06 December 2018

Advice on creating equal access to electricity networks (draft for discussion)

INNOVATION AND PARTICIPATION ADVISORY GROUP

Note: This presentation is in strictly draft form and was prepared for the purpose of discussion by the IPAG.

IPAG Secretariat

DER investment is happening in NZ, albeit at a slower pace than other countries, but the lesson is that the DER market has to be allowed to develop

- The rise of Distributed Energy Resources (DER) is already changing the monitoring requirements on networks because of the problems DER causes
- Contracting with DER to help alleviate the problems it causes is already viable and necessary. However, this prospect requires open and equal access for DER
- To accommodate the impact of DER and its potential use in network management, distributors (in particular) will need to respond as soon as by the end of 2019
- The regulatory change required will depend on the urgency of distributors response to the challenges

The Authority asked IPAG for advice on creating “equal access“ for investment in DER, and trade of DER services

The Electricity Authority Board requested that the Equal Access framework be added to the IPAG’s 2017/2018 work plan in November 2017. Specific focus was requested on:

- Whether the operation of the existing equal access framework for transmission and distribution networks is sufficiently effective at promoting competition, efficiency and reliability for the long term benefit of consumers. This may involve, for example, establishing the current feasibility for competitive supply of network support services
- Potential options to strengthen the equal access framework to further promote competition, reliability and efficiency in the provision of electricity and electricity related services, including network support services
- The design, costs and benefits of any changes (regulations and/or market facilitation measures) identified to strengthen the equal access framework (including arrangements for exchange of network support services)

IPAG has briefed the Electricity Authority Board on important aspects of the recommendations

The Group endorsed the durability of the current market design, but emphasised the importance of minimising transaction costs and lags in its operation. Before the entering the final phase of the project the IPAG identified the importance of:

- Speed of rule changes
- Effectiveness of rule enforcement and breach processes
- Establishment of default arrangements and standards; and
- Use of pilots to establish new operation practices.

Access arrangements at the distribution level (especially access to DER behind the meter) need to evolve more radically however – terms of network access, procurement of network inputs and provision of information – all had to be addressed and have been.

The IPAG reflected the Electricity Authority's statutory objective in its deliberations. It also considered the regulatory strategy and code amendment principles contained in Appendix 2.

"Equal Access" is multiple interrelated problems

1. Key network information is not collected and/or made available to DER providers
2. Providers and procurers of DER can't see DER "market" information
3. Technical specifications are not consistent or in some cases adhered to
4. Transaction costs for facilitating DER trade are high
5. Distribution pricing does not signal the cost of DER to network operation (congestion and voltage excursions for example) or its value to distributors
6. Distributors are not confident that DER can assist with service quality or is viable as a network alternative
7. Part 4 Incentives appear to be poorly understood
8. Distributors' DER investments are treated as regulated capital but the planning and operating services provided are contestable
9. Distributors may misallocate costs and revenues
10. Distributors may favour in-house or related party solutions
11. Distributors may favour network solutions
12. Distributors may restrict technologies or network users
13. Security and reliability at risk if DER use by transmission and distribution in conflict

Working through each issue, IPAG identified 13 desired outcomes from the equal access project (1)

1. Distributors have greater visibility (monitoring) of the performance of their low voltage networks, both current status and forward looking information, so they are better able to:
    - manage reliability with greater penetration of DER and
    - specify needs which could be obtained from a third party to support network management
2. DER owners have ready access to information of locations and network need so they can identify where they could assist if coordinated effectively with the distribution network operator. (See also transaction costs in issue 4 below)
3. Procurers and providers have confidence the connection standards and protocols for use are consistent and appropriate in order for network standards to be maintained where DER is deployed.

Working through each issue, IPAG identified 13 desired outcomes from the equal access project (2)

4. Reduced transaction costs to ease trade between procurers (especially distributors) and DER providers

   Mechanisms that give visible access of prices to DER providers and standing offers for DER from distributors in order to facilitate trade.

5. Distribution prices that reflect network conditions and costs in order that users of the network make informed decisions.

   Mechanisms for contracting and pricing DER that support its use as network alternatives

6. Distributors have skills and capability to coordinate DER, delivered through a contestable framework to provide network reliability or network alternatives.

   Distributors to adopt more stochastic techniques rather than a deterministic approach so the potential for their use of DER to support network operations can be realised

7. Part 4 incentives are well understood and/or effectively complemented with other incentives

Working through each issue, IPAG identified 13 desired outcomes from the equal access project (3)

8. A contestable framework should treat distributors' and third-party DER investments neutrally to maximise distribution benefits and limit unintended consequences
9. Distributors allocate costs and revenues efficiently between the regulated service and their contestable (unregulated) business activities
10. Distribution services are delivered using an efficient mix of providers
11. Distribution services are delivered using an efficient mix of network and non-network alternatives
12. Network users are confident that they are not subject to unfair connection and operation restrictions, and have a fair opportunity to challenge decisions
13. Contractual arrangement develop in way that reliability is not undermined by multiple conflicting calls on its use. This is a coordination problem between procurers of DER

DERs are small, widely distributed and behave differently to other electricity market resources

Mostly electricity, but can include other energy e.g., solar heating, hot water, etc

Distributed Energy Resources

Typically it is connected to roadside power lines, not the big power pylons, and increasingly it is on buildings

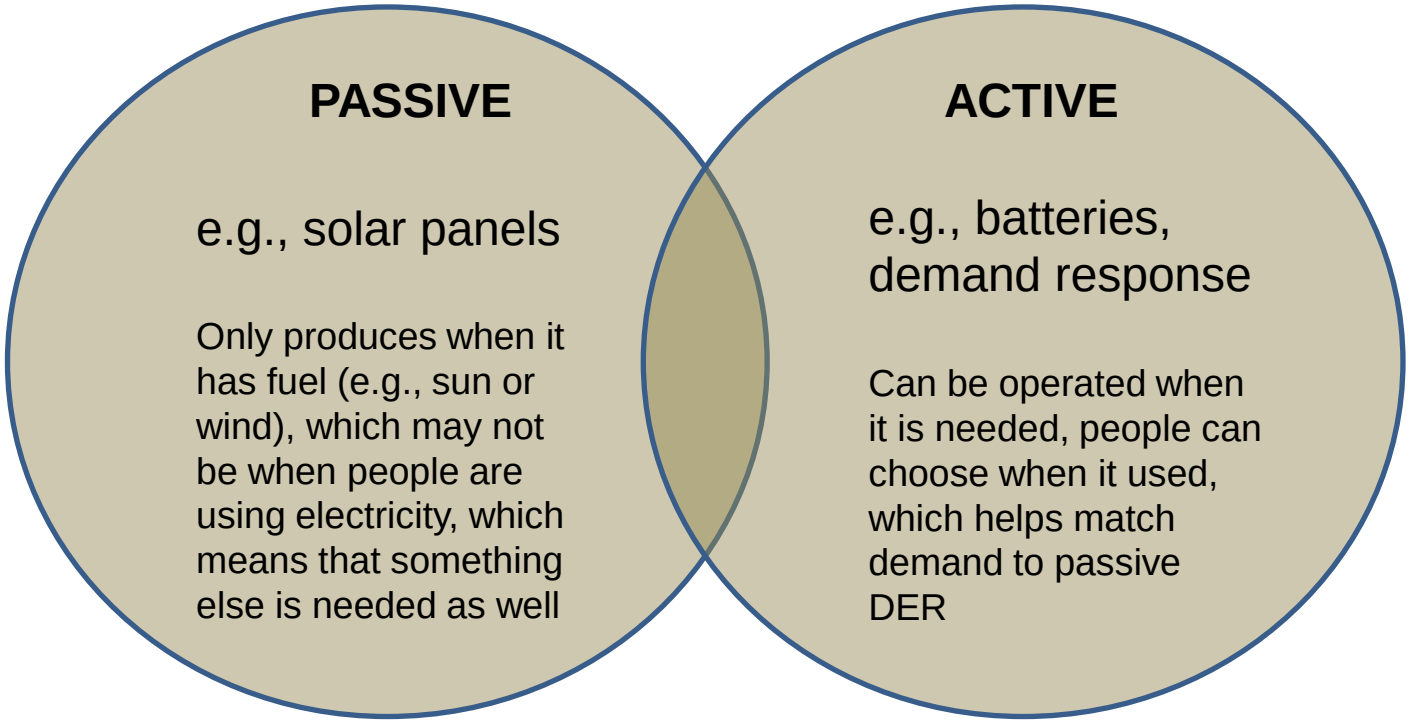
Often-used examples:

- **Rooftop solar panels (PV – photovoltaics)**
- **Storage (e.g., batteries)**
- **Demand Response**
  (people turning, or programming, things to turn off and on, to suit the power system, for a reward)

When plugged in Electric Vehicles (EVs) can be accessed as a combination of a battery and programmable Demand Response

There is an important difference between DER which can be controlled and that which can't

Distributed Energy Resources



But DER is only useful to assist network operation if it knows when it should be operating.

DER can both cause problems and offer solutions. Action is required to address both facets of DER

Problems

- DER creates two-way flows on a power system that is predominantly designed to generate power at big power stations and transport it big distances across power lines
  - DER can reverse voltage profiles and raise voltage above limits
  - DER can overload distribution lines – for example EV charging
- DER can replace large scale generation dispatched under the wholesale market rules but has different operating characteristics
- As more DER comes into the power system it can become less reliable, causing either expensive options to fix and/or requiring limits on how much DER can be deployed

Benefits

- DER can be designed to be controlled and can be programmed and/or automated
- DER can contribute to the decarbonisation of the electricity system
- Potential for DER to provide services back to the power system that have traditionally been provided by large generators or power lines
- BUT this needs some coordination

Even though investment in DER is happening the full value of the investment is not being realised

DER has potential
Allowing DER to provide services back to the power system that have traditionally been provided by large generators or power lines
BUT with coordination

More participation
More providers of DER and services than current electricity companies, that compete with the current electricity companies

Identification of need and coordination
For potential and participation to be combined there needs to be new ways to match up those that can provide services (and get paid for the services provided) to those that need them while still ensuring the power system is available to, and remains reliable for, those that continue to use it

12

If we're to make the most of these resources we need a market for DER services, with technical participation rules,

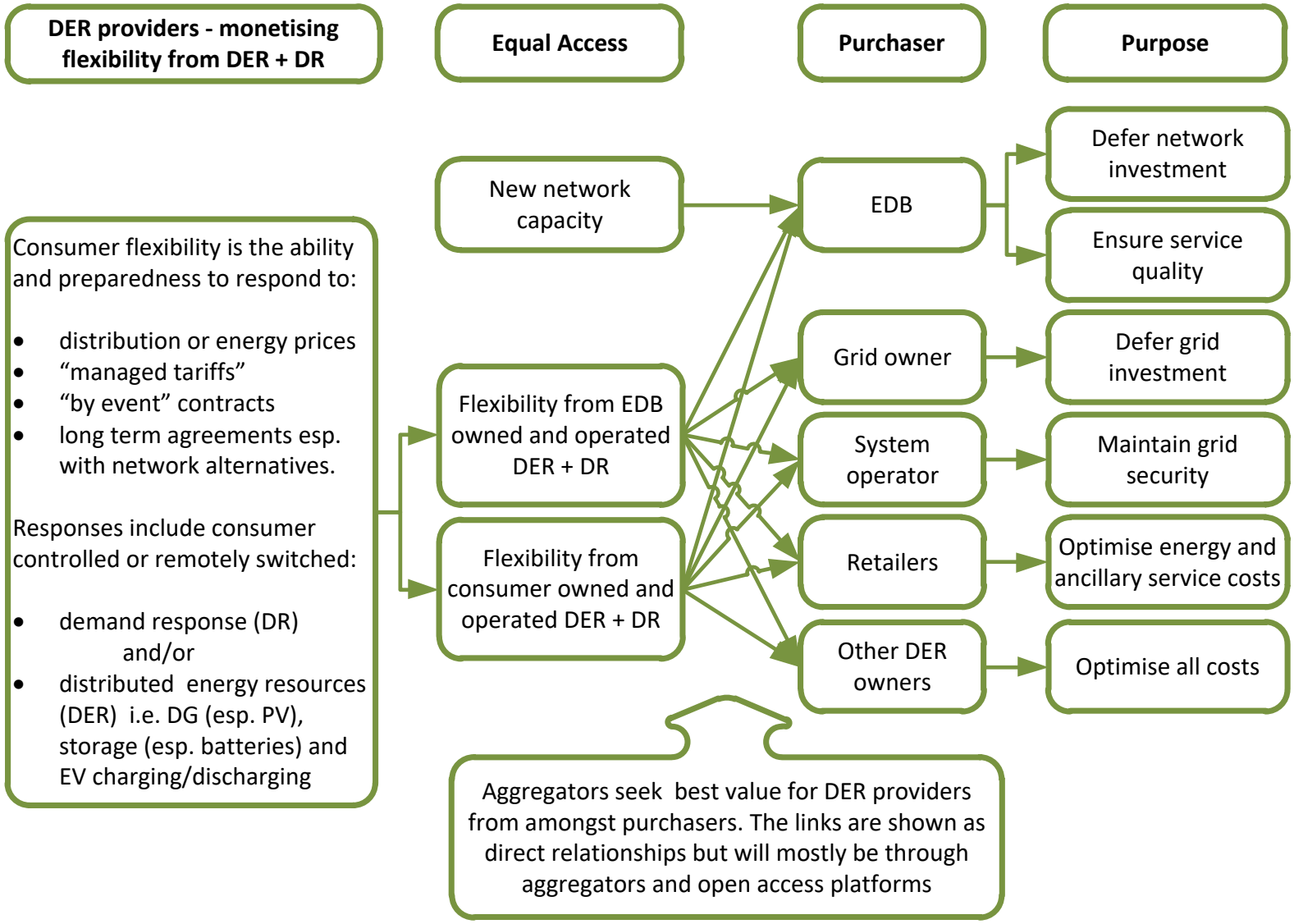
Most consumers won't spend money on DER technology until benefits are certain and they have choice and control

Technology development will be slow until the ability to compete with electricity companies is real

Distributors will need to impose limits and/or minimum standards for DER technology that is coordinated to ensure the reliability of the power system

Regulators will not be able to ease hard rules on the electricity industry, which may also include DER providers, unless consumer benefits are certain and the system is reliable

"Equal Access" - a market for DER services - requires pricing, incentives, engineering and trade



Making the best use of DER requires fulsome participation in the design of the market through each of the evolutionary phases

For exchange to occur providers of DER (sellers) and procurers of DER (buyers) need a platform or forum or exchange where they can identify the opportunities, see the prospective value, meet and trade.

The value of easy access, low-cost trading to make the most of resources like DER is well established

Coase's Theorem

"If at no cost people can negotiate the purchase and sale of the right to perform activities that cause externalities, they can always arrive at efficient solutions to problems caused by externalities"

Buyers and sellers of DER services need contractual arrangements and, in some cases, long-term contracts

Expanding on Coase

- In a spot market the transaction is simple: one party wants, another supplies. Once money is exchanged for goods there is little scope for dispute, so a written contract can be dispensed with. If one party is unhappy, he/she will take their business elsewhere next time. In this sense spot markets are largely self-policing. They are well suited to simple, low-value transactions, such as buying a newspaper or taking a taxi.
- Things become trickier when the parties are locked into a deal that is costly to enter into, costly to get out of and has a time dimension associated with delivery. Take a property lease, for instance. A business that is evicted from its premises might not quickly find a building with similar features. Equally, if a tenant suddenly quit, the landlord might not find a replacement straight away. Each could threaten the other in a bid for a better rent. The answer is a long-term contract that specifies the rent, the tenure and use of the property. Both parties benefit whether these are bespoke contracts negotiated bilaterally or standardised contracts traded on an open exchange.

Equal Access is about freeing up investment in DER plus making buying and selling DER easy

- IPAG understands equal access to mean:

  'equal' access to transmission and distribution networks by parties wanting to use those networks and to buy or sell services made possible through coordination of DER

- In this context, the focus for IPAG has been on:

  the ability of individual (technically compliant) DER owners and groups of DER owners to trade the flexibility at their site to any beneficiary in competition with other potential providers.

- This includes distributors selling their controlled DER into the contestable market and DER in the contestable market being made available to supply distribution services
- This does not preclude DER owners from simply optimising their assets to get the lowest cost of supply for themselves

For Equal Access to happen, distributors will be central to its success

Who is responsible

- Distributors will need to take action first, but other parties will need to contribute and participate
- Preference is for distributors to develop processes themselves
- Electricity Authority and Commerce Commission will need to monitor progress and hold parties accountable

When is action needed?

- Pretty quickly. For example, the AEMO forecast by 2025 all South Australia demand (on a low demand day) could be met by rooftop PV, with active management required by 2021/2022.That growth has been brought about as a result of subsidies but the lesson is that arrangements need to be in place as soon as possible so that when the growth comes distributors, in particular, are not caught out.
- IPAG recommend discernible progress in 2019

We should allow equal access to evolve pragmatically and avoid overcomplicating it in early stages

Distributor-led reform of equal access arrangements

PHASE 1	Distributor communication of need (e.g. “heat maps”) and standing offers (some trades executed) – discernible progress in 2019
PHASE 2	Bilateral DER flexibility contracts commonplace (esp. longer term for network alternatives)
PHASE 3	Control systems for DER flexibility are integrated into a single platform

- “Heat maps” are a way of showing areas of potential congestion or voltage issues
- Assume DER may be aggregated and deployed in wholesale value streams in the contestable market (e.g. frequency)
- Assume connection and operating standards are updated to include DER and 2 way flows
- Phases to establish “flexibility” contracting mechanisms for distribution level value streams (deferral, outage management etc)

Evolution of distribution companies and distribution systems is on its way, legacy arrangements must be considered in the evolution (for example ripple control)

Equal Access is a no regrets change

- Phase 1 is a low cost, no regrets step
- Distributors should be able to deliver on phase 1 now even if it is done at a very basic level.
- Failure to take action is likely to lead to increased costs to consumers from either lower service quality or increased network provision costs in future

Creating an Equal Access regime for DER will be a big change from today's market operation

The value in undertaking the equal access work plan is unlocking the potential use of DER in all markets and for all purposes.

Equal access is not a single problem. There are a range of factors that create a difficult and complex issue. IPAG have broken the problem into 13 distinct issues based on emerging issues with DER identified in:

- Consultation on the Commerce Commission's *Input methodologies review decisions Topic paper 3: The future impact of emerging technologies in the energy sector* 20 December 2016
- Electricity Authority *Enabling mass market participation in the electricity market How can we promote innovation and participation consultation paper* 30 May 2017
- Intelligence gathered from retailers and innovators by IPAG

IPAG assessed the market failures, framed the issues, detailed the desired outcomes and agreed the actions required to address the issues. IPAG worked with the Commission and Authority to develop recommendations that will address actions required and lead to the desired outcomes.

The idea of shepherding evolution of a market for DER through three phases with the first phase being steps that can be taken now came from the UK example. Some recommendations in later phases may require changes to legislation and regulation.

One thing that has been made very clear to the IPAG is what we are identifying and what we are proposing will challenge the level of information gathered by some distributors and tax their analytic capability. For example, future looking heat maps seems a simple idea but requires a lot of data and effort. However, in the first instance it could be done crudely to good effect.

Existing regulatory and access regimes will change to accommodate DER

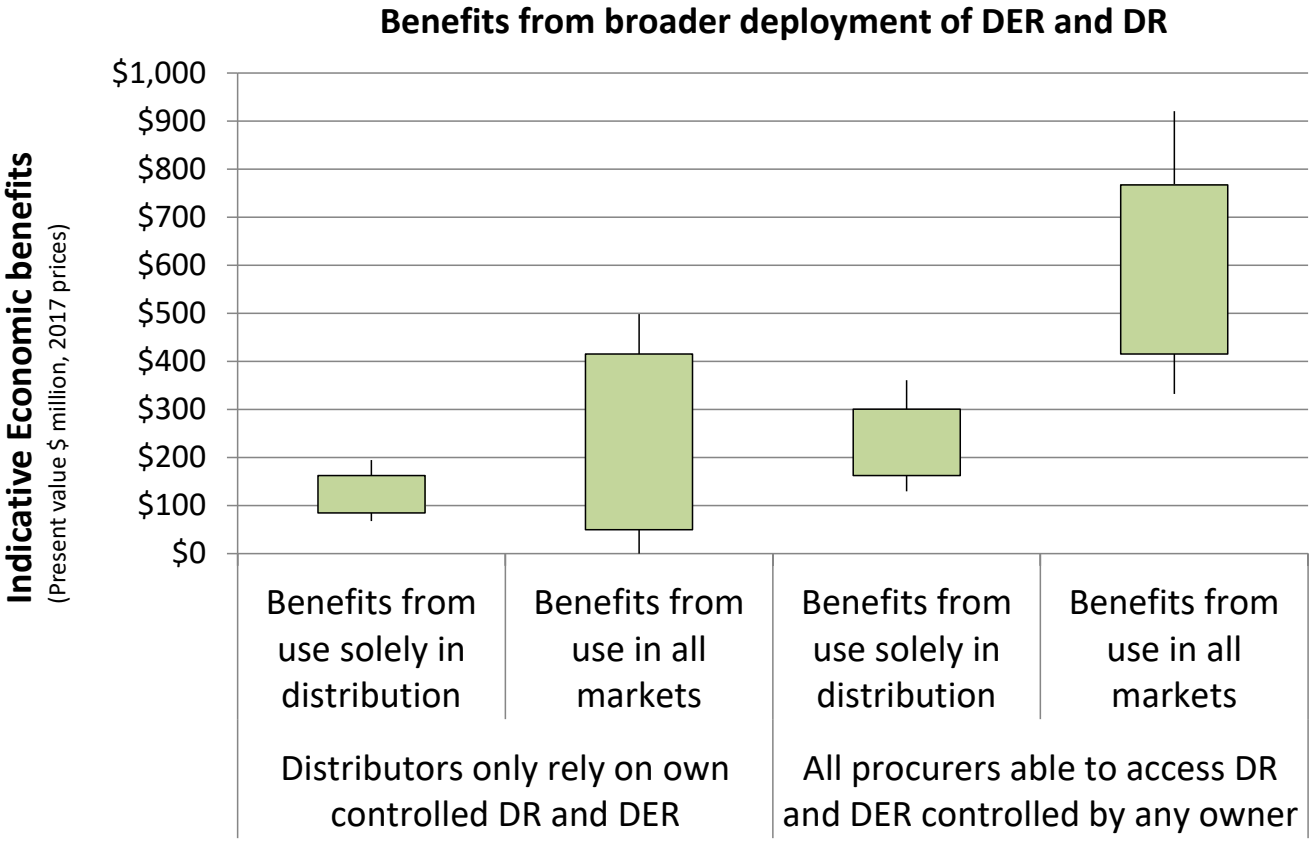
The scope of problems and solutions are covered by a range of bodies, and associated legislation and regulations

Regulation of the distribution line service	Participation of distribution business in retail and wholesale electricity markets	Connection and use arrangements to access the network service	Industry voluntary arrangements (including industry-led reforms)
Commerce Act 1986 (Part 4)	**Electricity Industry Act 2010**	**Industry Participation Code**	**Self-governance**
Defines the line service to be subject to monopoly regulation, and applies monopoly regulation on suppliers of line services	Establishes business separation, governance arrangements and other arm's length rules to govern how distribution business participate in retail and wholesale markets	Establishes distribution network access arrangements with the objective of promoting competition, reliability and efficiency	There are voluntary arrangements for: • Retailers, aggregators and non-household consumers to access distribution networks • Industry lead approach to reform distribution network pricing

Decentralised energy trends require evolving third-party or open access arrangements to distribution networks.

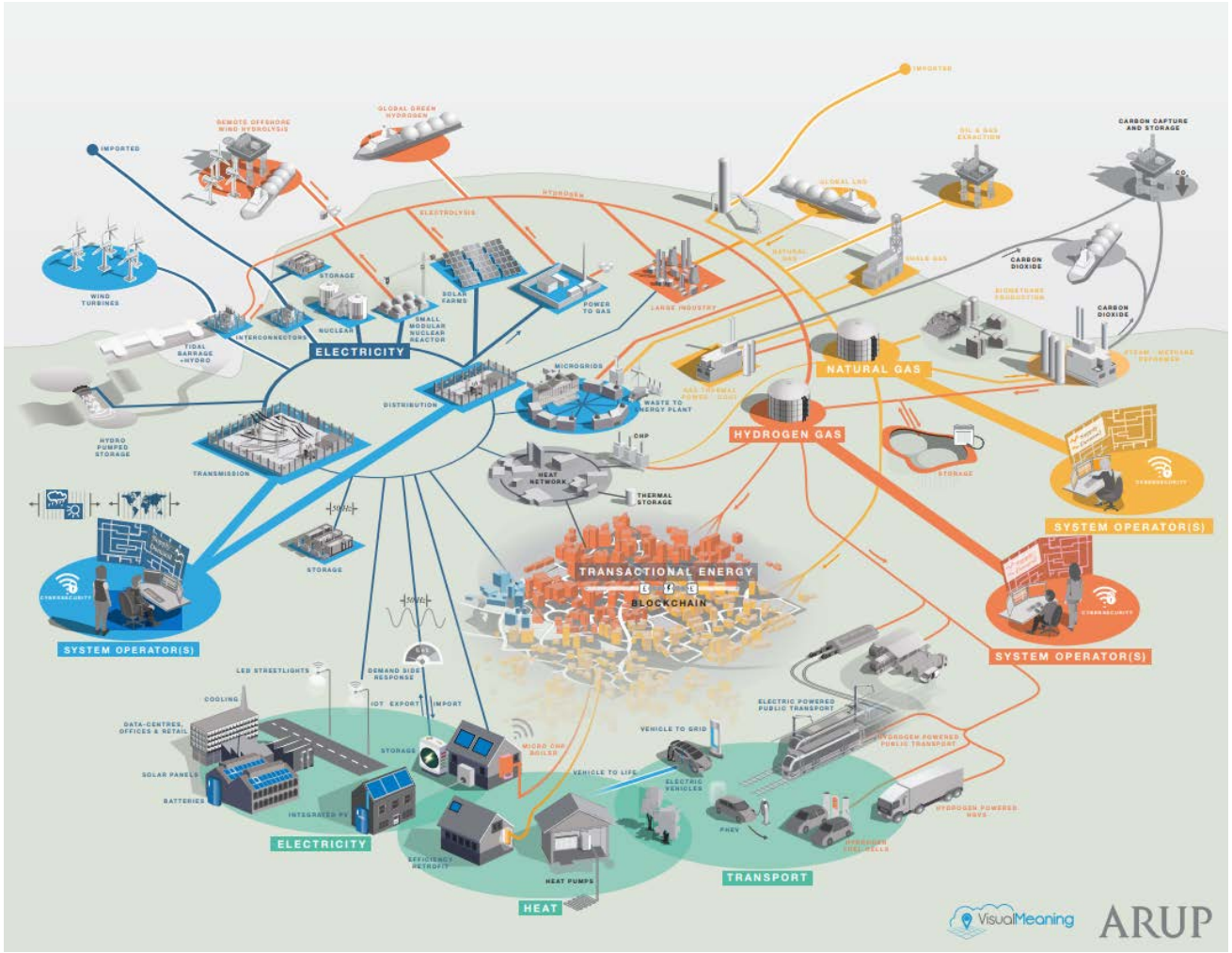
- New DER owners will want to use distribution networks. This will require an efficient connection and/or use of system arrangement that work for DER owners and distribution businesses
- Distribution businesses may face conflicts if they seek to become active participants in markets where competitors rely on accessing the distribution network

Electricity market costs will be significantly higher than would otherwise be the case without an Equal Access regime operating at distribution level,



Access to revenues is key to support investment in DER. Greater and more diverse DER supply delivers its full potential when there is equal access to both distribution services and other markets.

Other jurisdictions have much higher concentrations of DER than NZ and we can learn from the way they are integrating them



Source: Arup, Energy systems, A view from 2035

ARUP writes:

The energy system of 2035 will be more decentralised, disaggregated and multivector.

Demand-side response and batteries are widespread in commercial and residential property and have shifted the load profile of demand and generation.

Distribution networks are managing their own systems, becoming Distribution System Operators (DSOs).

Investment in reinforcing the network has shifted to integrated distributed solutions.

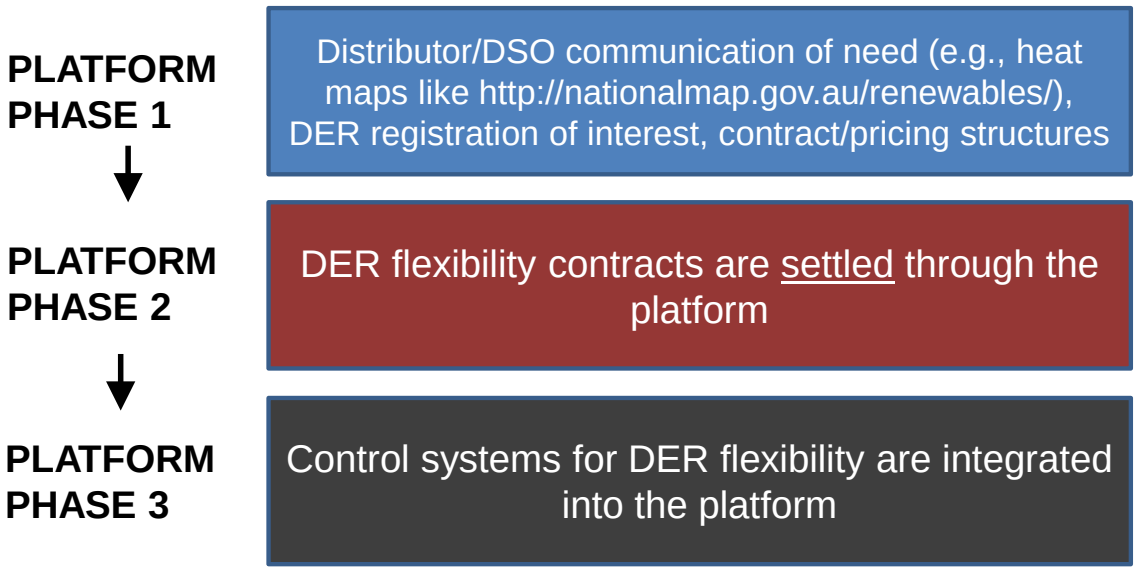
The distribution network has had to be reinforced due to the adoption of electric vehicles (EVs) and heat pumps.

UK, US and Australia are all working on the introduction and development of Equal Access markets

- Establishment of new platforms to facilitate innovation and participation
  - Australian Energy Market Operator
  - Tabors, Caramanis *et al,* USA
  - UK Power Networks establishment of “platform” (see next slide)
- Amendments to existing (wholesale) markets to facilitate DER participation
  - New York ISO and REV
  - NERC (North America Electricity Reliability Corporation) standard P1547 revision, Hz/Volt technical requirements
  - California/Mid-Continent ISOs development of ramping/flexibility products
- Examples of DER participation within existing wholesale markets (VPPs)
  - Sonnenbatterie, USA and Europe

UK Power Networks Roadmap provides a model for evolving equal access – starting with establishing a DSO and crude platforms for trade

Distributor-led platform roadmap



Roadmap presumes that DER will also be integrated with wholesale value streams (e.g., Hz).

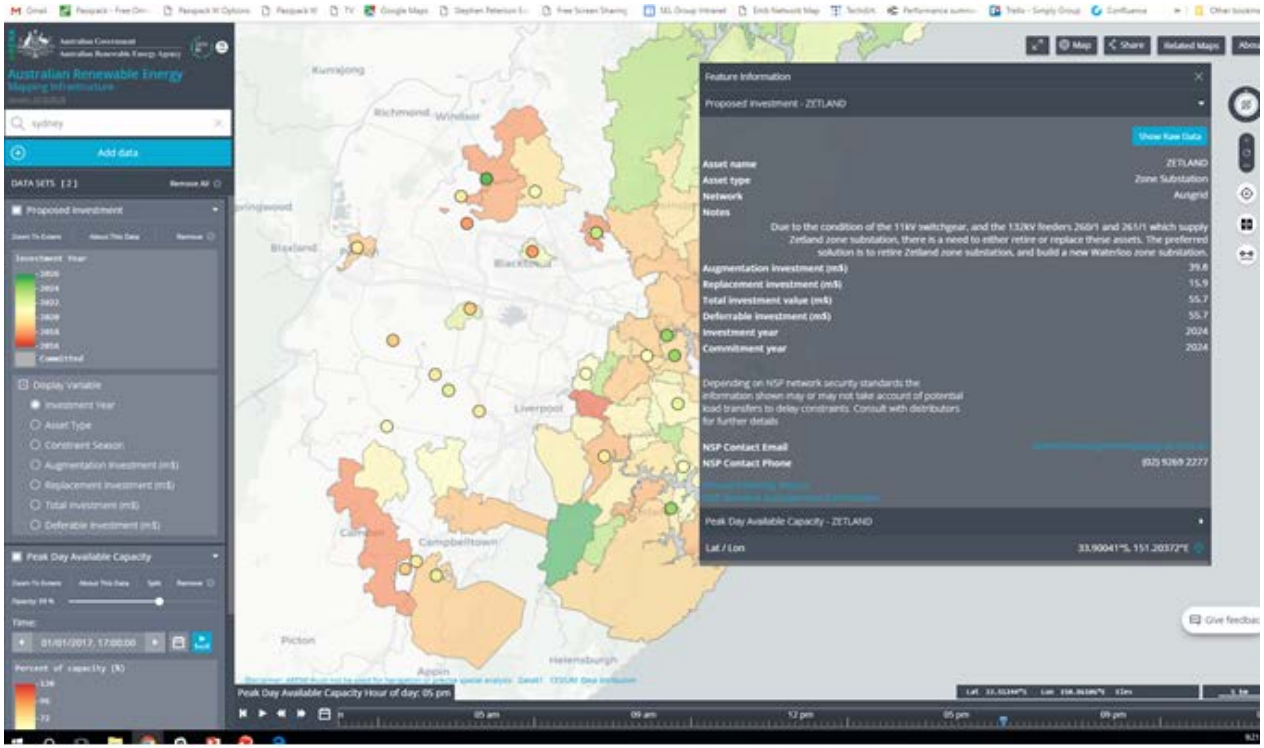
Hence is focused on establishing "flexibility" contracting mechanisms (via a DSO) for distribution-centric value streams (deferral, outage management etc)

UK Power Networks (distribution) has published their flexibility roadmap

- Q3 2018, publish sites where DER could offer services
- Q1 2019, invitation to for DER to tender for services
- Q2 2019, successful bidders are notified
- Q4 2019, start using contracted DER

Heat Maps are used in the UK and Australia to signal network congestion

For example: AREMI is a website for map-based access to Australian spatial data relevant to the Renewable Energy industry



https://nationalmap.gov.au/renewables/

Available Distribution Capacity

'firm substation capacity' (determined by the local reliability criteria), minus the forecast peak demand at the Zone Substation level

Annual Deferral Value

(expressed in $/kVA/year) is the planned investments that are potentially deferrable. In addition, the amount of network support (in MVA) from demand management or renewable energy required in a given year to achieve a successful deferral is calculated

Peak Day Available Capacity

load as percentage of asset capacity for each hour of the peak day in the lowest level of the network each area with potentially deferrable investment

Activity in New Zealand is increasing, but it is inhibited by an absence of equal access

Transmission	Distribution
Transpower's Demand Response Management Programme (DRMP) allows electricity consumers to monetise their ability to reduce their electricity demand DRMP contracts for demand response used at peak demand has been proven to be an effective alternative to investment in the electricity transmission network At present the capability is only applied to management of the grid, especially where high demand exacerbates a transmission capacity problem during grid maintenance periods The software DRMP is developing could be used by any party to manage demand peaks for any purpose. It has the ability to directly manage demand to individual appliance level On that basis there is no technical barrier for retailers to use DER to manage demand to optimise the cost of power, or distributors to use DER as a network alternative	Powerco has issued a Request for Information (RFI) to provide electricity supply options for Putaruru, Tirau, part of Matamata, and surrounding areas as part of its project to improve reliability of supply to the area In late 2014, Powerco consulted with the local community on the quality of the existing electricity supply and proposals to improve reliability by reducing the number and length of power cuts. The overwhelming response was supportive of improving the reliability of supply. The network alternative is not a short-term deferment of a network investment – it is for a full substitution of an existing and firm electricity supply. As a result, a longer term contract (15 years) for a network alternative is expected with a forecast capacity of 36 MVA in 2021 rising to 40 MVA in 2036 (reflecting forecast load growth).

Transmission and distribution may compete for the same DER

- Issues of the use of DER for security on the transmission system overlap with the same DER being coordinated for reliability and security on the distribution network. The same can be said of other users, i.e. generators or retailers use DER for other purposes. It is particularly acute where security and reliability could be compromised if the transmission operator and the distribution operator are both relying on the same resource.

- It is also the case that some of the other issues apply to Transpower as a regulated entity. However this work is focused on access to DER at the distribution level especially behind the meter. The focus on distributors is not at the exclusion of Transpower. In this context Transpower is one of a number of competing users and the fact they may have some similar issue with the regulatory regime is not central to equal access.

Appendix 1: Recommendations

- IPAG identified a number of **issues**, both with the potential future state and current behaviours
- IPAG set out several **desired outcomes**, leading from the identified issues
- IPAG converted the desired outcomes into **a series of actions**, starting with what is practicable now (phase 1) and incrementally building towards an environment which supports networks being used for buying/selling of services (choice), maintaining/improving reliability of supply, and putting downward pressure on supply chain costs
- The Authority and the Commission worked with IPAG to develop **recommendations** that assign responsibility for steps that can be taken to address the problems, lead to the desired outcomes and, ultimately open up access for all DER providers and procurers to trade. The recommendations identify who IPAG considers should be responsible for delivering the actions, and identified where the Authority, the Commission, or both should hold those parties accountable for taking and making action.

Issue 1 – Networks need to gather more information than they do currently so they and DER providers can identify needs

Issue – Network information
Distributors use static approaches to manage the lower voltage parts of their network. They may not have sufficient network information to effectively coordinate DER with the distribution network service as the level of DER on the network increases. There is a specific issue of potential constraints on distributors accessing feeder-level data from consumer metering in addition to shortfalls in data collected in the first place The lack of information also hampers networks' ability to understand how DER could be used to run the network better. This issue arises in the context of both network planning with the potential to use long term contracted DER as a network alternative and operational management for reliability purposes. This information may be required to support the move to more cost reflective distribution pricing as well.
Desired Outcomes - Reliability, efficiency and competition
Distributors to have greater visibility (monitoring) of the performance of their low voltage networks, both current status and forward looking information, so they are better able to: • manage reliability with greater penetration of DER and • specify needs which could be obtained from a third party to support network management

Issue 1 – Networks need to gather more information than they do currently so they and DER providers can identify needs

Actions
1.1Build on the practices for providing network information currently at sub transmission and HV level. 1. At the upper end of lines (above feeder level) distributor to install monitoring devices to capturing a large range of electrical performance measures at appropriate/selected feeder transformers 2. For the rest of the lines (feeder level) distributors to capture • Voltage information. E.g. 10 minute average information (not necessarily real time) for several connections on the feeder. • “Last gasp” power off signals (real time) • Neutral information, obtained occasionally to detect earthing problems 1.2 Distributors to develop an understanding of the ability of the network to accommodate increases in DER for the purpose for both understanding the implications of the growth in DER and the potential for deploying DER to support the network (I.e. network hosting capacity) 1.3 Distributors to publish utilisation of the network in both directions by transformer (or other critical network locations). This should take the form of near real time monitoring and long term projections of potential congestion

Issue 1 – Networks need to gather more information than they do currently so they and DER providers can identify needs

Recommendations (Numbers flows across issues)
1. The Commerce Commission to require distributors to report annually information necessary for interested parties to understand distributor progress with delivering action 1.1.
2. The Authority to amend the Code to integrate hosting capacity capability into Part 6. The Authority to gazette the Code amendment in 2019, and report on distributor progress implementing the requirements by December 2019.
3. The Authority to publish guidance on expectations regarding meeting requirements on distributors to report on export congestion (s6.2(2)(da)). The Authority to publish guidance by June 2019, and report on distributor progress implementing the requirements by December 2019.
4. The Authority to develop effective arrangements enabling parties operating across the supply chain to access data. [Note: the Authority has requested the IPAG provide advice relating to access to data and this will follow the equal access work.]
5. The Commission and Authority to encourage and support distributors to collaborate in finding the most efficient way of capturing and publishing utilisation data. The Authority and Commission should report publicly on progress on how this will be achieved by September 2019.

Issue 2 – For a DER “market” to open up more information on needs and standing offers have to be made available

Issue – DER “market” information
Information that would give third part DER providers a sense of where DER investment and deployment could provide benefits on the distribution networks or how much they would be paid is not accessible. This applies in the case of long term support as an alternative to network investment or as short term operational support i.e. for reliability
Desired Outcomes - Reliability, efficiency and competition
DER owners have ready access to information of locations and network need so they can identify where they could assist if coordinated effectively with the distribution network operator. (See also transaction costs in issue 4 below)
Actions
2.1 Distributors to publish signals of need where and when network issues are expected or occurring. This could take the form of a heat map that is openly accessible and contains relevant and timely information. It could take the form of near real time needs as distinct from long term projections of potential congestion where network alternatives may have a role 2.2 Distributors to also publish indicative standing offers for long term network investment deferral opportunities. (See also distribution pricing and transaction costs below) 2.3 Distributors to use requests for proposals for non-network solutions in a timely fashion to enable third-parties time to develop and prepare non-network alternatives (eg, see Powerco recent market-making https://www.powerco.co.nz/about-us/your-view/current-consultations/) 2.4 [A yet to be identified party] to create a register of DER to signal location, availability and capability in providing services.

Issue 2 – For a DER “market” to open up more information on needs and standing offers have to be made available

Recommendations (Numbers flows across issues)
6. The Authority to work with a sample of distributors and interested data users to identify what data and information is required to support a DER market, and take steps to make sure that accessible and user friendly data/information becomes available to DER suppliers. The Authority should report publicly on progress on how this will be achieved by September 2019 and thereafter. 7. The Authority and Commission to support distributors to collaborate to develop a consistent approach to providing accessible information on current or expected network investment needs in Asset Management Plans. A preferred option should be identified by December 2019. 8. The Authority to encourage distributors to make available ‘standing offer’ price information for DER to support longer term alternatives to network investment. (The Authority might work with a sample of distributors to test the concept and an approach initially).The Authority to report on its progress on how it plans to do this by September 2019. 9. The Authority to identify how to establish a register of DER which is available to supply services. (The initial register could be established for a sample of regions to test the concept.) The Authority should report on its progress on how it plans to do this by September 2019.

Issue 3 – For the use of DER to develop technical specifications have to be clear and consistent

Issue - Technical specification
Distributors and third-party owners of DER require clear and consistent specification to ensure DER entering the network meets appropriate network standards. This includes where DER is utilised for network support or any other purpose.
Desired Outcomes - Reliability, efficiency and competition
Procurers and providers to have confidence the connection standards and protocols for use are consistent and appropriate in order for network standards to be maintained where DER is deployed.
Actions
3.1 Have a common code for DER connection across all networks 3.2 Standards for DER to ensure their connection will not cause network issues, including safety concerns 3.3 Distributors to develop an industry standard connection information pack 3.4 Industry to develop common protocols for deployment of DER for any purpose across any network
Recommendations (Numbers flows across issues)
10. The Authority to oversee and support the Electrical Engineers Association (EEA) and interested stakeholders to develop common technical specification standards for connection of DER. 11. The Authority to require adoption of the common standards by all distributors. The Authority should report on its progress by September 2019.

Issue 4 – The cost of identifying needs and potential value (transaction costs) is too high for trade to flourish

Issue - Transaction costs
High transaction costs can impede trading between procurers (especially distributors) and suppliers of DER services
Desired Outcomes - Efficiency and competition
Reduced transaction costs to ease trade between procurers (especially distributors) and DER providers Mechanisms that give visible access of prices to DER providers and standing offers for DER from distributors in order to facilitate trade.
Actions
4.1 Industry to develop consistent contracting and/or pricing principles for DER 4.2 Industry to develop standardised information exchange protocols for distributors to communicate price information to DER providers 4.3 Authority to hold back from pushing for development of substantial platforms and allow the development of more simple formats for signalling prices and availability between buyers and sellers of DER initially
Recommendations (Numbers flows across issues)
12. The Electricity Authority to ensure the distribution pricing principles or equivalent provide appropriate guidance for providers and procurers of DER. 13. The Authority to determine how to provide DER installations with standard and default distribution connection and use of system agreements 14. The Authority to encourage interested procurers (especially distributors) and active DER providers to develop conventions for trade.

Issue 5 – Distribution pricing does not signal the cost DER places on the network or the mitigating value of it

Issue – Distribution Pricing
Current forms of distribution pricing may not signal opportunities for DER to provide operational support or serve as network alternatives
Desired Outcomes - Efficiency and competition
Distribution prices that reflect network conditions and costs in order that users of the network make informed decisions. Mechanisms for contracting and pricing DER that support its use as network alternatives
Actions
5.1 Authority to reinforce the message that cost reflective prices are an important step in the transformation to an efficient transactive network with widespread uptake and use of DER (i.e. they are not a nice-to-have feature of the workings of the market) 5.2 Distributors to obtain and make available improved network data to inform pricing reform (as described in issues 1 and 2 above) 5.3 Distributors to make price structures such as network load control tariffs participant and technology neutral 5.4 Distributors to identify what is required by DER suppliers to support development of a market for contracting support for DER as a network alternative. (As discussed in issue 4 above)
Recommendations (Numbers flows across issues)
15. The Authority to continue with its progress towards distribution pricing that will reflect the cost of DER on the network and, as a consequence, the opportunity for DER to provide distribution services. 16. The Authority to encourage and support ENA to develop distributor systems required to be able to signal the presence of, and cost of, congestion within networks. Authority to report progress by December 2019. 17. Authority to work with a sample of distributors and DER suppliers to develop options how distributors could contract with DER to support network alternatives. Review progress September 2019. Implement by December 2019. (See also recommendation 9)

Issue 6 – Distributors seem hesitant to rely on DER to provide regulatory services or network alternatives

Issue – Uncertainty
Distributors do not yet have the evidence that coordinated DER delivered through a contestable framework can provide network reliability or serve as an alternative to network investment.
Desired Outcomes – Reliability and Efficiency
Distributors have skills and capability to coordinate DER, delivered through a contestable framework to provide network reliability or network alternatives. Distributors to adopt more stochastic techniques rather than a deterministic approach so the potential for their use of DER to support network operations can be realised
Actions
6.1 Participants have a secure environment for experimentation to develop, test and implement delivery of products and services within contestable frameworks • Distributors and DER providers to trial a contestable framework, for example to test heat maps, DER response to prices, verify service provision, explore contractual arrangements, to inform contracting principles and sharing of lessons learned
Recommendations (Numbers flows across issues)
18. Electricity Authority and Commerce Commission to provide guidance to distributors and DER providers on how they are able to trial contestable frameworks This will include guidance on how quality standards apply, as well as on other relevant aspects of the broader regime. Authority and the Commission to report on progress by September 2019. 19. The Authority to develop a reporting framework for distributors and DER suppliers to report results of trials, including technical details and what worked and didn't work. The Authority to establish a portal for sharing evolving best practices around the use of non-firm DER (i.e. the use of stochastic techniques rather than a deterministic approach) and firm DER.

Issue 7 – Part 4 has incentives to use DER for regulated services and network alternatives but these incentives may not be well understood

Issue – Part 4 Incentives
Part 4 incentives may be complex, or misunderstood. This may lead distributors to focus on in-house solutions, without using a contestable framework or not use DER as a network alternative at all
Desired Outcomes – Efficiency
Part 4 incentives are well understood and/or effectively complemented with other incentives
Actions
7.1 Commission to actively improve distributors' understanding of the workings of and incentives in Part 4 7.2 Commission and distributors to provide for greater transparency and involvement regarding investment decisions
Recommendations (Numbers flows across issues)
20. Commerce Commission undertake an information campaign on Part 4 incentives including publicising relevant case studies

Issue 8 – distributors' own investment in DER is treated as regulated capital but the operating service is contestable and should be treated accordingly

Issue – The distributors' DER and regulated service

Distributors' DER investments are treated as regulated capital but the planning and operating services provided are contestable. This could result in unintended consequences (e.g., implicitly favouring distributors' DER over third-party DER) Network solutions for solving constraints and treatment could be any of the following combinations:

Supplier	Solution	Accounting treatment	Regulatory result
Internal resources	Traditional tech	Capex	In RAB
	New tech	Capex	In RAB
External supplier(s)	Traditional tech	Capex	In RAB
	New tech	Capex	In RAB
	Traditional tech	Opex (lease arrangement)	Regulatory opex
	New tech	Opex	Regulatory opex

Desired Outcomes – Efficiency and Competition

A contestable framework should treat distributors' and third-party DER investments neutrally to maximise distribution benefits and limit unintended consequences

Issues 9 to 12 – on a number of counts there is a question whether distributors treat their own DER and competing DER equally

Issue – The distributors' DER and regulated service

9. Distributors may misallocate costs and revenues

Distributors might not be constrained in allocating costs and revenues between emerging contestable markets and the regulated distribution service

10. Distributors may favour in-house or a related party solutions

Distributors may not be incentivised to explore non-internal or related party options to deliver the distribution service.

11. Distributors may favour network solutions

Distributors may not be incentivised to explore non-network alternatives to delivering network support.

12. Distributors may restrict technologies or network users

Distributors could place restrictive connection and operation standards for the use of DER without recourse

Desired Outcomes – Efficiency and Competition

9. Distributors allocate costs and revenues efficiently between the regulated service and their contestable (unregulated) business activities

10. Distribution services are delivered using an efficient mix of providers

11. Distribution services are delivered using an efficient mix of network and non-network alternatives

12. Network users are confident that they are not subject to unfair connection and operation restrictions, and have a fair opportunity to challenge decisions

Actions – issues 8 to 12

Actions
8.1 Commerce Commission to monitor the application of the cost allocation and related parties rules and report regularly on performance
8.2 The Authority to monitor the operation of the equal access framework and report on the impact on competition and efficiency outcomes from distributors' involvement in contestable markets.
8.3 Authority to extend default distribution connection and use of system agreements for all types of network users. (see lines 3 and 4 above and matching recommendations)
8.4 The Authority and Commission will promote and publicise good and bad behaviour. For example cost allocation, related party transactions or connection requirements
8.5 The Authority and Commission will develop and apply principles for publication of decisions relating to investigations (including timeliness)
8.6 The Authority will provide a mechanism for parties to raise equal access concerns and the ability to escalate issues to a regulator. The mechanism will allow timely resolution of issues
8.7 The Authority and Commission will make greater use of reputation incentives (e.g. meet with distribution boards to the regulator when problems emerge)
8.9 Commission and distributors to provide for greater transparency and stakeholder involvement regarding investment decisions (see also action 7.2 above).
8.10 Authority and Commission to develop standards of conduct for DER participants with equal access principles with accountability and sanctions for non-compliance.

Recommendations – issues 8 to 12

Recommendations (Numbers flows across issues)

21. Electricity Authority and Commerce Commission to develop a joint work programme to investigate potential efficiency and competition implications from:
    1. DER being treated as regulated capital;
    2. risks from miss-allocation of costs and revenues;
    3. risks from favouring in-house, related parties or network solutions; and
    4. risks from restricting technologies and network users. This will include developing and costing options to mitigate any efficiency and competition harm identified. For example, this could include greater flexibility for the Commission and/or the Authority to amend cost allocation or apply corporate separation where proportionate.

22. The Authority and Commission to report annually on the performance of the equal access framework, and progress with implementing the actions required to achieve the desired outcomes.

23. The Authority and Commission to develop a dashboard showing measures of progress towards equal access , including complaints

24. The Commission to reinforce its expectations of the treatment of costs and revenues for regulated service under the Part 4 regime via an annual review of practices and penalties to those who break the rules

25. “The Commission to require distributor Directors to sign an annual declaration in respect of the distributors’ disclosures of the extent of their efforts to investigate the use of DER for network alternatives.”

Issue 13 – DER access to Transmission is treated differently from access to distribution network

Issue – Transmission
The point has been made repeatedly that DER has the potential to serve multiple users with different objectives. Coordination is especially required for access between the transmission operator and the distribution operator so they aren't at cross purposes when either calls on DER. If arrangements result in both trying to access the same DER across similar periods security and reliability on both transmission and distribution networks could be compromised.
Desired Outcomes – Efficiency and Competition
Contractual arrangement develop in way that reliability is not undermined by multiple conflicting calls on its use. This is a coordination problem between procurers of DER and is addressed in items 2, 4 and 5

Issue 13 – DER access to Transmission is treated differently from access to distribution network

Actions
13.1 Transpower and distributors will effectively share information and coordinate on network status/operation with the potential to affect the other. 13.2 Industry (including Transpower) to develop consistent contracting and pricing principles for DER that ensure that DER is allocated and used to the highest value need (addresses issues 2 and 4) 13.3 Authority to reinforce the message that cost reflective prices are an important step in the transformation to an efficient transactive network with widespread uptake and use of DER (i.e. they are not a nice-to-have feature of the workings of the market) 13.4 Participants (including Transpower) have a secure environment for experimentation to develop, test and implement delivery of products and services within contestable frameworks 13.5 Actions 8.1-8.10 above apply
Recommendations (Numbers flows across issues)
26. The Commission and Authority to note the merit of aligning equal access at network level with transmission, including a longer term vision for similar principles to apply for both transmission and network companies 27. The Authority to report publicly the results of Transpower's trial DR programme, including technical details of what worked and what didn't work.

Appendix 2: Electricity Authority Principles

The IPAG took into account:

- the regulatory strategy principles published by the Electricity Authority
- the Code amendment principles published by the Electricity Authority.

The solutions range in how quickly they can be implemented:

- What is possible under today's regulation/legislation; or
- What requires change in the code, the input methodologies or even the Acts

Regulatory strategy principles

The Electricity Authority published regulatory strategy principles:

- As far as possible, adopt regulatory arrangements that move the problem over time to a situation where the first-best solution can be adopted.
- Where possible, avoid ‘one size fits all’ approaches to regulation when regulating parties that may exit the regulated activity.
- Adopt regulatory approaches that, over time, reveal more about the true nature of the problem and the true constraints on regulatory intervention so that more effective regulation can be designed as the regulatory problem and regulatory constraints are better understood over time. The aim is to address the cause, not the symptom.
-
- As much as possible, avoid the slippery slope of ever more intrusive interventions arising from poorly designed regulatory interventions.
- Avoid regulatory interventions that are not likely to be credible when adverse events occur.
- Strive to achieve regulatory predictability because this is particularly important when regulating high capital investment industries such as electricity.
- These regulatory strategy principles are designed to complement the Authority’s overall approach to its role, which places an emphasis on a coherent holistic market design and competition and consumer choice to deliver efficient outcomes, supplemented by effective monitoring of market outcomes and wide dissemination of information

Code amendment principles

The Authority and its advisory groups will have regard to the following Code amendment principles:[1]

- Lawfulness
- Clearly Identified Efficiency Gain or Market or Regulatory Failure
- Quantitative Assessment
- Preference for Small-Scale ‘Trial and Error’ Options
- Preference for Greater Competition
- Preference for Market Solutions
- Preference for flexibility to allow innovation
- Preference for non-descriptive options
- Risk Reporting

[1] Electricity Authority, *Consultation Charter,* 20 December 2010