Electricity Engineers' Association

# REVIEW OF DISTRIBUTOR CONNECTION TECHNICAL STANDARDS

## Findings and recommendations for Aotearoa New Zealand

**PREPARED BY THE ELECTRICITY ENGINEERS' ASSOCIATION OF NEW ZEALAND (EEA)**

SEPTEMBER 2025

**ACKNOWLEDGEMENT**

The Electricity Engineers' Association (EEA) gratefully acknowledges the support of the Electricity Authority, who commissioned this work under the Streamlining Connections Work Programme. Their collaboration and guidance have been invaluable in enabling this high-level review and in supporting efforts to drive greater consistency, clarity, and efficiency in DER connection processes across the sector.

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This report is intended to provide sector-wide insights from a high-level review of publicly available COPS (Connection and Operation Standards), Network Connection Standards (NCS), and related distributed energy resource (DER) connection information published by electricity distribution businesses in New Zealand. It provides general information only and is not a substitute for specialist engineering or legal advice.

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Examples, case studies, and figures are included solely to aid understanding. They are not exhaustive, do not constitute standards or prescriptive guidance, and should not be relied on as a complete statement of the steps required to meet statutory obligations. Readers must verify requirements with the relevant distributor's current published materials and applicable standards.

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# EXECUTIVE SUMMARY

**This report presents the findings of a high-level review of publicly available Connection and Operation Standards (COPS) and Network Connection Standards (NCS) issued by New Zealand's electricity distribution businesses (distributors). The review assessed how these technical standards support the integration of distributed energy resources (DER), including solar PV, batteries, diesel generation, and electric vehicle (EV) charging, into distribution networks.**

As DER uptake accelerates, consistency, clarity, and currency of connection information are critical for safe, efficient, and customer-friendly integration. The review found strong intent by distributors to support DER but identified significant variability in structure, terminology, and technical content, which creates friction for installers and consumers and limits opportunities for automation and efficiency.

These findings highlight the importance of industry-led coordination, supported by light-touch regulatory oversight, to deliver a streamlined, standardised approach that improves outcomes for all stakeholders. Key recommendations include:

- Developing national templates and standardised terminology
- Aligning standards referencing and improving document maintenance
- Integrating training and support for installers; and
- Establishing performance indicators to track adoption and effectiveness.

This proactive, collaborative approach reduces duplication, builds public confidence, and positions the sector to adapt to evolving technologies without the need for prescriptive regulation. These recommendations will be progressed through the joint EA/ENA/EEA Streamlining Connections programme.

**KEY TERMS USED IN THIS REPORT**

| | |
|---|---|
| **AS/NZS** | Joint Australian/New Zealand Standard |
| **BESS** | Battery Energy Storage System |
| **COPS** | Connection and Operation Standards |
| **DER** | Distributed Energy Resources |
| **DG** | Distributed generation |
| **EA** | Electricity Authority |
| **EDB(s)** | Electricity Distribution Business(es) |
| **ENA** | Electricity Networks Aotearoa |
| **ESRs** | Electricity (Safety) Regulations |
| **EV** | Electric Vehicles |
| **HEMS** | Home Energy Management System |
| **NCS** | Network Connection Standards; |
| **PAS** | Publicly Available Specification |
| **PV** | Photo Voltaic |
| **SEANZ** | Sustainable Energy Association of New Zealand |
| **the Code** | Electricity Industry Participation Code 2010 |

# 1. PURPOSE

**This report provides a high-level review of publicly available Connection and Operation Standards (COPS) and Network Connection Standards (NCS) published by New Zealand electricity distribution businesses (EDBs).**

It assesses how current materials support safe, efficient integration of distributed energy resources (DER) and identifies opportunities to improve consistency, clarity, and currency across the sector. The findings inform practical recommendations and next steps to be progressed through the EA/ENA/EEA Streamlining Connections programme.

This work was commissioned by the Electricity Authority under the Streamlining Connections programme as part of its Network Connections project.

While compliance with regulatory requirements is essential, good guidance goes beyond mere compliance. It supports better decision-making, enables smoother and faster processes, and builds confidence among users. In the context of DER, this means providing clear, accessible, and accurate information that empowers installers and customers to engage effectively with their local distribution network.

Inconsistent or outdated technical documentation across distributors not only risks confusion and inefficiency but also undermines public trust in the electricity system's ability to support new technology. By contrast, consistent, user-focused guidance enables faster, safer, and more equitable access to the benefits of distributed energy resources (DER)[1].

In this report, COPS set out the technical and procedural requirements for connecting and operating equipment on a distribution network (e.g., voltage bands, protection, power quality, inverter settings). NCS typically cover the broader design and construction requirements for new or altered connections (e.g., design approvals, metering cabinets, service mains, inspections). Clear, consistent standards reduce design rework and installer errors, and improve safety and customer experience.

Developing national guidelines and templates will help reduce duplication of effort across distributors, provide a foundation for consistent quality of DER installation connection, better installer training, and enable clearer communication with users. This work positions the industry to respond proactively to the increasing demand for connection services and to support innovation while maintaining system safety and resilience.

## CODE REQUIREMENTS FOR CONNECTION AND OPERATION STANDARDS (COPS) AND NETWORK CONNECTION STANDARDS (NCS)?

As outlined in Part 1 of the Electricity Industry Participation Code 2010 (the Code), all electricity distributors are required to develop and maintain COPS and NCS.

COPS and NCS serve complementary but distinct purposes:

- **COPS (Connection and Operation Standards) –** Promulgated under Part 6 of the Code, these standards specify the technical and operational requirements for distributed generation (DG) and, following the recent amendments to Part 6, from late 2026, will also cover new load connections. They ensure consistent technical performance, safety, and interoperability of assets connected to the network.
- **NCS (Network Connection Standards) –** Historically promulgated under the Default Distribution Agreement (DDA), NCS documents set out the standard terms and conditions for connecting to the distribution network. They define commercial and process-related elements, such as application procedures, timelines, and basic technical requirements that complement the more detailed technical provisions in the COPS.

Under the Code, distributors must publish both their COPS and NCS documents on their public websites, ensuring they are accessible to customers, developers, and installers. These standards establish the default requirements for the majority of connections, and promote consistency and transparency across the sector.

Distributors may also apply bespoke connection conditions for complex or unique projects, for example, high-capacity distributed generation, industrial facilities, or innovative technology pilots. These project-specific conditions are outside the scope of this report, which focuses solely on the standard, published requirements applicable to most connections. For a concise overview of the typical structure and contents of electricity connection COPS, see Appendix A: Typical Scope of COPS.

1 **Distributed Energy Resources (DER)** – including Consumer Energy Resources (CER) when owned or controlled by consumers – are electricity generation, storage, or flexible demand assets connected at the distribution level of the electricity system. They range from small-scale CER, such as rooftop solar, home batteries, electric vehicles, and smart appliances, to larger DER, including commercial solar arrays, community batteries, and solar farms or other generation plants connected to medium-voltage (MV) distribution networks. These resources can operate individually or in aggregated "virtual power plants," providing flexibility, supporting grid reliability, and delivering value to both consumers and the wider electricity system.

# 2. INTRODUCTION

**The rapid uptake of distributed energy resources (DER) such as rooftop solar, battery storage, electric vehicles (EVs), and smart inverters is transforming the way electricity is generated, distributed, and consumed in Aotearoa New Zealand.**

This transformation presents both opportunities and challenges for Electricity Distribution Businesses (distributors), who are at the forefront of enabling safe, reliable, and cost-effective integration of DER into the local electricity network.

To support this transition, clear, consistent, and up-to-date technical documentation is essential. COPS and NCS, collectively known as "technical standards", are critical resources that guide installers, customers, and internal teams on how to connect DER safely and effectively. Inconsistent or outdated guidance can lead to confusion, unnecessary delays, and potentially unsafe outcomes. As such, alignment of these documents across the sector is key to improving efficiency, safety, reducing cost, and enhancing customer and installer confidence.

In this context, the Electricity Authority (EA) requested the Electricity Engineers' Association (EEA) to undertake a high level scan of publicly available DER-related information published by the 29 distributors across New Zealand. The objective of this review was to:

- Assess the accessibility, currency, and consistency of DER-related connection guidance.
- Identify gaps, inconsistencies, and areas for improvement.
- Provide recommendations to support a more standardised national approach to DER integration.

This work is also designed to support the broader joint EA/ENA/EEA Streamlining Connections Programme, which aims to improve the efficiency, consistency, and quality of new connections across the electricity system.

The findings of this review offer an important snapshot of current practice and highlight meaningful opportunities to improve the DER connection experience. They provide the basis for a collective industry response that can:

1. Reduce duplication and streamline compliance requirements.
2. Build a consistent foundation for emerging technologies.
3. Improve safety, transparency and confidence for installers and consumers.
4. Support effective system planning, monitoring, and oversight.

These findings directly inform the recommendations in this report, which are intended to build on existing good practice and enable a more unified, future-ready approach to DER connection and integration.

# 3. SCOPE AND METHODOLOGY

**This review focused on publicly available DER connection and technical documentation published on the websites of New Zealand's 29 Electricity Distribution Businesses (distributors) that relate to the safe and effective connection of distributed energy resources.**

The methodology consisted of the following key steps:

1. **Document Collection:** Systematic search and retrieval of DER-related documents, web pages, guidelines, and forms from distributor websites, with a focus on materials relevant to solar, batteries, diesel generation, EV charging, smart inverters, and associated installation requirements.
2. **Content Review and Tabulation:** Each distributor's documents were assessed and catalogued against a consistent analysis framework. This included evaluating the presence, structure, and clarity of information related to:
   - Connection application processes (e.g., by capacity band)
   - Use of standard terminology (e.g., ENA glossary)
   - Voltage and power quality requirements
   - Capacity and congestion transparency
   - DER technologies referenced (e.g., solar, battery, EVs)
   - Referenced standards and regulations (e.g., AS/NZS 4777, 3000)
   - Smart inverter approval lists
   - Review dates and currency of documents
3. **Comparative Analysis:** Findings were synthesized to identify patterns of consistency and divergence across distributors. Common gaps and outdated practices were noted, as well as examples of well-structured and up-to-date information.
4. **Scoring and Visualisation:** A supplementary spreadsheet was developed to capture and score distributor responses across key fields. This dataset supports visual comparisons and highlights areas for improvement.
5. **Peer Review and Validation:** The summary of findings was internally reviewed and cross-checked to ensure completeness and accuracy.

This approach was designed to enable a robust, comparative baseline across all distributors, and to support practical recommendations that reflect both current practice and future needs.

# 4. KEY FINDINGS

## The following insights emerged from the analysis of the COPS and distributed generation (DG) connection materials:

### 1. INCONSISTENT STRUCTURE AND CLARITY OF PUBLISHED INFORMATION

Almost all distributors have DER connection information online, but the structure and presentation vary significantly.

» *Example (anonymised):* One distributor publishes a single, consolidated COPS document with a contents page and version control; another splits requirements across multiple web pages and PDFs with inconsistent update dates, making it difficult for installers to find the right information.

Appendix A of this report provides a typical scope of the content of a COPS.

### 2. CAPACITY BAND PROCESSES LACK CLEAR EXPLANATION

Connection processes are commonly split by system capacity (e.g., <10 kW, 10–100 kW, >100 kW), but the guidance and process steps are not always clear.

» *Example (anonymised):* One distributor provides a clear process map and checklists for each band, while another only lists high-level thresholds without indicating documentation or study requirements, causing confusion during applications.

### 3. SMART INVERTER SETTINGS NOT CONSISTENTLY CONTROLLED OR VERSIONED

Most distributors reference smart inverter requirements, often leveraging the Clean Energy Council (CEC) listing from Australia, but few documents include date stamps or version control.

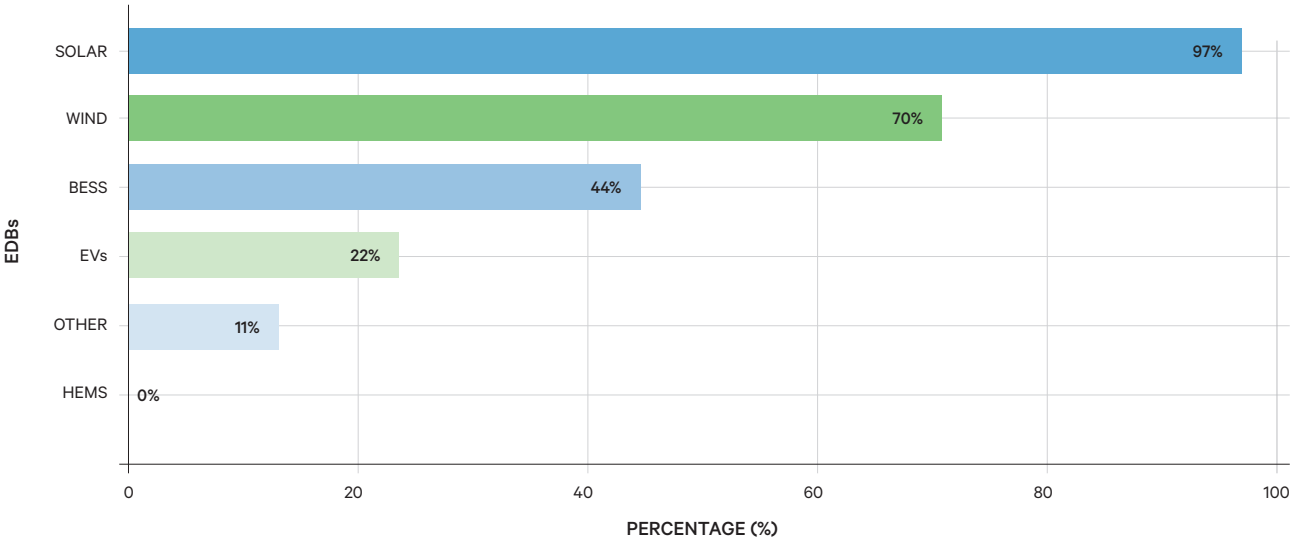
» *Example (anonymised):* One network maintains a one-page, dated settings table that installers can quickly reference, while another requires navigating three different documents, increasing the risk of incorrect configuration at scale.

### 4. LIMITED COVERAGE OF EMERGING DER TECHNOLOGIES

Guidance for solar PV is well developed, but there is little coverage of battery storage, diesel backup generation, EV charging, or Home Energy Management Systems (HEMS).

» *Example (anonymised):* One distributor provides clear application and commissioning guides for residential batteries, while several others offer no documentation beyond basic inverter requirements, leaving installers uncertain about approval criteria.

**FIGURE 1:** PERCENTAGE (%) OF DISTRIBUTORS WITH WEBSITE INFORMATION ON DER




BESS = Battery Energy Storage System
HEMS = Home Energy Management System

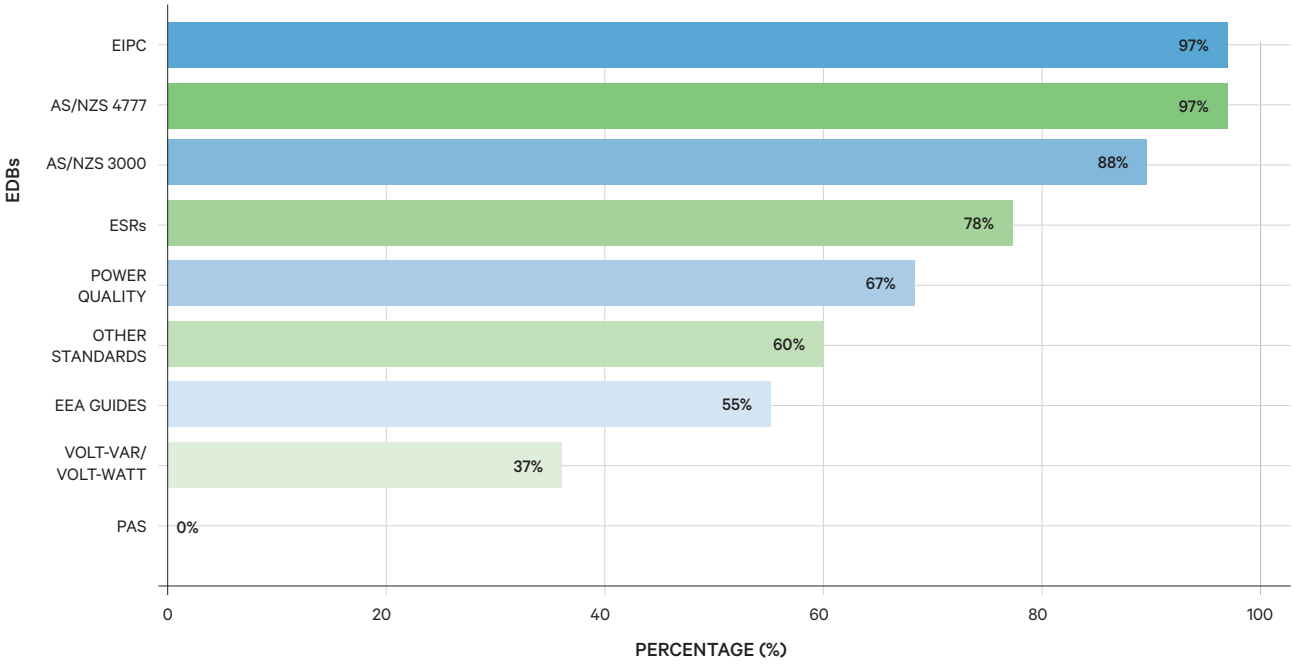
## 5. INCONSISTENT AND OUTDATED STANDARDS REFERENCES

Standards such as AS/NZS 4777 and AS/NZS 3000 are referenced inconsistently, with some documents citing outdated versions or omitting key clauses.

» *Example (anonymised):* One distributor references AS/NZS 4777.2:2020 with clear alignment notes, while another still cites AS/NZS 4777.2:2015, risking confusion and compliance issues for installers.

Appendix B of this report provides a summary of the plethora of standards, guides and other documents referenced in the various EDB COPS and DG connection material.

**FIGURE 2:** PERCENTAGE OF EDBS LINKING TO KEY DER TECHNICAL REFERENCE MATERIALS, HIGHLIGHTING STRONG COVERAGE OF CORE STANDARDS BUT GAPS FOR PAS AND ADVANCED MATERIALS.



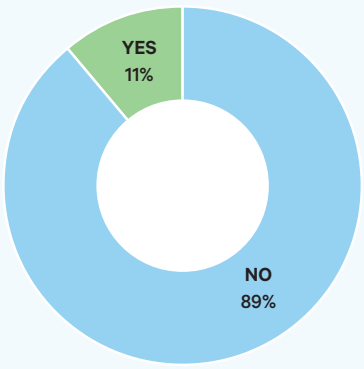

PAS = Publicly Available Specification
ESRs = Electricity (Safety) Regulations

## 6. POOR DOCUMENT MAINTENANCE AND REVIEW PRACTICES

Many DER connection documents are past their stated review dates, suggesting limited or informal update processes.

» *Example (anonymised):* One network reviews and republishes its technical standards annually with a version history, while another's DER guide has not been updated in over five years, despite significant changes in technology and regulation.

**FIGURE 3:** PERCENTAGE OF EDBS REVIEWING AND UPDATING CONNECTION INFORMATION WITHIN THEIR STATED SCHEDULES, HIGHLIGHTING SIGNIFICANT ROOM FOR IMPROVEMENT.



### 7. UNEVEN DETAIL ON POWER QUALITY AND TECHNICAL SETTINGS

Volt/Var requirements, voltage bands, and power quality expectations are often buried in separate documents or not clearly defined, leading to inconsistent outcomes.

» *Example (anonymised):* One distributor publishes a detailed Volt/Var and frequency response profile, while others simply reference "compliance with the Code," leaving installers to interpret or seek clarification individually.

### 8. TERMINOLOGY INCONSISTENCIES ACROSS THE SECTOR

Naming conventions differ across distributors, even where ENA's glossary is referenced.

» *Example (anonymised):* One distributor labels its document a "DER COPS," another calls it a "DG Standard," and a third uses "Embedded Generation Guide," making it harder for stakeholders to search for and interpret relevant materials.

## DISCUSSION OF KEY FINDINGS

The findings above reveal a number of systemic challenges and opportunities across the distribution sector:

1. **Inconsistent presentation of DER information:** The lack of a consistent structure for DER connection guidance across distributors creates unnecessary friction for installers, consultants, and consumers. This inconsistency undermines clarity and contributes to inefficiencies, particularly when stakeholders operate across multiple network areas.
2. **Divergence in connection process detail and scope:** While most distributors provide some form of guidance split by system size (e.g. <10kW, >10kW), the level of detail, supporting documentation, and process transparency varies significantly. This variation makes it harder to scale DER deployment and limits opportunities for automation or self-service connection processes.
3. **Gaps in emerging DER technologies:** While solar PV is consistently addressed, there is much less information on battery storage, diesel generation, EV charging, and Home Energy Management Systems (HEMS). This reflects an ongoing gap between current network practices and the growing diversity of consumer energy technologies.
4. **Regulatory and standards misalignment:** References to technical standards such as AS/NZS 4777 and AS/NZS 3000 are present but inconsistent in versioning and clarity. Without standardised referencing and regular updates, distributors risk creating compliance ambiguity, confusion over safety requirements, or disseminating outdated technical expectations.
5. **Document currency and maintenance:** Many distributors had DER documentation well past stated review dates, suggesting limited processes for document lifecycle management. This affects stakeholder trust and makes it harder for regulatory agencies to rely on these resources for light-handed oversight.
6. **Uneven treatment of power quality and system technical requirements:** Voltage regulation, power quality (PQ), and Volt/Var support are handled in different ways across networks. Where these are not explicitly addressed, installers and customers are left uncertain about expectations, increasing the risk of network issues or delays.
7. **Terminology differences:** Despite the availability of industry glossaries, terminology used in public-facing DER documents varies across distributors. Standardising terminology would support installer education, sector collaboration, and the development of common tools and templates.

These findings collectively point to a clear need for national coordination. They provide a strong rationale for the recommendations in the next section and reinforce the importance of embedding these improvements within a structured programme such as Streamlining Connections.

# 5. RECOMMENDATIONS

## To address the gaps identified in this review and support the development of a consistent national approach to DER integration, the following recommendations are proposed:

1. **Develop National DER Connection Templates:** Create nationally agreed templates for DER connection documentation – including application forms, technical checklists, and explanatory guidance – to drive consistency and efficiency across the sector. These templates should align with existing Electricity Authority (EA) guidelines and incorporate common capacity thresholds (e.g., <10 kW, 10–100 kW, >100 kW), covering solar PV, batteries, EVs, and other emerging technologies.

   This process should be industry-led, coordinated through the EEA's technical guidelines framework, with regulators providing light-touch oversight and support. Such oversight would make for more efficient national guideline updating and remain non-intrusive, shifting only to a stronger compliance role if distributors failed to implement and maintain the templates or meet agreed standards.

   Appendix C provides a sample checklist of elements that could be included in a connection template and industry input on this will be sought as part of the stakeholder consultation.

2. **Standardise DER Terminology:** Adopt and promote the ENA Glossary as the basis for standard terminology in DER connection documents. Encourage consistent use of definitions across distributors and ensure public-facing content is aligned with legislative and technical sources.

3. **Review and Update Existing Documents:** All distributors should review their DER-related documents to ensure they are current, accurate, and reflect the latest regulatory and technical standards. Review cycles should be formalised and publicly disclosed to build user confidence. Publish a simple version table on the first page of each COPS/NCS PDF (version, date, summary of changes, next review date) and target annual review for DER-relevant sections.

4. **Align Standards Referencing:** Agree on consistent referencing and application of key standards (e.g., AS/NZS 4777 series, AS/NZS 3000). Provide guidance on which versions are relevant and legally applicable and establish a mechanism to monitor and update references as standards evolve. Where ESR-cited editions remain legally applicable, guidance should state both the current technical edition and any ESR-cited edition explicitly to avoid ambiguity.

5. **Prioritisation and regulatory stance:** Urgent updating of all references to regulated Standards to reflect international technology and key safety outcomes. We also recommend an industry-led approach in the first instance – prioritising high-impact, low-controversy elements (e.g., document structure, inverter settings tables, naming) – with regulatory back-stops only if voluntary alignment stalls or consumer outcomes are at risk.

6. **Develop a national DER connection flowchart (non-normative, in an accompanying guidance pack):** Produce a simplified, visual process map outlining the standard connection pathway for DER installations, including indicative timeframes and key decision points. This should help streamline customer and installer expectations and engagement.

7. **Strengthen Installer Guidance and Training:** Work with sector training providers (e.g., Connexis, ETCO, SEANZ) to align installer training with national templates and requirements. Provide clear technical expectations for volt/var support, smart inverter settings, and connection quality.

8. **Use the Streamlining Connections Programme to Coordinate Delivery:** Embed the above actions into the EA/ENA/EEA Streamlining Connections work programme. This provides a credible, collaborative platform to guide implementation, track progress, and support adoption across the industry.

9. **Define Key Performance Indicators (KPIs) for Good Practice:** Develop a set of voluntary industry KPIs that monitor what good DER connection practice looks like – such as timeliness of distributor document reviews, clarity of technical expectations, availability of template forms, or user satisfaction. These indicators could help distributors benchmark performance, support continuous improvement, and offer a transparent basis for future reporting or light-handed regulatory oversight.

10. **Monitoring and reporting (options):**
    - Collect quarterly EDB self-reports on connection KPIs (document currency; template availability; smart-inverter settings publication; scope coverage across solar/BESS/EVs/HEMS/DG; user-facing clarity).
    - Publish a sector dashboard and six-monthly summary; choose delivery model: industry-led (i.e. EEA), distributor-led (i.e. ENA), joint steering (i.e. EEA/ENA/EA/SEANZ), or independent host.
    - If alignment stalls: issue advisory, publish traffic-light ratings, then consider targeted Code amendments limited to document currency and standards referencing.

# 6. NEXT STEPS

## The EEA proposes the following steps to progress this work:

1. **Industry Engagement:** We presented the findings and recommendations at the EEA Asset Management Forum on 25 June 2025 which provided valuable input that helped finalise this report. However, we have not yet re-engaged individually with all EDBs to outline and discuss the specific findings and recommendations relevant to their circumstances. As a next step, we propose developing individualised summary reports for each EDB, building on this report to provide tailored guidance and actionable insights. This approach will ensure the recommendations are practical, relevant, and adaptable to each network, while reinforcing sector-wide consistency in implementation and continuous improvement.
2. **Establishment of an EEA Technical Working Group:** Form a cross-sector working group to lead the development of national templates, terminology alignment, and technical guidance. Membership should include representatives from distributors, installers, regulators, and training bodies.
3. **Development of Draft Guide(s),Templates and Tools:** Using the findings of this review, a scan of international work in this area and input from the working group, develop a national guide (s) including prototype templates (application forms, technical checklists, flowcharts) for pilot testing and industry review.
4. **Stakeholder Consultation and Piloting:** Share draft materials with distributors, installers, and other stakeholders for feedback and refinement. Pilot the new templates and tools with a small number of distributors to test usability and impact.
5. **Finalisation and Publication:** Publish the finalised national guidance document(s) and DER templates under the Streamlining Connections banner. Ensure these documents are not only hosted on each EDB's website, as required by the Code, but also maintained in a central, easily accessible location – for example, as part of the EEA's website. This central home would provide a single definitive source and contact point for industry participants, regulators, and customers, thereby improving visibility and supporting consistent application across the sector. In parallel with other stakeholders, develop supporting training and communication materials to enable widespread adoption and effective implementation.
6. **Ongoing Review and Support:** Establish a regular review and update cycle for all national materials, supported by a prioritised and modular approach to implementation – ensuring the most critical guidance and templates are finalised and adopted first. Build in risk management processes to identify and address emerging issues early, maintaining confidence in the framework.

   Where appropriate, draw on overseas experience and standards – for example, approaches adopted in Australia – to leverage proven practices and accelerate delivery, while adapting solutions for the New Zealand context. This approach ensures alignment with international best practice while reflecting local operational realities.

   Support distributors and installers during implementation through technical advice, training, and forums for shared learning, and monitor sector uptake and performance through the Streamlining Connections governance framework. This proactive, industry-led approach helps avoid unnecessary regulatory intervention by demonstrating that the sector can collaboratively address connection challenges and deliver consistent, reliable outcomes.

# APPENDICES

1. **Appendix A: Typical Scope of COPS (Connection and Operation Standards)**
2. **Appendix B: Summary of documents, Standards and guidelines referenced by EDBs**
3. **Appendix C: Connection Guideline – Sample Checklist Elements (proposed)**

## APPENDIX A: TYPICAL SCOPE OF COPS (CONNECTION AND OPERATION STANDARDS)

**Purpose and Scope**
States the intent of the COPS, what it covers (e.g., LV/MV customer connections, small-scale DER, flexible loads), and what it does not cover (e.g., transmission connections, large generation covered by separate standards).

**Definitions and Acronyms**
Plain English definitions for key terms (e.g., COPS, DER, GXP, inverter, export limit), acronyms, and references to external standards for authoritative meanings where appropriate.

**Normative References and Regulatory Context**
Lists the applicable laws, Codes, and standards (e.g., Electricity Industry Participation Code, AS/NZS 4777.2:2020, AS/NZS 3000, distributor network codes) and explains how conflicts are resolved.

**Applicability and Connection Types**
Identifies who the COPS applies to (installers, customers, consultants) and classifies connection types (e.g., LV single/three-phase, MV commercial/industrial), including thresholds and export categories.

**Application and Pre-Approval Process**
Outlines application steps, information requirements (single-line diagrams, nameplate data, settings), indicative processing timeframes, and when fast-track vs. detailed studies are required.

**Technical Requirements – General**
Describes base technical criteria: voltage/frequency operating bands, earthing, fault levels, phase balance, and integration with ripple/controllable load schemes.

**DER-Specific Requirements**
Specifies DER settings and behaviours (e.g., anti-islanding, volt-var/volt-watt functions, ride-through, export control), referencing AS/NZS 4777.2:2020 and any distributor-specific profiles.

**Protection and Control**
Covers protection coordination (overcurrent, earth fault), interface protection, relays, settings documentation, and test records for LV and MV connections.

**Power Quality and Export Limits**
Sets limits for harmonics, flicker, voltage unbalance, and establishes export caps or dynamic limits; describes validation and the evidence the applicant must supply.

**Communications, Monitoring, and Data**
Specifies metering, telemetry (if required), commissioning data capture, and ongoing monitoring expectations, including cyber-secure access arrangements where applicable.

**Installation and Commissioning**
Provides installation workmanship expectations (referencing AS/NZS 3000 and manufacturer instructions), pre-energisation checks, commissioning tests, and required safety and performance certificates.

**Operation, Maintenance, and Ongoing Compliance**
Outlines responsibilities for maintaining settings, periodic verification, change control (e.g., firmware updates), and conditions for curtailment during network constraints.

**Safety, Isolation, and Access**
Specifies safety requirements for switching, lock-out/tag-out, point of isolation, signage, and site access for network personnel.

**Variations, Exemptions, and Departures**
Explains how applicants can request departures from the COPS, assessment criteria, documentation, and approval authority; requires recording as-built deviations.

**Change Control, Versioning, and Governance**
Describes how the COPS is maintained, versioned, consulted on, and published, including effective dates and transitional arrangements.

**Appendices, Forms, and Templates**

Includes application checklists, typical diagrams, settings sheets, commissioning forms, and example single-line diagrams to support consistent submissions.

**Contacts and Support**

Provides contact channels for technical queries, application status, and emergency support, including links to the distributor's website hub.

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## APPENDIX B: SUMMARY OF DOCUMENTS, STANDARDS AND GUIDELINES REFERENCED BY EDBs

**Electricity Act 1992**

**Electricity Industry Participation Code (EIPC) 2010**

- Part 6 Connection of distributed generation

**Electricity (Safety) Regulations 2010**

**AS/NZS 4777**

- AS/NZS 4777.1:2024 – Grid connection of energy systems via inverters, Part 1: Installation requirements (previous editions AS (2002, 2005); AS/NZS 2016 then 2024. Note the AS 4777.1 2005 edition remains applicable as it is cited in the Electricity (Safety) Regulations 2010
- AS/NZS 4777.2:2020 – Grid connection of energy systems via inverters, Part 2: Inverter requirements (previous editions AS (2005) AS/NZS 2015 then 2020, Amendment 1 (2021), Amendment 2 (2024))

**AS/NZS 3000**

- AS/NZS 3000:2018 + amendments – Note the earlier 2007 edition remains applicable as it is cited in the Electricity (Safety) Regulations 2010

**Other**

- AS/NZS 3008, AS/NZS 3010 – Note the earlier 2005 edition of 3010 remains applicable as it is cited in the Electricity (Safety) Regulations 2010 , AS/NZS 3760 – Note the 2010 edition remains applicable as it is cited in the Electricity (Safety) Regulations 2010, AS/NZS 4676 , AS/NZS 5033 – Note the 2012 edition remains applicable as it is cited in the Electricity (Safety) Regulations 2010 , AS/NZS 5139, AS/NZS IEC 61000, AS/NZS 61439, AS/NZS 62196.1
- IEEE 2030.5
- IEC TS 62749, IEC 62109, IEC 62116, IEC 60255, IEC 60068, IEC 519
- IEE 929
- ANSI/IEEE c62.41
- BS EN 50160
- ECP 36(1993); ECP 35 (1993); ECP 34(2001); ECP 51 (2004)
- ISO 31000

**EEA Guides**

- Power Quality Guide
- Connection of Generating Plant
- Connection of Small-Scale Inverter-Based Distributed Generation
- Connection of High Voltage Electrical Installations
- Live Low Voltage Electrical Work
- Power System Earthing
- SMEI

**Standards New Zealand (SNZ) – Publically Available Specifications (PAS)**

- PAS 6014:2025 – Residential solar photovoltaics (PV) and battery storage systems guideline
- PAS 6010:2023 – Commercial electric vehicle (EV) charging
- PAS 6011:2023 – Residential electric vehicle (EV) charging
- PAS 6012:2022 – Smart home guidelines

## APPENDIX C: CONNECTION GUIDELINE – SAMPLE CHECKLIST ELEMENTS (PROPOSED)

**Embedded Generation**

**Compliance**

- Standards & codes
- Industry and government rules and regulations
- Labelling and signage
- Compliance audit

**Technical Specifications**

- Voltage limits
- Operating voltage and frequency for ride through
- Generation controls for export
- Inverter requirements including voltage limits for sustained operations, power quality modes, power limiting controls, and systems with multiple inverters
- Non-IES requirements including re-energisation and synchronising, and power control
- Power quality including connection point power factor, voltage changes and flicker, harmonic distortions and voltage unbalance
- Connection type
- SCADA requirements
- Fittings at Point of Connection
- Telemetry and Measurement Equipment
- Phase Balancing Requirements
- Grid Forming (GFM) Technology requirements

**System Design**

- Capacity including storage
- Grid connection and isolation including grid synchronization and islanding
- Earthing including neutral earthing
- Control systems including demand control
- Protection
  - Inverter Energy
  - Systems (IES)
  - Non-IES
- Communications systems
- Communication and data protocols
- Cybersecurity
- Changeover Switches e.g., seamless

**Testing & amp; Commissioning**

- Compliance with the connection agreement including the intended design of all safety, protection, control, metering, monitoring systems
- Pre-commissioning requirements

**Operations and maintenance**

- Responsibilities and practices
- Ongoing maintenance
- Energy management
- Outage Planning
- Operational Liaison
- Vegetation Control
- Safety Co-ordination

**Documents**

- Reference documents and links
- System diagrams and configuration
- Connection arrangements and general technical considerations
- Technical Requirements, scope and responsibilities
- Approvals
- Safety in Design including public safety
- Network capacity mapping
- Study - fault levels & protection impacts
- Network study
- Asset Management Plan
- Contingency Planning
- Qualification and training
- Data and connection information required for connection application


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