Session XI

Pre-reading for 23 June 2022 session

Shared 20 June 2022

Workplan on a page – progress at 23 June 2022

		Before times	May	June					July				August				
Stage	**Topic**		23/05	30/05	06/06	13/06	20/06	27/06	04/07	11/07	18/07	25/07	01/08	08/08	15/08	22/08	29/08
Discover	**DER owner perspective**		Review input														
	Sector perspective		Review input														
Define	**Services & technical requirements** – What can flexibility be used for?		Review input					Workshops	Workshops								
Develop	**Commercial arrangements**		**FF 9 on 26/05** Comms & connectivity Terms of trade		**FF10 on 09/06** Valuing & rewarding flexibility		**FF11 on 23/06** Product templates Connection	Workshops	Workshops	Workshops	**FF13 on 21/07** Review input Finalise output						
Develop	**Identify practical steps and actions** • flag barriers • specify research questions				**FF10** Scoping action plan & next steps				**FF12 on 07/07** Draft Action Plan		FF13 on 21/07 Barriers & next steps		FF14 Workshops Get feedback on Draft Action Plan		FF15 Finalise Action Plan & Delivery Programme		FF16 Launch
Deliver	**Begin delivery** • Initiate projects • Assess / respond to barriers • Support iteration of Action Plan																

We are here...

These timeframes and deliverables are presented on a best endeavours basis. The main uncertainty relates to the time required to seek and address feedback

Session overview – topics and decisions

Five items

1. Connection requirements
    a) Discussion of the interaction between the physical and contractual aspects of connection to, and use of, a distribution network
2. Scoping next steps
    a) Consider the FlexForum next steps
3. End-to-end ‘product’ description
    a) Provide feedback on the initial draft of an end-to-end description of the actions and information required to identify, obtain and deliver a response using flexibility
4. Workplan, engagement and communications
    a) Update on preparations for workshops
    b) Update of progress with workplan tasks
5. Administration – governance, budget and funding
    a) Update on administration, governance and budget

Connection requirements determine access to the network

Access to the distribution network by DER – and its ability to provide services – is determined by the physical and contractual parameters of connection to, and use of, the distribution network

- For distribution networks, physical limits for each type of connection are specified in each distributor's Connection Standard (policy), which can also include regulated terms, eg, from Part 6 of the Code and electrical safety legislation.
- The technical requirements are translated into contractual requirements via the Distributor agreement (between the distributor and retailer) and Customer contract (between the retailer and customer).

Physical (typical residential connection)	**Contractual**
Import 15kVA	Customer access to the network to use electricity is largely unrestricted within the 15kVA limit • Distributors typically note that the distribution service can be disrupted for maintenance, in emergencies, or by agreement • Aurora more explicitly notes 'the assessed capacities of connections do not represent a guaranteed service level. There may be instances, especially during periods of high network loading, where the full assessed capacity is not available.' Practically speaking this is equivalent to the common qualification that service can be disrupted • 'Controlled' pricing has historically been a tool for managing wider network conditions through requesting a customer to flex their hot water load in return for a reward (ie, a price discount)
Export <10kW	Customer access to the network to produce (export) electricity is regulated under the Code • Up to 10kW – 10-30 day approval process subject to inverter type. Technical/network impact assessments only required if there is export congestion • More than 10kW – process includes technical & network impact assessments

Connection requirements: a function of network design & operation

Connection requirements are a function of network design and after diversity maximum demand (ADMD)

- ADMD is an estimate of the simultaneous maximum demand of a connection type, eg, households, calculated based on the typical daily profile of that group of customers (eg, consumers will not run all appliances at the same time within their home so after diversity maximum demand is not an aggregate of the maximum demand of all appliances. A large aggregation of homes will not all experience their maximum demand at the same time)
- ADMD figures used in Aotearoa range from 2.5kVA to 5kVA for each connection. The ADMD is less than the physical capacity of each connection due to diversity – the ADMD assumption means network infrastructure is right-sized to reflect expected worst case use not possible use
  - the full physical capacity of each connection is rarely used
  - peak network use of individual connections is rarely simultaneous

What happens when there is a structural mis-match between supply of and demand for network capacity? Three complementary options

- **upgrade the network to supply more capacity** – this means building 'more' network. Do ADMD estimates need to change (increase) given electrification of transport, heating and commercial activities are expected to result in a significant increase in demand for capacity on low voltage networks?
- **optimise the use of available capacity** – this means 'orchestrating' network use by using flexibility to optimise supply of and demand for network capacity
- **impose static or dynamic limits on access to the network** – this means using connection requirements to apply physical or contractual limits on import and/or export of electricity by a customer

How do existing network planning decision criteria and processes choose between upgrading, optimising and applying access limits?

- What information is, or should be, available to customers making connection-related investment decisions regarding the short-and long-term implications for them of the options?

Connection requirements: calculating and applying limits on network access (1)

Calculating access limits – a choice between static (set-and-forget) or dynamic (varying based on conditions)

Static limits – current practice for allocating capacity for most connections

- there is not a direct link between physical parameters (ie, ADMD) and contractual parameters
- most connections are supplied capacity based on static import and export limits, eg, household connections have a 15kVA import limit (though it is assumed this limit will rarely be reached) and a <10kW/phase export limit
- International studies indicate the averaging approach inherent in static limits results in lots of spare capacity most of the time, eg, network constraints for 5-10% of the network, 5-10% of the time, due to export-related congestion

Dynamic limits – a more sophisticated allocation of available network capacity

- Dynamic approaches will more closely link the physical parameters which underpin network operation and planning and contractual parameters
- dynamic operating envelopes (DOE) are a method for varying import and export limits for a connection over time and location based on the available capacity of the network or power system (this is the definition developed in Australia)
  - DOEs are about maximising access to available network capacity. However, they could easily be perceived as withdrawing access, particularly if DOEs are perceived as an effort to limit import capacity below 15kVA or prevent the installation of EV chargers
  - DOEs are being implemented to maximise export limits. More work is required to determine how to apply DOEs for imports
  - operational visibility of the LV network is needed, ie, supply/demand of capacity at the feeder level
  - See paper on Connection requirements for more detail
- AS/NZS4777.2:2020 inverter default anti-islanding settings can be used to automatically cease PV export – constraining network access – when network voltage is outside specified limits
  - there are currently no export-related quality of service measures or reporting on customer impacts of existing voltage limits and voltage tapping of transformers

Connection requirements: calculating and applying limits on network access (2)

Applying access limits – offering consumers varying levels of access requires contractual and practical mechanisms

- **Contractual** – customers will need the ability to agree to a varying level of access or choose a viable alternative. A dynamic connection agreement is just a contract offering varying levels of access to the network
  - choices will need to be real and offer the customer 'something'. SAPN is offering households in designated areas a fixed export limit of 1.5kW/phase or a flexible export limit of 1.5kW to 10kW/phase
  - the limits will need to be set using a reasonable and efficient approach. The flexible export limit offered by SAPN is set by calculating a DOE, which in turn is a network operation and planning tool
  - implementation will need to manage customer expectations around changes to existing levels of access (most households have a 15kVA connection)
- **Pricing** – the distribution pricing principles (a)(iii) expect pricing to 'reflect differences in network service provided'. Dynamic connection agreements will need accompanying price structures which reflect the varying levels of access relative to standard connection agreements
  - upfront capital costs for customer and network infrastructure
  - ongoing operating expenses, including ongoing network charges (a key part of operating expenses)
- **Practical** – offering varying levels of access to network capacity will require the distributor and customer to have extra capability
  - the distributor will need to calculate and allocate the available network capacity (ie, calculate DOEs), requiring data capture, communication and processing capability
  - the distributor and customer will need to send/receive instructions to vary access and report 'compliance' with the instructions
  - the customer will need to respond to instructions and vary their import/export

Connection requirements: so what?

Connection requirements affect access to the network by DER and use of flexibility

1. What are the implications of connection requirements and network access for investments in customer infrastructure and network infrastructure, and the associated operating limits?
2. What are the implications for upfront capital costs of customer and network infrastructure, ongoing operating expenses, including ongoing network charges?
3. What happens when there is a structural mis-match between supply of and demand for network capacity?
4. How do network planning decision criteria and processes choose between upgrading, optimising and applying access limits?
5. What information is, or should be, available to customers making connection-related investment decisions regarding the short-and long-term implications for them of the options?
6. What do you think about the distinction made between calculating and applying physical limits?
7. What do you think about the requirements for offering customers varying levels of network access?
8. What is settled? What needs more thought and practical research?

Initial end-to-end flexibility product and process description

The initial end-to-end flexibility product and process description sets out the information and actions required to identify, obtain and deliver a response using flexibility. See attached paper (#4)

1. Do you think the four-stage process is a useful structure?
2. Thinking about your use case(s), how relevant is each of the information / action steps?
    a) Price optimisation use cases
    b) Generation capacity adequacy use cases
    c) Corrective congestion management use cases
    d) Predictive congestion management use cases
    e) Ancillary services & power quality use cases
3. Are there any major information / actions steps missing?
4. How can we fill in the blanks to provide a specific answer for each information / action step for the applicable use cases?
    a) How can the action be taken?
    b) How can the information be created and provided?

Five main services and three types of response to network, system & market conditions

Peak shifting to obtain…
- Portfolio optimisation
- Predictive congestion management
- Generation capacity adequacy

Demand adjustment to obtain…
- Portfolio optimisation
- Corrective congestion management
- Generation capacity adequacy
- Balancing

Generation adjustment to obtain…
- Portfolio optimisation
- Corrective congestion management
- Balancing

Characteristics of service
- Shift load
- Shed load
- Shimmy load (up or down) over short timescales
- Shape load (up or down) routinely over long timescales

Planning & operational criteria of service
- Detection & location
- Procurement & deployment timeframe
- Lifespan
- Speed & duration of response

Technical (topic B)

Exchange (procurement) mechanism
- Price flexibility (indirect)
- Contracted flexibility (direct via buyer or platform)

Services used to respond to a need
- standard specification (ie, the technical characteristics and criteria)

Counterparties
- who are the contracting parties
- who operates the exchange mechanism

Payment & compensation
- How is value calculated
- How is value signposted

Workplan topic D

Terms of trade
- Conditions on participation, eg registration
- Liability & non-performance
- Option to deliver

Commercial (topic C and D)

Communication & connectivity
- Sending & receiving instructions requesting delivery (type & timing)
- Performance & measurement of delivery

Coordination
- Tx & D interface
- Wholesale market

Operational (topic C)

Investment information
- Planning information. Actual or forecast demand for a need & response
- Connection requirements + DOEs
- Signalling information. Timing and location of need & response

Planning (Topic D)

Customer proposition
- Factors enabling or blocking creation of attractive and effective propositions for transacting flexibility

Implementation (topic E)

- Key underway
- Tasks being completed by FF or others

Key tasks, actions and timelines - update

Task	Activity	Responsible	Progress
1. Valuing & rewarding flexibility	Identify: • How much is the buyer prepared to pay the provider? • How does the provider get paid for the service they are providing?	• Network perspective: Evie, Scott, James • Market perspective: Buddhika, Fiona, Jason, John	• DG, market & network perspectives shared 9 June • A collated view needs to be developed
2. Contracting arrangements	Identify: • Headline terms • Terms which materially impact transacting flexibility	Secretariat	Initial draft available 24 June for review by James, Fiona, Scott
3. Communication, measurement & validation	• Information / data exchanged when sending/receiving instructions • Measurement and validation methods	Terry, Matt, Quintin & Mike	Workshops being scheduled
4. Product templates	Develop and refine templates for each service	Secretariat, Evie, Buddhika	Initial end-to-end description discussed at session XI
5. Connection requirements	Describe interaction between physical and contractual aspects	Secretariat coordinating input from Shay, Glenn, Evie, Scott, Eric	Initial draft discussed at session XI
6. Pre-procurement information – planning & operational information	• Refine planning & operational information (tables 1 & 3 of first paper) • Closely related to task 4	Secretariat, Evie, Buddhika.	Workshops scheduled to test terminology and descriptions

Engagement – interaction since the previous session

Who	What
EECA	EECA will send an observer starting the 7 July session.
Commerce Commission	Commerce Commission will send an observer participate in FlexForum sessions
Simply Energy	Secretariat spoke with James Carberry & Luke Cartmell-Gollan. Simply is prepared to participate in the FlexForum process, initially by sharing perspectives on outputs
SEANZ	SEANZ has offered for the FlexForum: 1. To host a workshop on 25 August as part of its professional development day 2. To give a brief presentation on 26 August as part of its conference day
Stakeholder conversations / workshops	2 sessions on 5 & 6 June with community / flexibility providers:
IPAG	Presentation to the IPAG on 23 June

Inform the secretariat if you had a substantive FlexForum-related discussion it would be useful for other members to know about

Administration – governance, budget & funding

- Update