




# Connection and Operation of Distributed Generation Rated at less than 10kW

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## Connection and Operation of Distributed Generation Rated at less than 10kW

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# **1. Introduction**

## **1.1 Background**

The connection of distributed generation is regulated by the Electricity Governance (Connection Of Distributed Generation) Regulations 2007. These regulations specify a number of matters such as the time period within which we must process your application, the maximum fees that we can charge for processing your application and inspecting your generation, and a series of default terms and conditions. This policy is based on the Regulations, and should any inconsistent or unclear issues arise from reading this policy, the Regulations shall prevail.

This document describes...

- What distributed generation is all about, and what safety, technical, operational, commercial and regulatory issues may be encountered.
- Our policy on connection and operation of distributed generation rated at less than 10kW capacity.
- The processes that you must complete to connect distributed generation rated at less than 10kW capacity to our network.
- The form that you must complete as part of your application to connect distributed generation rated at less than 10kW capacity.

It is preferable that you discuss your intended generation with us by phone or in person as soon as possible so that issues can be resolved before you submit a formal application.

## 1.2 Definitions

Connection assets	means assets such as (but not limited to) lines, poles, transformers, cables, fuses, reclosers or circuit breakers necessary to connect generation to our network.
Half Hour Metering	means metering which stores information relating to electricity consumption during half hour periods
Network	means the distribution network owned or operated by MainPower New Zealand Limited
Regulation(s)	means the Electricity Governance (Connection Of Distributed Generation) Regulations 2007 or any regulation passed in substitution thereof.
Requirements	means the requirements referred to in Sections 2.2 to 2.6 of this document.
Retailer	means a company who runs an energy business
We, us, our, ours and similar words	means MainPower New Zealand Limited.
You, your, yours and similar words	means the party wishing to connect distributed generation to our network.

## **2. What is distributed generation**

### **2.1 Distributed Generation**

Although a precise definition of distributed generation is difficult to formulate it is usually recognised as generation that is embedded within a distribution network. In the context of distributed generation rated at less than 10kW capacity, this would most typically take the form of small hydro, small wind turbines or solar panels (including inverter equipment).

### **2.2 Safety Requirements**

Your generation must comply with the following safety requirements...

- The specific requirements contained in the Electricity Regulations 1997.
- The general requirements contained in the Health & Safety in Employment Act 1992.

## 2.3 Technical Requirements








Your generation must comply with the following technical requirements...

<u>AS 4777 2005</u>	Grid connection of energy systems via inverters
<u>AS 4777.1 2005</u>	Part 1 Installation requirements
<u>AS 4777.3 2005</u>	Part 3 Grid protection requirements
<u>AS/NZS 3000 2007</u>	Electrical installations (Aust/NZ wiring rules)
AS/NZS 61000.3.3:2003	Electromagnetic compatibility (EMC) Part3.3: Limits- Limits for limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to 16A per phase and not subject to conditional connection
AS/NZS 61000.3.5:1998	Electromagnetic compatibility (EMC) Part3.5: Limits- Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current greater than 16A
AS/NZS 61000.3.7:2001	Electromagnetic compatibility (EMC) Part3.7: Limits- Assessment of emission limits for distorting loads in MV and HV power systems (IEC 61000-3-7:1996, MOD)
AS/NZS 61000.3.6:2001	Electromagnetic compatibility (EMC) Part3.6: Limits- Assessment of emission limits for distorting loads in MV and HV power systems (IEC 61000-3-6:1996, MOD)
IEC 60255	Electrical relays (all relevant standards)
IEC 60068-2	Environmental testing
IEE Std 519-1992	IEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
IEEE/ANSI C62.41 Category B	"Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits" defines recommended surge tests.
IEC 60255	Measuring Relays and Protection Equipment

If your generator will be connected through an inverter you will also need to comply with the following additional requirements...

- AS 4777.2 2005- Part 2 Inverter requirements
- Use an inverter approved for our network.

## Protection Requirements- Summary

Requirements	< 10kW
Generator Circuit Breaker	
Dedicated Transformer	N/A
Disconnect Switch	
Over-voltage Protection	
Under-voltage Protection	N/A
Over-frequency Protection	
Under-frequency Protection	
Earth-fault Protection	N/A
Over-current Voltage Restraint Protection	N/A
Neutral Voltage Displacement Protection	N/A
Synchronisation	
Loss of mains	
Power Factor or Voltage Regulation Equipment	N/A
Fault Interrupting Devices	N/A

## Harmonics Requirements – Summary

Odd Harmonic order number	Limit of each individual odd harmonic current based on percentage of maximum power generation current (fundamental frequency component) at the point of common coupling.
3 <sup>rd</sup> - 9 <sup>th</sup>	< 4%
11 <sup>th</sup> -15 <sup>th</sup>	< 2%
17 <sup>th</sup> -21 <sup>st</sup>	< 1.5%
23 <sup>rd</sup> - 33 <sup>rd</sup>	< 0.6%
Above 33 <sup>rd</sup>	< 0.3%
Even harmonics in above ranges	< 25% of respective odd harmonic limits listed above

## 2.4 Operational Requirements

Your generation must comply with the following operational requirements...

- Your generation must include a switch or circuit breaker that disconnects and locks out if mains voltage is lost on our network or if the mains frequency dips below 49.5Hz for more than 2 seconds. This is to ensure that our network is not back-livened from your generation which would create a safety hazard for our faults staff.
- Clear and durable notices must be prominently posted near the point of connection to our network, and at your switchboard and meter box stating that there is connected generation. This is to warn people of the possibility that your installation could still be live even if the mains have been disconnected.

## 2.5 Commercial Requirements

Your generation must comply with the following commercial requirements...

- Because we are a lines business and not an energy business (as defined in the Electricity Industry Reform Act 1998, Section 4 and 5) we cannot purchase the energy from your generation. You must have a contract in place with a retailer for the purchase of the energy you generate, or provide evidence that you will be consuming all this energy yourself. You may not simply “lose” the energy in our network.
- You must have a meter in place that complies with the Metering requirements of the Electricity Governance Rules. This may mean that the meter will need to record both import (energy flowing to your generator) and export (energy flowing from your generator) energy or record consumption half hourly.
- The energy business/retailer that you contract with for purchase of exported energy, metering services and data management may charge you for doing so. Ensure that you request a copy of their tariffs and terms and conditions for distributed generation.

## 2.6 Regulatory Requirements

Your generation may require one or more of the following classes of consents...

- Resource consent issued by the Regional Council.
- Resource consent issued by the District Council.
- Building consent issued by the District Council.

You may also need to liaise with other agencies such as (but not limited to) Land Transport, the Civil Aviation Authority or the Department of Conservation if your generation extends into areas like road reserve, flight paths or ecologically sensitive areas. We do not provide advice on these matters nor do we issue such consents.

## **3. Our policy**

### **3.1 Open Access Network**

Our policy for network access is that anyone who meets the applicable safety, technical, operational and commercial requirements can connect to our network.

### **3.2 Funding and Ownership of Connection Assets**

Connection of your generation to our network may require construction of specific assets, such as a few spans of low voltage line, a length of underground cable or a fuse. These assets are referred to as connection assets and are funded and owned by you.

### **3.3 Funding Technical Modifications**

You may also need to pay for any technical modifications such as recalibrations of protection or control equipment.

### **3.4 Limiting the Density of Generation**

Our network was originally designed to distribute electricity in one direction from large zone substations. Although a single generator less than 10kW probably won't upset the way our network operates, connection of too many separate generators, in any one part of our network, may result in technical issues. We therefore reserve the right to decline an application to connect any generation to our network if we believe that installing generation in that area could interfere with the operation of our network or with our customers' quality of supply. In the event that we receive more than one application to connect generation, to the same part of our network, the Regulations allow us to consider these applications together, and as competing bids for limited capacity, as long as we consider the overall purpose of the Regulations.

### **3.5 Change of Occupancy or Ownership**

It is important that any new owner or occupant of a premise involving distributed generation is aware of the safety, technical, operational and commercial aspects. Accordingly you must advise us of any new occupant or owner so we can discuss their obligations with them.

### **3.6 Confidentiality of your Application**

The Regulations allow us to divulge the broad details (but not necessarily the ownership details) of generation applications to other applicants whose generation might be affected by your generation.

### **3.7 Fees**

In the case of distributed generation less than 10kW MainPower waives the right to an upfront application fee, and on site observation and testing fees in accordance with Schedule 5 of the Regulations.

# 4. Connection process

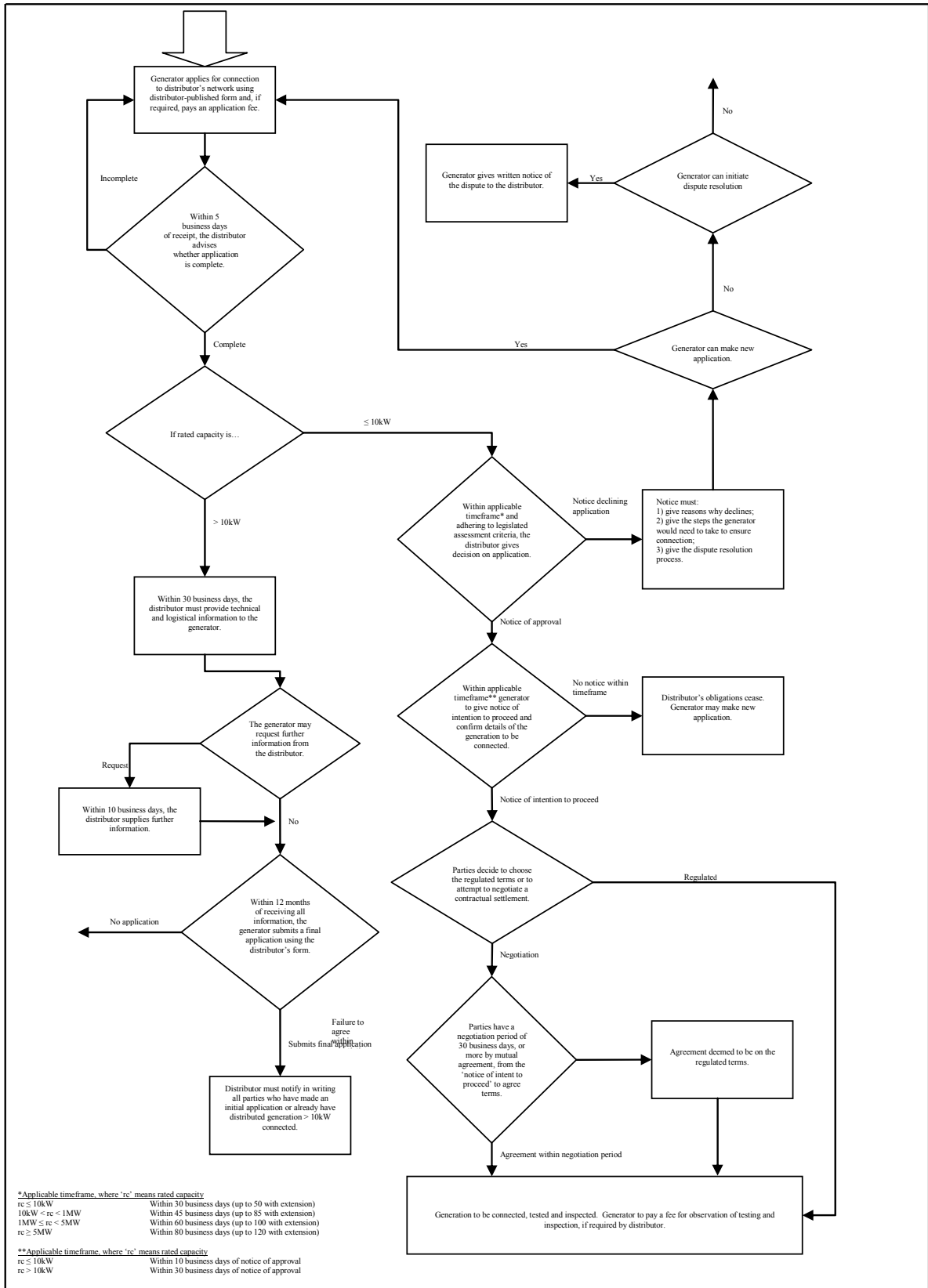


Figure 1- Process Flowchart for Connecting Distributed Generation

## 4.1 Step 1- Your Application

To begin the connection process you must apply in writing although we would prefer you phoned us to discuss your intentions first.

Please complete the following forms provided in your distributed generation application pack as follows:

- DGApplicationDetails(Lessthan10kW).doc
- DGTechnicalSpecifications(Lessthan10kW).doc

The details provided in the two forms referred to above will assist MainPower in assessing whether your distributed generation can successfully be connected to its distribution system.

## 4.2 Step 2- Our Response to your Application

Upon receiving your application, we are required to advise you within 5 working days whether your application is complete. If your application is incomplete we will advise you of the information you will need to include when you reapply.

If your application is correctly completed we must advise you within 30 working days whether your application is approved or declined. The Regulations do allow us to ask you for an extension of 20 working days, which you cannot reasonably refuse.

Broadly speaking we are required to **approve your application** if it meets the following requirements...

- It is made in accordance with the Regulations.
- It will comply with the requirements set out in Section 2.2 relating to Health and Safety.
- It will meet the requirements set out in Sections 2.3 to 2.6 of this policy.

If we **decline your application** we are required to do the following...

- Provide detailed reasons why your application has been declined.
- Advise what you would need to do to make a compliant application.
- Advise you of the dispute resolution procedure set out in Schedule 3 to the Regulations.

### **4.3 Step 3- You give Notice of Intention**

If we approve your application to connect generation, you must advise us in writing within 10 working days whether you intend to connect your generation, although we can extend this period at our discretion.

If you do not provide such written notice, our obligations under the Regulations cease. You can however make a new application.

### **4.4 Step 4- Negotiate Connection Agreement**

Once you have notified us in writing of your intention to connect your generation, we have 30 working days (starting from the date at which we receive your written notice of intention to connect) to mutually negotiate a connection agreement (MainPower has adopted the regulated terms and conditions set out in the Regulations for distributed generation less than 10kW.) This period can be extended by mutual agreement.

### **4.5 Step 5- We Connect your Generation**

Before you connect your generation to our network, you must test your generation.

You must also provide us with a comprehensive test and inspection report that includes confirmation that any metering will fulfill its intended purposes.

## 4.5 Amendments

Version 1.1	19.03.2009	Change document name to better reflect contents Change form reference under section 4.1 to new names that better reflect the contents of the forms Insert Document Control Box
Version 1.2	18.05.2010	New Process Flowchart in Section 4.