21st August, 2015

The Manager,
Market Assessment and Dairy Regulation Branch
Commerce Commission
Wellington

Attention: Keston Ruxton

Re: Input Methodologies Review – Problem Definition

Dear Keston

Please find as follows the submission from both the Sustainable Electricity Association (SEANZ 1) and Stored Energy Association New Zealand (SEANZ 2).

Both organisations represent the embedded electricity generation – primarily solar photovoltaic (Solar PV) and battery and storage industry's in New Zealand with our members comprising supply chain participants (manufacturers, suppliers, system designer and integrators) some prosumers and consumers, as well as some electricity retailers and electrical network businesses, who participate in the embedded generation and storage systems supply and implementation space.

For detailed information about SEANZ please visit us here.

Should you have any queries or wish clarification of any points please feel free to contact me as per my details below.

Yours sincerely

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SEANZ Submission to Commerce Commission
Input Methodology Review Discussion Paper

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SUBJECT: Topic 4: *Address the impacts of disruptive/emerging technologies – PV/batteries/big data on the grid and ENB's.*

Glossary:

DG – Distributed Generation

DR – Demand Response

ENB – Electrical Network Business

IM – Input Methodology

PEV – Plug in Electric Vehicles.

Prosumers – Consumers (customers) who also generate, primarily for their own use. The use of batteries to store energy and regenerate at a later time is included in this definition for the purposes of this discussion.

PV – solar photovoltaic generation.

SSR - Small Scale Renewables including solar PV, wind, hydro

TL – Technology Learning by "doing". For many energy technologies (including SSR DG) costs drop by 15 to 20 % for every doubling of installed capacity

This submission focuses on Topic 4: The future impact of emerging technologies in the energy sector, in which SEANZ has a high level of expertise. Our submission starts with general comments about the unprecedented, disruptive consumer-led nature of these technologies, and then addresses the specific questions asked.

KEY POINTS

- SEANZ, as the voice of solar PV and storage/battery stakeholder members in NZ, welcomes and values this IM Review to assist stakeholders in understanding the challenges ahead for the wider electricity industry driven by emerging technologies and consumer choice.
- Smart appliances, solar PV, distributed energy storage, big data, PEVs are emerging consumer-led technologies that are creating changing consumer demand patterns impacting on the grid and ENBs. The key problem for the electricity supply and distribution industry is that these technologies enable consumer choice portrayed in their changing behaviour.
- In consumer led investments, technologies are funded by the consumer for their own use. They do not depend on or require supply industry, taxpayer, corporate or other investors to implement.
- Consumer choice will drive the changes, not the supply industry ability to deliver existing services. This choice can promote extremely rapid change relative to industry asset lifetimes.
- Private consumers invest in technologies for a host of reasons other than purely economic benefit as has been identified by analysis in other jurisdictions and in NZ (Green Grid Project).

These include:

- strong desire for energy independence
- are dissatisfied with existing supplier and electricity regime
- perception of continually increasing power prices
- wish to lock in fixed pricing for retirement
- have an innovator/early adopter mentality
- simply have spare cash
- want to add value to their home
- see environmental benefits

- SEANZ considers that the grid needs solar prosumers and prosumers need the distribution system to achieve least cost transitions to deliver community benefits from a smarter grid.
- SEANZ also considers that potential for market failure exists or is already present under the current electricity market structure, where prosumers are required through regulation to sell electricity surplus to their competitor (the electricity retailer). The price is dictated by the retailer, who has no incentive to differentiate the higher locational value of the energy purchased from the nominal bulk wholesale price at the front end of the transmission system. The transmission system is not used yet the pricing implies that it is. The pricing regime requires a logically substantiated approach to define such as opposed to the current illogical structure for prosumers.

EXPONENTIAL GROWTH IN UPTAKE OF DISRUPTIVE TECHNOLOGIES

SEANZ wishes to ensure that Commerce Commission and regulators (Electricity Authority, MBIE) understand that this consumer-led change is strongly evidenced in many other jurisdictions, and is already occurring in New Zealand. The exponential growth trends overseas and locally (albeit from a very small base), have by now been well publicised by industry commentators. The prevalent view is that these consumer-led technologies represent massive imminent disruption to the existing supply industry business models. A key question SEANZ poses is what defines when the tipping point and cross over will be reached, where the consumer lead technology, investment in such, generation profile, and the ICP uptake number reaches the point (notional and real) where the real impact is detrimental to ENBs, from a NZ Inc perspective.

How is the real impact defined – stranded asset values, lost revenues, social inequities? A common theme appears to be revaluation of assets and the RAB with various forms of imposing higher connection fees, export tariff fees for solar PV prosumers or application of a flat rate across all consumers to accommodate the lost revenue.

It is our firm belief that policy needs to "front foot" and get ahead of the consumer led changes for the sake of all stakeholders – solar PV prosumers, ENB's and consumers. SEANZ refers to SEANZ member Vectors recent presentations by CEO Simon Mackenzie and Andre Botha, Chief Networks Officer:

"Regulation will need to change to deal with the rapid technological changes occurring here and now in electricity distribution….Changes are and will continue to be consumer led… Consumers want choice and change is delivering the choice….the industry needs to be prepared to act very quickly… to ensure that they do not just build another pile of lines".

SUMMARY OF SEANZ SUBMISSION

Overall, it is SEANZ view that:

> **To address the impact of these new consumer-led technologies, regulatory change is needed to meet IM objective of promoting the long term benefit for consumers. To provide a framework to guide future energy investments (either by the consumer or the supply industry, these issues must be addressed now.**

COMMENTARY FROM SEANZ PERSPECTIVE

Consumer viewpoint

What the solar PV industry currently sees is a strong desire by consumers to potentially disconnect from the grid. Most consumers that initially inquire about pure grid connected PV are thinking about going off-grid. Once they understand the technical issues and cost implications at the moment, most decide not to. With the advances however of storage/battery technology, this step becomes smaller and smaller.

The more the electricity supply industry pushes costs towards prosumers (eg a premium on lines charges, export tariffs, limits to connected generation capacity or export restrictions), the more encouragement there is to take the step to disconnect. This reduces the number of ICPs and increases the cost to the remainder.

The network provides value through demand diversity

Network efficiency comes through large numbers of dense connections – therefore grid defections will reduce the economic value of the grid and distribution system. The distribution system offers capital investment benefits through demand diversity (saves on both capacity and storage)

It is worth detailing the key value that network based electricity supply provides in the "long term benefit of the consumer", as this appears to have been overlooked in contributions to date.

The network effectively caters for load diversity. It supplies a cluster of like customers at a per customer capacity of only a percentage of the capacity each would individually otherwise have to provide. This feature is what makes it economic. Where the generation comes from is of secondary concern – traditionally it has been from GXPs, but increasingly it will be supplied locally at the LV level.

Compared with stand-alone energy supply, distribution system infrastructure offers capital investment benefits through demand diversity, achieving savings on capacity and if the supply is intermittent also storage. Typically, for New Zealand residential consumer load patterns, aggregation of only a few ICP's produces substantial capacity savings. At 100 or more, the network capacity requirement drops to around 20% of the individual installation, and thereafter levels out.

For this reason, the network needs consumers to remain connected, irrespective of where the energy comes from. Due to the intermittency of supply not matching their demand patterns, prosumers may want to export, as long as they have sufficient incentive to do so.

By the same token, prosumers need the network to efficiently share their generation locally with other users.

An appropriate market regime which operates at the local level will promote the long term benefit of consumers only if they are induced/incentivised to remain connected. This should be a long term focus of any regulatory action.

It is SEANZ view that prosumers can deliver more value in the common good by remaining connected. As the prosumer local generation and load shifting (storage) capacity develops, it can be incentivised and aggregated to maintain grid economic efficiency through network load diversity, and improve it by providing improved supply security.

Incremental technology changes are required to networks as the penetration of local generation grows, but there are no major barriers to a high level of penetration on most networks. The main barrier is the lack of appropriate general customer tariff structures at the prosumer level for both imported and exported energy to incentivise the gradual transfer of supply to embedded generation, and justify progressive network modernisation.

Incentivising Network Supportive Consumer Behaviour

SEANZ believes that the IMs should be designed to promote capacity – time of use based tariff structures at the individual consumer level that are consistent across the country, and should:

- be based on energy usage such as to not penalise low consumption – eg retain the low energy use fixed charge
- When there are supply (particularly network) constraints, penalise high usage and incentivise exporting.

A principle could be that any departure from the average standard demand profile should be rewarded if helpful to the grid and penalised if unhelpful.

Prosumers vs Energy Efficiency

SEANZ strongly rejects the argument that prosumers should be singled out and penalised specifically because they reduce net consumption by local generation, while consumers who achieve the same desirable result by investing in energy efficient appliances or undertake conservation measures are not.

Access to Regulated Infrastructure and Payment for Exports

In the consumer's eyes, fair access to the network generally means paying a transparent and defendable price for the services of conveying the exported power a very short distance on the local LV network, and providing the necessary billing and market reconciliation services. The prosumer also expects to be paid for network support services for capacity or other ancillary services they might provide. Minimum payments for these services could also be mandated.
In the absence of a local "retail market", one way of ensuring that a fair value is placed on prosumer exports would be to mandate a minimum payment indexed to the retail price on all tariffs. The difference would be transparently assessed and agreed within industry as a fair transaction cost. This would create more certainty for prosumers (where none exists at present), and share the investment risk more fairly across supply and demand sides.

Longer Term Solution and the Role of Lines Cos

Other non-generation consumer led technologies could contribute more effectively by incentivising Demand Response (eg BEV charging).

The longer term solution is to create well-planned, effective demand response markets at the general consumer ICP level which signals cost reflective pricing for services offered by the grid to consumers and prosumers, and vice versa.

ENA suggests that Cost Reflective Pricing as a step towards a solution. SEANZ agrees more cost reflective pricing is helpful **IF** it promotes future investment to address customer demands and does not perpetuate recovery of "sunk" asset costs that are no longer efficiently utilised.

ENBs should be allowed to engage in other revenue opportunities directly associated with their core business that are created by the changes, such as aggregating and retailing solar generation or providing other non-regulated, energy related services that benefit the consumer.

It is most important for "NZ Inc" for ENBs to understand and undertake Value of Solar and Storage (VoSS) analysis. Examples include the value of avoided cost of generation and transmission, avoided cost of grid investment, aggregated grid balancing, understanding geopolitical risk and the negative cost value for prosumers of solar PV and battery grid integration. From the solar PV and storage industry viewpoint, the ENB sector of the industry appears to be positioning itself to maintain the status quo, but apply additional charges for prosumers to help balance their revenue and ROI.

The locus of ENBs requires repositioning. They require business model innovation and change management skills, for example, creating other services to generate non-regulated revenue such as retailing solar generation, or aggregating for solar generation on their network with retailers. Or participating in the emerging technology markets or niches thereof. They need to be able to move to a model that allows them to sell a wider range of services for customer engagement.

The common perception of mistrust of the supply industry by prosumers (and consumers) is that they do not see the value of the lines company. The prosumer needs to see and understand the value of the service provided by the ENB.

The current process of billing (lines company charge as a line on the power bill) is not helpful. It is not transparent, as it displays the cost to the consumer, but does not help them understand the value.

Compare this to a PV system where the prosumer can visually see on a smart phone, tablet or computer, using both browser and application based technology all the statistics you need to understand that the value your PV system is providing you with. This is furthered by the solar PV installer and industry's ability to consolidate such data enabling management behaviour to be actioned. A country wide mandated transparent minimum export payment regime would dispel much of this mistrust.

SPECIFIC RESPONSE TO THE IM REVIEW INVITATION TO SUBMIT IN REGARD TO TOPIC 4

SEANZ agrees with the Commerce Commission view that the issues can be broadly grouped in two categories:

217.1 Issues more closely related to economic regulation of network monopolies; and

217.2 Issues more closely related to network stability and interoperability mainly at the electricity distribution level, including governance arrangements, commercial frameworks and settlement mechanisms.

We accept that for the IM review, the Commerce Commission is primarily interested in the former category of issues, but we would like to point out that these are closely inter-related and that settings for economic regulation can drive the direction of technology uptake, eg lack of incentive to export will turn customer choice away from offering load shifting or power quality support features from embedded generation and batteries, to the detriment of overall energy system economic efficiency. The role that new consumer led technology could play in network support such as resilience (eg self-sustaining micro grids) should be explored and taken into account in any regulatory changes. The chance to get it right won't come again. There are many advanced examples of substantial embedded micro grids operating around the world from which extract learnings relevant to the New Zealand situation can be applied.

246.1 Our description and scoping of the topic. In particular, we would find it helpful to know your view on the following:

We believe that the initial scoping of the topic by Commerce Commission is worthy, and is also enhanced by the recent views expressed at the IM forum and elsewhere by industry leaders and commentators.

246.1.1 What do you think are the prospects for change in electricity systems in New Zealand from these developments? How imminent and material is this change in New Zealand?

SEANZ knows from its membership base, which is involved with the current and emerging technologies that the change is well in play in New Zealand, supported by solar PV ICP count and the off-grid solar PV/batteries count.

Based on overseas evidence it will accelerate. The market participants in supplying solar PV/batteries (part of SEANZ member base) has increased 200% in less than 2.5 years, which is comparable to the grid connected ICP count uptake rate. And SEANZ has declined 24% of potential member applicants.

Irrespective of supply side viewpoints of the economic justification, we consider that from the consumer perspective only, the "tipping point" is near. To influence the trends for the benefit of the overall energy system economic efficiency (we include consumer investments in new technology capable of production and utilisation of energy in this), there is now a relatively short window for regulatory change to be introduced. This period we define as 2 – 3 years with refinements for a further 3 years.

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

There are widely varying responses within the ENBs. However it is our observation that either ENBS do not perceive that the technologies will be disruptive to their business models, or they feel that it is their responsibility to their customers to simply attempt to maintain as best they can the existing business models. Based on extensive research overseas, much of it already

completed, it is the SEANZ view that the operation and structure of LV and eventually MV networks close to general customer clusters (eg housing subdivisions) needs to be completely transformed to an "energy sharing" function, not a one way supply function as at present. Rapid regulatory change is required to facilitate this process.

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

SEANZ believes that the value of waiting is substantially negative. Economic efficiency through inclusion of the consumer led changes is not possible without changes to the market design, which is needed to incentivise the appropriate smart network refurbishment.

It is SEANZ view (as designers and installers of the technologies) that there is little uncertainty as to the technology trends and implementation pathways. Solar PV dominates and will continue to dominate prosumer generation technologies (currently 98.48% of all embedded generation, according to Electricity Authority EMI online statistics). Daily cycle batteries will be installed at prosumer and consumer premises wherever it is economic to do so. Gas fuelled fuel cell based home generation units will be installed wherever the price differential between LPG/NG supply and electricity justifies it. PEVs are likely to represent only a modest load for some time and will mostly be charged at home at night. These systems are in volume commercial production now. Substantial numbers will be embedded in the network within the next decade. Numbers of smart appliance controls have been and continue to be developed and installed for consumer convenience (by innovators), with large numbers being used if economic advantage can be obtained.

Information collected from prosumers systems, smart appliances and energy management systems already in use at a building/ICP or group of buildings/residences/ICPs **ENABLES** the prosumer or group of prosumers or the owner of the systems (PPA model means share with supplier) to make the decisions on supply variations, usage and management thereof, further impacting ENBs. The business model herein is transferred accordingly. The speed and scale of installation will depend primarily on the price structures set by the supply industry. Hence the regulatory environment is a strong factor in the up take mix.

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

Yes:

In the absence of local markets for sharing energy directly between prosumers and consumers, introduce a fair, transparent minimum export price regime for prosumers which is indexed to retailer charges.

Unbundle lines charges from retailer bills so that costs and price structures within the regulated parts of the industry (ENBs) are transparent to the consumer.

Immediately initiate an in-depth study of the potential for more user interaction and pricing mechanisms necessary to deliver optimum overall energy system economic efficiency in response to consumer-led new technologies. It is essential for this study and analysis to include consumer and technology developer-supplier stakeholders who understand the technology capability and trends. Economists and supply industry participants alone are not in possession of this relevant knowledge.

246.2 How this topic translates to specific issues for electricity (and where relevant gas) lines businesses, including on our understanding of the issues that flow from the potential increasing deployment of emerging technologies;

These issues are now well defined elsewhere in our submission, but to summarise:

Stranded assets: Investment in supply side assets based on historical load growth is now not a good idea – as is evidenced by the current flat demand and the current budget and spend by Transpower to reinforce the grid.

End of life replacement: Many ENBs, particularly in the rural areas need to replace their feeders. The business case and costs cannot be justified based on existing returns, and this will become less viable in the future.

In both cases a regulatory regime which encourages these activities (ie maintenance of the status quo) is undesirable.

Market failure: Prosumers who export energy perceive that zero to very low payments (eg wholesale rates) for their surplus represent a market failure, in that they are required to sell to their competitor at a price the competitor dictates. They have already which opens up the innovation space, as the industry and prosumers have found alternative ways to use the energy on-site, to the detriment of grid efficiency.

A simple example is solar PV excess generation for many installations is directed to "diverter technology" to heat hot water which eliminates an ENB's ability to manage peak loading using ripple control.

246.3 Any other experience (domestic or international) you think would be relevant in addressing any issues relevant to this topic. We ask that submitters are specific on what aspects of the experience they find relevant to the NZ context;

Feed in tariffs and other measures created manufacturing volume sufficient for TL to kick in. Once initiated, this is unstoppable until the technology and product becomes mature and is commoditised. Overseas experience and TL extrapolation shows that solar PV costs will reduce by at least 50% over the next decade. This expectation is reinforced by IEA analysis. Batteries are and will continue to follow the same cost down curve.

This position portrays the inadequacy and weakness of the current market design in New Zealand, as the forecast cost reductions will be so great that solar PV and batteries implementation costs will be lower than the cost of transmission and distribution alone. Examples exist already in US states.

The grid will play the part of supporting and distributing embedded generation locally.

SEANZ believes it is essential that New Zealand plans and provides appropriate regulation for its overall electricity system and design appropriate tariff structures for this inevitability. Notwithstanding a transition process to be enacted, actions taken now must contribute to operation of a system in this context, which is predictably vastly different at the customer interface to the one we know today.

Germany and Japan for example have substantial experience in advancing the technical design of this modified interface. New Zealand needs to design a market interface which is "friendly" to the uptake of these technologies. ENBs are positioned to have a key role, but they must be incentivised to respond in a manner which is to the "long term benefit of consumers".

246.4 The problem definition(s). There are a number of issues that may result from increasing deployment of emerging technologies, which we have attempted to describe in this chapter. However, it is not yet clear how this results in specific problems as they relate to Part 4 regulations and the IMs

SEANZ does not feel adequately qualified to comment at this time.

246.5 Potential solutions. While the focus at this stage is on problem definition, we welcome any potential solutions to the specific problems identified. Solution suggestions should be expressed in terms of how they promote the long-term benefit of consumers.

Suggestions for interim actions to provide breathing space for in depth studies and analysis to be carried out are made in **246.1.4** and **246.1.5**

While we have not examined proposals in detail, it appears that moving to a Revenue Cap regime for ENBs may provide more flexibility as to how they address the early adoption of these technologies.

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