Submission to the MBIE document "Accelerating renewable electricity and infrastructure"

Solarcity. Contact: Eric Pyle; eric.pyle@solarcity.co.nz Privacy of natural persons

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Summary – policy/regulation is critical to encouraging innovation, renewable and grid-edge technology

We strongly support MBIE beginning this process of looking at policy/regulation that will encourage the acceleration of renewable energy. We welcome the focus on the infrastructure aspect as well as generation. Electricity system regulation and policy has been designed largely in the paradigm of one-way power flow and limited information/communication systems. Grid edge technologies like solar, batteries, smart control systems etc are now readily available.

Grid edge technologies and innovations can enhance resilience and unlock value from existing infrastructure. Increased resilience is achieved through reducing point generation risk, enabling multi directional energy routing and using edge technology to support power system stability. Increased value is primarily a function of controlling the demand curve (time spread of energy use) to flatten demand at a level below current peak thereby allowing demand growth up to current peak without requiring further investment.

Regulation/policy needs an overhaul to reflect this new paradigm of two-way power flows and the deployment of grid-edge technologies, to unlock the benefits from grid-edge technologies. New Zealand's last major policy and regulatory review occurred over 30 years ago and led to the creation of the wholesale market. The kind of technology that enabled the creation of the wholesale market is now cost-effective at the grid-edge level.

Innovation in the power system is enabled and constrained by regulation/policy. To enable new technology and encourage innovation the policy and regulatory frameworks need to evolve and support innovation.

Overview – future direction of the electricity sector and the key role of batteries plus other smarts

Electricity demand is set to increase significantly due to the electrification of transport, process heat and the like. There are two key aspects to consider (i) generating a lot more electricity from ultra-low carbon sources and (ii) getting the electricity to where it is used in space and time, i.e. transmission, distribution etc.

Solar and wind are likely to be the main forms of new generation developed from now on. Geothermal could yet be significant only if carbon capture and storage is developed. Solar and wind are variable forms of generation. Batteries are key to enabling the power system to cope with these variable forms of generation. Battery technology and smart control at the grid-edge is now cost effective and will become a critical means of enabling New Zealand to get to 100% renewable electricity using solar and wind - provided policy at the grid edge is enabling.

In terms of getting electricity to where it is needed in space and time, transmission and in particular distribution and ICP-level energy policy becomes critical as grid edge technology develops. To date New Zealand has focused on policy at the transmission level, such as the national wholesale market, transmission pricing methodology, hedging policy etc. It is time to review electricity policy and regulation as the power system becomes seamless from behind the meter (grid edge) to the national

transmission/generation level, taking into account factors such as the deployment of batteries being key to enabling high penetration of variable renewable generation on the power system.

The distribution level becomes key to enabling high levels of renewable generation, particularly solar. Policy development needs to particularly focus on the distribution level. The reason for this need is that much of the generation in the future will be embedded (solar), at the grid edge and will include batteries together with smart control in the distribution system largely behind the meter.

Digital technologies will enable a very high penetration of wind, solar, batteries and demand management to work together to create a diverse yet stable power system. An unprecedented level of innovation is now possible in power system operation at both the transmission and distribution levels using digital technologies. Again, the policy and regulatory framework needs to enable innovation.

Batteries will become a critical part of the power system, enabling power to be shifted in space and time at the grid edge, something that has not been possible before. Further, batteries operating at the grid-edge and will enable two-way power flow, i.e. from the household/business level to the distribution level and up to the national/transmission level. Batteries coupled with ICT will be a gamechanger for the New Zealand power system as they will be globally.

RMA issues

As outlined above, the two main sources of generation that will be developed in New Zealand in the future will be wind and solar. The discussion document focuses on ways to accelerate wind generation via changes to the RMA and some other measures around data. But it does not propose ways to address barriers to the uptake of solar.

Our experience is that there are a range of barriers to the uptake of solar, including education and understanding of consumers after some years of negative statements from government agencies, delays in connection sign offs, unclear processes for connecting larger (ten-hundred plus kW) sized arrays to distribution networks.

We acknowledge that now some larger arrays are being developed. However, the process is not as easy as it ought to be for a technology that is now the largest form of new generation internationally.

In terms of section 7 of the discussion document, we recommend that the focus be broadened from a wind/RMA focus to include a focus on barriers to the uptake of solar. We recommend MBIE/EECA commission a piece of work exploring barriers to the uptake of solar and ways to address these. The focus should be the full spectrum of solar, ranging from rooftop solar, to commercial/industrial to the development of solar farms.

Demand response – grid edge technologies

Section 8 includes a basket of “grid-edge” technologies under the term “demand response”. We support the intent of this section and welcome the discussion on smart control, batteries etc.

We consider policies that encourage “grid edge” technologies to be a high priority for the electricity sector. The document uses the term “DR market”. This term is too narrow. We suggest it is broadened out to encompass the suite of grid edge technologies and policies to support these.

Grid edge technologies can significantly improve the productivity of the power system. Given that there is likely to be a substantial increase in the demand for electricity, the power system needs to

operate as close to 100% efficient as possible (defined by the difference between peak capacity and average demand) to minimise capital expenditure in the power system. Grid edge technology is key to increase the productivity of the power system.

The key features of a grid-edge technology (demand response) initiatives include:

- Non-wire solutions
- Peak demand management enabled by time of use pricing
- Power system management, such as frequency keeping, reserves etc
- Resilience management.

Work by the IPAG (ACESS initiative) is highly relevant to this topic and we encourage MBIE to consider IPAG's work.

In response to the questions:

- 8.7: Is the development of DR a priority? In our view absolutely. The question/section should be reframed as encouraging grid edge technologies as compared to "the development of the demand response market", i.e. broaden out the thinking beyond demand response.
- 8.8: Could DR help manage existing or potential electricity sector issues? Yes. Grid edge technologies can make a significant contribution to the operation of the power system in a range of ways, ranging from greater resilience to improving the productivity of the whole power system via reducing peak demand and increasing the operating efficiency of the power system to close to 100%, i.e. a flat demand profile 24/7.
- 8.9: Key features of demand response markets? We would prefer the term grid edge technologies rather than demand response markets. Areas that we see grid-edge technologies being involved include: frequency keeping, reserves, transmission deferral (including substation upgrade/development deferral), distribution-level infrastructure deferral, resilience (for example, enabling reliability of power systems to be reduced thus reducing costs).

Efficiency

We support the analysis in relation to energy efficiency, that there can be significant upfront costs to improving efficiency, followed by sustained paybacks. It is the upfront costs that are the key issue. In addition to the issues raised in the discussion document, the tenant landlord issue is at play here, where neither the tenant nor the landlord are incentivised to pursue energy efficient measures; the tenant does not have a sufficiently long lease and the landlord has few incentives to encourage efficiency. The tenant/landlord issue requires careful consideration, both in the residential and commercial contexts (e.g. private household sector, government housing, commercial sector)

The discussion document focuses on using obligations on retailers and lines companies to improve energy efficiency. We would suggest MBIE considers successful initiatives in a range of other jurisdictions where energy efficiency policies have achieved significant results, and understand how the policies worked, their costs etc. California is an example where there has been a significant, sustained and successful focus on energy efficiency.

Renewable electricity energy portfolio standards

As the discussion document identifies, portfolio standards and renewable energy certificates have been successful overseas at driving renewables forward, such as the REC scheme in Australia. Any scheme here would need to be carefully worked through with industry and consumer groups,

ensuring it fits the local context, does not distort the market, does not create perverse incentives and enhances rather than undermines existing business models. There is now a substantial body of knowledge internationally to draw upon should the government choose to go down this route.

Another aspect that needs to be included in the mix of options is the development of carbon emissions reporting by companies that use energy. Also, on householders power bills the carbon emissions should be shown.

A very quick win the government could achieve is around education in relation to solar and batteries. In the last few years there has been a significant amount of negative publicity about solar from government agencies and/or supported by government agencies. These views may have gained some traction. There is an opportunity for the government, via the likes of EECA, to put out more positive messages about solar and batteries, in the form of reports, social media posts, media activity and the like.

Other options considered

The discussion document considers the following other options:

- Government sponsored storage facility
- SoE for renewables
- Co-ordinated procurement (single buyer market)
- Tax incentives
- Provision of subsidies via auction.

We strongly caution government involvement in markets. Businesses will invest on the basis of regulatory certainty. Capital flows in the economy need to change to more sustainable outcomes and the government needs to adjust policy settings to influence capital flows rather than intervene directly.

In terms of tax incentives, an area that could be looked at is incentives for landlords (including the Government as a landlord) around provision of renewable energy and energy efficiency.

Community energy

We welcome an increased focused on community energy. In most cases community energy is about the grid edge, the transactive grid/two way power flow etc. Both the design of the power system and the regulatory system have been designed for one-way power flow; from the centre to the edge. Community energy is therefore a significant paradigmatic shift.

A focus on community energy should include a focus on the regulatory barriers to a two-way power system. Whilst support for community “pilot” schemes would be welcome in reality it is not possible to “pilot” a community energy scheme because investment is made etc, i.e. the project can only ever be “real”. What would be helpful would be to run a detailed policy and regulatory analysis exercise alongside a set of community initiatives to help identify the policy and regulatory barriers, and how these might need to be changed.

Connecting to the national grid

In an era where the grid edge is connected via information flows to the national grid, the distinction between the national grid and the rest of the electricity network becomes blurred. As part of grid planning the role of activities at the grid edge need to be considered. The grid can no longer be considered in isolation.

Again, the regulatory regime needs consideration. In a grid-edge future, regulations need to support a seamless transition from the grid edge to the distribution network to the transmission level. Grid edge technology therefore needs to be thought about as part of the consideration of connecting physical assets to the national grid.

A specific example of what we mean in terms of national grid and the grid edge is reserves and the HVDC. Currently the HVDC can run at only around 950-1000MW as compared to a design capacity of 1200MW, due to insufficient reserves in the North Island. Grid-edge batteries operating as reserve will enable greater capacity on the HVDC link. In this example a large number of behind the meter/grid edge batteries can be operated to support the national transmission system.

Local connections and trading arrangements

This is a critical section for grid edge technologies. Policy and regulation is designed for the one-way flow of power. The ICP as an example, is traditionally seen as a one-way gate for electricity. Grid-edge technology enables two-way flow of power across the network.

It is at the distribution level that the next round of policy and regulatory development is needed. The most recent major round (some 30 years ago) was at the transmission level and resulted in the creation of the wholesale market.

At the distribution level a set of initiatives are needed, such as:

- Lines companies becoming distributed system operators that enable services on their networks. Going a step further, there may be a split between the distributed system operator and the distribution network, just like there is a split between the System Operator and grid development at the national level.
- New measures are needed, such as the number of services being offered on a network.
- Policy and regulation needs to enable data and information flows from behind the meter through to the national system operation level, i.e. the distinction between transmission, distribution and behind the meter will become blurred over time.
- Mobile ICP, that could enable market reconcilable electric vehicle charging/discharging anywhere is another potential future innovation that policy and regulation needs to allow.

There is a significant chicken and egg situation in terms of policy and regulation to support the development of grid-edge technology. Where policy or regulation currently makes a service/product/innovation very difficult, there is no demand for it. Policy/regulation needs to get ahead of the game and enable a very different electricity future – one where participants at the grid edge are integral players in the whole electricity system. The trick is that the policy needs to be enabling rather than favouring particular technologies - the electricity sector has a history of developing technology-specific rules.

The ACESS project by the IPAG is highly relevant. This is a programme that is looking to the future, anticipating a grid-edge future and starting to propose options that will enable a grid edge future. We need more initiatives like the IPAG initiative and that flow from it. We need a set of policy and regulatory work akin to the work that took place for the development of the wholesale market 30 years ago, but focused at the distribution level.

The reason there was the focus on policy and regulation at the transmission level 30 years ago was that the technology had got to the point where a much better way of managing dispatch at the national level was possible. That technology was computing power and communications. Technology has now developed to the point where there is a directly analogous compelling reason to focus on

regulation and policy at the distribution and grid edge levels, as part of an overall power system. There is simply no logical reason why sophisticated and well-designed policy/regulation should stop at the GXP level. Policy and regulation needs to be seamless between the national transmission level and through to the grid edge because that is going to be the nature of the power system of the future.