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Fair network value for distributed generation

A submission in response to the Victorian Essential Services Commission *The Network Value of Distributed Generation: Distributed Generation Inquiry Stage 2 Draft Report*

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by
Backroad Connections Pty Ltd on behalf of Solar Citizens, the Tasmanian Renewable Energy Alliance, the Total Environment Centre and the Alternative Technology Association.

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About the "fair value of distributed generation" project

This submission is made by Backroad Connections Pty Ltd as the project manager of the collaborative project *Research review and advocacy on the fair value of distributed generation*. This project is funded by Energy Consumers Australia. The project's aim is to summarise existing research and undertake advocacy on setting a fair feed-in tariff for solar customers in Australia, with particular reference to review processes in Queensland, Victoria and Tasmania.

The project participants are:

- Solar Citizens
- Alternative Technology Association
- Australian Solar Council
- Total Environment Centre
- Clean Energy Council
- Tasmanian Renewable Energy Alliance

More information about the project is available at http://backroad.com.au/?page_id=97

Introduction

Nationally, network costs make up 47% of the typical residential electricity bill (42.7% in Victoria) (Backroad 2016). There is general agreement that we are moving to an electricity network with a much higher proportion of distributed generation and local energy storage and that over time this can significantly reduce the demands on parts of the electricity network and hence reduce costs.

For example the recent ENA / CSIRO Electricity Network Transformation Roadmap has been summarised as:

> "*A major new study by the CSIRO and the main networks lobby says a decarbonised energy grid by 2050, with half of generation produced and stored locally, will save billions in upfront capital costs and consumer bills, and deliver a secure electricity system.*" Parkinson (2016a)

We welcome the ESC's detailed investigation into the network value of distributed generation (DG) and the finding that "distributed generation can and does provide network value" (ESC 2016d, p.iii).

However there is much still to be done in determining the best methodology for assessing this value and for deciding on the best mechanisms for apportioning this value between all electricity consumers and those who invest in the distributed generation which makes the attainment of this value possible.

The approach used by the ESC, along with most regulators, is to look in detail at the potential for DG and storage to reduce the need for new investment in network infrastructure.

The assumption is that reduced need for investment in network infrastructure will lead to less capital expenditure by networks, hence a reduction in their regulated asset base, and in turn lower revenue determinations and lower network charges. It is further assumed that reduced network charges will be passed on by retailers resulting in lower retail electricity prices.

There is a huge difference between the ESC's careful and detailed assessment of the specific cost savings that existing solar PV contributes to reduced network costs in specific locations in Victoria

($3m in 2017, see ESC 2016 p.32) and the potential to reduce the approximately $1.25bn that Victorian households pay for network services as part of their electricity bill. [1]

Value from avoided use of networks

We believe that there is a significant area in which DG provides value which is not addressed in the Network Value draft report, which is that energy that is generated and consumed locally makes no use of the transmission network and makes less use of the distribution network.

Nationally, transmission costs make up 6.3% of a typical residential bill, a value of in the order of 1.8c/kWh. Distribution costs make up 40.8% of a typical residential bill, a value of in the order of 11.7c/kWh (Backroad 2016).

We argue below that the avoidance of the use of the transmission costs is a value of distributed generation which should be recognised. Valuing the reduced use of the distribution network is more difficult. DG makes less use of the distribution network in two ways. Firstly, exported local generation is typically used close to the point of export and therefore makes significantly less use of the distribution network. Secondly, a significant proportion of the cost of the distribution network is the cost of transformers which convert higher voltages down to 230V. Solar inverters have this capability built in and export power at 230V. In our national fact sheet we estimate that that the reduced use of the distribution network is worth up to 5.9c/kWh depending on location.

These values should be identified and their value quantified. We address separately below how these values should be compensated (via a regulated FiT or other mechanism).

The value of avoided use of the transmission network

The ESC estimates that in 2015 Victorian small scale solar PV generated 1,043,000 MWh of electricity (ESC 2016a p.11). If we assume half of this was exported and that this exported energy was consumed in the same section of the distribution network then customers who consumed this energy paid $8m for transmission charges for energy that was in fact not carried on the transmission network[2].

How could avoided use of the transmission network be rewarded?

There are several ways that the fact that local generation does not use the transmission infrastructure could be recognised:

- As a component of the mandated feed-in tariff.
- Via a rule change similar to the Local Generation Network Credits (LGNC) proposal. At the time of writing the AEMC is proposing not to implement this rule change.
- Retailer could be given a credit for the proportion of the energy they buy from distributed generators connected to the distribution network (including solar energy exported by their customers). The electricity rules already provide for 'avoided TUoS' (Transmission Use of System) payments to individual embedded generators over 5 MW that reduce the peak demand on the transmission network.
- The charge passed on to retailers for use of the transmission network could be based on the amount of electricity they buy from generators connected to the transmission network. (Currently the charge is based on the total amount of electricity they sell.) This

[1] 2.3m households * $1273pa typical bill * 42.7% on network costs = $1.25bn

[2] Based on 1.55c/kWh for transmission charges in Victoria – see Backroad 2016.
1,043,000,000 kWh * 0.5 exported * $0.0155/kWh = $8,083,250
Estimate that 50% of solar PV is exported is likely to be low and is based on ATA experience with analysing meter data from solar owners.

would be analogous to the fact that retailers pay NEM fees based on the amount of electricity they buy from the NEM rather than the amount they sell.

The last two mechanisms (which have the same effect) would reduce network costs paid by retailers in proportion to the amount of exported solar energy they buy from their customers rather than from central generators. It is an accepted part of the setting of FiTs in Australia that FiTs recognise savings to retailers and pass these savings to solar owners.

Would it be fair to other customers?

Some people argue that because the networks are already built, reducing the network charges for some customers would just increase the costs for other customers. But forcing customers to pay transmission charges for all the energy they use irrespective of its source discourages the more efficient option of local generation.

Networks owners (state and private) do face a dilemma caused by the huge investments in existing infrastructure and the fact that electricity demand is static or falling. Potentially this can mean increased costs for users of the network if the same revenue is recouped from a reducing consumer base.

This assumes that networks have a 'right' to continue receiving the same payment for the service they provide even when the demand for the service drops. This assumption is embedded in existing rules for the national electricity market which allow networks to earn a guaranteed return on their regulated asset base (RAB) irrespective of the amount of electricity they transport.

The fact that networks are paid on the basis of their assets rather than on the service they provide distorts the operation of the market. It encourages networks to invest in network infrastructure, rather than seek our more efficient ways of meeting the energy demand.

We recognise the concern that, given the way networks are currently financed, any increased payment to distributed generators can be seen as an impost on other consumers. For this reason we believe it is important that moving towards a more cost reflective approach to paying for use of networks needs to be combined with mechanism that reduce the cost of networks for all consumers. This might for example include asset write-downs.

Rewarding network value from reduced use

Is a FiT the best way to remunerate network value?

We partially disagree with the ESC's Draft Finding 8 that "A broad-based feed-in tariff is unlikely to be an appropriate mechanism to remunerate network value."

We have identified above that there are two different sources of network value:

- Value derived from deferral of network augmentation expenditure and reductions in the quantity of expected unserved energy as identified by the ESC.
- Value derived from the fact that DG makes less use of networks.

We accept that the first source of value is probably best remunerated by payment for specific grid services and support the ESC in exploring how these might operate.

Addressing avoided use of the transmission network

The value from avoiding the use of the transmission network entirely can be effectively remunerated via a FiT. This value does not vary by time or location.

We urge the ESC to acknowledge the network value of DG that results from the fact that it does not require or use the transmission network.

Reflecting this value in a state based FiT would have the following benefits:

- It is a move towards cost reflectivity that would encourage greater deployment of distributed generation in Victoria.
- It would act as important precedent on FiT methodology for other jurisdictions.
- It would inform consideration of national rule changes.

However we accept that in the absence of a national rule change on the way TUoS charges are calculated, this will be seen as an unreasonable impost on retailers and hence on customers.

R.1 The ESC should identify avoided use of the transmission network as a value of distributed generation.

R.2 The ESC should calculate a value for distributed generation that arises from avoided use of the transmission network.

R.3 The ESC should endorse the development of a national rule change that has the effect that Transmission Use of System (TUoS) charges are not levied on electricity fed into the distribution network.

Addressing reduced use of the distribution network

Although the calculation of a value of DG from reduced use of the distribution network is more complex, since distribution costs are such a significant part of electricity costs, we believe the final ESC report on network value should also address this issue.

R.4 The ESC should identify reduced use of the distribution network as a value of distributed generation.

R.5 The ESC should develop a methodology for assessing an average value for the value of distributed generation that arises from reduced use of the distribution network.

Ongoing monitoring

The ESC has performed a valuable national role in addressing the complex issue of the network value of distributed generation. The level of rigorous, detailed and credible analysis conducted by the ESC will be essential to inform future policy in this area, by regulators in other states and by national bodies such as the AEMC to provide an evidence base for possible rule changes.

We urge the ESC to continue its ground-breaking work in this area, both in exploring methodological issues and in updating calculations of network value on an annual basis as the nature and scale of distributed generation increases.

R.6 The ESC should continue to update its methodology for assessing network value of distributed generation and should assess the network value of distributed generation on an annual basis.

Market for grid services

The 880 MW of installed small scale PV in Victoria already provides valuable network services and energy value as identified by the ESC in the two strands of its inquiry. However the value has the potential to increase dramatically built on the synergies between three developments:

- Victoria's unique position due to the widespread implementation of smart metering
- The likely increased uptake of distributed storage driven by rapidly dropping battery prices

- The additional features available in all new solar inverters installed since 9 Oct 2016 as a result of the implementation of AS/NZS 4777.2:2015.

The ESC is to be congratulated for its forward looking approach in identifying the future possibilities for network services to be provided by distributed generation and associated systems.

This is a rapidly evolving area technologically and it will be necessary to develop and refine new regulatory and business models in order to maximise the value that these services can provide that reduce the cost and increase the efficiency of the electricity network for the benefit of all consumers.

Examples of services that might be provided by distributed generation and associated storage and energy management systems include:

- Ancillary services to improve network power quality in relation to voltage, frequency and power factor.
- Demand management through reduction of energy usage at times of network constraint or peak demand.
- Network support by providing additional energy back into the local grid to deal with local network constraint or peak demand.

In the medium term, as the amount of dispatchable storage in the distribution network increases, additional services will be possible, for example:

- Mitigating peak wholesale price events through the bidding of aggregated local energy into the wholesale market.
- Local islanding to provide continuity of supply in a local area when the network fails, or when feeders are deliberately de-energised to mitigate bushfire risk.

We support the ESC's conclusion that where network values are highly dependent on location, time and asset life cycle, a market for grid services may be more effective than a feed-in tariff in encouraging the provision of network service and remunerating the provision of these services by distributed generators.

This is an area of rapid technological development and experimentation to explore how such a market might work to benefit both networks and prosumers. In addition to the trials and demonstration projects described on page 111 of the draft report, we are aware of:

- The Consort project on Bruny Island in Tasmania which is an ARENA funded collaboration between TasNetworks, ANU, Reposit Power, UTas and the University of Sydney. This project is testing how distributed battery and solar PV in households can provide value to homeowners as well as providing grid support at times of network constraint.
- The Networks Renewed project, an ARENA funded collaboration including ISF, Reposit, SMA, Essential Energy, United Energy and the Victorian and NSW governments. It is focused on how solar PV, batteries and smart inverters can be used to assist with network voltage management.

We concur with the ESC's assessment (p113) that it is "important to identify the principles and measures for enabling a well-functioning market in Victoria" that can ensure that distributed generation at all scales has the opportunity to participate in the market for grid services.

We recommend that the ESC actively promote the development of a market for grid services in Victoria recognising that:

- The advanced meter rollout provides Victoria with a particular advantage in this space

- The potential network value from a diversified market for grid services will increase rapidly as a result of the takeup of smart inverters, storage systems and energy management systems.

Principles governing markets for grid services

R.7 The ESC should develop a set of principles that would ensure that markets for grid services operates fairly and ensures that small scale distributed generation are able to participate on an equitable basis.

We recommend that the ESC endorse the following principles:

- Providers of grid services should be financially rewarded for the benefits they provide.
- Markets should be structured to facilitate the participation and aggregation of small scale providers of grid services (down to at 4kW or less).
- A market for grid services should be technology neutral so that various technologies can participate (for example smart EV charging, demand management, solar PV with storage). However mechanisms should exist to ensure that the climate and health advantages of zero emission generation are recognised (so that for example gas cogeneration does not exclude opportunities for solar PV with storage).
- Customers should be in control of their own infrastructure. Opportunities to provide grid services should be opt-in at all times and should be encouraged by financial incentives. (Any perception that networks can remotely control infrastructure in a customer's premises for their own benefit will actively discourage participation.)
- Network business should not be allowed to make the provision of grid services a condition of grid connection without fairly compensating providers for services provided.
- Distributed generators should not be prevented from participating in a grid services market due to pre-conditions for grid connection.

In the past 'non-export' has been made a pre-condition for connection to some distribution networks. Grid connection requirements are a rapidly evolving area and will continue to evolve as the capabilities of smart inverters (eg. with partial export) are utilised. Clearly, requirements such as 'zero export' would limit participation by distributed generators in a grid services market. It is highly desirable for Victorian distribution businesses to avoid the use of options such as 'zero export'. However, it is worth noting that we are not aware of any Victorian distribution businesses considering a 'zero export' requirement for grid connection and we would expect the need for grid connection requirements such as 'zero export' to lessen in future as the penetration of smart inverters and energy storage increases.

We support the ESC's conclusion (p96) that the national electricity framework "is not orientated towards ensuring small-scale providers of grid services are able to efficiently participate in the market for grid services."

Under current national rules, opportunities such as avoided TUoS payments and network support payments are limited to generators over 5 MW. Ancillary service arrangements are purchased in increments of 1 MW. These conditions will exclude the vast bulk of DG and storage likely to be installed in the next few years. Ensuring that small scale DG is able to participate in grid service markets will maximise the potential and ensure that grid services can delivered across the whole network, rather than just at locations where larger scale DG is installed.

Measures to support markets for grid services

Measures which the ESC and the Victorian government could take to support the development and operation of markets for grid services might include:

- Lobbying for the above principles to inform any national rule changes that impact on the development of a market for grid service.
- Supporting existing trials and facilitating the development of further trials to test how markets might operate.
- Continuing the valuable work done by the ESC in identifying opportunities at the feeder level for optimum locations for DG projects to add value to the network.
- Defining the legislative framework under which a market for grid service could be developed in Victoria that complements national schemes, addresses participation of small generators who are excluded from national arrangements and maximises the opportunities provided by Victoria's advanced meter infrastructure.

R.8 The ESC should research and recommend a legislative framework under which a market for grid services could be developed in Victoria that complements national schemes.

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