National Connection Guidelines - Framework and Principles

1 June 2018

Energy Networks Australia

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Background

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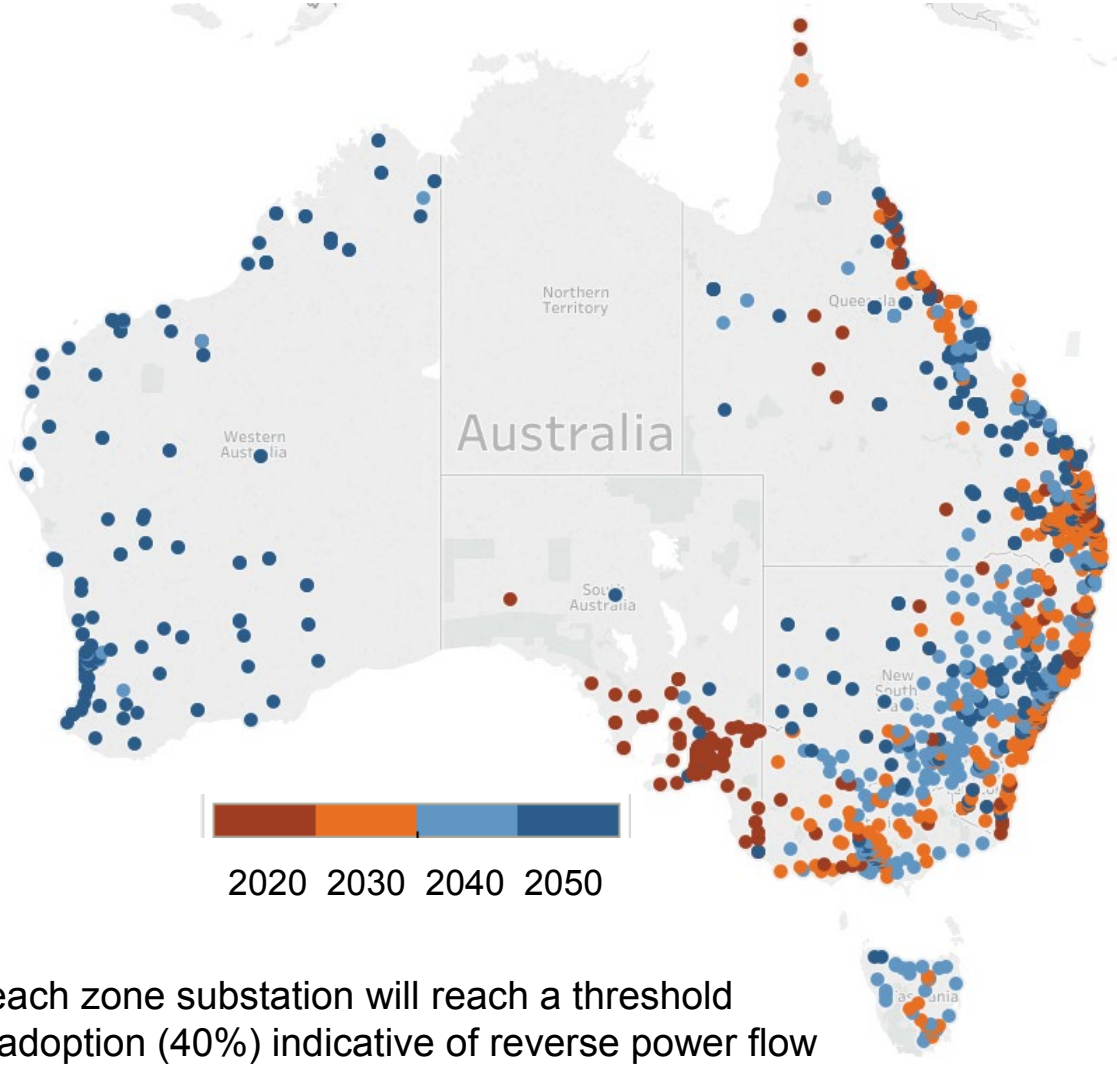
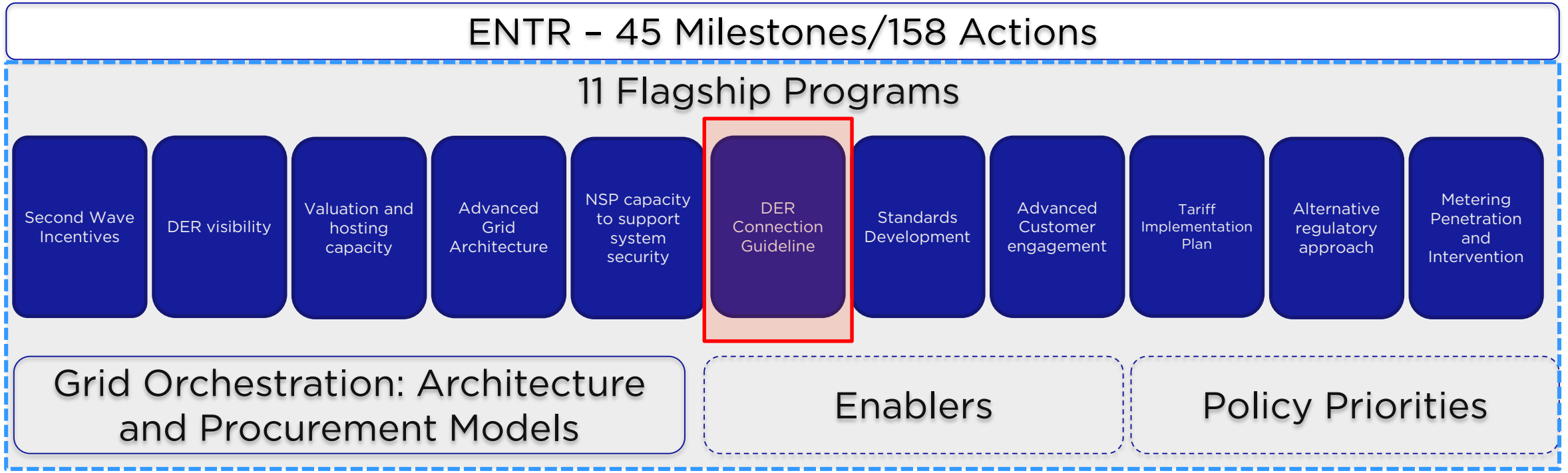
Significant new Operational Capabilities required

- Grid design and operation
- Distribution Interface with AEMO
  - Visibility of DER
  - DER ancillary services
- Forecasting energy and demand
- Increased data transparency to animate markets
- Cyber Security
- Consistent Connection requirements



Projected decade in which each zone substation will reach a threshold penetration of rooftop solar adoption (40%) indicative of reverse power flow

Transformation Roadmap - Implementation



In September 2017, The Energy networks Australia Board approved the 11 Flagship Projects including their resourcing, including the development of a set of *National DER Connection Guidelines.*

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What are the National DER Network Connection guidelines?

- National DER Connection Guidelines set out the framework, principles, approach and technical settings for Australian Network Service Providers to adopt in the development and application of their technical requirements for grid connection of DER.

- The aim of the guidelines is to facilitate the efficient integration of DER into the grid from the perspective of both network, renewable energy proponents and Australia's electricity system more generally.

- The guidelines are a voluntary industry code, with all Australian network service providers communicating an intention to adopt the requirements of the guidelines.

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Objectives

- Give rise to ***clear*** and ***complete*** technical requirements for grid connection for each Australian DNSP
- Provide for a level of ***consistency*** between Australian DNSPs' technical requirements for grid connection in terms of both structure of presentation and the requirements themselves
- Ensure that DNSPs' technical requirements are consistent with the National Electricity Objective. That is, that the technical requirements give regard to the long-term interest of consumers by appropriately ***balancing the economic benefits, costs and risks*** that the requirements impose upon the network, proponents, and Australia's electricity system more generally.

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Scope

Types of connection:

» Applies to a grid connection of any generating unit to an Australian distribution network

Technology:

» Does not include registered generators (>5MW in NEM, >10MW in WEM)

» Includes small registered generators and registered small aggregation generators

» Includes both exporting and non-exporting units

» Includes all technology with potential to generate electricity (including battery storage)

» Does not include demand response (except where also able to generate electricity)

Requirements:

» Technical requirements

» Process requirements (only existing legislative requirements)

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Who do the guidelines apply to?

Stakeholder Type	Directly applies?	How guidelines should be used
Distribution Network Service Providers	✓	To directly adopt in the development and application of their technical requirements for grid connection of DER
Transmission Network Service Providers	**Unlikely**	To consider (principles) in developing technical requirements for grid connection
Proponents	✗	To navigate and understand the technical requirements for connection to Australian networks
AER	✗	To assist in determining whether the technical requirements as proposed by DNSPs (in model standing offers) are fair and reasonable
Other stakeholders	✗	To navigate and understand the technical requirements for connection to Australian networks

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Documents

Framework and Principles Guideline

Specifies the number, scope and structure of the subsequent technical guidelines

Basic Connection Technical Guidelines

Specifies the technical requirements and/or technical outcomes to be achieved for basic connections (<30kVA microEG connections)

Low Voltage Connection Technical Guidelines

Specifies the technical requirements and/or technical outcomes to be achieved for all other connections to a low voltage network

Medium Voltage Connection Technical Guidelines

Specifies the technical requirements and/or technical outcomes to be achieved for connections to a medium voltage network

High Voltage Connection Technical Guidelines

Specifies the technical requirements and/or technical outcomes to be achieved for connections to a high voltage network

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Framework and Principles Guideline

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Process

- Webinar to all stakeholders to develop project awareness and hear key priorities/concerns
- Survey of key stakeholders to identify preferences
  - Technical survey (21 NSPs)
  - Non-technical survey (key stakeholders)
- Presentation of survey results and proposed straw man to Steering Committee (CEC, AER, AEMC, AEMO, NSPs)
- Drafting of guideline (CutlerMerz/Energy Networks Australia)
- Review of guideline by Steering Committee
- Launch webinar

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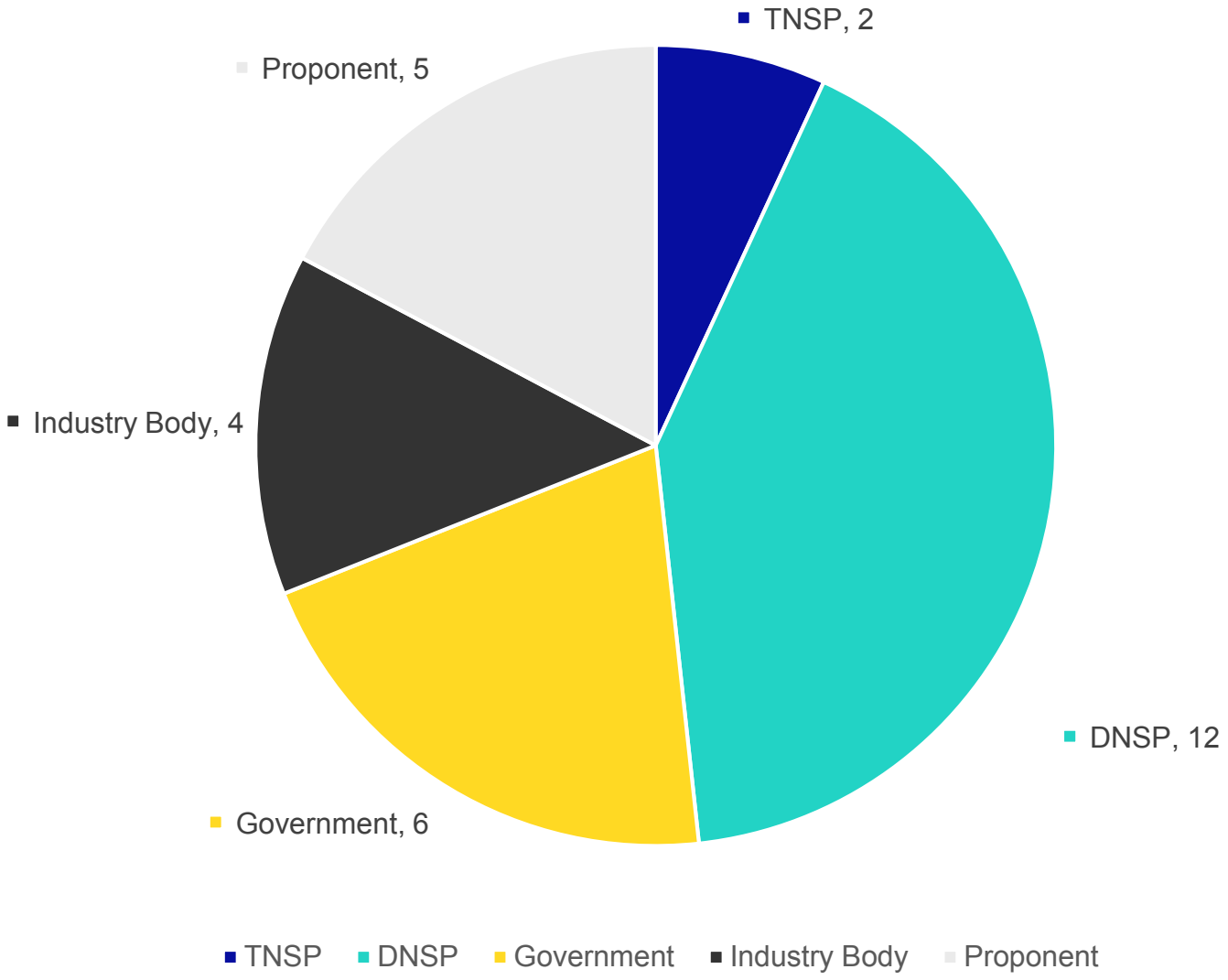
Survey respondents



TNSP

- ElectraNet
- AusNet

DNSP

- 12

Government

- Consumer, Building and Occupational Services, DoJ Tasmania
- QLD Department of Natural Resources, Mines & Energy
- Cth Department of Environment & Energy
- NT Department of Treasury and Finance
- WA Public Utilities Office
- Tasmanian Department of State Growth

Industry Body

- Australian Energy Market Operator
- Australian Energy Market Commission
- Australian Energy Regulator
- Energy Consumers Australia

Proponent

- Aurecon
- CECEP
- Clean Technology Partners
- Edify energy
- ENEL Green Power

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Key Survey Results

- Stakeholders overwhelmingly supported the Framework and Principles guidelines:
  - Guiding NSPs in how to produce technical requirements and educating proponents as to what to expect from NSPs
  - Providing definitions of connection types beyond those already prescribed by existing regulations
  - Providing process requirements (but only as consistent with existing regulations)
- Stakeholders had mixed views with respect to:
  - Whether the guidelines should be structured in terms of connection voltage, capacity of systems (size thresholds) and/or technology type
  - Whether there should be a separate guideline for battery storage
  - Whether and how the guideline should address NSPs queuing policies

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Connection Types

Connection Type	Connection voltage	Technology Type	Capacity
Basic micro EG connection	Typically 230V	Micro EG (inverter based and compliant with AS4777)	Less than 30kVA three phase Less than 10kVA single phase[7]
Low voltage connection	Up to 1kV	Inverter based	Greater than 30kVA three phase (up to a maximum capacity able to be accommodated on the low voltage network as specified by each DNSP) Greater than 10kVA single phase[7] (up to a maximum capacity able to be accommodated on the low voltage network as specified by each DNSP)
		Non-inverter based	Any size (up to a maximum capacity able to be accommodated on the low voltage network as specified by each DNSP)
Medium voltage connection	Between 1kV and 35kV	Any	Any size (up to a maximum capacity able to be accommodated on the medium voltage network as specified by each DNSP)
High voltage connection	Greater than 35kV	Any	Less than 5MW for NEM and less than 10MW for WEM
Registered generator connection	Greater than 35kV	Any	Greater than 5MW for NEM and greater than 10MW for WEM

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Standard vs negotiated connections

- Standard connections are automatically accepted by NSPs where:
  - The connection meets prescribed standard technical requirements AND
  - The proponent accepts the (fair and reasonable) terms of the Model Standing Offer.
- Where NSPs provide standard connection type(s), they must also have an AER approved Standard Standing Model Offer in place. The approval process requires the AER to assess whether the technical requirements are fair and reasonable and consistent with National Electricity Objective.
- Most NSPs do not currently offer standard connection offers and all connections (except basic) using the negotiated connections process
- Standard connections give NSPs an opportunity to specify sub-types of connections for which connections can be expedited/automated (e.g. low voltage connections of <200kVA AS4777 compliant IES)
- Standard connection sub-types will be identified during the development of the technical guidelines

Technical requirements

- Framework and principles guideline sets out structure for technical requirements (does not specify actual requirements) including
- Technical requirements are either:
  - Standard technical requirements – automatically accepted by NSPs
  - Negotiated technical requirements – accepted subject to the characteristics of the proposed connection and the characteristics of the network at the location of the proposed connection point.
- Expressed either in terms of specific technical settings and/or the network outcomes to be achieved.
- Where the settings are expressed as outcomes, the NSP may require the proponent to demonstrate, through technical studies, and validate via testing and commissioning, that the outcome has been achieved.

Queuing policy

- Provides clarity on how NSPs treat multiple applications at the same location which in aggregate exceed network capacity and/or other technical or physical limitations
- Open access regime does not allow NSP to establish any right to capacity (i.e. a place in a queue does not give a right)
- Queuing policy requires NSPs to provide information to proponents as to:
  - any limitations at the proposed connection point
  - options for proponents to overcome limitations

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How do NSPs comply with the guidelines?

- Whilst these guidelines are a voluntary industry code, the expectation is that NSPs shall comply with this guideline by:
  - Structuring their technical requirements consistent with the framework and principles set out
  - Directly adopt the requirements set out in the subsequent technical guidelines as relevant.
  - Update their own guidelines to align with the National Guidelines as soon as practicable. This also applies to future updates.
- Where DNSPs choose to adopt an alternative setting, structure or approach, they shall still be deemed to comply so long as the alternative setting is justified within their own technical guidelines.
- Justification shall include how the alternative setting either responds to jurisdictional requirements and/or how the alternative settings promote improved benefits to Australia's electricity system (in terms of both network and proponent benefits, risks and costs).

Document management

Review

- Initial review after 6 months
- Regular reviews:
  - Every second year
  - Or where a legal trigger is identified
  - Or where a technology trigger is identified
- Review undertaken by Energy Networks Australia and identifies potential amendments which
  - Better achieve the objectives as set out in Section 1.1 of this document
  - Respond to any legal or technology triggers identified
- Potential amendments issued to key stakeholders for comment
- Final amendments published on Energy Networks Australia Website

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Document management (cont.)

Evaluation

- Independent evaluation undertaken by third party every second year to identify:
  - Extent of NSP compliance
  - Proponents' views on the technical requirements (clarity, consistency, avoiding unnecessarily onerous requirements)
  - Any legal triggers
  - Any technology triggers
- High level findings published on Energy Networks Australia website
- Informs review

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Key Challenges

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Key challenges

Issue		Considerations	Final decision	How will we review?
1	Connections types defined by technology size or voltage?	Mixed views in survey Some NSPs already use voltage type (and business units structured around voltage type) Lack of agreement around size thresholds	Voltage level as the main connection type Max thresholds by connection type to be nominated by NSPs	To revisit in initial review after development of technical guidelines
2	Use of a medium voltage connection type	Preferred by most NSPs No standard definition for MV Likely to be repetitive Potential for NSPs to exclude MV connection type if not relevant	MV connection included to respond to stakeholder preferences Definition of MV included in framework and principles guideline based on stakeholder feedback	To revisit in initial review after development of technical guidelines
3	Inclusion of technical requirements for Registered Generator Connections	Proponents clearly perceive as an issue Covered by NER Undergoing significant review/change via the Generator technical performance standards rule change	Excluded (in terms of technical requirements for now)	To revisit in initial review or after Rule change (legal trigger)

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Key challenges (cont.)

Issue		Considerations	Final decision	How will we review?
4	Single phase threshold for basic micro EG connection	Desire to move all NSPs to best practice Risks of phase imbalance in low load density networks Range of existing single phase thresholds	10kVA set as best practice Option to reduce to 5kVA, but must be clear where this applies Option to apply alternative setting where it can be justified	Review after first evaluation, if NSPs cannot comply, alternative setting may be considered
5	Differences between WA SWIS/WEM and NEM	Stakeholders view that needs to be complementary to existing regulation Differences in processes and requirements WEM/NEM	Largely NEM based, but WA DNSPs agree can apply with structure and requirements	To revisit in initial review to identify WA compliance issues
6	Queuing policy	Consistency with open access regime Practical considerations for NSPs Need for Rule Change to accommodate any capacity reservation policy	Included, but states very clearly, the intention is not to reserve capacity	Review after first evaluation, if NSPs cannot comply, need for Rule change may be considered

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Next Steps

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Next Steps

- First technical guidelines (to be determined but likely low voltage connection)
  - Survey (June 2018)
  - Steering Committee meeting (July 2018)
  - Drafting (July to August 2018)
  - Stakeholder consultation (September 2018)
  - Launch (October 2018)

- Initial review (December 2018)

- All Technical Guidelines are scheduled to be completed and published by March 2019

Questions?

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Disclaimer

The material in this document has been prepared by CutlerMerz.

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