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Philip Weickhardt
Electricity Network Inquiry
Productivity Commission
GPO Box 1428
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Dear Mr Weickhardt,

Electricity Network Regulation inquiry: submission on Issues Paper

EnerNOC welcomes this opportunity to respond to the Productivity Commission's issues paper. Other National Electricity Market (NEM) reviews and consultations tend to interpret their remits very narrowly, so the ability of the Productivity Commission to consider the bigger picture is valuable.

In this submission, we focus on the opportunities for demand response (DR), and its puzzling lack of uptake in the NEM, as this is our area of expertise. EnerNOC is an aggregator of commercial and industrial DR, operating in many different electricity systems across North America and Australasia, and in the UK.

1 The potential for demand response

The NEM is an outlier amongst electricity markets: it has unusually severe and infrequent peaks in demand, and yet addresses them almost entirely from the supply side.

This has led to inefficient over-investment in both network infrastructure and generation, and hence to electricity bills which are much higher than necessary. This is not in line with meeting the efficiency goals of the National Electricity Objective.

A useful rule of thumb for determining the potential for DR in a mature market is that around 10% of system peak demand can be efficiently curtailed by commercial and industrial DR.[1] The Western Australian and New England (USA) markets currently have around this level of DR, and PJM (USA) has had it in the past (before its expansion into new regions which have not yet developed much DR).

EnerNOC's analysis of NEM load duration data suggests that the NEM stands to save more by using DR than most other markets in the world: an unusually high proportion of the demand appears for only 40 or fewer hours per year; building supply-side infrastructure to service this rare demand is very wasteful and inefficient, whereas it can be addressed relatively easily through DR.

1 This figure applies where market and environmental rules allow the use of customer-sited emergency generators for DR purposes. The use of such generators, being relatively efficient, and avoiding transmission and distribution losses by being co-located with loads, generally leads to lower overall greenhouse gas emissions.

2 Current incentives for network service providers

If the regulatory regime was working perfectly, network service providers (NSPs) would treat the money they spend – whether capital or operating expenditure – as if it were their own: they would seek to minimise the total costs of serving their customers with a safe and reliable supply of electricity.

DR and distributed generation are effective substitutes for many types of network infrastructure. NSPs with efficient investment as their primary motivation would consider these on an equal footing with building new infrastructure, and choose the most efficient option. In the NEM, this barely happens.

This suggests that there is a problem with the current regulatory framework: the overall balance of incentives seen by the NSPs do not result in them making the most efficient decisions.

Exactly which aspect of the regulatory framework is most responsible for the problem is hard to discern. As indicated in the issues paper, the weighted average cost of capital and the rollover arrangements are obvious suspects. However, as discussed below, they are not the only contributors.

It is critical that investor and public policy interests be aligned. Otherwise, NSPs will have, in essence, a fiduciary duty to their shareholders to ignore or subvert policy directives that would reduce revenues or profits. Such alignment can be achieved through “carrots”, “sticks”, or both, so long as the result is that NSPs have a significant financial stake in respecting policymakers’ goals by making the most efficient use of customers’ money when making investment decisions.

3 Decoupling is needed

When it comes to the use of demand-side alternatives, NSPs’ incentives are also muddied by the way the bulk of their revenue comes from per-kWh charges. This means that successful DR, embedded generation, or energy efficiency (EE) projects tend to decrease the NSP’s revenue and profits.

Part B of the AER’s Demand Management Incentive Scheme is intended to reimburse NSPs to neutralise this effect. However, this is an awkward, inefficient approach, as each demand management project requires separate approval by the AER. As well as causing bureaucratic overhead, this leads to NSPs perceiving a risk that they will not be reimbursed.

A cleaner approach is to have a clear decoupling between NSP revenues and energy throughput. Much work has been done on utility decoupling in the USA, and both the National Association of Regulatory Utility Commissioners (NARUC)[2] and the Regulatory Assistance Project (RAP)[3] have extensive literature on this approach, which has been adopted in many other jurisdictions, and seems to be effectively a prerequisite for successful DR and EE schemes.

2 *Decoupling for Electric & Gas Utilities: Frequently Asked Questions*, NARUC, September 2007.

3 *Revenue Regulation and Decoupling: A Guide to Theory and Application*, RAP, June 2011.

4 Decoupling is not enough

The issues paper asks whether eliminating the biases towards excessive investment will suffice. We do not think so.

There is a general cultural preference amongst NSPs for building infrastructure: that is what they were established to do, and where most of their expertise is centred. For many years, their creed has been “capex good, opex bad”.

Due to this cultural preference, simply removing the biases – such that NSPs become financially ambivalent as to whether they tackle a given problem through a DR programme or by building new supply-side infrastructure – will not be enough: there would still be no driver for the NSPs to change their ways.

A strong driver is required – aligning NSPs’ financial incentives with public policy directives – or change will not happen. The current approach of having a set of prescriptive tests does not achieve this: it seems to be straightforward for NSPs to pay lip service to the regulatory investment tests, while continuing business as usual.

We believe it will be necessary either:

(a) to allow the NSPs to earn a greater return on investment by using DR than from building network infrastructure, when DR is the more efficient solution, or

(b) for NSPs to face clear penalties if they fail to use DR when it is the most efficient solution.

This way NSPs will have an obligation to their shareholders to take DR seriously. Since much less investment is often needed for DR, allowing them to earn a greater return would still result in cheaper overall solutions.

Note that the AER’s Demand Management Incentive Scheme (Part A) does not achieve this: it simply entails giving NSPs money to spend on “innovation”, with no requirement for them to integrate DR into their internal decision-making processes. In fact, the existing scheme is counter-productive in that it continues to treat, and causes NSPs to continue to treat, demand-side alternatives as a “special” activity, requiring separate filings and regulatory processes to pursue.

Instead, the goal should be to inculcate NSPs with the mindset that DR and EE are a normal part of their business, just like building new infrastructure, in the cases where that is needed. They should have comparable certainty that the regulator will view favourably the use of DR and EE in place of network capex, without the need for additional burdensome regulatory submissions.

Simply put, at present, it is easier and more profitable for NSPs to build out the network and ignore demand-side alternatives, so this is what they do. The regulatory framework must be changed to turn this around, such that the integrated use of demand-side alternatives becomes the easiest and most profitable path for NSPs.

5 Benchmarking

The issues paper suggests the load factor, i.e. the ratio of average load to peak load, as a potential partial indicator. This indicator is a widely used summary statistic of the load duration curve.

When considering the potential for DR, the relevant part of the load duration curve is the very top end, as it is this part of the curve which is driving much of the network spending. Fortuitously, it also happens to be the part that can most efficiently be altered through demand-side measures.

Hence we would suggest a more targeted summary statistic: the proportion of the peak load which appears for 40 hours or less in a year. 40 hours is a fairly arbitrary choice – values from 10 to 80 hours would all be reasonable. DR schemes can readily extend to this number of hours per year, and it is clearly a waste of money to build supply-side infrastructure which will have such low utilisation when there are less costly demand-side alternatives available.

These statistics could be used in two ways:

(a) To assess the productivity of the NSP's assets – i.e. the higher the load factor, or the more moderate the extreme peaks, the better it is doing. This is straightforward to measure, but somewhat difficult to compare between NSPs. This is because the peakiness of the load in the NSP's territory is not entirely within the control of the NSP. It can take action by introducing DR programmes or altering tariffs, but it has little influence over building standards or climate. However, this may still be an useful indicator.

(b) To assess the peakiness of "native" demand in the network region – i.e. the peakier the measure, the more expensive it would be to meet demand using supply-side infrastructure alone, so the more DR we would expect to see.[4]

Option (b) is not a performance measure in itself. However, it can be used to identify similar NSPs for benchmarking purposes.

We would advocate explicit benchmarking of NSPs on the proportion of the extreme peaks in demand they face that they address through DR, instead of by building infrastructure.

Since none of the NSPs in Australia use DR at anywhere near an efficient level, it will be necessary to look overseas for best practice.

The suggestion of regulatory benchmarking seems a good one: comparing current outcomes with those of NSPs which use a more efficient level of DR should confirm the importance of reform.

4 Demand figures used in calculating this metric should be for the underlying demand – i.e. before the effect of any DR or EE programmes. In mature markets, such programmes can make a significant difference to overall peaks. For dispatchable DR programmes, subtracting out the effects of their dispatches is straightforward. For the effects of EE programmes or targeted tariffs, some modelling is required.

6 Probabilistic reliability standards

The issues paper notes that deterministic reliability standards tend to lead to the building of more redundant network infrastructure than probabilistic standards. There is a further problem: it is difficult to assess the use of DR within a deterministic reliability standard designed for network infrastructure, as the two have very different characteristics.

Network infrastructure is very reliable: if a piece of infrastructure is designed to deliver 100 MW, it will be able to deliver this almost all the time. However, if it fails, it will deliver 0 MW. Aggregated DR programmes, consisting of many small facilities working together, behave differently: if programme designed to deliver 100 MW suffers a failure, such that it cannot deliver the intended 100 MW, it would typically still deliver at least 90 MW. The consequences of such a failure may be small, or non-existent.

Attempting to fit DR programmes within a deterministic reliability framework tends to lead to DR programmes being over-specified, and hence more expensive than necessary. In contrast, probabilistic reliability standards can naturally incorporate the characteristics of optimal DR programmes.

7 Wider market issues

DR for managing network peaks should not be considered in isolation. DR can also be used to manage wholesale market peaks, reducing wholesale prices and/or the need for investment in peaking generation.

DR is technically capable of providing all services that generation can – including energy, capacity, network support, and ancillary services – and it should be allowed to compete with generation to provide them. The distributed nature of DR also makes it an inherently more reliable resource than large centralised generators.

There are, of course, limits to the amount of capacity, energy, and ancillary services than any given DR resource can provide, and to the length of time for which it can be provided. Generally, DR can provide all the services which are needed for relatively short periods, such as reserve capacity, responses to emergencies, responses to extreme peaks in price or demand, support for intermittent renewable energy sources, and all ancillary services.

Because DR requires relatively little capital investment compared to generation, DR can often provide such services more efficiently and less expensively. Our experience elsewhere, especially in PJM, New York, and New England, confirms this: DR has consistently displaced new (and in some cases existing) generation resources in capacity auctions within those markets since their inception.

The widespread use of DR in the wholesale market should greatly facilitate the use of DR for network issues. This is because the brief duration of many network support programmes – typically lasting for less than three years – prevents the participation of many potential DR provider sites, especially the smaller ones, as the cost of recruiting them into the programme and equipping them with the necessary telemetry equipment cannot be justified given their value to the programme. The presence of an open-ended market DR opportunity changes this significantly: such sites' costs can then be recovered over a longer period.

In regions at the forefront of demand-side policy and innovation, where DR has penetrated most heavily into all aspects of both wholesale markets and utility planning, the same DR provider may participate in multiple markets, providing multiple services – just like a generator. For example, EnerNOC has resources in New York City that participate in the NYISO's Special Case Resource capacity programme, which is called during reserve shortages, in the Con Edison Distribution Load Relief Program, which is called to address network peaks, and in the Con Edison Commercial System Relief Program, which is dispatched to reduce Con Ed system peaks. Each programme provides a separate revenue stream, and there are times when resources have been activated under 1, 2, or all 3 programmes at once.

The current structure of the NEM unfortunately largely prevents the widespread use of DR for market purposes: there is no way for a third-party aggregator to offer DR into the wholesale energy or ancillary services markets. Thus the New York example provided above is not currently replicable in Australia. Fixing this should increase the potential for the use of DR for network peak management.

Finally, the issues paper asks how the NEM should be modified to meet the best interests of consumers. We believe that it is necessary to correct the long-standing supply-side domination of both the wholesale markets and the NSPs, and be more agile in correcting faults in the market design.

Please feel free to contact me if you would like to discuss this submission. EnerNOC is happy to provide supporting evidence from other electricity markets if this would be helpful.

Yours sincerely,

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