vehicle charger or a hot water cylinder so overuse of the device for grid management may result in real impacts on a consumer's day-to-day life. This may,

for example, take the form of guarantees similar to those that underpinned historical “off-peak’ tariffs.

Question 3: What are your views on our proposed Consumer Archetypes? For the purposes of this review:

- *Do the Consumer Archetypes capture the diversity of future energy consumers?*
- *Do you agree that engagement is the primary axis of differentiation among electricity customers?*

Archetypes are an established method for building an understanding of customer segments. However, the use of consumer archetypes has also been widely critiqued for framing people in generalised and static (i.e. unchanging) ways that oversimplify consumers' complex lives in ways that are ultimately unproductive. For example, see the book "Smart Utopia" or the Digital Energy Futures report from Monash university.

Engagement?

The AEMC has stated that engagement is the main differentiator between consumer types. While we see the value in engagement being attended to, overall, we question this assertion. The way that the AEMC has described engagement is also simplistic. The kinds of engagement considered by the AEMC appear to be mainly related to technology or with energy retailers. We encourage the AEMC to look beyond the relationship between a billpayer and their energy retailer to look further at the other relevant relationships that underpin energy use and management.

Other relevant forms of engagement could be within communities, within households, or with key intermediaries such as solar installers. Wider possible engagements may influence the kinds of products that consumers may be aware of and attracted to. The archetype stories likely need to include this sort of diversity.

Examples of possible extra diversity considerations:

- Community groups we know are increasingly influential in energy change. Community can and has influenced product design with several networks and retailers having experimented with and created community energy product offers. However, community is entirely absent from the vignettes presented by the AEMC.
- Regional and remote consumers have very different experiences of the energy system, and their circumstances need particular consideration. Of critical import is including the most difficult fringe and remote energy systems, including in First Nations' communities. Research at ANU has highlighted the high level of energy insecurity and disconnections experienced by residents of remote Indigenous communities who remain on electricity prepayment arrangements.

One challenge of describing a complex landscape of factors through a simplification (such as engagement) is that it is easy to miss nuance through its application. While simple principles can be helpful "rules of thumb" during the AEMC's design process, it will be important that a more detailed view of consumer engagement is used at critical points to ensure the AEMC remains responsive to the lived experience of diverse consumers.

Evolving archetypes

The archetypes that are presented in the consultation paper are potentially too general to achieve the aim suggested in question 3 of capturing diversity. Despite some drawbacks in the way they are currently employed in the sector, scenarios and consumer archetypes can be useful. We suggest that further consideration of some key concepts and some evolution of archetypes will assist AEMC to better support their pricing review processes. We therefore suggest the following be considered in relation to evolving archetypes:

1) Develop and describe scenarios, consumer profiles, and archetypes in a way that is flexible. This means that they constitute informed forecasts, rather than exact predictions and can be evolved as needed.
2) Find ways to further embrace complexity. Rather than simplifying people and circumstances we have found it more useful to genuinely embrace complexity by capturing key dynamics in archetypes and case examples. In our research we understand people by understanding the detail of their lives and situations as they relate to energy. We also understand that not all complexity can be captured (by us, or by the AEMC). But we would argue that further complexity can be captured in the proposed archetypes and vignettes. So, we suggest that further key factors could be included in your archetypes and vignettes. Factors affecting energy use and decisions that could be considered for inclusion include: income levels, knowledge of energy systems, main languages spoken, the complexity of CER, whether people are drivers or public transport users and other factors related to mobility, states of health, types and quality of housing, household makeup and dynamics, types of key technology, how old key technology is, climate change impacts, strategic and logistical elements of life (such as where a person lives and where they work), and overall capacity to change energy use.
3) Energy-related purpose for consumers is not the same for organisations and government. Market systems, ethics of processes and underlying theories are important, but not the reality for consumers. Consumers use energy for practical reasons in their lives – they pay for the service, for example, for cooling, warmth, being able to prepare clothes to wear, safety, and preparation and consumption of food. The real and practical intentions behind energy use, or winding back energy use, need to be kept in mind when developing archetypes. Approaching archetypes and this pricing review assuming market intentions and financial savings are the main outcome can be problematic and clashes with the practical intentions consumers have related to energy use. Consumers have communicated a raft of important values and intentions associated with energy use that are not about money. Affordability is important but is an intention mixed with other concerns. For example, depending on the technology and system involved, current and near future systems could help with affordability, but not so much the care of the environment and this may be a concern for a consumer. Or, systems may work on time of use, but the household might need to function at certain times using peak power and then will have to forgo affordability and may have to also deal with increased stress. Certain intentions will need to be prioritised, so invariably some other intentions cannot be. If the energy industry unquestioningly places financial drivers first, then other important values, needs and intentions may have to be ignored. We see this clash of purpose occur for consumers and for organisations in all pilots and trials that have market versus network care versus consumer care intentions. We also heard this from householders in projects such as Symphony and CONSORT.
4) Consider relevant communities. This includes online and face-to-face communities that are involved in collective support, co-education and/or decision making around energy, for example the Facebook group My Efficient Electric Home or community groups involved in neighbourhood batteries.
5) Factor in locations, including the part of the grid a consumer connects to (e.g. on grid, edge of grid, islanded grid) and whether consumers are urban, regional, rural or remote.

Figure 3.4 in the AEMC report provides more detail on how the AEMC relates the archetypes to each other. Relating the archetypes to the scenarios presented in section 3.2.1, we note that these are focussed on particular kinds of flexibility and engagement. Some of these scenarios are conceptually similar to those presented in the Monash Digital Energy Futures project, and so

understanding further digital energy futures examples from the Monash report may help the AEMC design a more diverse set of scenarios.

The AEMC has further described archetypes as existing on a spectrum of resources and interest (figure 3.4 in the consultation paper). The use of spectrums is a useful way to explore how factors influence outcomes. Another analogous spectrum is that proposed by Powells and Fell in their paper "Flexibility capital and flexibility justice in smart energy systems" which explores the dimensions of financial resources and flexibility capital. This paper describes the way financial resources combine with everyday practices to change how people may (or may not) be able to flexibly consume, and the impact this flexibility has (or does not have) on their daily lives. This complements the AEMC's existing spectrum by asking how people are being flexible, as well as if they want to be flexible.

- Consumers are guided by the current system

The way that consumers interact with the energy system is as much a product of the system itself as it is to consumers' intrinsic drivers. The energy system itself is a key influence on what consumers are able to choose and it is co-constructed by all of the actors who participate in or are impacted by it. An example of these influences can be found in the concept and actions related to self-consumption (for example, where a householder uses their solar energy as much as possible before exporting left over energy to the grid). The energy system has emphasised individualism through its design throughout its history; consumers have a meter, receive an individual bill, and are educated on personal actions they can take to manage their personal energy bills. Against this backdrop the driver of consumers to maximise self-consumption and minimise bills is unsurprising. In the same vein energy bills are outward facing – or built upon the costs of supplying energy rather than the householder's capacity to pay. This in effect sets the perception that energy is a luxury afforded to those who have capacity to pay for it.

The challenge for the AEMC in this case is to expand their thinking about how energy might be different in the future, where there could be different ways of thinking about energy or where they energy system might differently construct the action/choice space that consumers respond/act within. One example of this is our report from last year on meter unbundling which explored different ways of thinking about flexibility and metering.

Question 4: We want stakeholders to help us imagine the widest range of possible future products, services, and pricing structures. How might they look in the future?

For example, you might consider:

- *How have products and services evolved in similar markets that were disrupted by new technologies, for example, in telecommunications and point-to-point transport?*
- *What new innovations are we starting to see in current offerings?*
- *What electricity products and services are available internationally that aren't available here?*
- *Which technological trends may impact the electricity market, beyond those already discussed in this paper?*
- *What types of pricing structures might align well with the proposed Consumer Preference Principles*

It is important that futures that underpin a pivotal reform such as this are diverse and explicitly call out and challenge the assumptions and expectations of the energy system today. There has been relevant existing work done to design and assess future products and services in energy futures work in our team at ACES, in Monash's energy futures team (already referenced), CSIRO and other energy futures teams around Australia (please see Digital Energy Futures work, Future Grid project, and the customer focussed network management project as examples). This period of significant reform also provides an opportunity to consider fundamental market changes to prioritise equity, for example by establishing energy as a basic right as proposed by Sturmberg in "Watt equity? Australians deserve a basic energy right".

Our response to this question focuses on responding to specific assumptions we identified in the futures the AEMC has proposed in this consultation paper.

- Recognising relationships and collectives in decisions

In the consultation paper people are presented individualistically. We have evidence that households need to consider energy use as a group and that communities can and want to consider energy collectively for various reasons. Energy and energy use practices therefore, including assessments of pricing, are regularly influenced by groups. For example, a community collective in an apartment complex, a neighbourhood battery cooperative, or a household group can make decisions about a retailer and what retail products they use together. Aligned with this, the person or people who are affected by pricing structures and retail products may be different to the person who is deciding on what the appropriate pricing structure is.
Related to the type of group considering energy use, collective retail products are likely going to need to focus on different households and communities and so retail offerings may be significantly different to each other. How can the AEMC's regulations enable these decisions to be made in households and collectives better? Can assumptions be developed related to the various ways people make energy decisions?

- Non energy feedback

While in scenario 1 in section 3.2.1 the AEMC describes 'Joel' as having been given information on the kinds of energy practices that would impact their bill through an email, implementation of this formal documented information into day-do-day practices is not described. Recent research

highlights the diverse kinds of feedback beyond that provided by energy monitors, bills and apps by examining "non-energy feedback". This kind of feedback includes things like the weather, social cues, or the design of one's home that while not explicitly about energy, do end up providing feedback that importantly shapes how people use energy day-to-day.

In some ways this relates to how retail offers can be decoded into “rules of thumb”. For example, “if it’s sunny, consider vacuuming”. Even for consumers with smart devices which can automatically respond to dynamic signals, they still have day-to-day practices that drive the bulk of their energy use. Current network pricing principles in the NER contain principles related to “understandability” e.g. 6.18.5 (h) (3) and 6.18.5 (i). Although we note that based on our experience with Project Symphony, even consumers with smart devices must integrate tariffs into their practices, therefore the AEMC could consider changing the wording of 6.18.5 (i) (2) to ensure that pricing products based on these are still understandable by consumers. Potentially requirements around how pricing can be decoded into practices could be added to retail pricing rules too.

- Mediators/intermediaries will continue to influence

Mediators/intermediaries such as solar installers, salespeople at hardware stores, electricians, plumbers and community leaders often have a significant role in what energy products households choose and how they integrate them into their lives.

In the future we argue that these intermediaries need more attention and consideration. We have seen them overlooked or assumptions made about their capacity on multiple occasions in energy innovation trials and pilots. This oversight is to the detriment of new innovations being tested and to the smooth scaling once something has been tested. We suggest that AEMC consider how these mediators/intermediaries can be considered explicitly in future programs and systems.

- Considering futures with our communities

Fundamentally the future scenarios used to underpin this analysis should be grounded in the lived experience of those who are impacted by reforms (be they consumers, users, communities, or intermediaries). Consultation papers such as the one we are responding to can have a limited audience. They are often only accessible to experts who have sufficient background knowledge to understand the questions, and the time or commercial drivers to respond. Specifically engaging with energy users, intermediaries, and stakeholders can help ensure that futures are reflective of the needs, experiences, and perspectives of those who are actors in them. This engagement may need to be repeated at times to ensure that the rules remain responsive to outcomes.

- New products in the future

There are certain new products described in scenarios, such as the automatic retail offer switching service (presented in scenarios 1 and 5). We question whether a retail system that creates a need for additional (potentially profit driven) retail offer-switching services is overall economically efficient. It may be beneficial to more explicitly consider the needs and drivers of other organizations in the scenarios. For example, what might drive a retailer to develop this kind of product? What about solar installers? We note previous (recent) history where energy retailers have not created products based on new network prices to the extent that regulators have expected.

Question 5: How could electricity products, services, and pricing structures be presented to serve future consumers?

The AEMC has rightly considered the role of information in helping consumers choose retail offerings. We note there has been several initiatives aimed at providing information to consumers before (such as the Energy Made Easy website) that may not have achieved their stated aims. We suggest two further questions may help further explore the subject matter alluded to in question 5:

- Who are future consumers imagined to be and what will be their needs, capacities and wants?
- Who is involved in presenting electricity products, services, and pricing structures?

An engagement spectrum

We note that in this section, as in others, the view of consumers and their engagement with electricity products and services is overly simplified and that an expanded and enriched view of consumers will help to explore future products, services and pricing. In essence, consumers are often framed as engaging with energy products and services in straightforward ways, and as having simple and rigid needs (generally assumed to revolve around price). Challenging these simple notions of future consumers is vital for reimagining how electricity products, services, and pricing structures should be presented to better serve consumers in the future. For example, currently there are assumptions that people will either directly engage with market products, or they won't. It is true that some consumers will choose products by engaging with the market and commercial offerings, and that others will not. But the choice is not either/or. There is grey, in between, aspects in decisions consumers make and the way they engage.

Intermediaries serving customers affect what engagement looks like

There is already an array of possible offerings that involve intermediaries as agents who are involved in how and when and how much consumers engage. These intermediaries are changing the way people engage with the energy system. Intermediaries (also noted as mediators earlier) are people who help consumers in various parts of their energy lives and are not usually market participants or do not have explicitly recognised roles in the energy system. Intermediaries are people such as solar installers, energy experts, aggregators, battery software, friends, family members, and community leaders who often have an involvement and/or advisory role. Our experience in numerous projects (for example, VOICES, CONSORT, and Symphony) has been the role of intermediaries is often significant in moderating consumers' needs to be fully involved but is largely under- or un-recognised.

Difficulty from simplification through economic framing

Another problem regarding the framing of consumers involves reducing consumers' concerns to purely economic ones (i.e. thinking consumers are just or primarily interested in price). While financial cost is indeed important for regular consumers, as shown in recent research from the ANU, UTAS and Monash, there are broader considerations that shape how consumers think about and use energy; these considerations include time and emotional costs (e.g. in engaging with new services, managing energy in relation to tariffs), or the health and environmental effects of using (or not using) energy (e.g. managing heat stress using air conditioning, or seeking to reducing one's overall energy consumption). Accounting for the complexity of consumers is necessary for developing and presenting appropriate products for future consumers. It is important to note that the regulatory framework, commercial landscape, and the way people consider energy is co-constructed. So, a different regulatory landscape will result in different ways of thinking about energy in industry and among energy users.

Building on what we have said throughout this response, one way this oversimplification of consumers could be addressed is by using a more multi-dimensional set of vignettes or user-stories that meaningfully explore the way consumers engage with the energy system. For instance, vignettes exploring the role of intermediaries in consumers' interactions with both the wider market of energy retailers and other consumers could be useful. Alongside helping to reframe our

broader understandings of the way in which consumers engage with the energy market and retailers, these user-stories could draw out specific design points or interventions that serve as a guide for how to connect future consumers with electricity products and services.

Whatever path the AEMC chooses to take in exploring who future consumers are and how they will engage with the market, any exercise should engage with the wealth of rigorous and detailed social science research already dealing with these questions (see: Digital Energy Futures work, Future Grid project, the customer focussed network management project, Project Converge, Project Symphony, the CONSORT Bruny Island Battery Trial, New Energy VOICES, a social licence to automate overview, and a social licence to automate batteries in a VPP article).

Question 6: How could consumer protections be balanced to enable further innovation in a future retail electricity market?

Clearly the scale of change needed to decarbonise the energy system will require significant innovation. All innovation comes with a range of foreseen and unforeseen influences and positive and negative impacts. It is hard for us to talk about specific protections as we need to understand the specific retail products and set ups that may be in use in the future. Social science energy futures researchers do talk as much as we can about consumer needs in the projects already mentioned above in this document.

When thinking about protections, we find it useful to think about a meta question that sits behind the one posed by the AEMC (as questions 6). That is: *"How can we innovate responsibly?"* Responsibility as a concept can be scoped in many ways but generally indicates to us a respect for all impacted, and we see consumer protections as part of a responsible evolved energy system.

Energy is not the first industry that has faced large, disruptive changes. There are several techniques that have emerged from other areas that appear to be useful for our evolutions of energy systems and services in Australia. For example, the responsible innovation framework is a toolkit (mentioned earlier) that has been developed as *"a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)"*. Using an approach such as the responsible innovation framework can assist to navigate dilemmas of not yet knowing the kinds of protections that are needed, without knowing the specifics of the innovation being considered.

The UK government has created versions of this framework such as the PAS440 guidance standard, and the AREA framework for innovators to use when considering new products, services, and business models. We suggest these could be useful guides for the AEMC. Conceptually the AEMC could consider two approaches:

- Application of the responsible innovation framework on reforms such as those discussed in this paper.
- Requirements of innovators to use a form of responsible innovation as part of their product development and testing processes.

Pragmatic help to answer questions around tariff reform and protections can be realised through the extension of archetypes/vignettes presented in section 3.2.1 of the consultation paper. As we have noted earlier, extensions of the scenarios considered will help guide understanding as to how reforms could result in positive or negative outcomes for consumers. **Scenarios, vignettes and diversely described archetypes are useful tools to help anticipate outcomes and can be used in consumer engagement** (for example as used in the customer focussed network management project) and for planning/system design.

Question 7: What barriers will need to be addressed to deliver future consumers a meaningful and beneficial range of products, services, and pricing structures? How might we consider addressing those barriers?

- *Consider the changes that are happening in the system now - what barriers might either endure or emerge post 2035*

Understanding of key barriers is extremely useful, especially when they lead us to understand true areas where progress cannot be made and areas where work arounds can be found. Five key barriers/challenges we see as not yet resolved are:

1) Complexity

2) Communication

3) Capacity to be involved

4) Skilling-up the nation at scale

5) Consumer perceptions

- Complexity

Increasingly we are seeing that the energy landscape is becoming more complex for consumers. The past 20 years has seen the addition of technology such as DER and CER. More recently we are seeing the addition of virtual power plants that connect CER and DER together virtually to enable them to act more like a large-scale generator. Overlaid on top of this are network-led approaches such as dynamic operating envelopes that enable networks to assert the importance of network capacity management onto the consumption and generation of energy. Arguably these new technologies and systems can be thought of as reframing what it is to be an energy consumer (e.g. see this paper on energy problem representation). The energy landscape is now much more complex, with new approaches and drivers overlaid onto an energy system regime that still largely uses the same tools and techniques for grid development and management since market liberalisation of the 90s. It is a good time to consider how energy might be different for people in the future, given the changes that are likely to occur in energy coupled with decarbonisation, and the interactions with consumer values. Consideration of this energy future could be considered as a confluence of three questions:

- What kind of response is needed from energy consumers, and what is the best way to elicit it?
- What are the values and expectations of consumers and how are they realised?
- When it is reasonable for the energy system to exert influence over energy consumption and generation and when isn't it?

An example of this is to consider the overlaid and complex methods that are used to manage the grid, and map these back to the three questions linked above:

- Consumers have vibrant and complex lives with intersecting values and expectations that dictate how they would like to consume and generate energy.
- The AEMC discusses the concepts of markets and price signals as ways to elicit operational response and signal investment to consumers. This has the underlying assumption that network needs are a signal that consumers may choose to respond to in exchange for a financial reward.

- The application of dynamic operating envelopes make network capacity an explicit constraint in the operation of CER and DER. Most dynamic operating envelope approaches we see today do not have an explicit financial reward for consumers. This has the underlying assumption that network capacity is a more important need that should take preference to other actions a CER or DER might otherwise want to do (e.g. export energy).
- The emergency backstop measure, under frequency load shedding, and inverter standards define behaviour in abnormal situations. These are not specifically remunerated and sometimes have a significant impact on consumers (e.g. UFLS causes blackouts) however is an expected part of being a good grid citizen.

Potentially in the future as DER and CER have a greater role in the energy system the mix of these mechanisms will need to change. This review is a good opportunity to consider what tools are required to manage a decarbonised grid, and how they intersect with pricing.

As the AEMC discussed, and significant work has shown, people have a diverse array of values. An implication of values is how they might be realised. For example, if people are encouraged to participate in a virtual power plant because they have an important role in grid management, how will they come to understand the impact of their participation? We have observed in previous projects (e.g. Project Symphony, and Project Converge) that it is important for people to clearly see that their values are being met. However, in some cases the disaggregation of the energy system works against this being possible. For example, only networks know the roles a Virtual Power Plant plays in network management, however there are no standard frameworks to enable VPP operators to collect information on VPP contribution to network performance for sharing with their customers.

Complexity also means that it is hard for us to grasp exactly what the future of energy will entail. There are still lots of untested assumptions in predicted trajectories. For example, the uptake of EVs and batteries has occurred as expected.

Communication

Communication needs and the challenges with these are extensive in the area of energy systems and technologies. Social research we were involved in (e.g. Projects Converge and Symphony) created insight into communication and its effects on and with consumers in piloted energy systems and technologies. There are a few key points we will make here relevant to communication in energy innovation pilots and trials we have observed, while noting these are just skimming the surface.

Communication is an interaction that requires some understanding of the impacts of the technologies and systems being deployed. Therefore, before communications content is developed, there need to be accurate understanding of what the technologies and systems that are being applied effect. As a lot of energy systems and technologies are new, it is hard to effectively communicate key information in early stages. So, organisations are evolving their communications over time. The consumer-focused planners and the communications teams are critical parties in this work.

Communication is a two-way flow of information and so needs to be back and forth. Please see Project Symphony (already linked) for examples of how communication developed over time to be usefully two-way, and the benefits of this development.

Even when communications are flowing, emergence of understanding and knowledge (for both organisations and consumers involved) does not emerge directly. That is, information provision does not equal direct and immediate understanding at the recipient's end. Knowledge about the topic at hand emerges due to multiple factors and takes time. Decisions are normally made when people feel that have enough knowledge.

Communication is not only about *giving* information. Equally, or arguably more important is listening. Whilst knowledge and best practice will change over time, good communication will always include regularity. Keeping consumers (& stakeholders) informed on a regular basis will help to build trust. Perfectly pitched 'Goldilocks' amounts of information (not too little, not too much but just right) will remain key to a post 2035 energy system.

Communication, while not the only factor influencing decision making, plays a key role in one's ability to make sense of energy systems and technologies and therefore is seen as a key barrier to attend to in any energy system changes.

- Capacity to be involved and related flexibility capital

As well as the themes discussed above, it will be important for the AEMC to consider how they might ensure that products, pricing structures, and services contribute to an equitable and just transition. One framework that can help understand this is "flexibility capital" (also mentioned earlier) which helps broaden understanding of flexibility or capacity to engage beyond just that as mediated by technology.

We have mainly explored this aspect of energy futures adaptations in a project as yet not released to the public. Please contact us if you would like us to seek permission from the organisations involved to share the report.

- Skilling-up the nation at scale

In other answers, we have noted the need to further understand and work with intermediaries and mediators, such as installers and other service providers. The lack of understanding of what is particularly needed in relation to services for CER to be connected successfully at scale is a barrier we have noted in research. The urban solar installation industry is a useful example. Traditionally solar installers in urban spaces focused on photovoltaic installation only and now they also include interconnections with batteries, advanced inverters, other orchestration technologies and more. Installers now require significantly more understanding of IT application environments and are having to expand their skills and their businesses, often urgently. As we have mentioned previously, solar installers are often the forefront of engagement with consumers and what they say and do effects consumer perceptions. Scaling of key, rapidly evolving services like these will need further attention.

Consumer perceptions

The barrier of decision makers having limited understanding or perceptions of consumers and their needs, drivers and contexts is a significant problem. We have explored this barrier in some detail in earlier responses in this document and will therefore simply note here that this barrier/challenge needs more attention as a new pricing system develops.

Question 8: What should network tariffs look like in the future?

- What are the key choices and trade-offs we should consider when answering this question?

The AEMC underpin this question with four other questions relating to the tension between simplicity and precision, prescriptiveness, equity, and process. Like other questions, our focus here is on how pricing is developed, as answers for other questions posed can flow from this.

As explained in the consultation document, network pricing is different to retail pricing. Network prices are selected and used by energy retailers as a basis for their products. Network pricing, with energy market pricing, are the main cost drivers for an energy retailer. The purpose of network pricing, as described by the AEMC, is to signal investment, create network efficiencies, and share benefits. There is an expectation that retailers will take these prices and reform them into products that are attractive to consumers. However, in many cases retailers pass them through directly, as reforming prices is a risk retailers may not want to take. Network prices have become increasingly complex and dynamic, in some cases resulting in unexpected price shocks for consumers (including 14 hour peak periods).

We support the AEMC's approach to use pricing principles rather than deterministic requirements but feel that the principles listed are not adequate by themselves. The Energy Justice framework provides principles that can expand the current list of pricing principles to make them more responsive to the situations in which they will be used, and to the outcomes desired by society as a whole. The Energy Justice framework is commonly described with three core tenets, which can act as additional principles:

- Distributional justice: which asks for explicit consideration of how the benefits and ills of proposed tariffs are distributed. This may take the form of an analysis of how proposed pricing structures change outcomes for different cohorts of people (e.g. those without access to smart, flexible devices).
- Procedural justice: which asks for the people who are impacted by change to be included and given real power in change processes. In the case of network tariffs, intermediaries like energy retailers also need consideration. This may take the form of an enhanced version of the current TSS process undertaken by networks. In particular this process should consider how power is given to impacted people to have a voice in pricing framework.
- Recognition justice: which asks for recognition of the diverse circumstances and experiences of populations that are marginalised and calls on designers to take these into account in designs. For example, this may take the form of explicitly requiring the needs of First Nations and CALD people in pricing design processes.

Increasingly networks are adopting alternative network capacity management approaches (such as dynamic operating envelopes). These approaches manage network capacity through sending limits electronically to smart appliances in customer homes. These raise the question: How do dynamic operating envelopes integrate with network pricing? Dynamic operating envelopes shift energy generation or consumption to avoid network congestion, much in the same way that cost-reflective network tariffs aim to encourage consumers to do the same thing. We recommend that the AEMC also consider how these impact tariff design. For example, if a dynamic operating envelope is doing most of the "flexibility work" that a network price might do through pricing structure, potentially a much simpler tariff design could be used.

Question 9: How should the role of energy supply businesses evolve to meet customer and energy system needs in the future?

It is important to recognise that technology, energy supply businesses, service providers, and regulations all co-exist and are already evolving. There is a broad range of initiatives from both within and outside of the energy system encouraging consumers to change. These are all involved in shaping and reflecting the future needs of customers and the energy system. The influences include: regulatory changes; climate change impacts; energy prices (nationally and internationally); shifting social and cultural norms; changing demographics; electrification, particularly of transportation; housing types available and its affordability; disposable income and more.

The highly regulated nature of the energy systems in Australia, particularly the NEM, greatly influences what innovation and change can occur and how. **Within the complex possibilities of what may evolve, we keep coming back to trying to understand what the nature of the service needs to be. So, for us understanding exactly what consumer needs are is paramount.** This includes recognition that these needs will be as diverse as the consumers themselves and are not static but continually changing.

Additionally, we see it as extremely important to understand and recognise where consumer and energy system needs overlap and diverge. This understanding allows identification of areas where intentions and drivers may be difficult to reconcile or are even potentially antithetical to one another. Project Converge research interviews highlighted the challenge there is in identifying what is the responsibility of different parties once CER is involved and used. There is a critical need for clarity in the roles of energy supply organisations and consumers, including what services are explicitly paid for and what are expectations of grid connection. For example, today services like underfrequency load shedding and dynamic operating envelopes are not paid for, but others such as energy market services and network demand response services are. It is unclear what the boundaries between service types are and what is a reasonable expectation of CER (whether paid or not).

Question 10: What changes might be required in the future to the interfaces between different energy supply businesses?

We are looking forward to AEMC's interrogation of the interfaces between networks and retailers as there are barriers that may be able to be interrogated and perhaps even removed in relation to innovating to smarter energy systems.

A relevant consideration is the kinds of information that might need to be shared between different organisations to enable consumers to see the value they seek in products. Examples are consumers who desire to join a Virtual Power Plant may do so in part so they can help the grid. **Price alone is not sufficient for a retailer to demonstrate to a customer the role they have had in grid management and will require additional communication.** Although it is hard to foresee exactly what form this information may take, a flexible regulatory framework can help enable this.

We have observed that ringfencing, while implemented for good reasons, have in some cases limited innovation. A future decarbonised energy system will require more organisations working more closely together, and ringfencing can be a barrier to this. The limit of communication has, for example, hindered what retailers can share about how to communicate with customers. This limitation of communication has led to innovation being slower than it otherwise could be.

Perhaps in part due to difficulties with ringfencing and in part due to the ultimate benefits for energy retailers versus networks, we have noted that energy retailers simply haven't been so involved in pilots and trials for energy future tests**. We need retailers involved in trials and pilots as they are consumer specialists and ultimately the ones who translate cost to consumers.**

(We say this with recognition that some barriers are to maintain competition in markets and this need consideration,)

Question 11: Do you have any feedback on our proposed assessment criteria?

We feel that while it could be considered under the first principle, **equity needs to be an explicit consideration and warrants a separate criterion.** This could be implemented through consideration of the diversity of outcomes which might be experienced by different cohorts of consumers. There are several known factors such as home tenure and living situations that may serve as dimensions of this analysis.

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