New ways to empower electricity consumers

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Submission by:

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I am submitting as an individual, and understand that my name will be published.

Introduction

I have a home solar installation consisting of 16kW of panels, a 10kW 3-phase inverter, and 16kWh of battery storage. I also have an EV with a 60kWh battery that can be charged at 7kW single phase. I have an all-electric home with extensive home automation facilities allowing me to monitor and control my electricity usage.

My retailer is Electric Kiwi, and I've chosen their Movemaster plan as it provides TOU pricing, including a free Hour of Power (HOP) which I heavily exploit.

My experiences in commissioning and running this system will be useful in answering the general question of "How can electricity consumers be empowered?" as well as the specific questions in the EA survey, which I will answer first.

The purpose of empowerment also needs to be clarified as it affects the measures that should be put in place. In the national interest consumers should be encouraged and enabled to use electricity at non-peak times, thus reducing peak loads on both generating facilities and Transpower/Lines company transmission lines.

Clearly a good way of doing this is to encourage generation close to the source, which is typically achieved by rooftop solar for homes and businesses, supplemented by Lines company battery storage to store the excess (typically in the middle of the day) and release it at peak consumption hours (typically in the early evening).

From a consumer's perspective empowerment means the ability to measure and control their electricity consumption (and generation for those with solar), and to choose the retailer offering the lowest net cost for their electricity usage patterns. Specifically, solar consumers need the ability to inject electricity into the grid at times of peak demand, and should be rewarded for doing so.

Compared with Australia, NZ's uptake of residential solar is woeful, and clearly things need to change if we're to meet our climate commitments and reduce our dependence on fossil fuel peaking generators. Additionally, all New Zealanders are concerned at the escalating cost of electricity, particularly when large scale manufacturing is forced to close with the loss of hundreds of jobs.

The structure of our electricity market where gentailers maximise their returns by keeping electricity supply on the brink rather than investing more heavily in cheaper renewables also needs to change, but that's the subject of a separate Comcom/EA initiative.

This survey at least will address the demand side of the equation, and when implemented will reduce peak hour consumption for which generation and transmission need to be provisioned.

Questions

1. Do you agree more power companies should be required to offer time-of-use pricing?

Response: Yes

It could be argued that as some retailers already offer TOU pricing then not all retailers should be compelled to. Let the consumer decide. Consumers can switch to those retailers offering the best deal, and retailers can adjust their pricing to attract and retain consumers.

Theoretically this is a good competitive model. Unfortunately it doesn't work in NZ for two reasons:

- The gentailers have considerable market power and market share, and offer a limited set of plans to keep their billing models simple and their revenue high
- Most consumers regard electricity as a grudge purchase as they have minimal ability to change their usage patterns and see no benefit in changing retailers, despite having sites like Powerswitch available.

Forcing gentailers to change their billing systems to allow TOU plans would send a signal to their customers that they do indeed have choice. This in turn may lead customers to reconsider their electricity usage, and investigate more options to change their behaviour. However it does need to be coupled with consumers' ability to actually effect change.

2. Do you agree more power companies should be required to offer a 'time-varying buyback' rate?

Response: Yes

At present the buyback rates are pitiful, mostly around 8c/kWh, but some retailers offer more. Meanwhile the cost of wholesale electricity (ref em6) is typically in the 20-30c range. Ie the retailers are making a killing at the expense of household solar producers.

This differential also acts as a disincentive for householders to configure extra capacity into their solar installations, whether additional panels or battery storage. Thus, many home installations barely cover usage on sunny days, let alone cloudy days. It also means they are ill-prepared for when the EV arrives, or gas cooking/heating is inevitably replaced by electric.

Consumers should be fairly rewarded for the energy they pump into the grid, particularly at peak times, by higher buyback rates. Whether these follow em6 rates aligned with half-hourly metering or a higher fixed rate varying more slowly (or both) can be up to the retailer, with the customer free to choose what's best for them.

3. Do you agree only large power companies should be required to offer time-of-use pricing?

Response: Yes

The smaller retailers are much more nimble and are able to respond to niches in the market. Requirements should only be forced on the gentailers due to their market power and privileged monopoly position.

4. Do you agree only large power companies should be required to offer a 'time-varying buy-back' rate?

Response: Yes

For the same reasons as above.

5. Do you agree these power companies should be required to promote both the pricing plan and 'time-varying buy-back' rates to their customers?

Response: Yes

It's fundamental that all retailers accurately describe their plans and terms of use on their websites so customers (existing and potential) can make an informed choice of the plan that's best for them. Retailers should also analyse a customer's usage and offer a different plan if more favourable for the customer. This should also extend to retailers being required to export their customers' usage in a standardised way so it can be used for comparison against different retailer plans.

Additionally, retailers should prominently display the current dynamic buyback rate for their customers (assume based on geographic location) and make this available via an API (similar to em6) so it can be integrated into home automation systems.

6. Do you think the proposed ways of promoting them would work?

We're proposing that power companies would be required to:

• show time-of-use and 'time-varying buy-back' plans on their website

• include the plans on our consumer switching website (currently Powerswitch)

• proactively offer time-of-use and 'time-varying buy-back' plans to the customers likely to benefit.

Response: Yes

If not (or in addition), what else could they do?

Many retailers' advertisements are very generic/feel-good and don't explicitly state how or why they can offer consumers a better deal. It would be good to see some improvements here, though this would need to come through encouragement and recommendation rather than direction.

7. Do you agree all lines companies should be required to pay a rebate when consumers supply power when it's needed?

Response: Yes

Lines companies are in a privileged monopoly position and benefit from electricity injected into their networks by lowering demand and reducing the need for transmission line upgrades.

My Lines company (Powerco) charges a fixed daily fee and peak and off-peak consumption tariffs, but no buyback, even though they benefit from it. Electricity retailers are therefore limited in the buybacks they can offer customers.

I agree with the survey's comments that the rules should be flexible enough so the rebate reflects the local levels of demand and capacity – and be able to change.

Essential to all of this is transparency so the customer can see the current buyback rate and how it is composed. This will lead to households and businesses making informed choices as they implement or expand their solar implementations.

8. Do you agree that rules for this rebate should be a set of principles lines companies must follow, rather than stricter regulation?

Response: See above.

9. Do you have any other comments on our proposed rule changes?

Response: Yes

The thrust of the consultation is that consumers are fairly compensated for the energy they inject into the grid, but this is predicated on their ability to do so. My comments relate to both of these topics, and the direction that the EA should provide.

Net billing for multi-phase customers

This one relates to fairness.

I think all owners of solar systems accept that net metering needs to change to bi-directional metering for visibility and management of electricity flows. In my case as a 3-phase customer my EDMI Atlas Mk10D meter records grid import (UN uncontrolled channel) and grid export (EG solar channel) by 30 minute intervals with the phase data summed into an aggregate figure for each channel. This data is relayed to retailers for billing purposes by the metering company.

For owners of 3-phase solar systems (and owners of single-phase solar systems on a multi-phase supply) it's entirely possible for import and export to take place concurrently within a given half-hour period.

All retailers I've contacted (Electric Kiwi, Octopus Energy, Z Energy) use an iniquitous billing method whereby customers are billed for consumed energy at high TOU tariffs and credited for exported energy at the low feed-in tariff (FIT). This is entirely at the discretion of the retailers and has nothing to do with net metering.

This makes no sense and unfairly penalises owners of 3-phase systems. My argument is that customers should be billed for the net energy consumed within a given half-hour period (or credited if a net export). Lines companies providing a rebate for energy injected into the grid will allow retailers to provide this facility without being disadvantaged.

Recommendation: That the EA directs electricity retailers to implement net billing for multi-phase customers, and for their billing algorithm to be clearly explained on their website.

Visibility of real-time data at the meter

My EDMI Atlas Mk10D meter records a wealth of information as well as energy import and export. Included are per-phase voltages, power in both VA and W, and power factors -all in real time. This is invaluable information for those monitoring and tuning their household's electricity profile. Interfaces include optical, RS232, RS485 and IP over Modbus. Software is already available to query these sources. However this data is locked down by the metering companies and completely inaccessible to the householder who hosts the meter on their property.

As a result, new electrical services (solar, EVSE, hot water control for excess solar) need to install their own meters such as the DTSU666 with associated CT clamps on the phase wires. Not only does this lead to a messy switchboard, there is opportunity for error if a CT clamp is installed incorrectly, and the CT clamp data can be inaccurate by a few percent.

All this is completely unnecessary if the highly accurate information measured by the electricity meter was made available to the householder and installers of electrical equipment.

In the In the European Union access to electricity meter data is governed by regulations aimed at empowering consumers and promoting transparency, and includes consumer access, interoperability, non-discriminatory procedures and third-party access. The same should occur in NZ.

Recommendation: That the EA directs metering companies to allow householders and their equipment suppliers to access metering data in real time (assumes a smart meter is in place).

Visibility of metering data delivered to the retailer

At present the customer data delivered by the metering company to the retailer for billing isn't easily accessible to customers. Some retailers offer a web portal, while some only begrudgingly supply it if the customer specifically requests it through a Service Desk. Delivery is slow, and the data is almost certainly out of date, so cannot be used for anything close to real-time monitoring.

In the interests of transparency and customer access to their data, this situation needs to be substantially improved.

Recommendation: That the EA directs electricity retailers to provide customer metering data via an easily accessible web portal, in near real time. The recommendation could be enhanced by requesting retailers to provide an API interface for access by home automation systems. This can tie into the earlier recommendation where retailers provide real-time TOU tariffs and FITs.

Water heating monitoring and control

Hot water heating is a large percentage of a householder's energy consumption, but typically they have no monitoring or control over its operation. A thermostat associated with the element at the base of the cylinder cycles the power on and off based on water temperature, but with no knowledge of peak periods, forecast demand or a requirement for energy storage. An exception is the use of ripple control for demand management, but this is outside the customer's jurisdiction or requirements.

While some customers may prefer this "set and forget" method of operation, many who are attempting to better manage their electricity and energy usage in general require greater monitoring and control. In particular, householders should know the temperature of the water in the cylinder (whether by gauge or electronically), and have the ability to cycle the element on and off via a timer or programmatically. While this can be achieved through sensors and high current switches/relays, it's difficult and inconsistent. Much better would be for these facilities to be integrated into the element assembly, and monitoring and control accessible wirelessly (wifi or a wireless mesh network) so it could be integrated into home automation systems.

Recommendation: That hot water cylinder (and hot water heat pump) manufacturers be directed to offer hot water solutions that provide the householder with wireless monitoring and control functionality conforming to common home automation standards.

Control over solar performance

Many households with solar have little control over the performance of their systems. Like hot water, they are often configured in a "set and forget" mode. Where an app or web interface is provided it is typically used for monitoring with only limited options for control. In my case my app allows me to set a battery charge time and when the battery should not discharge, but I have no control over forcing the battery to discharge to the grid. As I have a background in engineering and IT I have been able to access the inverter's internal registers via Modbus and I now have the control I require, but this ability would be outside the ability of most users.

For solar consumers to play a role in grid management and smoothing the peaks they must be given the tools required to manage their inverters, whether this is through an app or managed by an external provider through a VPP (Virtual Power Plant), as per the Solar Zero model.

Recommendation: that the EA take a much more proactive stance in directing solar installers to provide fine-grained control of their inverters by customers, including the ability to export to the grid on demand. The EA should also take a more proactive stance in ensuring inverters sold in NZ meet standards to participate in VPPs should the owner choose to do so.

EV integration

EVs can be considered to be mobile grid stabilisation devices. Their large battery capacities coupled with their high power connectivity to the grid (typically 7kW single phase or 21kW 3-phase) allow them to play an important part in demand management. However standards are woeful, and already we have a multitude of EVs and EVSEs in NZ that do little more than draw a large current when an EV is plugged in.

Most EV's have some degree of scheduling capability, but there is little incentive for the owner to sit in their car and program it, especially if they're not on a TOU plan.

Some smart EVSEs (eg Evnex, Zappi, Wallbox Pulsar) have app control and the ability to schedule charging sessions to align with off-peak periods or when excess solar is available, however these are frustrated by some EVs' inability to respond. For example, the OBC (on-board charger) of the popular BYD range of EVs available in NZ is afflicted by a sleeping bug which means it fails to respond to a delayed charge start initiated by a smart EVSE (to date only Evnex has been able to work around this bug).

Clearly EVs and EVSEs need to work seamlessly in both grid consumption and possibly injection, with the owner having full control (and reimbursement for injection) over what happens when.

While V2X (vehicle to load, home & grid) standards are evolving it's important that the EA is on top of this issue and introduces guidelines that minimise the pain for current and future purchasers of EVs and EVSEs.

Recommendation: That the EA takes a much more proactive stance in advancing V2X standards, and over time this should evolve into VPP standards where distributed energy resources can be localised in the hands of a group of local consumers/generators.

Further, as a short term measure, the EA should direct manufacturers and importers of EVs and EVSEs to meet basic interoperability as well as safety standards. BYD and Tesla as a case in point.

Summary

The EA's mandate is supposed to ensure a competitive, reliable, and efficient electricity market for the long-term benefit of consumers, and to protect the interests of small electricity consumers.

To date I've seen little evidence of this, but this consultation is a step in the right direction. If the EA has been proactive in delivering on its mandate it needs to communicate this much more strongly. Most electricity consumers would be surprised to discover the EA is actually on their side as power prices escalate and the gentailers reap excessive profits and pay handsome dividends.

It's time for the EA to step up. I trust the results of this consultation will motivate it to do so.