Enabling mass participation in the electricity market

How can we promote innovation and participation?

Consultation paper

30 May 2017

Market Design

Executive summary

The Electricity Authority wants your views on changes to regulation that may be needed for consumers to benefit from the changes in technology and innovation happening now in the electricity industry. Our objective is to promote competition in, reliable supply by, and efficient operation of the electricity industry for the long-term benefit of consumers.

The electricity industry is changing. Household, business and industrial consumers have more control than ever before. Technologies such as solar panels, batteries and electric vehicles mean consumers can produce and store their own electricity. Smart controls for equipment and appliances, such as ‘smart’ hot water cylinders, allow consumers to more easily control when and how they use electricity. As well as buying electricity, they can participate in the market as sellers of electricity and related services.

Consumers also have more choice. New and existing suppliers are competing to win customers by offering innovative products and services that reflect consumer preferences.

The result is a change to the decades-old electricity supply model with large-scale and specialised electricity businesses. We call the changes ‘mass participation’ in the industry because they mean more buyers and more sellers of electricity and related services.

More participation promotes competition. Competition is likely to deliver long-term benefits for consumers from more choice of supplier and type of service. Additionally, more participation is likely to deliver significant reliability benefits by allowing consumers to choose more personalised levels of reliability and security of supply. That said, more participation is also likely to bring reliability challenges and costs, such as those arising from managing two-way power flows on the distribution network.

We have a comprehensive work programme focusing on removing regulatory barriers and enabling mass participation. The focus of this paper is the ‘gaps’ in that programme and what further work needs to occur. Broadly, we want to know your views on these key questions:

- What opportunities do you see for more participation across the electricity supply chain?
- What changes are needed for consumers to experience the benefits of innovation in technology and business models?

To help us answer these questions, we are asking a series of specific questions about how the electricity industry is changing, the potential benefits, and the things that may need to change.

Your comments and answers to these questions will help us determine what, if any, changes to the rulebook—the Electricity Industry Act 2010 and Electricity Industry Participation Code 2010—may be needed to promote competition in, reliable supply by, and efficient operation of, the electricity industry for the long-term benefit of consumers.

The changes and the likely impacts

The Authority has already identified some possible changes to enable more participation or ‘mass participation’.

Distributors and Transpower can now use alternative means to help provide network services

Transpower runs the transmission network (the ‘grid’). Distributors run the networks linking the grid to consumers. Both Transpower and distributors provide a network service.

The network service is considered a natural monopoly because it is more efficient to have one party provide the poles, lines, substations and other infrastructure associated with transporting electricity. However, the improving capability and falling cost of batteries, solar and other distributed generation, and of communications and control systems, means it is now feasible for other parties to provide aspects of the network service. In particular, it is now possible for third parties to help maintain and enhance network reliability by using batteries or demand response.

Having a platform or a set of market arrangements for matching buyers (Transpower and distributors) with sellers (suppliers of required services) could be an effective mechanism for realising the benefits of technologies such as grid-scale and household-scale batteries.

Open access to distribution networks will promote competition

Distributors and Transpower, as monopoly infrastructure providers, have a privileged position. Distributors in particular have significant control and influence over who uses the network and in what way.

For example, a distributor could discourage competition in the retail market by imposing contract terms that shift risks and costs to retailers on its network. Consumers would be worse off due to having less choice and less efficient, higher cost services.

Distributors should provide a level playing field where all parties using the network can be confident that they will be treated equally and receive efficient and non-discriminatory terms to use the network.

Peer-to-peer platforms could increase competition

Peer-to-peer (P2P) trading is a feature of many marketplaces. It typically involves matching buyers and sellers of a product or service over a market platform. P2P platforms for electricity are already being established in New Zealand to allow households with solar panels to sell surplus electricity to other households.

There are many reasons a consumer might want to participate in a P2P platform. A household without solar panels may want to buy electricity locally or to buy electricity produced by solar panels. A household with solar panels may want to sell locally or try to get a better price than offered by a retailer.

Participants and non-participants in the market need to be recognised correctly

To participate in the electricity market you need to be recognised as a participant. Conversely, parties that are not directly participating in markets for electricity services should not be recognised as participants. That means people face obligations that are relevant and consistent with promoting the long-term benefits of consumers.

The current list of industry participants was established in 2010 and was based on a list of participant types developed in the mid-1990s. Each type of participant is linked to a particular activity, such as retailing or generating.

Because changing technology and new business models blur the lines between the old participant types and activities, it can mean that people can be unaware when regulation applies to them. Technology also opens the way for different ways to participate. This raises questions about whether the existing arrangements:

- enable parties that provide, or want to provide, electricity services to be recognised as industry participants
- inadvertently impose obligations on parties that are only indirectly part of the electricity industry.

More diverse sources of electricity supply and increased demand response could improve competition

More diverse sources of electricity supply from new forms of generation could supplement existing grid-connected and distributed generation and improve competition in the generation market. For example, competition could be increased using the 'virtual' power station concept to take a 'combined' or integrated approach to small-scale generation. A virtual power station might link dispersed generators–like solar panels or batteries–in a web-based network. In addition, consumers altering their electricity use (referred to as demand response) will enhance competition in the generation market.

We have put significant effort into making it easy for parties to invest in generation and demand response. The Authority's view is that the electricity and finance markets are workably competitive markets, and long-term contracts are likely to be available for commercially attractive investments. The Authority does not believe that it would promote the long-term interests of consumers to compel participants to offer or purchase such long-term contracts to support generation or demand response.

That said, it may be possible to facilitate new forms of demand response or generation participating in the electricity market by improving the functioning of these markets. For example, we could seek to introduce greater transparency of long-term prices and greater standardisation of terms and conditions for long-term contracts. This could reduce transaction costs and facilitate risk assessment, making it more attractive for parties to offer long-term contracts or financing, even for smaller-scale generation or demand response projects.

Contents

1 We want your comments

1.1 The Electricity Authority wants your views on any changes to regulation that may be needed for consumers to benefit from the changes in technology and innovation happening now in the electricity industry.[1] Our objective is to promote competition in, reliable supply by, and efficient operation of the electricity industry for the long-term benefit of consumers.[2]

1.2 The rulebook that governs the operation of the electricity market—the Electricity Industry Act 2010, associated regulations, and Electricity Industry Participation Code 2010—was established in the late 1990's and has been regularly updated since then. However, the electricity industry it governs is changing. Household, business and industrial consumers have more choices due to technology, such as solar panels and batteries, and from innovation in business models:

a) Consumers can choose from an increasing number of suppliers of electricity services who are competing to win customers by offering new or different products and services. More and new suppliers will increase the diversity and choice of products and services available to consumers.

b) Consumers have more control. They can:

   (i) produce their own electricity using solar panels

   (ii) store it in batteries

   (iii) monitor their use in real time

   (iv) control when and how much they use by remotely switching appliances on and off.

c) Consumers can participate in the electricity market as sellers as well as buyers. They can sell their surplus solar production to a neighbour through a P2P trading platform or can help support the reliability of the network using their household-scale battery.

1.3 Many consumers will probably still participate in the electricity market in the traditional way by buying electricity from a retailer. But some may start participating directly, or through an intermediary, by becoming retailers, distributors, and generators.

1.4 We are calling the changes happening to the electricity industry a shift to more participation or 'mass participation' because they will mean more buyers and sellers of electricity and electricity services participating in the industry.

We want to make sure the electricity market can adapt

1.5 We have a comprehensive work programme focusing on removing regulatory barriers and enabling mass participation. The focus of this paper is the 'gaps' in that programme and what further work needs to occur.

---

[1] Section 16 of the Electricity Industry Act 2010 states the Authority's functions include: to make and administer the Code; to monitor compliance with the Act, the regulations, and the Code; and to undertake market-facilitation measures (such as providing education, guidelines, information, and model arrangements), and to monitor the operation and effectiveness of market facilitation measures.

[2] Section 15 of the Electricity Industry Act 2010 states the objective of the Authority is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

1.6 We want your comments and ideas on what changes to the rulebook may be needed to enable mass participation. In particular, we want to make sure that the uptake of both technology and innovation in the electricity industry are not blocked.

1.7 With this purpose in mind, this paper is organised as follows:

a) section 2 discusses how the electricity industry is changing due to innovation in technology and business models and discusses the competition, efficiency and reliability benefits of mass participation

b) section 3 discusses how relying, wherever possible, on promoting competition and markets for the exchange of electricity services is a proven way to achieve long-term benefits for consumers

c) section 4 discusses how distributors and Transpower can use markets and competition to help provide the network service

d) section 5 discusses how open access to distribution networks will promote competition

e) section 6 discusses how P2P platforms could increase participation and competition

f) section 7 discusses how the rulebook may need to change to make sure that the parties that want to participate in electricity markets are recognised and to avoid capturing parties that are not participating

g) section 8 discusses how more diverse sources of electricity supply and demand response could improve competition.

How to make a submission

1.1 The Authority's preference is to receive submissions in electronic format (Microsoft Word) in the format shown in Appendix A. Submissions in electronic form should be emailed to submissions@ea.govt.nz with "Enabling Mass Participation Issues Paper" in the subject line.

1.2 If you cannot send your submission electronically, post one hard copy to either of the addresses below, or fax it to 04 460 8879.

Postal address	Physical address
Submissions Electricity Authority PO Box 10041 Wellington 6143	Submissions Electricity Authority Level 7, ASB Bank Tower 2 Hunter Street Wellington

1.3 The Authority wants to publish all submissions it receives. If you consider that we should not publish any part of your submission, please

(a) indicate which part should not be published

(b) explain why you consider we should not publish that part

(c) provide a version of your submission that we can publish (if we agree not to publish your full submission).

1.4 If you indicate there is part of your submission that should not be published, we will discuss with you before deciding whether to not publish that part of your submission.

1.5 However, please note that all submissions we receive, including any parts that we do not publish, can be requested under the Official Information Act 1982. This means we would be required to release material that we did not publish unless good reason existed under the Official Information Act to withhold it. We would normally consult with you before releasing any material that you said should not be published.

When to make a submission

1.6 Please deliver your submissions by **5pm** on **11 July 2017**.

1.7 The Authority will acknowledge receipt of all submissions electronically. Please contact the Submissions' Administrator if you do not receive electronic acknowledgement of your submission within two business days.

2 The electricity industry is changing

2.1 The electricity industry is changing fundamentally as technology makes it possible to do things differently. The change is analogous to what has happened in telecommunications, transport, accommodation and banking. Each of these sectors has experienced significant change due to technology change and new business models. For example, technology change has enabled businesses like Uber and AirBnB to compete for transport and accommodation services. These firms are using technology to provide low cost methods for matching buyers and sellers with spare capacity, such as a spare room or infrequently driven vehicle.

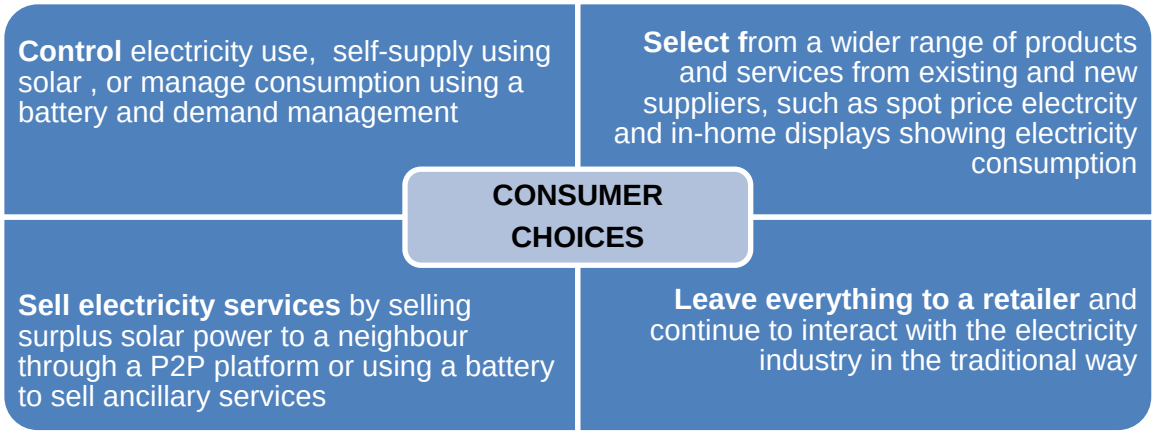
2.2 In the electricity industry, technology change is expected to lead to similar outcomes. It will provide low-cost opportunities to bring to market new sources of generation, storage and consumer, or demand, response.[3] For example, technology could make it cost-effective to use back-up generation for many commercial buildings, commercial-scale heating, ventilation and air conditioning (HVAC) systems or commercial refrigeration systems to help maintain the reliability of the transmission grid or a distribution network.

2.3 Similarly, solar panels, batteries, and remote communication and sensor devices will change the traditional relationship consumers have with the electricity industry. Consumers will have more choice and control over how they use electricity.

2.4 One example is solar panels. There are now more than 13,000 households and businesses in New Zealand using solar panels to generate some of their own electricity. A less visible example is that consumers can find out over the internet how much electricity they used, whether last week or last year.

2.5 Figure 1 shows the wider range of choices available to consumers compared with just two or three years ago when the only realistic option was to leave everything to a retailer.

Figure 1: Competition and innovation in technology and business models provides consumers with more choices



Source: Electricity Authority

[3] Demand response allows electricity consumers to reduce their electricity use for a period of time in response to changes in electricity prices or in exchange for compensation. Demand response is intended to alter the timing or level of instantaneous demand or total electricity consumption.

The change is already underway

2.6 The electricity industry is experiencing change brought about by technology right now. We are calling the change a shift to more participation or 'mass participation' in the industry because it will mean more buyers and sellers of electricity and of other existing or new electricity-related services.

2.7 There are many examples from New Zealand, and internationally, of technology enabling mass participation. Some local examples are:

a) A P2P electricity trading platform was launched in early 2016. It matches owners of solar panels that want to sell surplus electricity with consumers that want to buy locally.[4]

b) More than 19,000 residential consumers buy electricity from retailers at the spot price plus network and other charges. Arrangements like this have become possible because more than 75 per cent of households now have smart meters.[5] Several other retailers offer innovative pricing, for example one retailer offers a free hour of power every day. Another retailer sells electricity in 'packs' of electricity.

c) A retailer started a trial offer to commercial customers in September 2016 which involves installing 8 kWh batteries. The battery system includes a management platform which allows the retailer to aggregate and remotely control the batteries. Consumers can take advantage of lower time-of-use rates to recharge the batteries and automatically respond to distribution price signals.[6]

d) A firm aggregates the electricity used by industrial and commercial consumers across the country which it sells into the instantaneous reserve market.[7] The consumers supplying the demand response reduce their consumption or take their operations off the grid for short periods of time. In doing so, they help maintain system frequency and avoid the lights going off.

e) A distributor started trialling a 1 MW battery in early 2016 to better understand the impact of the commercial application of battery storage technology, including the opportunity to reduce the distributors operating.

f) The grid owner operates a 'demand response programme' that enables consumers to be paid to reduce the electricity they use for a period of time when asked. The grid owner benefits from access to flexible ways to reduce congestion on the grid at peak times. This allows the grid owner to reduce or postpone investment in the grid.[8]

2.8 We are concerned, however, that there may be opportunities and benefits being lost or not being developed because the rulebook doesn't accommodate new ways of doing things that could result in long-term benefits for consumers.

---

4 P2 Power is available to consumers connected to the Vector network. Go to https://p2power.co.nz/ for more information.

5 Most smart meters record the amount of electricity your household is actually using at half hourly intervals, and sends the data daily to your retailer using similar technology to text messages or a radio network. Go to https://www.ea.govt.nz/consumers/what-are-electricity-meters/ for more information.

6 Go to http://www.energynews.co.nz/news-story/30486/contact-testing-battery-aggregation for more information.

7 Instantaneous Reserves (IR) enables the electricity system to respond to the loss of the largest single supply asset (generally a generator) without interrupting supply to load (frequency to stay above 48Hz).

8 Go to https://www.transpower.co.nz/keeping-you-connected/demand-response for more information.

2.9 For example, consumers may benefit from being supplied electricity by one retailer in the day and another in the night. Similarly, it might be possible to use electric vehicles as mobile batteries that can be used to maintain network reliability. Or a consumer may want to delegate their choice of retailer to an agent that would constantly check for the best deal and switch them automatically.

2.10 We are interested in your views about whether the existing rulebook is flexible enough to allow the full range of possible new ways of doing things that would be for the long-term benefit of consumers.

Mass participation will bring significant benefits

2.11 We do not really know how mass participation might unfold into the future. However, it is likely that it will bring significant long-term benefits for consumers from more competition, and from a more reliable supply and more efficient electricity industry.

2.12 At a high level, we expect mass participation will bring the following benefits:

a) competition will increase, which will lead to greater consumer utility, or satisfaction, as suppliers innovate to develop new products and services to win customers and market share[9]

b) competition will lower the cost of electricity supply across the supply chain. For example, more demand response, storage, or surplus generation will provide distributors with cheaper alternatives for maintaining network reliability and will help to reduce or postpone network upgrades. The reduced costs will be passed on to consumers

c) consumers will be able to make better consumption decisions. This will result in lower ongoing costs to generate and transport electricity across the country and making the market more efficient

d) reliability will be increased, and become possibly cheaper to achieve, due to a greater stock of resources able to help maintain reliability across the electricity supply chain. Reliability will also become more personalised, for example, because consumers will be more able to use the existing network, according to their preferences, by altering consumption depending on price.

Case study: the world of a future electricity consumer

Evolving technologies are already changing consumers' electricity related decisions and the impact will increase. This case study provides a hypothetical but plausible illustration of the world of a possible electricity consumer in the not too distant future.

On a cold evening (following a sunny day), Finn was driving home from work a little later than usual, thinking about what he will do with the money he is saving on energy. Earlier in the afternoon, Finn used a price comparison website to switch retailers and save money on his energy bill. The price comparison found the best offer for him was from a new retailer offering a spot price retail tariff.

[9] In economics, utility is a way to represent consumer's preferences over some set of goods or services (something that satisfies human wants). Although difficult to measure it attempts to reflect the monetary and non-monetary value that a consumer places on a good or service.

Finn parked his electric car in his garage and plugged it in, but it didn't start charging straight away – that would happen later in the night when the price of electricity was lower because of lower spot and network prices. The car had come with an app that managed the charging process, so Finn could be confident it would be fully recharged by the morning at the lowest cost possible.

Because it was a cold evening, lots of people were using the electricity network, which meant that both the price of electricity and the price of network capacity were higher than usual. Fortunately Finn was using an app from an energy services company that assessed the different prices, and chose to power the heat pump in a way that would lead to the cheapest overall electricity supply. This meant the heat pump used previously-stored electricity in Finn's 10kWh battery cell. The electricity had been collected earlier that day from the solar panels on Finn's roof.

Both the solar panels and battery were provided by the energy services company. With the help of this company, Finn was able to manage his electricity use, and keep his prices down, and come home to a pleasantly warm home.

Several of Finn's neighbours had signed up with the same energy services company. Finn never noticed his heat pump switch itself on and off early in the evening, but allowing this remote control meant the prices he paid–and his power bill–were lower overall. It also worked well for the distributor too as Finn's and his neighbours' choices aggregated together to reduce network use and avoided the need to build more expensive network infrastructure.

Benefits from more competition and innovation

2.13 More competition meant that Finn was able to use the services of a price comparison website and buy electricity at the spot price. This allowed Finn to benefit from his investments in goods such as solar panels, batteries and heat pumps and save money on his energy bill.

2.14 More competition is also likely to lower the cost of supplying electricity and increase quality across the electricity supply chain including generation, ancillary, retail and network services.[10] For example, Finn's new retailer is able to offer a better price because it has a less expensive billing system than its competitors. This will put pressure on other retailers to find new ways to reduce the cost to serve their existing customers and attract new ones.

2.15 In addition, competition is also likely to prompt new goods and services that are attractive to consumers. For example, Finn is able to find an energy services company that has developed a new simple innovative way to provide home energy management services using a simple and easy smartphone app.

Benefits from improved reliability

2.16 Operating an electricity system requires that electricity supply and demand move very closely to each other at all times. The system can tolerate small imbalances between supply and demand of electricity. However, large imbalances, whether from a large

[10] Ancillary services support the continuous flow of electricity across the grid. Ancillary services in New Zealand are black start, over frequency reserve, frequency keeping, instantaneous reserve, extended reserves or voltage support.

generator or transmission line suddenly shutting down or because the demand for electricity suddenly increases to a high level, can result in the interruption of electricity supply to consumers. In other words, the lights go off.[11]

2.17 In this context, reliability of electricity supply refers to the ability of the power system to keep the lights on for consumers by bringing supply and demand back into balance quickly and effectively, even when demand for electricity is very high. This might be because there is sufficient generation to meet demand, or because there are sufficient consumers that are able and willing to reduce their electricity demand, or both.[12]

2.18 Mass participation will result in more diverse ways to bring supply and demand back into balance quickly and effectively, even at times when electricity demand is very high. It means that consumers can choose between self-generation, storage, or reducing their demand if prices are high. It also means that the market is less reliant on traditional forms of electricity generation to ensure that supply meets demand at all times. Overall, this is likely to deliver significant benefits to consumers from increased reliability of supply.

2.19 For example, there will be more consumers who can reduce their electricity when spot prices are high. High prices signal that electricity use is high compared to available generation. In our case study, Finn and his neighbours could reduce home energy use when electricity prices are high, to ensure that supply could meet demand. This reduces the risk of blackouts and the costs these events impose on the economy.

Benefits from a more efficient electricity industry

2.20 Mass participation will benefit consumers because more consumers will be able, if they want, to better understand the value of using electricity. In this way, consumers will have the choice to use electricity only when the value to the consumer is greater than the cost of generating and transporting electricity signalled through electricity prices.[13]

2.21 Consumers that are more responsive to electricity prices make the market more efficient because it reduces the ongoing costs of generating electricity to meet demand, and avoids incurring costs associated with expanding the capacity of the network.

2.22 For example, Finn and his neighbours invest in a home energy management system. This allows them to use less electricity when the price of generating and transporting electricity to their homes is high.

2.23 In this way, Finn and his neighbours, by all reacting at the same time to a price signal, save themselves money and help maintain the reliability of the network. Their electricity use is coordinated through a network price signal to avoid the higher network charges when demand over the network is high. The distributor can then rely on their choice to reduce their use to reduce or avoid the cost of a network upgrade.

---

11 If the lights do go off (which may occur in the case of very large imbalances), we would expect this to occur in a controlled fashion, and for a preselected group only (not for all consumers).

12 A more reliable electricity supply also makes it easier to operate the electricity market more securely. This means that the supply of electricity to consumers is less likely to be interrupted when the power system is affected by the sudden break down of a generator or a transmission line.

13 The price of electricity can change very quickly because electricity supply and demand conditions change very quickly, and sometimes drastically, every second. Currently, a price signalling the cost (in financial terms) of generating and transporting electricity over the transmission grid is calculated in 30 minute chunks. This means that there will be a new price for electricity every 30 minutes.

Q1. What is your view of the potential competition, reliability and efficiency benefits of more participation?

We are already working to enable mass participation

2.24 We are working on several possible changes to the rulebook that would make it easier for more parties to participate.[14] A list of things we are working on in this area is provided at Appendix B of this paper.

2.25 Technology change is a major impetus of our *Transmission pricing project* and *distribution pricing project*. Prices that are more efficient— service-based and cost-reflective—help consumers and parties along the supply chain make decisions that allocate resources more efficiently; for example, a decision to invest in solar panels, batteries or tools to assist demand response.

2.26 Similarly, technology changes mean more parties want to operate in electricity markets, using market systems and processes such as the registry, clearing and settlement, electricity information exchange protocols (EIEPs). However, the existing systems and processes were designed to support a small number of 'specialist' participants.

2.27 Through the *Data and data exchange project*, we are checking whether changes to the existing systems and processes are needed to enable growth in participant numbers and different ways of doing business.

2.28 Through the *Multiple trading relationships* project we are examining what changes to the existing systems and processes are required to enable a consumer to obtain electricity services from multiple parties at the same time. For example, what changes are needed to allow a consumer to buy electricity from one retailer and sell any surplus electricity produced to a different retailer.

2.29 Finally, the traditional relationships between participants are altering as technology enables electricity services to be provided by more parties. For example, consumers can produce electricity and Transpower and distributors can buy network support services from consumers with a battery, generation or the ability to alter their consumption.

2.30 Our perspective is that contracts between retailers and distributors should reflect what occurs in workably competitive markets.[15] For example, the *default distribution agreement project* is intended to reduce barriers to competition arising from the existing distributor and retailer contractual relationship in the use-of-system agreement.

[14] The Authority's current work programme is available here: http://www.ea.govt.nz/development/work-programme/.

[15] A workably competitive market is one that produces outcomes that are reasonably close to those found in strongly competitive markets. In a workably competitive market, no firm has significant market power. The tendencies are thus towards cost-reflective prices and normal rates of return (although those outcomes may never in fact be achieved).

3 Competition is a proven way to realise the benefits

3.1 In our *Interpretation of the Authority's statutory objective* we describe how competition can bring very large benefits to consumers over the long term by promoting entry by innovative suppliers and efficient investment.[16]

3.2 Competition is a process of rivalry between firms seeking to win customers' business over time. Successful firms are able to take business away from competitors. This poses a threat to some firms that they might lose business to others if they do not offer products and services that meet consumer expectations, for example on price and quality. Some firms might have to leave the market if they do not compete successfully. Other firms might enter the market if they consider they can be successful and take business from other firms.

3.3 For electricity markets, competition imposes a strong discipline on businesses that operate across the electricity supply chain to deliver long-term benefits to consumers through:

(a) setting prices close to the cost of producing a given good or service

(b) improving processes to reduce costs. This reduces the cost of the good or service, with some or all of the gains passed on to consumers in the form of lower prices or higher quality

(c) improving quality of the goods and services being produced

(d) introducing new and better products and services that reflect what consumers' value

(e) providing a reliable supply at a cost that reflects what consumers are prepared to pay.

3.4 Promoting competition has proved effective in encouraging the electricity industry to deliver long-term benefits to consumers. We can see this in the retail electricity market. Consumers in some regions of the country can now choose from more than 20 retailers, compared to eight in 2004. More retailers increases competition which puts pressure on the prices they charge and expands the range of products and services, with examples including web-based tools showing individual consumption data to being offered a daily 'hour of free power'.

3.5 Innovation in technology and business models is providing more opportunities to promote competition across the electricity industry. For example, it is possible that goods and services that have traditionally been supplied within a business can now be provided more efficiently through competition. This can be seen in the transport and accommodation sectors, where technology and different business models have reduced the transaction costs of matching buyers and sellers. This suggests doing things in-house may no longer be the best option. Innovation in technology and business models

[16] Electricity Authority, February 2011, Interpretation of the Authority's statutory objective, available at http://www.ea.govt.nz/dmsdocument/9494. The Authority interprets competition to mean workable or effective competition. This is a well understood meaning in the economics literature and in New Zealand.

reduces the benefits of coordinating and managing risks in-house and means there is less to gain from attempting to obtain economies of scope.[17]

Q2. What is your view of the opportunities to promote competition and more participation in the electricity industry?

Areas where changes might enable more participation and promote competition

3.6 We have identified five areas where changes to the rulebook may achieve long-term benefits for consumers. The rest of this paper describes the five issues and the reasons changes may be required.

3.7 The five areas are:

a) **Competition can help provide the network service.** Section 4 describes how some aspects of the traditional monopoly network service can now be obtained from third parties. Consequently, distributors and Transpower can now use competition to more efficiently supply the network service.

b) **Open access to distribution networks will promote participation.** Section 5 describes how open access to distribution networks provides a level playing field that enables participation and promotes competition. A level playing field will provide parties using the network with confidence that access to network infrastructure is on efficient and non-discriminatory terms.

c) **Peer-to-peer platforms could increase participation.** Section 6 describes P2P trading and the different ways P2P trading could work in the New Zealand electricity market.

d) **Participants and non-participants in the electricity market need to be recognised correctly.** Section 7 discusses how the rulebook may need to change to make sure that the parties that want to participate in electricity markets are recognised. Conversely, some parties may be considered a participant under current arrangements, despite having little or no direct interest in the electricity industry. Potentially only some aspects of the rulebook should apply to these participants, but not all.

e) **More diverse sources of electricity supply and demand response could improve competition.** Section 8 possible challenges to the entry of new forms of smaller and medium-sized generation.

3.8 We recognise there will be issues or possible changes that we have not identified. We welcome your views, and reasons, on changes that you consider necessary to enable mass participation.

[17] Economies of scope are efficiencies formed by variety, not volume (the latter concept is "economies of scale"). Economies of scope arise when businesses share centralised functions (such as finance or marketing) or when they form interrelationships at other points on the business process.

Q3. What other issues might inhibit efficient mass participation? Please provide your reasons.

4 Competition can help provide the network service

4.1 The transmission grid transports electricity produced by generators around the country to distributors and large industrial consumers. There are 29 distributors supplying the network service across New Zealand.

4.2 Transpower and distributors provide the infrastructure that connects electricity users with electricity producers, and operate that infrastructure to provide safe, reliable and secure transport of electricity. We call this the network service.

4.3 Transpower supplies the network service to generators and large industrial customers directly connected to the grid, and to distributors. Distributors typically supply the network service to retailers that on-sell the service to their customers, or directly to consumers, and to generators connected to the network (called distributed generation).[18]

4.4 The network service is a natural monopoly. This is because it is more efficient to have only one party supplying the poles, lines and substations that deliver the network service. However, network businesses can use other parties to help provide the network service. For example, they commonly use third parties working under contract to help maintain network assets, to trim trees overhanging lines, or to provide legal services. Many businesses obtain external help in producing goods and services and will typically get quotes or go to market to identify a preferred supplier.

More parties can now compete to help provide the network service

4.5 Innovation in technology and business models allows Transpower and distributors to obtain external help and assistance to maintain the reliability of the network.

4.6 Transpower and distributors commonly use load management (also called load control) or demand response to help maintain the reliability of the network service.[19] Load control and demand response are used to help support network reliability by reducing consumption and the total amount of electricity flowing across the network at times of very high demand. Consumers that reduce their consumption in this way are compensated for the network support service they provide.

4.7 For example, distributors have traditionally obtained network support by switching off households' hot water cylinders when the network becomes congested using a 'ripple control' system.[20] Consumers are typically compensated for allowing control of their hot water cylinder through a discounted distribution charge.

4.8 Consumers can benefit in two possible ways when they help provide the network service in this fashion:

a) in the short term, the network support reduces network congestion and means electricity supply is more reliable

---

18 This list of customers is deliberately being kept simple. Parties use the network service to either import electricity from the network or to export electricity into the network. The equipment involved in importing or exporting is not that relevant.

19 Load management, or load control, are the terms used when the distributor exercises sole control over load being on or off. Demand response is the term used when the consumer exercises the control, including by offering that control to another party.

20 Hot water cylinders are controlled using a so called ripple control system. Distributors send a frequency signal over the network to a receiver device that can turn on and off the hot water cylinder or other non-essential residential or industrial loads. Ripple control remains widely used in New Zealand.

b) in the long-term, the network support reduces or defers investment in the network which means consumers pay less in the future for the network service because there is no need to recover the investment cost.

4.9 Ripple control systems are generally controlled by a distributor which owns the signalling equipment. Generally, consumers cannot choose when their hot water cylinder is turned off, and no other third party, such as a retailer, can directly control the cylinder. However, more capable technology now exists that can perform the same function. For example, household hot water cylinders can be fitted with a device that responds to a long-wave radio signal, enabling precise and quick control of the cylinder. Or the cylinder could be fitted with a device that operates as a 'smart' thermostat, providing the consumer with more control over when the cylinder switches on or off (perhaps by allowing a third party to exercise control).

4.10 Batteries can also be used to provide network support by discharging electricity from them into the network at times of high demand. Some distributors and retailers are trialling batteries for this purpose. Importantly, control of the battery does not need to rest with the distributor. Anyone can own and control a battery that is being used to help support network reliability.[21]

4.11 A household can also help provide the network service by having a home energy management system which could control a heat pump, a smart hot water cylinder, or the home's whole energy load.

4.12 This means that it is no longer necessary for a network business (whether a distributor or Transpower) to own and control the assets that support network reliability. Consumers can adjust their demand in response to the price signal provided by the spot price. Also, the network can coordinate the operation of demand response with third parties. Transpower does this now through its demand response programme. Network businesses will be able to access a more flexible and diverse range of resources[22] that can respond quickly to specific requests or to a price signal.[23]

A network support service market will deliver significant benefits to consumers

4.13 Network businesses can buy network support from a range of parties using competitive tendering or some other market mechanism. For instance, a distributor could contract with a third-party service provider that aggregates the responses of a group of smart hot water cylinders or batteries. A distributor would do this when it is cheaper than the distributor owning and controlling assets that provide the required service.

4.14 Alternatively, a distributor could rely on the owner of a battery, or a consumer, achieving the same result by either discharging electricity from the battery into the network, or reducing consumption.

---

21 Batteries and other technologies can also provide other services in markets across the electricity industry. For example, a battery can be used to provide ancillary services to the system operator.

22 By diverse, we mean more parties are able to supply the service. By flexible, we mean that the service can more easily be obtained for a specific location in the network and can be matched to need. In contrast, ripple control is a blunt instrument.

23 For example, when a transmission line becomes congested in a particular location of the network (commonly referred to as a node) the price of electricity downstream of the congestion will rise. This signals that demand is high in that location compared to the capacity available over the transmission line to serve demand in that location. When the price rises participants that directly pay this high price for the electricity they consume have a choice to cut their demand, making the network service more efficient and reliable.

4.15 Adopting a market-based approach to getting network support, and other aspects of the network service where possible, will deliver significant long-term benefits for consumers. For example:

a) Relying on third parties allows network businesses to avoid the upfront costs of owning and controlling assets that provide network support. These cost savings are likely to be passed on to consumers in the form of lower network charges.

b) Competition between network support providers will encourage greater innovation. Over time this will mean that network business will be able to benefit from new and more efficient ways of providing network support from greater innovation in the market. In short-term, relying on competition might mean network businesses missing out on some benefits from economies of scope. However, dynamic aspects of competition (dynamic efficiency) through improved incentives to innovate will bring down the costs of providing network support, which over time will swamp any loss from economies of scope. These efficiency gains are likely to be passed on to consumers in the form of lower network charges.[24]

c) Greater competition means a more diverse and flexible pool of resources to support the network. In the short-term, this means more opportunities to improve the reliability of the network service. In the longer term, this means more opportunities to reduce or defer investment in long-lived network assets that represent a considerable sunk cost to recover from consumers. Over time, this is likely to result in a more reliable and less costly network leading to lower network charges for consumers.

4.16 At the distribution level the benefits from introducing competition for network support are likely to be large. Distributors across the country are collectively planning to spend an average of $750 million a year on network assets, each year from 2016 to 2026.[25] Not all of this spending will be avoidable. For example, it will still be necessary to maintain a lot of the poles and wires. However, if competition in obtaining network support delivered a five per cent reduction in costs it could result in a $375 million cost saving over the same time period.[26] A substantial benefit for distribution network customers and consumers in general.

4.17 However, distributors might be reluctant to make greater use of competition to more efficiently supply the network service. For example obtaining network support from third parties is currently not common practice for distributors, and some distributors may be reluctant to adopt an unfamiliar or unproven approach.

4.18 Distributors may also be reluctant to use third parties due to concerns the level of reliability will fall or costs will increase because they won't directly control and own the assets providing the network support. However, improved communication and control technology, and innovation in contracting practices, reduces the need for a distributor to own and directly control the assets required to provide a service. This should encourage distributors to adopt new practices. An example of this from another industry is the ability

---

[24] For example, see Motta (2006) Competition policy: Theory and practice, p 57. There it is argued that a monopoly is worse than competitive market structures because a monopoly fails to stimulate dynamic efficiency. Accordingly, steps should be taken to promote competition in markets where there is none.

[25] Commerce Commission, Information disclosed from March 2013 to August 2016, available at: http://comcom.govt.nz/regulated-industries/electricity/electricity-information-disclosure/electricity-information-disclosure-summary-and-analysis/information-disclosed-from-march-2013-to-august-2016/.

[26] This figure is not discounted. It is for illustrative purposes only.

to obtain software-as-a-service from firms such as Xero. Similarly, Rolls Royce could be said to no longer sell jet engines. It rents them by the hour to the airline, including providing maintenance and servicing support. The key point here is that the job of maintaining the complex machinery required to keep aeroplanes in the air can be undertaken by a third party.

4.19 Alternatively, distributors may have strong commercial incentives to supply all services themselves through owning and controlling assets that provide network support despite the potential cost savings from relying on competition.

4.20 Some network businesses are already looking ahead to ensure that their customers benefit from new competition opportunities to provide network support. For example, Transpower's trial of a demand response programme is an example of how competition is already being considered as a means to obtain network support to help maintain network reliability.[27]

4.21 International examples also show how distributors could start relying on the abilities of new participants to manage and control their usage to directly procure network support services from them.

4.22 For example, after actively looking for alternatives to traditional network augmentation options, Australian distributor United Energy partnered with Australian software development company GreenSync to help United Energy manage network congestion. GreenSync will do this by 'piggy backing' on consumers' investments in roof-top photovoltaic systems and household scale batteries and other forms of demand response to deliver network support.[28] If United Energy can avoid having to build more network infrastructure to cater for demand at peak times, it can pass on the cost savings to consumers in the form of lower network charges than would otherwise be.

4.23 In this context, we are interested in your views about the benefits available from promoting greater use of competition to help supply aspects of the network service and what barriers may prevent those benefits being realised.

Q4. What is your view of the opportunities for network businesses to obtain external help to provide aspects of the network service using competition or market mechanisms?

Q5. What do you think are the main challenges to be dealt with to increase the use of competition in supplying network services? What are your reasons?

[27] Note that in this case competition is between providers of demand response, not between different platforms that can provide similar demand response services to Transpower.

[28] For more information about the GreenSync and United Energy venture, go to: http://www.greensync.com.au/greensync-partners-with-united-energy-for-landmark-asset-deferral-project/.

5 Open access to distribution networks will promote competition

5.1 Transpower and distributors, as monopoly infrastructure providers, have control over who uses the network and in what way. This privileged position means it is important that Transpower and distributors avoid using their dominant position to discourage or distort competition in markets for electricity services.

5.2 For example, a distributor could distort competition by favouring itself or an affiliate when sourcing support to help maintain network reliability. Or a distributor could discourage competition in the retail market by imposing contract terms that shift risk and costs to retailers on its network. Consumers will be worse off due to less choice and less efficient, higher cost services. Consumers may also experience worse reliability of supply.

Open access means the network is a level-playing field

5.3 Transpower and distributors are expected to provide a level-playing field where all parties using the network are treated equally. This will involve, at a minimum:

a) distributors offering equivalent terms for access and use of the network, including price. New retailers would know they can use the network on terms that are equivalent to established retailers

b) the terms for access and use of the network demonstrably reflecting an efficient allocation of risks and costs between the distributor and its customers such as a retailer, a large commercial business, a property developer, or a generator connected to the distribution network. The terms of access would not be offered on a take-it-or-leave it basis or adversely influence customers' business operations

c) parties being able to objectively verify that a distributor's own related businesses do not receive favourable treatment for connection to, and use of, the network and that the distributor is not using information gathered from retailers or other network users for purposes not expressly permitted, for example to provide an advantage to a distributor's own related businesses.

5.4 Without open access a distributor or Transpower might:

a) set connection standards or technical specifications for batteries or other equipment, or new connections that either preclude connection or favour one brand of equipment over another to favour itself or a related business. For example, a distributor might require a developer of a new industrial park to use a 'pre-approved' business to supply network infrastructure, thereby reducing competitive pressure

b) use information obtained through negotiations for access to gazump an investment by someone else. An example is a distributor installing an electric vehicle charging station at a specific location following an approach by a party to install one at that location. Or a distributor using information obtained from retailers expressly for network management to identify commercial opportunities to sell solar panels or similar

c) not disclose information about opportunities to supply network support services to favour a distributor's or Transpower's own self-supply options such as installing their own batteries, by closing- off competition from competitors

d) allocate distributor's or Transpower's costs to its regulated activities to become more competitive in the unregulated markets it participates in. For example, this could include underwriting an investment in a grid-scale battery with regulated revenues with the knowledge that it will be used to provide unregulated services (for example ancillary services) further 'down the track'

e) introduce discriminatory distribution charges that encourage consumers to invest in affiliated businesses. For example, a distributor could possibly structure its charges to increase uptake of solar when it has a solar business.

A framework for open access

Existing open access arrangements

5.5 One of our tasks is to develop a regulatory framework that makes sure networks provide open access and a level playing field. Currently, the components of this framework include:

a) a voluntary use-of system agreement model that outlines preferred terms for the relationship between distributors and retailers trading on a network. At this stage, a model agreement is only available to retailers and not all distribution customers, for example distributed generation or a large consumer directly connected to the distribution network[29]

b) the process and regulated terms for connection of distributed generation in Part 6 of the Code. Distributors must connect distributed generation according to a prescribed process and on regulated terms

c) voluntary distribution pricing principles and information disclosure guidelines overseen by the Authority to promote efficient distribution pricing. These are currently under review to make sure that distribution charges reflect the cost of the service being provided

d) the benchmark agreement that sets out the terms for the relationship between Transpower and parties connecting to the grid.

5.6 We can introduce additional or different arrangements under the Code or through market facilitation measures.

5.7 Another component of an open-access framework is price and quality regulation and information disclosure regulation by the Commerce Commission under Part 4 of the Commerce Act 1986. The Commerce Commission regulates the maximum revenue a distributor can earn and links this to a minimum quality of supply standard.[30] The purpose is to prevent distributors, as monopolies, from charging too much, operating in a way that leads to a lower quality of supply.[31]

---

29 The Authority is separately developing a proposal for a default distribution agreement for retailers, refer http://www.ea.govt.nz/development/work-programme/consumer-choice-competition/default-distribution-agreement/.

30 The Commission regulates 17 distributors using price and quality regulation. The remaining 12 distributors are exempt from price and quality regulation because they are consumer owned. These distributors are required to disclose information about their activities. For more on the role of the Commerce Commission, refer http://www.comcom.govt.nz/regulated-industries/electricity/electricity-role/.

31 We refer to unregulated activities to mean activities that are not the distribution line service that the Commerce Commission regulates. For example, the entity involved in the business or activity of providing distribution line services could also be involved in the businesses or activity of selling solar panels or socks.

Changing environment questions whether the existing open access arrangements are sufficient to support a level playing field

5.8 Until recently, network users have been retailers, some distributed generation, and those few consumers that contract directly with a distributor.[32] However, the way the network is used is changing and the list of network users is growing. For example:

a) more distributed generation is connecting to networks to sell electricity. Distribution networks were traditionally designed for a one-way flow of electricity to the consumer. More distributed generation, particularly at the household level, can change the direction of flow and can adversely affect network reliability and performance

b) more businesses are emerging that can participate in multiple markets, for example aggregating demand response or using batteries to supply network support services or ancillary services. How parties use the network can affect network reliability and performance, particularly if the distributor is not anticipating a sudden increase or decrease in consumption.

5.9 This changing environment raises questions about whether the existing arrangements for open access are sufficient to support a level playing field across the network in both their coverage and content. Specifically, the current arrangements around distributors' involvement in unregulated activities might need strengthening given the prospect of more participants requiring a distribution network service to compete in markets where distributors might also be active.

5.10 A commonly-used term to refer to the arrangements that govern distributors' involvement in unregulated activities is 'ring-fencing'. Ring-fencing can take various forms and involve introducing a degree of separation between a distributor's regulated business (the monopoly business) and its business activities in other unregulated markets.

5.11 In New Zealand, a weak form of ring-fencing is used which is referred to as *accounting separation.* It is employed by the Commerce Commission as part of its role regulating distributors' revenues. Stronger forms of 'ring-fencing' are also used in New Zealand and elsewhere in the world across different sectors, such as telecommunications. These include:

a) *functional separation* which allows distributors to participate in activities outside distribution if they set up affiliates with separate corporate structures and set rules around how resources are shared between them. For example, under Part 3 of the Electricity Industry Act 2010 distributors must have different corporate structures to manage any distributed connected generation that they own above 50 MW of capacity in their network area.[33]

b) *legal separation* which would prohibit distributors from directly participating in unregulated markets. For example, under Part 3 of the Electricity Industry Act 2010 distributors can only be involved in grid connected generation up to 250MW of capacity.

---

32 Retailers generally deal with distributors on behalf of most consumers regarding use of the network. This is called an interposed use-of-system model. Large commercial and industrial consumers and all consumers in a handful of networks deal directly with the distributor. This is called a conveyance use-of-system model.

33 Part 3 of the Electricity Industry Act 2010 says that distributors can own and operate retailing and generation activities, subject to threshold restrictions for in relation to the amount of retailing and generation undertaken. The Authority is responsible for enforcing the obligations set out in Part 3 of the Act.

Q6. What is your view on whether open access is required and what would be the elements for an effective open access framework?

Q7. How effective are the existing arrangements for open access? What are the problems?

Q8. What type of distributor behaviours and outcomes should the Authority focus on to understand whether changes are required to support open access?

6 Peer-to-peer platforms could increase participation

6.1 P2P trading is a feature of many sectors. It typically involves matching buyers and sellers of a product or service over a market platform. Examples of P2P platforms in New Zealand are TradeMe (goods and services) and Harmoney (finance).

6.2 P2P platforms for exchanging electricity are being established in several countries, including in New Zealand. One platform matches consumers in the Auckland area with parties, typically households, wanting to sell their excess solar power.[34] Another party has announced an intention to establish a P2P electricity trading platform.[35] This platform would use a blockchain database to record transactions.[36]

6.3 The basic premise of a P2P platform is to match a buyer and seller of electricity who agree terms of the exchange. The exchange could be physical or financial:

a) A physical exchange matches exactly the electricity generated by the seller with the electricity consumed by the buyer.

b) A financial exchange involves the buyer and seller exchanging a 'notional' amount of electricity at an agreed price.[37]

6.4 There are many reasons a consumer would want to participate in a P2P platform. A household without solar panels may want to buy electricity locally from solar panels. A household with solar panels may want to sell locally or want to try to get a better price than offered by a retailer.

The wholesale market influences the design of P2P platforms

6.5 The wholesale electricity market is organised as a gross pool. This means that most electricity generated across the country, including generated by household solar panels, is 'pooled' together, and buyers and sellers pay or are paid as part of one large transaction.[38]

6.6 The gross pool model makes it difficult to operate a P2P platform based on the physical exchange of electricity. For a physical exchange, the electricity imported and exported by a consumer would need to be reconciled separately when calculating who owes what to whom for the electricity. The current market systems do not allow for this.

6.7 A financial exchange involves transacting separately to the spot market. The P2Power platform uses a simple financial P2P model. The key is that the buyer and the seller work through the same retailer. This retailer is the intermediary between the consumers and the wholesale market systems and processes. The retailer can settle P2P transactions to

---

34 Refer: https://p2power.co.nz/. P2Power is a brand of emhTrade.

35 Refer: https://www.vector.co.nz/innovation-news/peer-to-peer-energy-trading-to-be-trialled-in-nz. The Vector/Power Ledger platform trial had not started at time of writing.

36 The blockchain can be thought of as a ledger or account book that is updated in near real time with the account balance theoretically accessible to all parties to a transaction. All the contractual terms for the exchange and the prices and quantities traded for each individual exchange are recorded in the blockchain for settlement and audit purposes.

37 A financial P2P exchange is equivalent to a contract-for-differences (CfD). CfD's are a feature of the electricity market. They allow generators and retailers to manage the risk of electricity spot price volatility by fixing a price for a 'notional' amount of electricity rather than the measured volume of electricity.

38 For example, this would not include electricity that has been generated for self-consumption purposes.

mimic a physical exchange of electricity because it has the consumption data for both parties and can calculate the amount exchanged and the amount owed by the seller.[39]

6.8 Arranging payment for a financial P2P transaction is more difficult if consumers want to transact as if they were physically exchanging energy without engaging with the same retailer. In this case, the retailer at each end of the transaction would have to coordinate to calculate the exact amount of electricity exchanged and the amount owed by the seller. The costs of this approach are likely to be higher because participating retailers may incur costs involved in sharing data and developing billing systems.

6.9 The Vector/Power Ledger platform will use a financial exchange model without requiring the buyer and seller to have the same retailer. Its point of difference is that terms of the exchange will be recorded in a blockchain for settlement and audit purposes and mimic physical exchanges of electricity. The blockchain can be thought of as a ledger or account book that is updated in near real time, providing the account balance to all parties to the transaction. The blockchain reduces the transaction costs for retailers to participate.

Q9. What changes to existing arrangements might be required to enable peer-to-peer electricity exchange?

Q10. What are the costs and the benefits of enabling peer-to-peer electricity exchange?

[39] For simplicity, we assume that trades occur within the same grid exit point (GXP).

7 Participants and non-participants in the electricity market need to be recognised correctly

7.1 Participating in markets for electricity services requires you to be recognised as a participant. This is no different to many endeavours. For example, to participate in a cricket match between New Zealand and Australia you must be a member of one of the two teams or an umpire.

7.2 Conversely, parties that are not directly participating in markets for electricity services should not be recognised as participants and should not face participants' obligations.

7.3 The Electricity Industry Act 2010 (Act) sets out which parties are participants in the electricity industry and the Code establishes the obligations that participants are subject to.

7.4 The Act recognises a range of industry participants, including retailers, generators, distributors, and industry service providers. Industry service providers include traders in electricity, metering equipment providers and load aggregators.[40]

7.5 Through the Code we can impose obligations on industry participants, including establishing specific obligations on subsets of parties within a participant class defined in the Act. New participant sub-classes can also be created under the Code. We can also encourage participants to behave in particular ways using voluntary market facilitation measures.

7.6 Consumers are not participants and cannot be regulated by the Code. However, a consumer can live a 'double-life', using electricity as a consumer and also engaging in the electricity market as a participant. One example of this is a household with a solar panel sending electricity back into the distribution network. This household is a consumer (when it uses electricity) and a participating generator (when it generates electricity). The Code can regulate the activities of this household when it is acting as a generator.

Technology raises questions about who is a participant

7.7 The current list of industry participants was established in 2010 based on the list of participant types developed in the mid-1990s. Each type of participant is linked to a particular activity, such as retailing and generating.

7.8 New technology is blurring the lines between the old participant types and activities, and making more parties participants, often without them realising. Technology also opens the way for different ways to participate. This raises questions about whether the Act and Code:

a) recognise parties that provide, or want to provide, electricity services

b) inadvertently impose obligations on parties that are only indirectly part of the electricity industry.

[40] Refer section 7, Electricity Industry Act 2010. Industry participants currently include: retailers, generators, Transpower, distributors, and a person who buys electricity from the clearing manager. Industry participants also include the industry services providers, such as a metering equipment provider, a trader in electricity and a load aggregator.

There is blurring of lines between participant type

7.9 One example of the blurring of lines between types of participants concerns batteries, which both use and export electricity. When someone uses electricity to charge a battery they are a consumer. When the same person sends electricity from the battery to the network, the battery is equivalent to a generator and the party needs to be treated as a generator participant. This is because there is no difference between a battery and a hydro generator or any other form of generation. Hydro generators produce electricity by converting the energy of water force to electricity. Batteries produce electricity by converting chemical energy to electricity. The people who operate them are–or should be–industry participants.

7.10 In the case of batteries, the blurring has been mostly resolved. A person who owns a battery can be treated as a generator participant and required to comply with the relevant obligations in the Code.

There are questions about what being a participant involves

7.11 Technology is providing different ways to supply electricity and enabling parties to interact with electricity markets in different ways. One effect is more parties are becoming participants without realising it. This raises the question of whether these parties should be subject to none, some, or all, of the provisions of the rulebook.

7.12 There are about 130 industry participants listed in the register the Authority maintains.[41] The list could be longer as there are many parties that are participants because they undertake the activities of an industry participant, but are not aware that they ought to register.

7.13 As an example, electricity and other utility services in a residential apartment complex are often supplied by the building owner.[42] In this situation, the building owner is selling electricity and distributing electricity. Notionally, it is an industry participant, both as a retailer and a distributor.[43, 44] However, the building owner is probably unaware of the obligations applying to retailers and distributors under the Act and Code.

7.14 The supply model described above is essentially a micro-grid; a small electricity grid that can operate independently or in conjunction with the local distribution network. Micro-grids and alternative supply models are likely to become an increasingly feasible choice for communities as distributed generation and batteries become cheaper and more capable.

7.15 Another example is electric vehicle charging stations which, when used to fuel-up an electric vehicle, could be considered to be retailing electricity. This is because a retailer is a business engaged in the sale of electricity to a consumer other than for the purpose

---

41 Refer section 9, Electricity Industry Act 2010. Every industry participant must register as an industry participant. The Authority register is available at: http://www.ea.govt.nz/operations/industry-participants/participant-register/.

42 Most consumers are supplied from a distribution network. However, more than 100,000 consumers are supplied from secondary networks—embedded networks, customer networks, and network extensions. Each secondary network type is a different model of responsibility for supplying retail and distribution services, and for electricity market functions.

43 Technically, this example describes a customer network. Customer networks do not necessarily interface with the markets systems. For all practical intents and purposes, a customer network is recognised by the market systems as a consumer.

44 Note that an amendment to the Electricity Industry Act 2010 is proposed to clarify that customer networks are distributors.

of resale.[45] However, it is not clear that a business providing electricity vehicle charging infrastructure should be subject to the electricity industry rulebook.

7.16 The possibility that there are or will be business models that are captured by the meaning of industry participant and are not currently explicitly subject to regulation raises several questions. The key question is which regulatory obligations, if any, should apply to these notional participants.

There are questions about new and different types of participation

7.17 Technology enables new and different types of participation that may not be allowed under the current Code.

7.18 Energy services companies wanting to provide price comparison services are one example of a type of participation that is likely to become more prevalent. Energy services companies here and overseas compare prices and find the best deal for a consumer, using the consumer's consumption data. At present, the consumption data must come from the consumer or the consumer's retailer. Energy services companies are not participants so cannot obtain the data directly from the market systems. This might reduce innovation and competition because energy services companies find it more difficult to get their products to market.

7.19 Another example of a different type of participation is using a battery to supply ancillary services. The Code currently describes ancillary services in a way that may prevent batteries from providing instantaneous reserves to the system operator. The consequence of this limitation potentially includes reduced reliability and reduced efficiency if cheaper and more efficient sources of ancillary services cannot be used.

Q11. What is your view of the possibility for, and impact of, any current or future blurring of participant type? What are your reasons?

Q12. What types of participation are or might be prevented because the party is not recognised as a participant? What are the potential impacts?

[45] Refer section 1, Electricity Industry Act 2010.

8 More diverse sources of electricity supply and increased demand response could improve competition

8.1 Technology change is likely to drive new forms of smaller and medium-sized generation and increase the potential for demand response, including new demand response offerings from new entrants. These developments will promote more competition in the wholesale electricity market, particularly at the regional level, and perhaps also in the retail market.

8.2 For example, competition could be increased using the 'virtual' power station concept to take a 'combined' or integrated approach to small scale generation. A virtual power station might link dispersed generators–like solar panels or batteries–in a web-based network. Competition could also be enhanced through aggregation of demand response.

Accessing finance is important for businesses wanting to supply electricity from new sources and demand response

8.3 All start-up businesses rely on finance. A generator, virtual power station or demand response aggregator has two main options for obtaining sufficient funds to invest into building and producing electricity (or supplying demand response):

a) equity finance from small private investors, venture capital businesses or investment banking institutions

b) debt finance from a bank or other lenders such as pension funds.

8.4 The role of finance is to get a business up and running and earning sufficient revenue to cover its costs of supply, including the cost of finance. An electricity generator, for example, can earn revenue from four main sources:

a) selling electricity into the spot market[46]

b) selling electricity financial hedge products. There are already a number of financial hedge markets in New Zealand. Different products with a range of maturities are available, including to buy/sell electricity up to four years in advance

c) agreeing a long-term contract with a buyer or buyers of the output of the generator. Another term used for this arrangement is a power purchase agreement (PPA)

d) selling directly to consumers via the retail market.

8.5 A long-term contract offers lenders certainty that a generator has secured enough revenue, and for a sufficient period of time, for debt to be repaid over an agreed timeframe. A demand response provider could similarly benefit from the certainty of a

[46] The trading of electricity can begin years before it is produced and continues until it is actually produced in real time. This is accomplished with a sequence of overlapping markets. The earliest trades are for non-standard, long-term forward contracts, which are traded over-the-counter and are generally referred to as OTC contracts. Futures contracts are standardised forward contracts and are traded over organised exchanges, such as the Australian Securities Exchange (ASX). Both, OTC and future contracts are traded years in advance of the actual delivery of the associated electricity and those contracts are used to hedge the spot market electricity price. Electricity traded in real time is a physical market as all trades correspond to physical power flows and is generally referred to as the spot market. The full sequence of markets is generally referred to as the wholesale electricity market.

long-term contract. That said, a demand response provider might wish to retain flexibility to adapt to changing circumstances, so might prefer not to lock itself in to a long-term contract. It could instead rely on shorter term arrangements, such as participating in the spot market, the interruptible load market and/or Transpower's demand response scheme.

Changes the Authority could consider to promote efficient investment

8.6 We have put significant effort into making it easy for parties to invest in generation and demand response. In respect of generation, we have done this particularly by developing the hedge market with sufficient depth and variety of products.[47]

8.7 The Authority's view is that the electricity and finance markets are workably competitive markets, and long-term hedge and PPA contracts are likely to be available if required. Of course, it is possible that the pricing terms of those contracts might not be attractive to a would-be generator or demand response provider. However, this would not necessarily mean there was a problem to be addressed, given that the electricity and finance markets are workably competitive markets. Further, there is a thriving venture capital market in New Zealand. So our current view is that commercially sound projects are likely to be financed, even if long-term contracts were not available. We are interested in hearing opposing views on any of these matters.

8.8 The Authority does not believe that it would promote the long-term interests of consumers to compel existing participants to offer or purchase long-term contracts to support generation or demand response.

8.9 That said, it may be possible to improve the functioning of the market for hedges and PPAs. The risks involved in providing long-term hedges and PPAs and the transaction costs for investors of investigating the feasibility of potential projects are very considerable. Transactions costs can be large relative to projected revenue, particularly for small-scale generation and demand response projects. If measures could be introduced to reduce transaction costs and facilitate risk assessment, it could become more attractive for parties to offer long-term hedges, PPAs or equity financing, even for smaller-scale projects. Some potential ways to achieve this could be to introduce greater transparency of long-term prices and greater standardisation of terms and conditions for long-term contracts.

8.10 More generally, the Authority is keen to understand whether it would be in the long-term interest of consumers to make further changes to the hedge market or any aspect of the wholesale electricity market to facilitate new forms of demand response or generation participating in the market.

Q13. What challenges might new forms of generation, such as virtual power plants, or small and dispersed generators, face in entering the market?

Q14. What changes might be required to the rule book to facilitate the emergence of virtual power plants or demand response?

47 The hedge market is the market through which businesses and consumers establish contractual arrangements for managing the risks to their incomes, or to the costs that they face, because electricity prices vary. It has been defined to include the exchange-traded and over-the-counter markets for electricity derivatives, and the market for trading physical supply contracts.

Q15. Would the functioning of the market for hedges and PPAs and the availability of finance be improved if there were greater transparency of long-term prices and greater standardisation of terms and conditions for long-term contracts?

Appendix A Format for submissions

Submitter	

Question		Comment
Q1.	What is your view of the potential competition, reliability and efficiency benefits of more participation?	
Q2.	What is your view of the opportunities to promote competition and more participation in the electricity industry?	
Q3.	What other issues might inhibit efficient mass participation? Please provide your reasons.	
Q4.	What is your view of the opportunities for network businesses to obtain external help to provide aspects of the network service using competition or market mechanisms?	
Q5.	What do you think are the main challenges to be dealt with to increase the use of competition in supplying network services? What are your reasons?	
Q6.	What is your view on whether open access is required and what would be the elements for an effective open access framework?	
Q7.	How effective are the existing arrangements for open access? What are the problems?	
Q8.	What type of distributor behaviours and outcomes should the Authority focus on to understand whether changes are required to support open access?	
Q9.	What changes to existing arrangements might be	

	required to enable peer-to-peer electricity exchange?	
Q10.	What are the costs and the benefits of enabling peer-to-peer electricity exchange?	
Q11.	What is your view of the possibility for, and impact of, any current or future blurring of participant type? What are your reasons?	
Q12.	What types of participation are or might be prevented because the party is not recognised as a participant? What are the potential impacts?	
Q13.	What challenges might new forms of generation, such as virtual power plants, or small and dispersed generators, face in entering the market?	
Q14.	What changes might be required to the rule book to facilitate the emergence of virtual power plants or demand response?	
Q15.	Would the functioning of the market for hedges and PPAs and the availability of finance be improved if there were greater transparency of long-term prices and greater standardisation of terms and conditions for long-term contracts?	

Appendix B Work programme activities relating to enabling mass participation

B.1 The Authority is already working on several possible changes to the rulebook (the Code) that would make it easier for more parties to participate in the electricity industry.

B.2 A list and brief description of some of the relevant activities from our current working programme to enable mass participation is provided in Table 1 below.

Table 1: 2016/17 work programme activities relating to enabling mass participation

Project	Description
Data and data exchange	Review of the data and data exchanges between participants (including service providers). The right information needs to be provided at the right times, and at an appropriate level of accuracy. Significant volumes of data are exchanged between participants and service providers to facilitate market functions. We need to ensure that parties can access the information that they require, at the right times, to facilitate competition and operational efficiency. We want to understand if the data architecture: • needs to be updated to accommodate a significant increase in participant numbers • can become more efficient by using new technology.
Multiple Trading Relationships	The Code currently allows a consumer to have a relationship with only one trader per connection (ICP). This prevents consumers from being able to enter multiple trading relationships, for example, to purchase electricity from one retailer and sell surplus solar power to another party. We are doing this project because allowing multiple traders at an ICP will promote competition and innovation.

Project	Description
What's My Number campaign	What's My Number (WMN) is a marketing campaign that aims to provide consumers with information about the ability to switch power companies, the ease of switching, and the potential savings that can be made on their power bills. The WMN campaign is one of the Authority's key 'choice orientated' programmes promoting retail competition. The campaign website (www.whatsmynumber.co.nz) allows consumers to see how much they may be able to save on their power bills by switching power supplier.
Default distribution agreement	We are considering whether to introduce a default distribution agreement to achieve the benefits from more standardisation of use-of-system agreements from enhanced retail competition and a more efficient operation of the electricity industry. The relationship between distributors and retailers (and potentially other parties that contract with distributors) is a factor influencing innovation in technology and business models.
Transmission pricing investigation	We are reviewing the guidelines that Transpower and the Authority must follow in setting the transmission pricing methodology (TPM). The TPM sets out how the revenue Transpower is entitled to recover in respect to the regulated components of the grid is allocated between designated transmission customers (the parties liable to pay the charges calculated under the TPM). Prices that are more efficient— service-based and cost-reflective—help consumers and parties along the supply chain making decisions that allocate resources more efficiently
Distribution pricing review	We are reviewing arrangements for distribution pricing. Distribution prices can become more efficient. Our preference is for an industry-led approach to distributors adopting more efficient pricing. They have a strong incentive to do this in the face of evolving technologies and business models. Prices that are more efficient— service-based and cost-reflective—help consumers and parties along the supply chain making decisions that allocate resources more efficiently.

Source: Electricity Authority