SOLARCITY

Submision to Commerce Commission

Discussion Paper on Input Methodology Review

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INTRODUCTION

"Change is coming to the electricity sector that is so significant it will make the creation of the electricity market look like re-arranging the deck chairs." That is the view expressed by the former head of Meridian Energy, Keith Turner, in an address to the energy industry leaders, August 2015. The changes, driven by reducing costs of solar, batteries, electronic control systems, clean technology, energy efficienct appliances and information systems will "turn the industry on its head". The regulatory frameworks and structures need to reflect the opportunities provided by this new technology and not constrain them to protect out of date technologies or investments.

solarcity welcomes the Commerce Commission's discussion paper on input methodologies (IM). We agree with the key points in the paper in terms of technology changes coming to the electricity sector and are pleased that the Commerce Commission has opened up the debate on electricity sector technology and the associated governance, regulatory and financial arrangements.

SUMMARY

Electricity policy settings generally are not technology neutral. The settings reflect the status quo and imaginable technologies. For example, in PJM Interconnection[1] the rules around reserve products were recently changed to reflect the characteristics of batteries and the advantages these characteristics offered to the grid in terms of frequency keeping.

The major change in electricity systems is occurring at the distribution level due to solar generation, batteries, electric vehicles (EV), controllable load and potentially improved information systems. Importantly the distribution level will have increasing amounts of two-way power flows, which is a significant change. Unlike the national grid, the distribution network has largely had one-way power flow, although there is embedded generation in a number of locations. The embedded generation has to date been small in number and large in output the big change that solar brings is to embed large numbers of small generators.

With considerably more generation coming onto the system at the distribution level, the way the distribution companies invest in their networks becomes an important issue.

The IM is part of the overall regulatory and governance framework for the electricity system. It will need to adjust and change as technology changes to ensure there are no unnecessary regulatory and governance barriers to the adoption and application

[1] PJM Interconnection covers the area from Chicago to Maryland. It is generally regarded as the world's largest electricity grid in terms of load served.

of new technology, such as solar generation, batteries and electronic control systems at the household and commercial enterprise level.

Solar and battery storage moves the whole system in a new direction. Managing this and ensuring benefits for consumers will require new ways of thinking at the distribution level – thinking that has not been required to date. Thinking about IM in isolation may no longer be appropriate, just as thinking about electricity sector policy settings (i.e. the EA's area) in isolation may not be effective. Exactly where the crossover points are need to be identified and the issues worked through.

This submission raises a number of issues and acknowledges that the IM review may not be the appropriate forum to resolve all of them. However, solarcity believes it is appropriate to raise these issues and we strongly suggest that the Commerce Commission and the Electricity Authority start joint work on the governance and regulatory framework for the grid of the future. There are now examples overseas that can be considered and the learnings applied to New Zealand. We need to ensure we do not needlessly reinvent the wheel, nor wait until significant problems arise before taking action. And we need to ensure a joined-up approach that develops a shared vision of the grid system of the future.

What are the prospects for change in electricity systems in New Zealand? How imminent and material is the change in NZ?

Change in the New Zealand electricity sector is already underway. Solar generation has doubled in the last year (to 20MW) as has the number of electric vehicles (743). Battery storage is becoming an option; the electric car and battery company Tesla has pre-sold output from its "Giga factory" for the first 12 months of the factory's operation, exceeding even Tesla's expectations. Tesla's recent estimate of future battery prices is lower than many analysts have predicted[2] – these same analysts had to significantly reduce their price estimates for batteries when Tesla announced the price of the "Powerwall" battery.

Australia now has "1 million solar roofs" and some 4GW of installed solar generation capacity. Similarly in countries such as Germany and the US solar generation is expanding significantly. In the US solar growth rate has been 50% per year for the last 3 years[3].

We should expect to see significant adoption of solar and batteries in the coming years. Largely this potential rise in solar and battery uptake is not recognised by industry analysts, with the argument being that solar only works where it is subsidised. It is incorrect to consider that solar is only possible with significant

[2] http://www.businessspectator.com.au/news/2015/8/10/smart-energy/tesla-sold-out-powerwall-battery-2016?utm_source=exact&utm_medium=email&utm_content=1510218&utm_campaign=cs_daily&modapt=

[3] https://medium.com/solutions-journal-summer-2015/is-peak-electricity-price-coming-27228ace2f26

subsidies. In many countries where solar receives a subsidy so do other forms of generation[4].

The example of the wind industry is salient in terms of views on economics, subsidies and analysts. For many years the common-held view was that wind generation was only economic with subsidies. Now in a number of jurisdictions wind is directly competitive with thermal generation. In parts of the US wind is more cost effective than gas generation even in the era of so-called cheap shale gas.

Solar is analogous to wind situation with the cost of solar electricity generation continuing to decline for the foreseeable future as a consequence of improvements to the technology. As importantly, advances in installation methodologies and business models, such as zero money down, will result in further improvements in the cost competitiveness of solar generation and batteries and remove many of the initial capital barriers to adoption[5].

What changes (if any) have you implemented or seen in anticipation or in response to these developments in NZ?

The Commerce Commission paper correctly identifies that much of the work in NZ has been on the technical aspects of the changes in the electricity sector. The Green Grid project, for example, has a strong focus on the technical aspects of solar. It also focuses on some consumer interest aspects of solar.

The Green Grid project does not consider the distribution and grid level aspects of solar generation and batteries, in particular potential benefits of distributed generation in space and time. Overseas studies are starting to discuss the potential benefits to electricity networks at the distribution level from distributed generation and batteries.

Again an example from the wind sector illustrates the point. In the early days of wind generation there was significant concern about the impact of variable generation on the grid and distribution networks. Studies were done and conclusions reached that an electricity system could cope with 5% wind generation, until that was exceeded and the limit became 10%, then 15% and now 40%. Now electricity operators are realising the benefits of wind – a large number of individually controllable generators with modern power electronics can help maintain grid stability[6].

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[4] For example, in Germany coal use for electricity generation was subsidised for more decades and only in the last few years have coal subsidies been in eliminated. In the US oil, gas and coal development have all attracted favourable tax regimes. The International Energy Agency estimates that fossil fuel subsidies globally add up to USD110/tonne of CO_2 emitted and ammoun to some USD550b/yr. http://www.worldenergyoutlook.org/resources/energysubsidies/

[5] US Wind Technologies Market Report, US Department of Energy. http://energy.gov/sites/prod/files/2015/08/f25/2014-Wind-Technologies-Market-Report-8.7.pdf

[6] http://www.awea.org/Issues/Content.aspx?ItemNumber=5451

The Te Uku windfarm near Raglan was designed in such a way that it provides voltage support to the distribution network, even when the wind is not blowing. Further, the Te Uku windfarm provides voltage support through the grid exit point to the Stratford-Huntly high voltage line. The point of this example is that initially a technology was viewed as a problem and in time it was viewed as a solution.

Similarly in time it is likely that solar generation and batteries will come to be recognised as having attributes that are beneficial to the distribution network. Solar inverters have the latest power electronics and communication systems. Software settings can be adjusted to help ensure that solar contributes to the electricity system in the optimal way and arguably solar is less variable than wind; the wind may not blow every day but the sun will rise. The important changes to look at in terms of solar are overseas. The situation in Hawaii is a case in point and an example of where New Zealand does not want or need to be. In Hawaii the utility stopped approving solar connections using the argument that the grid could not cope with additional solar generation. The resulting 'shut down' of the solar industry in Hawaii led to 3000 people being made redundant and a significant back log of un-approved connection applications. Subsequently a solution was reached via requiring that the settings for solar panels needed to be configured in a certain way. This and tests on smarter inverter technologies has led to a doubling of the solar capacity regarded as supportable by the grid. For a significant number of inverters the solution was supplied via a software upgrade over the web[7]. In essence the Hawaiian Electricity Utility had developed a plan for managing solar, which the regulators considered to be "fundamentally flawed" and required the utility to develop a "utility of the future" blueprint.

Lessons from the solar debacle in Hawaii show that it is very important to be thinking in New Zealand now about the policy settings for utilities in relation to solar[8]. While there are significant differences in detail between Hawaii and New Zealand in terms of, for example, generation mix and flexibility, an important point is that in Hawaii both the regulatory and utility sectors were unprepared for the significant growth of solar.

We need to learn the lessons from the situation in Hawaii and the debates taking place in other jurisdictions. Solar will grow in New Zealand and we need to learn from the experience overseas and start work now on the appropriate regulatory and governance frameworks of which the IM process is part.

[7] http://www.greentechmedia.com/articles/read/Hawaiis-Utility-is-Approving-a-Backlog-of-More-Than-3000-Solar-Installati

[8] http://www.greentechmedia.com/articles/read/as-hawaii-demands-utility-reform-thousands-of-solar-installers-are-laid-off

Given the current level of uncertainty, how does the value of waiting compare to get more certainty compare with the risks of maintaining the status quo?

New Zealand has the opportunity to learn from other jurisdictions that have more solar development than we do. It is now time to start gathering information from overseas sources. It seems highly likely that both solar and battery uptake will increase in New Zealand.

Analysis, reports and practical experience in other grid systems can give us an indication of the future. For example, the Rocky Mountain Institute considers that:

- People will stay connected to the distribution network. But what will change is the nature of that use.
- Batteries can in effect load shift, i.e. in effect reduce peaks.
- EVs provide a potentially flexible load that can be scheduled at optimal times.

There are examples of where things have not gone well in terms of policies around solar generation. Hawaii is a case in point. Understanding why some things have not gone well is likely to be as useful as exploring examples where the roll out of solar generation and batteries etc is going well.

solarcity considers that this IM should start to consider the implications and opportunities provided by distributed solar, batteries and other clean technologies. Compiling experiences internationally will provide a sufficient picture of the future to develop a first version of policy, including a revised IM. In particular examples from overseas could help shed light on the interplay between the Commerce Commission's role and the Electricity Authority's role.

It is worth noting that the option of waiting may, in fact, not be available as the primary driver behind the increased uptake of solar is the consumer whose interest has not been halted despite the decsion by all the nations retailers to stop paying a fair price for any excess power generated.

Are there any no-regret measures we could take now?

One area that progress can start to be made is information systems and gaining an understanding of some of the real costs associated with running an electricity network. Improvements to information systems need to be designed in such a way that they can lead to pricing systems that consumers can respond to. For example, consumers with EVs are likely to respond to pricing signals in relation to peak electricity loads and charge their vehicles at off peak times. It is the adoption of this type of technology that is of interest to solarcity and we would suggest consumers in general.

Encouraging and incentivising clarity of information on pricing and exploring ways to send those signals to consumers would be a no-regret measure.

Another no regret measure would be to clearly define the minimum service levels acceptable for consumer initiated infrastructure changes (e.g ICP meter change and the like). When such decisions and changes were initiated and made solely by the incumbent businesses in control of the outcomes there was no need to do this but with the move to consumer initiated requests, defining these would set bounds on anti-competitive behaviours.

How this topic translates to specific issues for electricity lines businesses, including our understanding of the issues that flow from the potential increasing deployment of emerging technologies?

The issues raised in the Commerce Commission's paper (paragraphs 217-230) are a good summary of the kinds of issues being discussed in the industry. solarcity agrees the both long and short term issues need to be considered. As a priority we strongly suggest that regulatory barriers obstructing the efficient adoption of new technology should be removed.

The Commerce Commission paper groups issues into two categories (paragraph 217). solarcity agrees broadly with these categories (economic regulation and stability, interoperability, commercial frameworks and settlement mechanism). The paper notes that for the IM review the Commerce Commission is most interested in the first item (economic regulation). In practice it is hard to tease these two issues apart. As information technology improves the economic regulation aspect can become strongly related to operation of the distribution networks, such as the way consumers may respond to pricing signals. In solarcity's view the presence of significant numbers of smaller embedded generation and storage units all responding to economic signalling will almost automatically create a linkage between the two issues.

Any other experience (domestic or international) you think would be relevant in addressing any issues relevant to this topic.

A number of organisations around the world are working through the kinds of issues that the Commerce Commission has raised in its discussion paper. Experiences can be gained from a number of locational examples, such as Hawaii and from a number of research papers and case studies, such as those prepared by EPRI, the US Advanced Energy Economy Association and the Rocky Mountain Institute to name a few. There is now a sufficient body of material from studies and international experience for New Zealand to undertake a thorough review and start to understand the implications of new technologies for New Zealand. It will be important to identify the issues that are of most relevance to New Zealand. These issues are driven by a mix of physical characteristics and the governance/regulatory environment.

THE PROBLEM DEFINITION(S)

The issues identified in the problem definition are largely the right ones. In response to the questions posed in the paper:

- Expenditure efficiency: solarcity believes that the current framework is biased in favour of business as usual. We do not have a good understanding in New Zealand of the potential of new technologies, hence, almost by definition corporate investment will be biased in favour of business as usual. Individual investment, however, will likely be highly motivated to adopt the new technologies as has been evident overseas; potentially leading to a systemic inefficiency with corporate investment solving yesterday's problems whilst not addressing the growing issues of today.
- Scope of regulated services. There is potential for confusion and distortion related to investment during this period of change in the electricity sector.
- Network pricing for a range of reasons. For example, are the prices currently well understood and are they being effectively communicated to consumers? Are the potential economic benefits to the distribution network from new generation and storage technologies identified and transparent pricing mechanisms available to consumers?
- Where more progressive lines companies are actively looking to adopt these technologies, are there appropriate arm's length mechanisms between the regulated business and the new technology business to avoid cross subsidisation or other behaviours that create an un-level playing field for other players in the market?
- Asset stranding. There may well be risk of asset stranding. This area does need consideration. In particular it is important that lines companies are not allowed to recover historic investments that are now out of date because technology has moved. Communities should not be expected to carry these kinds of costs associated with poor investment decisions. This kind of practice would be inefficient and has the potential to slow down the roll out of a more competitive technology like solar generation.

A further and more practical problem is that the distribution companies can either encourage or discourage the uptake by consumers of new technology. An extreme example outlined above is Hawaii where the utility (a combination of generator and lines company) attempted to stop the roll out of solar generation before identifying that it had, in fact, the ability to accommodate more than twice its original solar capacity estimate without detriment. The Commerce Commission must guard against anti-competitive behaviour that attempts to shut our more efficient technologies.

solarcity is seeing variable responses around the country. Whether this behaviour is deliberately anti-competitive or caused by a lack of understanding of new technology is a moot point from solarcitiy's perspective. Examples of the kinds of behaviours we are seeing include:

- Prices for permitting costs varying across New Zealand, ranging from $0 to hundreds of dollars.
- Significant variation in times for changing electricity meters for solar around New Zealand, from 1 week to 3 months.
- Significant variations in inspection requirements, costs and timeframes
- Utilising utility consumer dividends to provide free solar / batteries to a number of needy customers in the network. While the distribution of dividends in this manner is laudable, the approach of using the utility's solar division rather than going to market for supply is disturbing.
- Blocking of price signalling by retailers who remove customers with solar installations access to differentiated pricing (e.g. day / night rates).

The variations in practice place a significant burden on a new industry. It is not clear to us who has responsibility for addressing some of the behaviours – the Commerce Commission or the Electricity Authority. The issues do need to be sheeted home to an agency to address.

POTENTIAL SOLUTIONS

One possible way to think about the deployment of emerging technologies is in terms of the development of the national electricity market, only much more significant. In the early 1990s it became clear that technology had the potential to enable much more sophisticated management of the electricity system at the wholesale level. The modern electricity market is only possible as a consequence of ICT technology. The development of the market was a significant step change in the operation of the electricity system. It enabled participants in the electricity system to see and understand the true costs associated with the system. In turn, more efficient operation and investment decisions could be made because of much better information.

Some 20 years later we are moving the next step in electricity system evolution - to the distribution level. As at the national level much greater transparency in information can now be achieved. Smart information systems could be implemented that enable participants at the distribution level to see the real costs of all aspects of the electricity system. Just as Transpower and all the players in the wholesale market lifted their game and changed the way they operated, so to lines companies need to lift their game.

There does, however, appear to be a significant industry-cultural difference between the creation of the wholesale market and the creation of efficient pricing structures at the distribution level using new technology. In the mid-1990s there was widespread agreement across the electricity sector that a better way was needed and that technology could help improve decision making. A clear vision was developed on how the electricity market should operate and the details developed under the vision. In essence the change was industry driven.

There does not appear to be similar vision or agreement on how management at the distribution level will evolve through new technology, what is good practice, what is bad practice. Nor is it clear who should lead the development of this vision and its implementation. All of which need to be addressed as this time the change is consumer driven. The internet and massive democritisation of information has shifted expectations as to the locus of choice and control; modern consumers expect to be able to control their own lives. An expectation which is arguably driving the appetite for new, user controlled, technologies like solar.

The Smart Grid Forum is a step towards developing a clear national vision. But this vision needs to be developed further and then a process for giving effect to it in the regulatory and policy process. A key part of the vision must be ensuring a fair and equal operating environment for the emerging distributed generation industry.

The Commerce Commission has a particular role. Other players also have a role in governing and regulating the electricity system. It may be timely to set up a process that looks at the management and operation of the electricity at the distribution level, just as a process was established to look at the management and operation of the wholesale aspect of the electricity market some 20 years ago. Pricing methodology around electricity lines is critical for providing a fair, efficient and equitable environment for developing distributed generation such as solar.

It is too early to identify solutions to problems that are still being identified and worked through. What is needed is a process that involves key players working through the main issues and proposing potential governance, regulatory and financial models. The starting point should be an analysis and synopsis of trends overseas that relate most closely to New Zealand.

To some extent our proposal is a “Smart Grids II” process, that moves beyond the technical and into the governance, regulatory and financial areas. The IM is just one part of the overall system that needs to be looked at.

Overseas experience shows, for example in Hawaii and other parts of the US, a kneejerk reaction by lines companies against the development of solar. The Commerce Commission needs to ensure that some of the attempted anti-competitive measures being promoted, largely unsuccessfully, in some other jurisdictions are not allowed in New Zealand. The Commerce Commission will need to be vigilent.

CONCLUSION

In conclusion we welcome the Commerce Commission opening up debate on the future impact of emerging technology in the energy sector. Debate on this topic is timely and needs to be had in the policy area as well as in the technical area. Lessons are starting to emerge overseas and in New Zealand that can be used to help shape policy now.

The potential change occurring in the electricity sector is significant. Anti-competitive behaviour could slow this rate of change which would be to the detriment of consumers. It might also have the unintended consequence of serving to further motivate consumers to wrest control back and, longer term, increase the probability of the 'stranded asset' scenario: the more incumbents seek to defend the status quo the more consumers perceive their right to control and choose is being attacked and the more they seek to disengage from the system completely. A choice increasingly facilitated by the changes already in motion in the energy storage field. Adding attempts to load the cost of recovering out of date historic investments onto users will potentially exacerbate this as the cost of disconnecting becomes less differentiated from the cost of remaining connected. It will be important that the Commerce Commission stands resolute in the face of any anti-competitive behaviour.

solarcity believes that the red tape and charges that some industry participants have put in place appear to be anti-competitive and designed to slow down the development of solar and other clean technologies. Policymakers need to recognize that these additional costs and bureaucratic delays put an undue burden on new, clean technologies like solar that are trying to create jobs and deliver more affordable cleaner power to our consumers and industry. Whilst this will protect revenues of incumbants in the short term it will damage our economies ability to benefit from lower energy costs and will undermine the nations clean green brand on which 50% of NZ jobs are dependent. It may also inhibit New Zealand's ability to benefit from the revenue possibilities available from solving these challenges and marketing this expertise to the rest of the world; the challenge of embedded distributed generation is facing all of the world's electricity networks. There is an opportunity here analogous to NZ's ability to leverage its geo-thermal expertise.

We welcome the Commerce Commission raising the issue of new technology as the first step to ensuring a level playing field in the electricity sector for new technologies and ensuring they become part of an integrated future grid rather than a substitute for it.

Getting the balance right between competition and regulation will be key to enabling communities to benefit from increasingly affordable clean technology. Developed in the right way this new technology can help drive more efficient use of capital across the energy network. But allowing incumbents in the electricity sector to block the roll out of new technologies would not be in the interests of consumers and could impact on our nations abilty to compete effectively in international markets. Again, we welcome the Commerce Commission starting a dialogue on this very important issue.

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