

# Connecting your business solar generation

For connections  
more than 15kW



Orion

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## Introduction to large distributed generation systems—more than 15 kilowatts

Distributed generators, also known as ‘embedded generators’, are located at a home or business to produce electricity for that home or business’s own use. They may also be capable of putting surplus energy back into Orion’s distribution network. These generators can take several forms: solar panels, wind or micro-hydro turbines and diesel generators are the most common.

If you are interested in operating distributed generation and connecting it to our network, there are some things you need to know.

### Who is this information for?

This information is for people who want to connect large inverter type distributed generation systems, more than 15kW, to Orion’s electricity network to generate electricity and possibly export energy into our network. These systems are usually three-phase, and are typically installed at industrial, commercial or rural sites.

This information does not apply to generation systems which are not connected to our network.

For information about connecting smaller distributed generation, see our guides to Connecting your home generation. This guide is available on our website.

### Talk to us about your proposed distributed generation

Installing distributed generation is complex. If you intend to install generation that is capable of exporting any excess energy from the generator into our network, even if this seems unlikely, then you will need to involve us in the process as early as possible. Each situation is different and needs to be discussed with us.

Any agreement to connect distributed generation to our network may include costs associated with design and reinforcement of our existing network. If reinforcement of our network is required, the design and schedule for this project work will need to be factored into your installation planning. Projects may be constrained by network resources and restrictions.

Larger generators, more than 1000kW, may be subject to Transpower’s terms and conditions. If this is the case, we will work with you to meet Transpower’s requirements. The generation owner will be responsible for providing any requested information to us to assist in the process.

Distributed generation must meet all relevant statutory and regulatory requirements and comply with all applicable safety standards. If you connect distributed generation to our network, safety equipment and procedures must be in place to ensure safe interaction between your distributed generator and our network.

More information about distributed generation is available on the Electricity Authority Te Mana Hiko website:

[www.ea.govt.nz](http://www.ea.govt.nz)

Alternatively, you can contact:

Connections - Customer Solutions

**Phone:** 0800 363 9898

**Email:** [generator.application@oriongroup.co.nz](mailto:generator.application@oriongroup.co.nz)

Orion New Zealand Limited  
565 Wairakei Road  
PO Box 13896  
Christchurch 8140  
New Zealand

[www.oriongroup.co.nz](http://www.oriongroup.co.nz)

### Process to connect distributed generation more than 15kW to our network

We outline below the steps that you will need to take to connect distributed generation more than 15kW to our network. This information complies with the Electricity Authority, [Electricity Industry Participation Code 2010, Part 6 Connection of Distributed Generation](#) (“the Code”).

#### Select your system

These guidelines are for distributed generation systems that connect to our network via an inverter. If you want to connect a system to our network without an inverter, please talk to us.

If your distributed generator connects to our network via an inverter, then the inverter must conform to the relevant standards (Australian Standard 4777.2 and 4777.3) which you can purchase and download from [standards.org.au](http://standards.org.au) or view for free at your public library. While these standards have been created with solar powered systems in mind, they can be applied to other systems.

You can speed up the processing of your application to connect to our network by using a distributed generation inverter that conforms to the AS 4777.2 standard and is pre-approved by Orion. A list of currently compliant inverters is available on our website. We will aim to update this list quarterly.

#### Contact your electricity retailer

You must discuss your proposed distributed generation installation with your electricity retailer (or the Electricity Authority’s clearing manager, although this approach is less common), as any surplus energy you generate may be sold to them. Unless you have contractual arrangements for purchase of any surplus electricity generated, and an electricity retailer is responsible for the connection, you will not be able to connect to our network.

#### Notify us

Generation systems more than 15kW in capacity can have significant impacts on our network. We need to know where the distributed generation system will be connected and ensure the generation operates safely. Ideally, you should contact us as soon as you have decided which system you intend to install.

It’s important that the inverter you are intending to install complies with the AS 4777 standard. If your proposed inverter is not on our list of currently compliant inverters, you will need to provide a copy of the Supplier’s AS 4777 Declaration of Conformity. The Declaration of Conformity proves that the inverter has been type-tested

as complying with all relevant parts of AS 4777 by a laboratory with accreditation issued or recognised by international Accreditation New Zealand.

#### Your application

You will need to complete the application form on pages 8 to 11 and return it to us, along with the detailed information requested in the form.

#### Application fees

An application fee applies and payment is required with applications. Relevant charges are set out in [Associated service prices](#) on our website.

Payment can be made by direct credit, to our bank account **03-0855-0345995-03**. When paying by direct credit please quote the reference **DGAPP** together with the house number and street name of the premise where the distributed generation is to be connected and the name of the person or organisation lodging the application. Please do not pay by cash.

#### Confirmation that your application is complete

Within five business days of receiving your application we will advise you in writing whether or not your application is complete.

#### After your application

Within 30 business days of receiving your completed application we will provide you with the following information:

- a. the capacity of our network, including both the design capacity, including fault levels, and actual operating levels
- b. the extent to which connection and operation of your distributed generation may result in a breach of the relevant standards for safety, voltage, power quality, and reliability of supply to other connected parties
- c. any measures or conditions, including modifications to the design and operation of our network or to the operation of your distributed generation, that may be necessary to address the matters referred to in paragraphs (a) and (b)
- d. the approximate costs of any network-related measures or conditions identified under paragraph (c) and an estimate of time constraints or restrictions that may delay the connecting of your distributed generation
- e. any further detailed investigative studies that we reasonably consider are necessary to identify any potential adverse effects on the system resulting from the proposed connection, together with an indication of:

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- i. whether we agree to you, or a suitably qualified agent for you, undertaking those studies
  - ii. if not, whether we could undertake those studies and, if so, the estimated cost of the studies that you would be charged
- f. any obligations to other parties that may be imposed on us and that could affect your distributed generation, for example obligations to Transpower, in respect of other networks, or under the Electricity Industry Participation Code
- g. any additional information or documents that we consider would assist your application
- h. information about the extent to which planned and unplanned power cuts may affect the operation of your distributed generation

## **Other information to assist with your decision making**

You can request further information from us which is reasonably necessary to enable you to consider and act on the information which we provided in response to your application. We will provide this further information within 10 business days of receiving your request.

## **Our acceptance of your application for generation**

Within 45 business days of receiving your application we will give you written notice of our decision to approve or decline your application for generation, we will also let you know of any conditions or other measures that will apply if we accept your application. Please note that notice can be extended under the provisions outlined in [Schedule 6.1 part 2 of the Code](#).

## **If we decline your application**

If we decline your application we will detail our reasons. If you disagree with our decision, a dispute resolution process is provided in [Schedule 6.3 of the Code](#).

## **Your intention to proceed**

After we approve your application you have 30 business days, or a mutually agreed longer period, to notify us in writing if you want to proceed with the distributed generation connection, and if so, confirming:

- a. the details of the distributed generation to be connected
- b. that you accept all of the conditions, or other measures, which we have specified as conditions of the connection

Notice can be extended under the provisions outlined in [Schedule 6.1 part 2 of the Code](#). Please note that if you choose not to proceed, and then apply to connect the same generation at a later date, we may charge an application fee.

## **Connection of generation**

We have 30 business days to negotiate a connection contract with you after you notify us in writing of your intention to proceed. This contract will be based on the connection contract set out in [Schedule 6.2 of the Code](#). This schedule and terms are a default agreement if we are unable to negotiate a connection contract.

Once your system has been installed, you are required to provide a copy of your Certificate of Compliance (COC), Record of Inspection (ROI) and a completed Orion commissioning sheet within ten working days. A copy of our commissioning sheet will be sent out with our distributed generation approval letter.

**Congestion management policy**

Distributed generation on our network has traditionally been installed by individual customers who wish to enhance the security of their electricity supply and reduce their costs associated with peak demand on our network.

The electricity generated has generally been used at the premises where it was generated and at a time coinciding with high network demand.

New forms of distributed generation, such as solar power, photovoltaic panels, are predominantly being installed to reduce the quantity of electrical energy required from the network on a continuous basis. This change in approach can lead to significant amounts of electricity being exported on to our local area network. This is particularly true in the height of summer when photovoltaic output is at a maximum and homeowners may be at work or away on vacation with very little electricity being used in the home.

Our network is mainly engineered so that electricity flows in one direction. Continued growth of distributed generation is likely to create reverse energy flows and congestion on some parts of our network. Typically this will create excessively high voltage, which can damage customers' electrical appliances as well as our network equipment.

At the moment small distributed generators are not causing any congestion on our network but we will continue to monitor this. We will undertake regular assessments, using our database of distributed generation installations and network capacity models, to determine what areas on our network will be congested with the addition of future distributed generation. We will report areas of distributed generation congestion on our network.

Distributed generation can be provided in many different forms, with wide variations in the business model and operational requirements. Congestion management is best

determined on a case-by-case basis during the network application process. There are two main ways to manage network congestion:

- by ensuring that distributed generation connection only occurs in uncongested areas or is always accompanied by an appropriate network upgrade
- by agreeing on a case-by-case basis the real-time operational rules that will apply

The outcome will depend on the nature of the network congestion, the distributed generation operational characteristics and the business model of the proposal.

In line with the pricing principles in the [Electricity Industry Participation Code 2010 Part 6 Connection of Distributed Generation](#), in situations where a proposed generator will add to, rather than relieve, network congestion, and where this congestion requires reinforcement of the network, we will charge this to the connecting distributed generator.

Future updates to this congestion management policy will detail our approach to managing distributed generation congestion, including operational rules.

In some instances, events on Transpower's national transmission grid may restrict distributed generation.

**Emergency response policies**

Our emergency response policies are detailed in our Asset Management Plan, Section 6.9.1: List of Contingency Plans. Printed copies are available from our offices at 565 Wairakei Road, Christchurch 8053.

**Safety standards**

Our safety standards are detailed in our Asset Management Plan, Section 6.3: Safety, and Section 3.3.5: Service Level Measures - Safety. Printed copies are available from our offices at 565 Wairakei Road, Christchurch 8053.

# Application to connect and operate solar distributed generation with capacity more than 15kW on Orion's network

Details of person/organisation applying to connect  
distributed generation on customers behalf

Name:

Company:

Address:

Phone:

Email:

Details of customer at premises where distributed  
generation is to be connected

Name:

Company:

Address:

Phone:

Email:

ICP number—from your power account if you are an  
existing customerEnergy retailer who will purchase your electricity/is  
responsible for your connection

## Approximate commission date

## Details of your proposed distributed generation

## Connection\*

 Existing New Residential Commercial

## Fuel type

 Solar PV**\*Assessing the capacity of your connection**

For all existing electricity connections, and when applying for a new electricity connection, we will evaluate the total export capacity of your proposed distributed generation which is the maximum amount of electricity your generation is able to inject into our network. This enables us to assess whether your proposed generation will exceed the capacity

## Data required for each inverter

## Number of phases

## Model of inverter

## Manufacturer's rating of equipment

Amps:

Volts:

kW:

kVA:

Maximum proposed generation export in kW:

Is your inverter included in our current list of AS4777.2 or AS/NZS4777.2 compliant equipment?  
See list available on our website

 Yes No

If not please provide a copy of the supplier's AS4777.2 or AS/NZS4777.2 Declaration of Conformity

## Battery storage

## Make and model of any battery storage

## Total installed battery rating (kWhr)

## Total installed battery rating (kW)

Does the battery have an integrated inverter:  
If yes what is the inverter size in kW

## Required Documents to support application

Please include a single line diagram for the installation

Please provide details on the size and length of the service main supplying the installation (point of supply to main switchboard)

of your electricity connection. To complete this evaluation, we will need evidence of your generation capacity – normally a kilowatt rating.

**Please attach to your application a copy of the manufacturer's specifications and/or a photograph of the 'name plates' for your proposed generation, as evidence of its capacity.**

Additional information may be required if the manufacturer's specifications are not comprehensive.



| Protection of the distribution network |                     |                 |
|--|---------------------|-----------------|
| Parameter                              | Recommended setting | Design settings |
| Vnom-max<br>(10 minute average)        | 248V                |                 |
| Mains Overvoltage 1                    |                     |                 |
| Limit                                  | 260V                |                 |
| Minimum trip delay time                | 1 second            |                 |
| Maximum disconnection (trip) time      | 2 seconds           |                 |
| Mains Overvoltage 2                    |                     |                 |
| Limit                                  | 265V                |                 |
| Maximum disconnection (trip) time      | 0.2 seconds         |                 |
| Mains Undervoltage                     |                     |                 |
| Limit                                  | 180V                |                 |
| Minimum trip delay time                | 1 second            |                 |
| Maximum disconnection (trip) time      | 2 seconds           |                 |
| Over-frequency                         |                     |                 |
| Limit                                  | 52Hz                |                 |
| Maximum disconnection (trip) time      | 0.2 seconds         |                 |
| Under-frequency                        |                     |                 |
| Limit                                  | 45Hz                |                 |
| Minimum trip delay time                | 1 second            |                 |
| Maximum disconnection (trip) time      | 2 seconds           |                 |
| Minimum reconnection time              |                     |                 |
| Limit                                  | 60 seconds          |                 |

| Inverter Power Quality Response modes                                 |                       |                       |
|---|-----------------------|-----------------------|
| Tick which modes are available, and if so which modes will be enabled |                       |                       |
| Response Mode   | Available             | Enabled               |
| Volt-Var  | <input type="radio"/> | <input type="radio"/> |
| Volt-Watt   | <input type="radio"/> | <input type="radio"/> |
| Volt balance  | <input type="radio"/> | <input type="radio"/> |
| Fixed power factor  | <input type="radio"/> | <input type="radio"/> |
| Fixed reactive power  | <input type="radio"/> | <input type="radio"/> |
| Power response  | <input type="radio"/> | <input type="radio"/> |

  

| Required Settings                           | Recommended settings                         | Design settings |
|---|--|-----------------|
| <b>Volt-Watt response mode if available</b> |  |                 |
| V1  | 207V   |                 |
| V2  | 220V   |                 |
| V3  | 244V   |                 |
| V4  | 246V   |                 |
| <b>Volt-Var response mode if available</b>  |  |                 |
| V1  | 207V   |                 |
| V2  | 220V   |                 |
| V3  | 235V   |                 |
| V4  | 244V   |                 |
| Power rate limit, Ramp time                 | 6 minutes (16.67% of rated power per minute) |                 |
| Soft ramp up after connect or reconnect     | Enabled                                      |                 |

  

|                                      |  |
|--------------------------------------|--|
| <b>Name of electrical contractor</b> | <b>Phone number of electrical contractor</b> |
| <br>                                 | <br>   |

If you do not complete all sections of this form your application may be delayed.

## Application payment

An application fee applies and payment is required with applications. Relevant charges are set out in [Associated service prices](#) on our website. Payment can be made by direct credit, to our bank account **03-0855-0345995-03**. When paying by direct credit please quote the reference **DGAPP** together with the house number and street name of the premise where the distributed generation is to be connected and the name of the person or organisation lodging the application. Please do not pay by cash.

## Checklist, I have:

- Completed all sections of the application form
- Attached a copy of the manufacturer specifications and/or a photograph of the 'name plates'
- Attached a copy of the technical specifications of your equipment
- Paid my application fee to Orion

I apply to connect a distributed generator to Orion New Zealand Limited's electricity network and confirm that the above information is correct.

**Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_



**Please send your application and supporting documents to Orion by mail, or email:**

Orion New Zealand Limited  
565 Wairakei Road

PO Box 13896  
Christchurch 8141

+64 3 363 9898

[generator.application@oriongroup.co.nz](mailto:generator.application@oriongroup.co.nz)

### Delivery credits

Generators can often reduce Orion's delivery costs by lowering the peak loading levels on our network, which reduces our need to upgrade and reinforce our network. We reflect these savings through reduced charges and export credits arrangements - providing high credit rates for generation that occurs during our relatively short peak loading periods.

As with our delivery charges, credits are usually paid to electricity retailers who pass them on to generators.

The credits are optional and generators must apply for them and agree to the associated conditions. In some situations, additional metering is required in order to apply the credits, see metering.

In our experience, distributed wind generation provides a highly correlated contribution which does not effectively reduce our peak loadings, and photovoltaic generation does not reduce our significant winter evening peaks. On this basis, we do not generally provide credits for these forms of generation.

For further details, refer to our ['export and generation credits schedule'](#) available on our website.

### Metering

The generator is responsible for ensuring that suitable metering is installed which meets the minimum requirements for the size of the generator, and is also suitable for the pricing options applicable for the generator. This metering must be certified and compliant with the metering standards set out in the Electricity Industry Participation Code (the EIPC).

The generator must ensure that arrangements are in place to read meters and provide this metering information to Orion in a suitable format.

### Energy credits

Separately, and in addition to our delivery credits, generators are able to contract with electricity retailers, or the Electricity Authority's clearing manager, to sell any generation that is injected back into our network.

### Charges

For the initial connection to our network, we consider the costs of any extension or modifications that are required, including any ongoing operational and maintenance costs, and generally require the generator to cover all of these costs via a one-off capital contribution. Wherever possible, we encourage generators to contract directly for the construction of extensions to take advantage of the competitive electrical contracting alternatives that are available.

As long as peak export does not exceed peak load, we do not currently impose any ongoing charges in relation to distributed generation, and normal delivery charges can often be reduced significantly by generating to supply some or all of the load at the connection.

For the avoidance of doubt, any charges for power used (i.e. real load or reactive load) at the site is not covered under these distributed generation terms, and is instead subject to Orion's standard delivery charge basis set out in [Orion's Pricing Policy](#) and subject to change over time.

For further details, refer to our ['pricing policy'](#), available on our website.

| Minimum metering requirements                                    |  |   |
|--|--|---|
| Total generation capacity installed                              | Metering category of the connection (under the EIPC) | Orion's minimum metering requirement  |
| 15kW or less or 30kW or less (with no export, or minimal export) | 1 or 2   | Separate import/export metering of accumulated kWh flows at the network connection point.   |
| Above 15kW and up to 350kW                                       | 1 or 2   | Half-hour interval metering to separately measure kWh import and export volumes at the network connection point.  |
| 350kW or less (with low voltage 230/400V network connection)     | 3 and above  |   |
| 350kW or less (with high voltage 11kV network connection)        | 3 and above  | Half-hour interval metering to separately measure kWh and kVAh import and export volumes each half hour at the network connection point (ie four-quadrant interval metering). |
| Above 350kW  | any category   |   |

### Metering requirements for export credits

In order to take advantage of the applicable export credits that we offer (see above) the generator will need to ensure that the following additional metering is in place:

| Export credits  | Metering  |
|---|---|
| <b>0 to 30 kW</b><br>with anytime credits   | No additional metering requirements as the anytime network connection point export metering is used for credits                             |
| <b>0 to 30 kW</b><br>with peak period credits   | Half-hour export metering to measure kWh export at the network connection point during our chargeable peak period half-hours                |
| <b>above 30 kW</b><br>real-power credit component   | Half-hour interval metering to measure kWh export volumes at the network connection point during our chargeable control period half-hours   |
| <b>above 30 kW</b><br>reactive-power component (required only for optional reactive power credit) | Half-hour interval metering to measure kVArh export volumes at the network connection point during our chargeable control period half-hours |

On application, we will consider the suitability of alternative metering arrangements.

Please note that these metering requirements are additional to our general metering requirements for delivery, and electricity retailers will also specify their own requirements. We recommend that generators discuss their metering with their electricity retailer who can provide metering options that meet all requirements.

**Schedule 6.5 of the Electricity Industry Participation  
Code 2010 (Connection of Distributed Generation)**

In this schedule, reference to a kW or MW rate, in relation to distributed generation, is a reference to the kW or MW rate at which distributed generation is capable of generating electricity.

A distributor may require the payment of fees for any of the documented activities prescribed under the regulations up to the maximum fee specified in the column opposite the activity: