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CSIRO and CutlerMerz
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28 September 2020

Submission to **Value of DER: Methodology Study** *Consultation Draft Report*
September 2020

Renew (formerly known as the *Alternative Technology Association*) is a prominent advocate for all Australian residential energy consumers. As a member of the *National Energy Consumer Roundtable*, Renew works closely with other consumer advocacy organisations, providing expertise and experience in energy policy and markets, and conducting independent research into sustainable technologies and practices. It has long supported a consumer-centric approach to energy market regulation and reform, with rules and frameworks designed to maximise benefits to small consumers and allocate costs fairly, while still meeting the technical and economic requirements of our energy system.

Renew is also the direct representative of its 12,000 members – mostly residential energy consumers with an interest in sustainable energy and resource use – who, like many Australians, are increasingly investing in distributed energy resources (DER) for the financial and environmental benefits they offer. This growing group of households may not even realise they are becoming an integral part of the energy system, and it is imperative that their contribution is valued and rewarded appropriately, and their obligations costed fairly and imposed in proportion to their ability to manage them. This all depends on a methodology to value DER that can distinguish between the private and public benefits in order to share DER integration costs fairly.

This submission was written as part of a project funded by Energy Consumers Australia (energyconsumersaustralia.com.au) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas. The views expressed in this document do not necessarily reflect the views of Energy Consumers Australia.

Current issues with valuing DER

Renew agrees that the issues cited on p.p. 6–8 of the consultation paper are problematic in current approaches to valuing DER used by DNSPs and other bodies, and that a more robust and evidence-based methodology is required. We also note that the issues of variability of DER network benefits (as identified by the ESC Vic and coted in the consultation paper on p. 8) need to be recognised and managed within the methodology used to value DER, especially the spatial and temporal variability – the location of DER and the timing of DER injections into networks are both critical factors in whether DER can have a positive or negative value. Any use of a DER valuation methodology by a network to rationalise DER enablement must consider these limitations.

Key consultation issues

The completeness of the list of considered value streams

The list of value streams appears complete. Most of the value streams apply to total DER generation, not just injections into the network. This is appropriate, as on-site utilisation provides a range of energy and non-energy benefits including demand reduction, limiting voltage rise, and others. Because hosting capacity increases may induce consumers to instal larger DER generation systems that increase both self-consumption and exports, when the valuation of DER is to be used to assess hosting capacity investment to enable more injections it must consider total generation from the DER, not just injections.

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The treatment of change in customer DER investment may need to be nuanced.

- If hosting capacity is increased, customers may choose to invest in larger generation systems because they can realise more private benefit from greater exports. Even though this requires the expenditure of more money, it may be a positive value for those customers (Renew's analysis shows that in most cases, the economics of larger and smaller DER systems are similar, with fairly small differences in levelised cost of energy and payback times) and potentially for other network customers (due to the value of additional demand reduction and injections). They may also choose to invest less in batteries – this will often increase their private benefit (because batteries currently are more likely to reduce than increase the financial benefit of generation systems) but may have a more variable impact on benefit to other network users, depending on circumstances (whether or not variable generation is more or less valuable than flexible generation or capacity – this in itself may depend on the degree of orchestration). (Renew's view is that DER systems with batteries are more likely to offer greater network benefit than systems without batteries, but it is contingent on incentives for how they are operated.)
- If hosting capacity is not increased or is reduced, this may encourage customers to invest in smaller systems with lower shared benefit; or it may encourage investment in large generation systems with batteries, which is more likely to reduce private benefit (compared to the same system without batteries) and, as noted above, this may be a positive or negative benefit to other users, depending on a range of factors.

Defining the system boundaries for consideration of costs and benefits

Consideration of the most appropriate system boundaries to use in assessing costs and benefits to arrive at a methodology for valuing DER is contingent on the purpose of the valuation. Renew understands that the overriding purpose for this approach to DER valuation is to guide the AER and other stakeholders in assessing DNSPs' DER integration expenditure. Thus, either the system boundaries should be defined in such a way that best meets this need, or the methodology should allow for varying the system boundaries applied depending on the purpose of the valuation.

Public vs private benefits

A critical characteristic of DER is that it provides both public and private benefits. There is already some concern in the community that households without DER (who are more likely have lower incomes, less wealth, insecure tenure and be more vulnerable to financial hardship) are paying more for network services than households with DER (due to the lack of cost-reflectivity of network tariffs) and are likely to end up paying a disproportionate share of the cost of network upgrades to integrate DER.[1] This will be exacerbated if valuing DER for the purposes of assessing DER integration expenditure considers the private costs and benefits of DER to the DER owner.

Renew's considerable experience in giving independent advice to consumers wishing to invest in solar PV demonstrates that for residential homeowners with access to funds, investing in solar PV gives a generous return on investment and has a relatively quick payback time even with typical export limits and low feed-in tariffs in almost all cases. Generally, the more people are willing to spend, the greater the overall benefit they can realise. These private benefits are in addition to the shared benefits such investment offers to all consumers.

Networks are a shared community resource and sharing of costs is desirable even though users get different degrees of benefit depending on how they use the network. Cost-reflective pricing that allocates costs in proportion to responsibility for driving costs is the most appropriate way to share the cost, and the difficulty in implementing cost-reflective network tariffs has limit the capacity to share costs fairly. In this context, perfect cost-reflectivity is not yet possible. But given the move toward separate consideration of DER enablement expenditure by networks and the opportunity for nuanced approaches to allocating those costs in relation to

[1] For example, the TEC/ACOSS (https://www.aemc.gov.au/rule-changes/network-planning-and-access-distributed-energy-resources) and St Vincent DePaul (https://www.aemc.gov.au/rule-changes/allowing-dnsps-charge-exports-network) rule change proposals to update the regulatory arrangements for DER integration express this concern.

the distribution of benefits (of which this study is an element), There is no need for other consumers to materially subsidise DER owners' private benefits by paying extra through network tariffs for benefits beyond those that accrue or will accrue over time to all consumers.[2]

Renew's recent DER Enablement study[3] demonstrated that for a considerable time in many scenarios, there is considerable scope for networks to enable more DER using low-cost measures, and that it is likely that the shared value of DER exports is sufficient for some moderate-cost DER enablement measures to also provide net benefits to all customers, in addition to the higher value of the private benefits unlocked.

Assessments of the behind-the-meter value of DER investment to DER owners may be useful in other contexts – for example, in setting enhanced connection costs or other co-contributions that DER owners may be prepared to pay to unlock further private benefit, or in assessing government-funded projects to increase renewable generation or emissions reduction using a combination of large-scale and distributed energy resources.. But assessments for DER enablement investment that will be shared by all DNSP customers should be based on the shared value – this suggests using a total electricity system approach. It could also be extended to value streams outside the electricity system where they are realisable by DER customers in proportion to their contribution to network costs – for example, it there are quantifiable financial benefits from outside the energy system to all consumers from emissions or particulate pollution reduction driven by DER enablement.

In summary: ***using a total electricity system resource test is appropriate in some applications of this methodology but risks justifying shared funding of private benefits when used for assessing DNSP DER enablement proposals. The methodology should be able to define the system boundary flexibly and strategically depending on the investment proposals it is being used for.***

The appropriateness of the overall methodology proposed

The general approach of determining the value of enabled DER by comparing the total system cost as a result of increasing hosting capacity with the total system cost of the BAU case is appropriate – with the caveat, discussed above, that the private costs of installing DER and the private benefits should be included or excluded strategically, depending on the purpose of the valuation and the extent to which cost will be shared broadly or proportionately to benefit received.

In particular, Renew commends the distinction between the three types of services – variable energy, flexible energy, and capacity – and the consideration of interaction between the three services – such as the example given that increased support for variable energy may reduce flexible energy and capacity. We note that the various approaches DNSPs might use to increase hosting capacity may also interact with each other – some whole-of-system modelling may be needed for DER enablement planning as well as for DER valuation.

The appropriateness of the individual methods developed

Overall, the individual methods seem to be fit for purpose – with some exceptions described below. However, it's unclear how they are considered in concert with each other, rather than separately.

Quantifying wholesale market benefits

Renew has some questions about the approach used to value variable energy as described in the worked examples:

Example 5.3.3:

- "For the trend in prices that would be received by rooftop solar PV, an index of the change in the total costs of large-scale solar should be used."[4] It's not clear why the costs of large-scale

[2] For example, setting up a DER management system whose purpose is to curtail or "switch off" household solar systems to manage adverse impacts while still enabling capture of shared benefits may well be appropriate as a shared cost where the benefits over time will exceed the cost of implementation.

[3] See https://renew.org.au/research/distributed-energy-resources-enablement-project/ , in particular https://renew.org.au/wp-content/uploads/2020/06/Energeia.pdf

[4] p. 33 of the consultation paper

solar is appropriate, rather than the marginal cost irrespective of generation type for the applicable time of day.

Example 5.3.4:

- The statement that "rooftop solar costs are subsidised by Commonwealth policies in 2030 in all states"[5] obscures the nuance that STCs are being gradually phased out and that, for example, the subsidy applicable in 2030 is very small. The additional Victorian subsidy will also scale down between now and 2030. The jump in cost shown on the chart for 2031 appears to show a sudden end that seems too abrupt to account for the tapering of these subsidies.
- The statement "Given the relative costs of the two competing technologies there is no generation sector benefit to be found from inducing investment in solar-battery systems with higher export limits. They would only displace lower cost investment in large-scale systems"[6] appears to assume a zero-sum approach. But large-scale solar can face transmission limitations; and rooftop solar draws upon a different pool of investor capital. AEMO's Integrated System Plan sees overlapping but distinct roles for both large-scale and rooftop solar, which are not fully interchangeable.
- Additionally, the 5 kW per connection increase in hosting capacity modelled in this example will not just be used for the VPP offering capacity services to the wholesale market; it will also be used to just export extra surplus generation at other times, often providing additional variable and flexible energy benefits (the latter due to any batteries installed). This is why considering the different DER services together is important, and suggests that the relative frequency and duration of opportunities for different services is as significant a factor as the relative value.

Quantifying network sector benefits

The approach to valuing distribution network reliability as set out in Table 7 on pp. 38–39 is another example of the complexities of extending the system boundary behind the meter. A customer using their private investment in a battery to provide power during an outage yields a private benefit in addition to the public benefit of helping a DNSP meet its reliability obligations.. If a DNSP was to invest in batteries itself as the most cost-effective way to provide customers in a fragile network node with the required standard of service, it's a clear shared benefit that should be included in capex and shared as all investment to meet demand and service standards is. But investment that enables some customers, but not others, to privately invest for private and public benefit needs to be assessed in a more nuanced way. What proportion of that investment benefits all customers (through improvements in meeting reliability standards), vs only benefits the customers able to co-invest?

The caveat to the above – and to other comments about valuing private benefits of DER – is that if the DER Access and Pricing reform supports allowing networks to levy additional charges on DER customers for extending hosting capacity beyond the amount that provides a net shared benefit, then valuation approaches such as these may be useful in assessing such additional expenditure and any proposed charges related to it.

Renew supports the other approaches to quantifying network sector benefits shown in Table 7.

Consideration of environmental benefits

Renew strongly supports consideration of environmental benefits where they can be realised, but also recognised that current policy settings limit this within the energy system. This is the strongest rationale for looking at extending the system boundary (at the opposite end to the meter side) outside the energy system to capture other benefits of emissions and particulate pollution reduction that will reduce non-energy costs

[5] p. 36 in the consultation paper.
[6] p. 36 in the consultation paper.

for households, such as food and health expenditure. We recognise that this is outside the remit of this process.

We also note that on p. 102 the consultation paper erroneously states that "the Victorian environmental charge considers avoided greenhouse gas emissions but also avoided air pollution." In fact, the Victorian FiT does not include a value for reduced air pollution, this was ruled out by the ESC for a number of reasons including difficulty quantifying the benefit, and the pollution reduction from Victorian distributed generation largely occurring in other states.[7]

The veracity of the recommendations

Renew strongly supports the recommendations in chapter 6 of the consultation paper.

Additionally, we'd like to note that our current DER Enablement Stage 2 project,[8] which is using whole-of-system and wholesale market modelling to assess the efficacy and value of a range of DER enablement approaches in remediating problems caused by excess DER injections in order to promote maximum possible DER enablement that's consistent with shared net benefits, will also be of assistance in the AER's assessment of DER enablement proposals from DNSPs. We look forward to briefing the AER, CSIRO, CutlerMerz, and other interested parties on our findings in the first part of 2021

Conclusion

Thanks for the opportunity to respond. If you have any questions or additional matters you'd like our view on, please contact me at [redacted]

Sincerely yours,

Dean Lombard
Senior Energy Analyst

[7] Essential Services Commission 2016, *The Energy Value of Distributed Generation, Distributed Generation Inquiry Stage 1 Final Report*, August 2016. pp. 65–69

[8] See https://renew.org.au/research/distributed-energy-resources-enablement-project/