Distributed Generation Connection and Operation Standard

06 October 2017

Version 3.0

DG CONNECTION AND OPERATION STANDARD

Contents

1 General

1.1 Scope

This standard cover the connection and operation condition for distributed Generation that is connected to the Alpine Energy Distribution Network.

1.2 Application

All distributed generation that is connected to the Alpine Energy network and may at times inject energy into the network.

1.3 Objective

The purpose of this standard is there to ensure safety to the public, consumers, contractors, the Alpine Energy Distribution Network and Alpine staff.
The requirements will also allow the Generator to understand when and why the Distribution Network is not available to connect Distributed Generation at times.

1.4 Referenced documents

1.1.1 Legislation

- Resource management Act 1991 (RMA)
- Hazardous Substances and New Organisms Act 1996 (HSNO)
- Electricity Act 1992
- Electricity Industry Participation Code (EICP) 2010
- Electricity (Safety) Regulations 2010 and pursuant Codes of Practice (NZECP)
- Health and Safety at Work Act 2015
- NZECP 35:1993 - Power Systems Earthing
- NZECP 36:1993 - Harmonic Levels

1.1.2 Industry standards

Standard	Description
AS/NZS 4777.1	Grid connection of energy systems via inverters – installation requirements
AS/NZS 4777.2	Grid connection of energy systems via inverters – inverter requirements
AS/NZS 3000	Electrical installations (Australian/New Zealand Wiring Rules)

Standard	Description
AS/NZS 5033	Installation and Safety Requirements for Photovoltaic (PV) arrays

1.1.3 Alpine Energy documents

Document	Description
AEL.SS.002	Health and Safety Requirements for Contractors Standard
AEL.DS.001	Network Harmonics Standard

1.5 Definitions

Unless stated otherwise, all words and phrases used in this document shall have the meaning as defined in: -

- Electricity Act 1992
- Electricity Safety Regulations 2010
- AS/NZS 300:2007 - Electrical Installations (known as the Australian / New Zealand Wiring Rules)
- AEL definitions in AEL.AS.003 Definitions
- Safety Manual – Electricity Industry(SMEI) part 1, 2 and 3
- Common English language definitions

Below we set out the definitions of different terms.

Term	Definition
Business Day	means any day of the week other than a Saturday, Sunday, or a public holiday within the meaning of the Holidays Act 2003.
Customer	the person who owns or operates DG and wishes to connect the DG to the Distribution Network
Connection Charges	means the cost of connecting distributed generation to Alpine Energy's distribution network (i.e. the capital cost of connection). Normal line charges and any offsets from having the generation connected will be discussed during the connection process.
DG or Distributed Generation	means distributed generation being equipment used, or proposed to be used, for generating electricity that is: ▪ connected, or proposed to be connected, to the Network or to a consumer installation which is connected to the Network; and

	▪ is capable of injecting electricity into the Network.
DG Regulations	means the Electricity Industry Participation Code Part 6 Connection of Distributed Generation
Generator	A company that generates electricity connected to the grid or a local network.
Distribution Network	means the Alpine Energy distribution network.
Point of Isolation	refers to the physical location of a device (e.g., a switch, fuse or link) which enables de-energisation of the connection from the Network.
Alpine Energy or AEL	means Alpine Energy Limited
Power Factor	Power factor is the ratio of real power to the Apparent power (kW/kVA)
Regulated Terms	means the Regulated Terms for Connection of Distributed Generation set out in Schedule 6.2 to the EIPC, Part 6, a copy of which can be found on our website
Retailer	means the Customer's electricity retailer.

1.6 Health and safety hazard identification and management

Contractors and Service Providers to AEL shall obey the requirements of AEL's standard *Health and Safety Requirements for Contractors – AEL.SS.002*.

A systematic method of identifying all hazards shall be applied to all projects and worksites, generally as required by *Safety Manual – Electricity Industry* (*SM-EI) Parts 1, 2 & 3.* Appropriate hazard mitigation methods shall then be implemented before work commences.

This process is particularly important when selecting materials and equipment for use on AEL's network.

Particular attention shall be given to the ability to apply effective worksite earthing equipment and any equipotential bonding requirements, to comply with all SM-EI earthing requirements.

Personnel shall use personal protective equipment (PPE) as per the requirements of: -
AEL's standard *Personal Protective Equipment AEL.SP 001*. This standard outlines where and when staff, Contractors and Service Providers alike should be wearing personal protective equipment.

1.7 Environmental considerations

Environmental considerations shall be in accordance with the requirements of AEL's *Environmental Management Plan*.

1.8 Risk identification and management

A systematic method of identifying all risks shall be applied to all design, construction and maintenance projects undertaken on the AEL electrical network, generally as required by *Risk*

Management Standard AS/NZ/ISO 31000:2009. Appropriate risk mitigation or reduction methods shall then be implemented before work commences on any network asset.

1.9 Copyright

1.10 Enquiries regarding this document

Contact Person: General Manager – Asset Management

1.11 Review date

The review date for this document is 14 July 2022 or its second anniversary, whichever occurs first. After this date this document can no longer be quoted as a standard.

2 Alpine Energy Connection and Operation Standards

Alpine Energy's Connection and Operation Standards include:

a) Distributed Generation, equal to or less than 10 kW Information and Application Process
b) Distributed Generation, greater than 10 kW Information and Application Process
c) AEL.SS.002 Health and Safety Requirements for Network Contractors
d) Alpine Energy Electricity Network Connections and Extension Policy
e) AEL.DS.001 Network Harmonics Standard
f) Certain industry regulations, codes of practice, and standards
g) A congestion management policy (included in this standard)
h) DG protection systems requirements (included in this standard)

These standards are available on request from Alpine Energy at: *mailbox@alpineenergy.co.nz*

2.1 Congestion Management Policy

This Congestion Management Policy is an integral part of this document, and sets out the conditions under which Distributed Generation that is connected to any of Alpine Energy's Networks, can be curtailed or interrupted from time to time to ensure that Alpine Energy's other Connection and Operation Standards are met.
Alpine Energy may interrupt the connection of any Distributed Generation to the Distribution Network, or curtail either the operation or output of Distributed Generation, or both, and may temporarily disconnect the Distributed Generation from the Distribution Network in any one or more of the following cases:

(a) if Alpine Energy considers it reasonably necessary for planned maintenance, construction or repairs on the Distribution Network;
(b) in an emergency or for the purpose of protecting, or preventing danger or damage to, persons or property;
(c) if the Customer modifies its Distributed Generation, without obtaining prior authorisation from Alpine Energy, in such a way that the modification has a material effect on the injection of electricity from the Distributed Generation into the Distribution Network (i.e. increasing the system capacity from less than 10 kW to more than 10 kW; or
(d) as a consequence of obligations that may be imposed on Alpine Energy which, in Alpine Energy's opinion, could affect the operation of the Distributed Generation for example, obligations imposed by Transpower New Zealand Limited both as owner of the National Grid and as the System Operator, obligations to an electricity retailer, or obligations arising in respect of other distribution networks, or imposed by law including the Electricity Industry Participation Code 2010.
(e) in the case of a prevalence or saturation of Distributed Generation installations on any part of Alpine Energy's Distribution Network leading to operational issues including

(but not restricted to) excessive voltage or the compromising of protection equipment or settings.

Alpine Energy strongly recommends that prospective generation operators review their internal networks with regard to minimising voltage drop between the point of connection and the generator.

2.2 Existing congestion areas

The presently known export congestion areas are:

- Installations supplied from distribution substation D1769. These properties are located included and between 245 and 257 Talbot Street, Geraldine.
- Installations supplied from distribution substation D545. This is the Milford Huts area, including Stopbank Road, Davey Road and Milford Lagoon Road.
- Installations supplied from distribution substation B237. This is the Waipopo (Peterson Park) Huts area, including Waipopo Road and River Road.
- Installations supplied from distribution substation B834. This is the Stratheona Huts area, including Stratheona Road.
- Installations supplied from distribution substation B303. This is the Butlers crossing Huts area, off Butlers Road.
- Installations supplied from distribution substation D1184 and D313. This is the Peel Forrest area, including Peel Forrest Road and Dennistoun Road.
- Installations supplied from distribution substation D318, D651, D652 and D1208. This is the Burns Bush area, including Blandswood Road and Lookout Road.
- Installations supplied from distribution substation D591, D592 and D1083. This is the Rangitata Huts area, including on and off Rangatata Huts Road.
- Installations supplied from distribution substation B516. This is the Pareora Huts area, including off Pareora River Road.
- Installations supplied from distribution substation A705. This is the Glenavy Huts area, including off Fisheries Road.
- Hadlow feeder past Rosebrook regulator B1939: This covers the following areas: Hadlow, Claremont, Fairview, Levels Valley and Taiko.

These areas can change and new areas added due to new DG applications or a change in the Distribution Network configuration.

2.3 Distributed Generation Protection Systems Requirements

The protection systems associated with Distributed Generation plant must be co-ordinated with the other protection systems associated with the Distribution Network.
The setting or operating limits of any protection controlling a circuit breaker, or operating values of any automatic switching device at any point of connection between the Distributed Generation and the Distribution Network, shall be agreed in writing, between Alpine Energy

and the Generator, during the process for approval and connection of the Distributed Generation. These protection settings or operating values must not be changed without the express written agreement of Alpine Energy.
Operators of Distributed Generation must ensure that voltage levels of injected energy to the grid remain within the requirements of the *Electricity (Safety) Regulations, clause 28.*

3 Alpine Energy's Health and Safety Standards

3.1.1 General

Alpine Energy promotes the safety of its staff and contractors who may be working on its Distribution Network from time to time and that of the general public, and also ensures the integrity of its Distribution Network at all times.

3.1.2 Contractors

All contractors working on the Distribution Network, or involved in the connection or disconnection of Distributed Generation to or from Alpine Energy's Distribution Network, must be an Alpine Energy Approved Contractor, licensed to perform such work(s), and must adhere to Alpine Energy Standard *AEL.SS.002 Health and Safety Requirements for Network Contractors*.

3.2 Industry Rules and Standards

In constructing, operating and maintaining the Distributed Generation, the Customer, any contractors working on the Distribution Network, and any equipment to be connected must comply with the requirements of the following industry standards as they may be amended and reissued from time to time:

- Electricity (Safety) Regulations 2010 and subsequent amendments.
- Electricity Industry Participation Code 2010 including all relevant Codes of Practice and subsequent amendments.
- Safety Manual - Electricity Industry (SM-EI).
- NZECP 35:1993 Power Systems Earthing.
- AS/NZS 3000:2007 AUS/NZ Wiring Rules (excluding interlocking requirements).
- AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.
- AS/NZ4777 Parts 1 & 2 Grid Connection of Energy Systems via Inverters.
- AS/NZS5033 Installation and safety requirements for photovoltaic (PV) arrays.

- Your system needs to comply with the previously mentioned AS 4777.1 to 4777.2 standards to ensure that our network's safety requirements are met. Systems that comply with these standards are classified as "non-islanding" systems. This means that your generator will automatically isolate itself if there is a power outage on the distribution network upstream of your point of supply. It also means that your system will not reconnect to the network until we have restored the supply. Also we require that your inverter be sealed so as to restrict any adjustment of the protection provisions.

4 Power Quality

It is important that any connected Distributed Generation does not cause interference to other consumers.

4.1 Inverter

Inverters can interfere with the reliable operation of the network or can affect plant and appliances of other connected parties. This is one of the reasons that the inverters used will need to be on the approved list. Alpine Energy accepts the approved list of the Clean Energy Council (Australia): List of Inverters approved for connection to the Alpine Energy distribution network.
If the inverter is not on the approved list, Alpine Energy requires that the inverter be approved by an Australia or New Zealand-based independent test house.

If interference does occur, you will be required to disconnect your Distributed Generation system to remove interference with other consumer's equipment until you have remedied the fault.

4.2 Harmonics

In addition to the requirements in this standard, refer to Alpine Energy's website for specifications on harmonic limits and maximum allowable 'pollution', as well as the provisions of NZECP36 (NZ Electricity Codes of Practice).
The Electricity Engineers' Association (EEA) has also published a power quality guide.
This can be obtained here: EEA Power Quality guide 2013

5 Emergency Response and Contingency Planning

Emergency response and contingency planning is an integral part of:

- Emergency response procedures, as covered in detail in our Emergency Preparedness Plan.
- Electricity Authority approved Participant Outage Plan as required under the Electricity Governance (Security of Supply) Regulations 2008.

- Other contingency plans for electricity restoration.

We are a member of the Canterbury Lifelines Utility Group. The Group promotes utility resilience and is involved with the development and review of disaster recovery plans for civil defence emergencies as required under the Civil Defence Emergency Management Act 2002.

For more information, refer to our Asset Management Plan (AMP). This AMP is available in the disclosure section of our web site.

6 Document Review History

Version Number	Reviewed By.	Review Date	Reason
0.1	JLH	18/10/16	First draft for discussion
0.2	WTR	19/10/16	Comments incorporated
2	JLH	06/10/17	Congestion areas up dated (section 2.2)
3	JLH	14/07/20	Congestion areas updated, GM-Network changed to GM-Asset Management

7 Alpine Standard—Document change request

Memo To	General Manager – Asset Management Alpine Energy Limited 31 Meadows Road Washdyke Timaru
Change details (Attach separate sheets as necessary).	
Paragraphs affected	
Priority (Double-click on box to check it).	**Urgent** ☐ (Within 1 week) **Routine** ☐ (Within 12 months) **Low** ☐ (Next Review)
_____ **Submitted by (Print Name)**	14/07/2020 **Date (Click date to update)**

Document change request—acknowledgement

Dear _____

Thank you for your suggested changes to the above document.

Your request has been noted and added to our works programme. Should we require any additional information about your notification, we will contact you.

Thank you for your contribution to improving the quality of Alpine's documents.

Regards

_____ _____

General Manager – Asset Management Date