

Connection and Operation of Distributed Generation



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Contents

Contents	2
1. Introduction.....	3
1.1 Introduction	3
1.2 Definitions	4
2. Distributed Generation Requirements.....	5
2.1 General Requirements	5
2.2 Technical Requirements	5
2.3 Operational Requirements.....	6
2.4 Commercial Requirements	7
2.5 Regulatory Requirements.....	7
3. Policies for Embedded Generation	8
3.1 Open Access Network.....	8
3.2 Financing & Ownership of Connection Assets	8
3.3 Financing Technical Modifications	8
3.3 Financing Technical Analysis.....	8
3.4 Financing Corrective Actions.....	9
3.5 Recognition of Benefits (or Costs) to ENL.....	9
3.5 Limiting the Density of Generation	10
3.6 Operational Functions.....	11
3.7 Ensuring Safety and Stability.....	11
3.8 Change of Occupancy or Ownership	13
3.9 Confidentiality of the Application.....	13
4. Connection Process for Distributed Generation > 10kW Capacity	14
4.1 Step 1 (Initial Application)	14
4.2 Step 2 (Response to Initial Application)	16
4.3 Step 3 (Final Application).....	17
4.4 Step 4 (Notice to Proceed)	18
4.5 Step 5 (Negotiate connection contract).....	19
4.6 Step 6 (Connection of the generation)	19
5. Connection Process for Distributed Generation < 10kW Capacity	20
5.1 Step 1 (Initial Application)	20
5.2 Step 2 (Response to Initial Application)	22
5.3 Step 3 (Notice to Proceed)	22
5.4 Step 4 (Negotiate connection contract).....	22
5.5 Step 5 (Connection of the generation)	23
6. Schedule of Fees	24
Form 1 – Initial application - Generation Greater than 10kW Capacity	25
Form 2 – Final application - Generation Greater than 10kW Capacity	34
Form 3 – Initial application - Generation Less than 10kW Capacity	37

1. Introduction

1.1 Introduction

The purpose of this document is to provide details of the processes necessary and information required to enable connection of distributed generation to ENL's assets.

The document contains:

- The nature of distributed generation, and the safety, technical, operational, commercial and regulatory issues or requirements that may be encountered.
- ENL policies relating to connection and operation of distributed generation.
- Application forms that must be completed as part of the Applicants initial and, where applicable under the Regulations, final applications to connect distributed generation. It is preferable that applicants make contact with ENL to discuss intended generation as soon as possible so that issues can be resolved before submitting an initial application.

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 ENL must process the application, the maximum fees that can be charged for processing an application and inspecting the generation, and a series of default terms & conditions.

The Regulations provide for the following classifications of Generation:

- Generation at a rate of 10kW or less
- Generation at a rate greater than 10kW

The varying requirements and timeframes for the classifications are defined in the Regulations.

This document is based on the Regulations, and where this document is inconsistent or unclear, the Regulations shall prevail.

1.2 Definitions

Distributed generation	<p>Distributed generation (Also known as embedded generation) is electricity generation equipment that is embedded within a distribution network, and is connected in such a way that it can produce energy flow into the network, or loads connected to the network.</p> <p>Distributed generation is designed to operate in parallel with the electricity network.</p> <p>Distributed generation does not include standby generation that can only operate in isolation and provides energy to loads that are disconnected from the network.</p>
Connection assets	<p>Means assets such as (but not limited to) lines, poles, transformers, cables, fuses, re-closers or circuit breakers necessary to connect generation to our network.</p>
Regulations	<p>Means the Electricity Governance (Connection Of Distributed Generation) Regulations 2007 or any regulation passed in substitution thereof</p>
Requirements	<p>Means the requirements referred to in Sections 2.2 to 2.6 of this document.</p>
ENL	<p>Means Eastland Network Ltd and includes the associated company Eastland Infrastructure Ltd.</p>
The Generator or the Applicant	<p>Means the party wishing to connect distributed generation to Eastland Network Ltd's network.</p>
Network or Distribution Network	<p>Assets such as (but not limited to) lines, poles, transformers, cables, fuses, re-closers or circuit breakers forming ENL's electricity distribution and sub-transmission system</p>

2. Distributed Generation Requirements

2.1 General Requirements

Distributed generation must comply with the following general requirements:

- The specific requirements contained in the [Electricity Regulations 1997](#) and associated codes of practice.
- The general requirements contained in the [Health and Safety in Employment Act 1992](#).
- [Dam Safety Rules](#) in the case of hydroelectric generation.
- The funding and policy requirements identified in section 3 of this document.
- Requirements contained in the [Electricity Governance \(Connection of Distributed Generation\) Regulations 2007](#).

2.2 Technical Requirements

Distributed generation must comply with the following technical requirements:

- [AS 4777.1 2002](#)
- [AS 4777.3 2002](#)
- [AS/NZS 3000](#)

For a generator connected through an inverter, the inverter must comply with the following additional requirements:

- [AS 4777.2 2002](#)
- The inverter must be approved by ENL, to ensure compatibility with the ENL network

2.3 Operational Requirements

In addition to the general requirements contained in ENL's Connection Standard, distributed generation must comply with the following operational requirements:

- Unless the generation is specifically designed to supply the distribution network, as an isolated network, and has been approved as such by ENL, the generation installation must include a switch or circuit breaker that disconnects and locks out (requiring a manual action to reset) if the mains voltage varies by more than 3% from the standard operating voltage, or if the mains frequency varies from 50Hz by more than 0.5Hz for more than 2 seconds. This is to ensure that the distribution network is not back-livened from the generation. Back-livening would create a safety hazard for fault staff and can result in un-synchronised closing between the grid and generator causing damage to equipment.
- For high voltage distributed generation installations, the generator must employ trained staff and have appropriate systems in place, in order to carry out isolation, earthing, and issuing of assurances, in accordance with the Safety Manual Electricity Industry (SM-EI).
- Under the Electricity Governance Rules and Regulations (EGRs), the generator may be required to provide asset capability information and comply with the requirements of the System Operator.
- For operational and safety purposes, generation installations may need to provide real time information of Generator Operational State, Connection State and Output Load. In general, ENL can provide SCADA equipment for connection of Status and Analog indication, or can support modbus/DNP protocols.
- Clear and durable notices must be prominently posted near the point of connection between the generator and the network, stating that there is connected generation. For generation within an installation containing load, additional notices at the switchboard and meter box are required. This is to warn people of the possibility that the installation could still be live even if the mains have been disconnected.

2.4 Commercial Requirements

The Generator must comply with the following commercial requirements:

- The Generator must have a contract in place with a retailer for the purchase of the energy being generated, or provide evidence that the energy will be consumed within the installation.
- Electricity metering is required, and must be capable of recording all energy flow in the distribution network, both in to and out of the generator installation.
- The energy retailer contracted for purchase of exported energy may charge the generator for metering services and data management.
- ENL line charges must be included in the contractual arrangements with the retailer.

2.5 Regulatory Requirements

The 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.

The generator 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 the generation extends into areas such as road reserve, flight paths or ecologically sensitive areas. ENL does not provide advice on these matters, or issue such consents.

3. Policies for Embedded Generation

3.1 Open Access Network

Our policy for network access is that any generator who meets the applicable safety, technical, operational and commercial requirements, and who agrees to pay the applicable charges, can connect to our network.

The details of our distributed generation policy are set out in Section 4.6 of the [ENL 2009 Asset Management Plan](#).

3.2 Financing & Ownership of Connection Assets

Connection of distributed generation to our network may require construction of specific assets, such as a few spans of line, a length of cable or a disconnecter. These assets are referred to as connection assets and can be financed and owned in either of the following ways:

- The generator can install and own these assets at their own cost, subject to ENL's technical requirements for connection to the network. This will require the generator to assume all usual ownership responsibilities and obligations, such as obtaining planning and building consents, safety, maintenance, fault restoration, land issues and tree trimming.
- Subject to approval by ENL, the generator can contribute 100% of the capital costs, and ENL will install and own the assets. In this case ENL will assume all usual ownership responsibilities and obligations.

3.3 Financing Technical Modifications

The generator may be required to finance technical modifications to the ENL network, such as re-calibrations of protection or control equipment, which may be necessary once the generation installation is connected to the network.

3.3 Financing Technical Analysis

The generator may be required to arrange and finance technical analysis and modelling necessary to demonstrate that the proposed generation installation can operate without having a negative impact on the distribution network. ENL will provide information including the line types, line lengths, loading data and protection settings for this purpose.

3.4 Financing Corrective Actions

The generator may be required to finance corrective actions to problems arising in the network, which may be identified once the generation installation is connected to the network. For example, this may include costs for additional power factor correction, or additional control and monitoring equipment required to ensure safe operation of the ENL network.

3.5 Recognition of Benefits (or Costs) to ENL

The following may be useful when considering recognition of the benefits (or costs) to ENL provided by a distributed generation installation:

- The generator contributes toward a solution where the existing network is unable to supply, which contributes positively toward ENL's security of supply standard.
- The generator contributes to a solution where investment can be deferred. Arrangements put in place will, in general, be linked to penalties when the generator is unable to provide for the agreed contribution. Typically agreements are separated from published tariffs, and are applied to fixed timeframes.
- In recognition of the benefits of distributed generation to the region, the variable component for energy flow from an installation to the distribution network is not charged by ENL.
- In recognition of the benefits of distributed generation to the region due to the evasion of transmission costs, ENL may reduce the cost of energy delivery to customers, or defer tariff increases. In general, changes in transmission charges from period to period are reflected by changes in tariffs. Therefore benefits to ENL from generators (and users undertaking load management strategies) are averaged across the different capacity groups and users, so generator contribution cannot be recognised directly. In some cases where deferred investment costs or reductions in reinvestment costs can be specifically identified, direct recognition may be considered.
- Reduction of losses is excluded, as the benefits are realised by the energy retailers and are passed on to end users. In addition, due to the varying load conditions typical in the distribution network, the assessment of the physical losses applicable to a single installation is typically complex, and as such ENL does not financially recognise the reduction of losses.

- Tariffs covering the provision of the line function services provided by ENL will be charged and amended periodically. Published tariffs are based on active (MW) power capacity requirements for an installation, and averaging is applied across groups within a number of capacity bands.
- Where generation is embedded within an existing connection, the capacity charges for the greater of the net imported or exported demand are applied to the installation.
- ENL has not historically required tariffs based on reactive (MVAR) requirements. It is likely that tariffs of this nature will be developed.

3.5 Limiting the Density of Generation

ENL's distribution network has been designed to distribute electricity in one direction from large grid substations to remote end users. The following guidelines for distributed generation limits are likely to apply to the current network. Actual limits are determined on a case by case basis. These limits are applicable in considering size and location of generation.

Approximate limits for generation connected to:

- | | |
|--|----------------|
| • Urban Sub-transmission 50kV | -Maximum 15MW |
| • Rural Sub-transmission 50kV | -Maximum 5MW |
| • Rural Sub-transmission 33kV | -Maximum 3MW |
| • Urban Distribution 11kV | -Maximum 4MW |
| • Rural Distribution 11kV near Zone substation | -Maximum 1MW |
| • Remote Rural Distribution 11kV | -Maximum 0.5MW |
| • Generation within a domestic installation | -Maximum 10kW |

ENL reserves the right to decline any application to connect generation to the network if it is believed that any distributed generation could interfere with the operation of the distribution network (including overloading), or alter the quality of supply provided to any currently connected installation. In the event that more than one application is received to connect generation to part of our network, the Regulations allow for ENL to consider such applications as competing bids for limited capacity.

3.6 Operational Functions

ENL operates a number of standby generators, which supply the distribution network independently from the grid during outages and maintenance activities. In general, to maintain stability of the network, distributed generation will not be permitted to operate in parallel with the standby generators when isolated from the grid.

For planned shutdowns, notifications are sent via the generator's energy retailer, in accordance with the process agreed with the retailers. For larger generation customers, direct consultation and notification will be undertaken whenever possible.

For unplanned events, ENL operate an external service to provide communication relating to the outages. For larger generators, direct communication can be arranged.

The priorities for fault restoration and repair work are determined on the basis of the nature and number of customers affected, the available resources, locations, environmental conditions, and estimated repair times. In general, generation only connections are expected to have a lower priority assigned, compared with load using customers, who have a greater dependence on their electricity supply.

3.7 Ensuring Safety and Stability

It is important that any new distributed generation can operate safely and effectively using the distribution network. In addition, the operation of equipment within an installation must not cause interference or hazards to other installations. The impacts are assessed in terms of the following categories:

Effect on Fault levels

Distributed generation can increase the design fault levels of the distribution network, affecting the ability for existing protection systems to operate correctly. The increased fault levels may also exceed the fault rating of cables, conductor and equipment.

Frequency Performance

Because the distribution network stability is affected by frequency, the size, type and location of generation is assessed to establish the ability of the generation to influence other generators, and the ability of the generators to

disconnect or remain operating when the grid or mains frequency disappears. Remote signalling and control functions may be required to ensure safe operation of the distribution network.

Voltage Control

In general, rural connected generators are expected to cause increased voltage, where the size of the generator is greater than the minimum load conditions of the connected segment. It may be necessary for generators to adjust output power levels to maintain voltage levels at existing customer installations to levels required by the Regulations. Voltage flicker or momentary changes in voltage caused by step changes in output, or excitation inrush on induction generators, must be maintained within the guidelines identified by the Committee Report on Motor Starting currents.

Power Factor Correction

To maintain the network efficiency and maximise stability, all embedded generation installations must maintain a power factor between 0.95 lag and unity. Load Control signals levels can be influenced by power factor correction. Where operation of distributed generation affects the correct operation of load control equipment, the generator is required to finance and/or carry out corrective actions.

Harmonic Levels

Distributed generation can introduce harmonic levels that are not typically present in the distribution network. In general, the ability to determine adverse impacts on harmonic levels cannot be established prior to connection of distributed generation. Where harmonic levels impact on power quality and adversely affect other equipment connected to the network the generator must alter operating patterns or make the necessary alterations to eliminate any interference.

Security of Supply

Where generation is capable of outputs greater than or equal to the load of a segment of the distribution network, and is approved by ENL to operate in isolation from the grid, analysis of the synchronising arrangements and remote signalling requirements may be necessary to ensure safe operation of the distribution network.

Compatibility with Other Generation

Proposed generation in a related or adjacent network segment may react with other established generation. In general, the ability to determine adverse interaction between generators cannot be established prior to operation of generators. Generators may be required to disconnect or adjust

output levels for periods where adverse interaction with previously established generators is found to occur.

3.8 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, ENL must be notified of any new occupant or owner so arrangements can be made to discuss the obligations of the new owner or occupant.

3.9 Confidentiality of the Application

The Regulations allow for the broad details (but not necessarily the ownership details) of generation applications to be made available to other applicants, or existing generators whose generation might be affected by the proposed generation.

4. Connection Process for Distributed Generation Greater than 10kW Capacity

4.1 Step 1 (Initial Application)

To begin the connection process the applicant must provide ENL with the following information in writing. It would be preferable for the applicant to contact ENL to discuss the generation proposal first.

Form 1 is provided at the end of this document, defining all information required. Additional pages including drawings, maps, photos and descriptive text must be clearly marked with a reference, and the reference identified in the relevant section on the form. Form 1 requests important information to enable ENL to assess the proposed generation in terms of the relevant requirements and policies.

Component and asset identification information is required to update operational records and systems, to ensure clear communication in all operational matters. The line/cable information is required to maintain records associated with information disclosure requirements.

The technical data and performance related information is necessary to enable ENL to analyse the impacts of the distributed generation on the distribution network components, and assess the effects on other customers connected to the distribution network, as per the requirements and policies detailed in Sections 2 and 3 of this document.

The energy profile information is necessary to enable assessment of the generation to affect the network, as detailed in Section 3.7 and the possible contribution to any benefits. This information will typically include; half hourly, weekday and weekend daily profiles, monthly or seasonal trends, and a long range annual forecast. The basis for projections should also be described, with reference to any testing or monitoring work undertaken or assumptions made to arrive at the profiles. The daily and weekly profile information is also used to assess the effects on other customers connected to the distribution network.

Technical Information Required:

- Type of generation to be connected (hydro, wind etc).
- Manufacturers' rating of the generator, or if this is not possible, a certification of its maximum rating.
- The configuration of the proposed generation installation, in particular whether the generator is a new generator or an addition to an existing generator. If the proposed generator is an addition, the rating of the entire installation at the single point of connection to the network must be specified.
- The technical specifications of the generator and associated equipment including maximum real power, reactive power requirements, resistance and reactance, fault level contribution, means of voltage and frequency control, synchronisation and expected operating modes.
- The technical specifications of the equipment that will disconnect the generator from the network in the event that mains voltage is lost.
- Exactly where the generator is expected to be installed.
- Whether the generator is single phase or 3-phase.
- The proposed point of connection to the network (exact location).
- Evidence that the generation installation will meet the requirements set out in Section 2 of this document.

The completed Form 1 will need to be accompanied by the required application fee plus GST (refer Section 6), payable to Eastland Infrastructure Ltd.

If the completed Form 1 does not provide sufficient information for ENL to determine if the proposed generator meets the standards set out in Sections 2.2 to 2.5 of this document, further information may be requested.

4.2 Step 2 (Response to Initial Application)

After submitting an initial application, the applicant will be advised within 5 working days whether the initial application is complete. If the initial application is incomplete, the applicant will be advised as to the information that will need to be included when reapplying.

Within 30 days of receiving a correctly completed initial application the Regulations require ENL to provide the applicant with the following information:

- (a) Information about the capacity of the distribution network, including both the design capacity (including fault levels) and actual operating levels.
- (b) Information about the extent to which connection and operation of the distributed generation may result in a breach of the relevant standards for safety, voltage, power quality, and reliability of supply to our connected customers and other generators.
- (c) Information about any measures or conditions (including modifications to the design and operation of the distribution network or to the operation of the distributed generation) that may be necessary to address the matters referred to in points (a) and (b) above.
- (d) The approximate costs of any network-related measures or conditions identified under point (c) above and an estimate of time constraints or restrictions that may delay the connecting of the distributed generation.
- (e) Information about any further detailed investigative studies that ENL reasonably considers are necessary to identify any potential adverse effects on our network resulting from the proposed connection, together with an indication of...
 - Whether ENL agrees to the generator, or a suitably qualified agent of the generator, undertaking those studies; or
 - If not, whether ENL could undertake those studies and, if so, the reasonable estimated cost of the studies that the generator would be charged.
- (f) Information about any obligations to other parties that may be imposed on ENL and that could affect the distributed generation (for example,

obligations to Transpower, in respect of other networks, or under the rules).

- (g) Any additional information or documents that ENL may consider would assist the generator's application.
- (h) Information about the extent to which planned and unplanned outages may adversely affect the operation of the distributed generation.

The applicant may also make written requests for information such as single line diagrams, equipment ratings, normal switch configurations (including fault levels), and protection system details relevant to the proposed point of connection. The Regulations require such information to be provided within 10 days of receiving a written request.

If either involved party becomes aware of new information that is relevant to the application, that party must make reasonable endeavours to pass the information to the other party.

4.3 Step 3 (Final Application)

Final application to connect the generation installation may be made at any time within 12 months of receiving the information set out in Section 4.2 above. The application must include the correctly completed Form 2 (at the back of this document) and copies of any technical studies that may have been requested.

Once the correctly completed final application is received, the Regulations require ENL to make reasonable endeavours to notify in writing:

- Everyone who has made an initial application to connect generation to a part of our network that could be affected by the proposed generation.
- All generators connected to that part of the ENL network on the regulated terms and conditions that could be affected by the proposed generation.

If a final application from another generator is received within 10 days of receiving the applicant's final application, ENL may consider the two final applications as competing bids for limited connection capacity, as long as the overriding principles of the Regulations are kept in mind. Otherwise, final applications will be treated on a "first come, first served" basis.

Upon receiving the applicant's correctly completed final application that includes evidence that the proposed generation will meet all safety requirements, all statutory requirements, technical and operating requirements, ENL have:

- 45 business days if the generation capacity is less than 1MW
- 60 business days if the generation capacity is greater than 1MW but less than 5MW
- 80 business days if the generation capacity is greater than 5MW

to do one of the following three things:

- Provide written notification that the final application has been approved with no additional conditions.
- Provide written notification that the final application has been approved but with additional conditions. In such a case, ENL must provide the conditions in detail, state why such conditions are necessary, specify any charges payable by the applicant, and advise the applicant of how to challenge the decision under the dispute resolution process set out in Schedule 3 of the Regulations.
- Provide written notification that the final application has been declined. In such a case, ENL must inform the applicant why the final application has been declined, how to re-apply, and how to challenge the decision under the dispute resolution process set out in Schedule 3 of the Regulations.

ENL may also request an extension of up to 40 working days to process the final application, which cannot be reasonably refused.

4.4 Step 4 (Notice to Proceed)

If the application to connect generation is approved, the applicant must inform ENL in writing whether it is intended to connect the generation. The applicant has 30 working days to do so, although this period may be extended at the discretion of ENL. This written notice of intention to proceed must include the details of the generation, and confirm the acceptance of any conditions that may have been imposed on the connection. If the applicant does not accept any conditions that may have been imposed, but wishes to continue with connection, they must notify ENL of this dispute within the 30 day period. If such written notice is not provided, the obligations of ENL under the Regulations cease. However, a new application may be made.

4.5 Step 5 (Negotiate connection contract)

Once ENL has been notified in writing of the intention to connect the generation to the network, a connection contract must be mutually negotiated within 30 working days (starting from the date at which we receive the written notice of intention to connect). This period can be extended by mutual agreement.

If mutually acceptable connection terms and conditions cannot be mutually negotiated, the regulated terms and conditions set out in Schedule 2 of the Regulations will apply.

4.6 Step 6 (Connection of the generation)

Before connection to the network, testing of the generator installation must be performed. The applicant must provide ENL with sufficient notice of these tests to allow ENL to send qualified personnel to observe the testing and inspection. The applicant must also pay the fee specified in Schedule 6 for ENL to witness the testing, plus GST.

Following testing and inspection, ENL must be provided with a comprehensive test and inspection report, including confirmation that any metering will fulfil its intended purposes.

5. Connection Process for Distributed Generation Less than 10kW Capacity

5.1 Step 1 (Initial Application)

To begin the connection process the applicant must provide ENL with the following information in writing. It would be preferable for the applicant to contact ENL to discuss the generation proposal first.

Form 1 is provided at the end of this document, defining all information required. Additional pages including drawings, maps, photos and descriptive text must be clearly marked with a reference, and the reference identified in the relevant section on the form. Form 1 requests important information to enable ENL to assess the proposed generation in terms of the relevant requirements and policies.

Component and asset identification information is required to update operational records and systems, to ensure clear communication in all operational matters. The line/cable information is required to maintain records associated with information disclosure requirements.

The technical data and performance related information is necessary to enable ENL to analyse the impacts of the distributed generation on the distribution network components, and assess the effects on other customers connected to the distribution network, as per the requirements and policies detailed in Sections 2 and 3 of this document.

The energy profile information is necessary to enable assessment of the generation to affect the network, as detailed in Section 3.7 and the possible contribution to any benefits. This information will typically include; half hourly, weekday and weekend daily profiles, monthly or seasonal trends, and a long range annual forecast. The basis for projections should also be described, with reference to any testing or monitoring work undertaken or assumptions made to arrive at the profiles. The daily and weekly profile information is also used to assess the effects on other customers connected to the distribution network.

Technical Information Required:

- Type of generation to be connected (hydro, wind etc).
- Manufacturers' rating of the generator, or if this is not possible, a certification of its maximum rating.
- The configuration of the proposed generation installation, in particular whether the generator is a new generator or an addition to an existing generator. If the proposed generator is an addition, the rating of the entire installation at the single point of connection to the network must be specified.
- The technical specifications of the generator and associated equipment including maximum real power, reactive power requirements, resistance and reactance, fault level contribution, means of voltage and frequency control, synchronisation and expected operating modes.
- The technical specifications of the equipment that will disconnect the generator from the network in the event that mains voltage is lost.
- Exactly where the generator is expected to be installed.
- Whether the generator is single phase or 3-phase.
- The proposed point of connection to the network (exact location).
- Evidence that the generation installation will meet the requirements set out in Section 2 of this document.

The completed Form 1 will need to be accompanied by the required application fee plus GST (refer Section 6), payable to Eastland Infrastructure Ltd.

If the completed Form 1 does not provide sufficient information for ENL to determine if the proposed generator meets the standards set out in Sections 2.2 to 2.5 of this document, further information may be requested.

5.2 Step 2 (Response to Initial Application)

After submitting an initial application, the applicant will be advised within 5 working days whether the initial application is complete. If the initial application is incomplete, the applicant will be advised as to the information that will need to be included when reapplying.

Within 30 days of receiving a correctly completed initial application the Regulations require ENL to give written notice of whether the application is approved or declined. ENL may also request an extension of up to 20 working days to process the final application, which cannot be reasonably refused.

If either involved party becomes aware of new information that is relevant to the application, that party must make reasonable endeavours to pass the information to the other party.

5.3 Step 3 (Notice to Proceed)

If the application to connect generation is approved, the applicant must inform ENL in writing whether it is intended to connect the generation. The applicant has 30 working days to do so, although this period may be extended at the discretion of ENL.

If such written notice is not provided, the obligations of ENL under the Regulations cease. However, a new application may be made.

5.4 Step 4 (Negotiate connection contract)

Once ENL has been notified in writing of the intention to connect the generation to the network, a connection contract must be mutually negotiated within 30 working days (starting from the date at which we receive the written notice of intention to connect). This period can be extended by mutual agreement.

If mutually acceptable connection terms and conditions cannot be mutually negotiated, the regulated terms and conditions set out in Schedule 2 of the Regulations will apply.

5.5 Step 5 (Connection of the generation)

Before connection to the network, testing of the generator installation must be performed. The applicant must provide ENL with sufficient notice of these tests to allow ENL to send qualified personnel to observe the testing and inspection. The applicant must also pay the fee specified in Schedule 6 for ENL to witness the testing, plus GST.

Following testing and inspection, ENL must be provided with a comprehensive test and inspection report, including confirmation that any metering will fulfil its intended purposes.

6. Schedule of Fees

Maximum fees for connection of distributed generation

Schedule 5 of the Electricity Governance (Connection of distributed Generation) Regulations 2007

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 following activities prescribed under the Regulations up to the maximum fee specified in the column opposite the activity:

Fee for application for distributed generation 10kW or less in total	\$
Distributed generation of 10kW or less in total	200
Fee for initial application for distributed generation above 10kW	
Distributed generation of above 10kW in total but less than 100kW in total	500
Distributed generation of above 100kW in total but less than 1MW in total	1,000
Distributed generation of 1MW and above	5,000
Fee for observation of testing and inspection	
Distributed generation of 10kW or less in total	60
Distributed generation of above 10kW in total but less than 100kW in total	120
Distributed generation of 100kW and above	1,200

Form 1 – Initial application

Eastland Network Ltd Application for Distributed Generation Greater than 10kW Capacity

Initial application for connection of distributed generation
(12 pages including this page)

- **Generator applicant contact details:**

Company name _____

Postal address _____

Street address _____

Contact name(s) _____

Daytime phone _____

Mobile phone _____

Fax _____

Email _____

- **Nature of entity:**

Single individual Limited company Incorporated society

Trust Other (please specify below)

- Will the generation be:
 - An entirely new installation
 - Generation to be installed in an existing installation
ICP No. _____
 - An addition to an existing installation containing generation
ICP No. _____
- Proposed location of the generation connection to the network (please specify map reference if possible):

- Generator Plant Identifying Name:

- Type of generation (eg. Hydro): _____
- Total rating (MW) of the generation installation:

- Maximum output (MVA) achievable at the connection:

- Maximum reactive power requirement (MVA_r) at the connection:

- Connection Voltage:
 230V 400V 11kV 33kV 50kV
- Connection phases:
 1-phase 3-phase
- The configuration of the proposed generation:
 Attach single line diagram

General generator details (per generator)

- Unit Designation (eg G1): _____
- Nominal kVA rating: _____
- Synchronous / Asynchronous: _____
- Primary Energy Source: _____
- Prime Mover Description: _____

- Nominal Generator Voltage: _____
- Rated Terminal Voltage: _____
- Terminal Voltage Range: _____
- Turbine / Generator Inertia Constant: _____
- Active Aux. Load at Rated Power: _____
- Reactive Aux. Load at Rated Power: _____
- Does Aux. Load Trip with Generator: _____
- Short Circuit Ratio (Synchronous): _____

Synchronous Machine Unsaturated Impedance (in per unit, on generator base):

- Armature or Stator Resistance (R_a): _____
- Direct Axis Synchronous Reactance (X_d): _____
- Quadrature Axis Synchronous Reactance (X_q): _____
- Direct Axis Transient Reactance (X'_d): _____
- Quadrature Axis Transient Reactance for Round Rotor Machines (X'_q): _____

- Direct Axis Sub-Transient Reactance (X''_d): _____
- Quadrature Axis Transient Reactance for Round Rotor Machines (X''_q):

- Leakage Reactance (X_l): _____
- Negative Sequence Reactance (X_2): _____
- Zero Sequence Reactance (X_0): _____
- Earthing Resistance (R_e): _____
- Earthing Reactance (X_e): _____
- Earthing Transformer Ratio: _____
- Direct Axis Transient Open Circuit Time Constant ($T_{d0'}$):

- Quadrature Axis Transient Time Constant for Round Rotor Machines ($T_{q0'}$):

- Direct Axis Sub-Transient Open Circuit Time Constant ($T_{d0''}$):

- Quadrature Axis Sub-Transient Open Circuit Time Constant ($T_{q0''}$):

- Saturated Sub-Transient Reactance ($X''_{d\text{ Sat}}$):

Asynchronous machines:

- Attach detailed functional description []
- Reactive Power Range (kVAr): _____

- Current Ratio on Excitation (p.u.): _____
- Pole Pair Number: _____

Asynchronous Machine Impedances (in per unit on generator MVA base):

- Stator Resistance (R_1): _____
- Stator Leakage Reactance (X_1): _____
- Magnetising Reactance (X_m): _____
- Rotor Resistance (R_2): _____
- Rotor Leakage Reactance (X_2): _____

Power Factor Correction Capacitors:

- Capacitors Total kVAr: _____
- Capacitor Step Sizes: _____
- Capacitor Dielectric Losses (kW): _____

Reactive Power and Voltage Control Systems:

- Attach detailed description []
- Settings and Parameters: _____

Governor or Frequency Control Systems:

- Attach detailed description []
- Settings and Parameters: _____

Other Equipment:

- Attach single line diagram showing CBs, Disconnectors, VTs, CTs, Capacitors, Transformers []

Connection Circuit Breakers (for each CB):

- Equipment Label (eg. CB1): _____
- Rated Voltage: _____
- Nominal Current Rating: _____
- Short Circuit Rating (3-second): _____

Network Connection Disconnectors:

- Equipment Label (eg. SW1): _____
- Rated Voltage: _____
- Nominal Current Rating: _____
- Short Circuit Rating (3-second): _____

Protection Settings:

- Attach single line diagram showing Protection System []
- List Protective Devices and Settings: _____

Restrictions:

- Attach details of any special islanding, protection, or synchronising requirements []

Generator Transformer General Details:

- Nominal Voltage Ratio including any tertiary windings: _____
- Number of Windings per Phase: _____

- Rating of HV Winding: _____
- Rating of LV Winding: _____
- Rating of any Tertiary Windings: _____
- Vector Group: _____
- Iron Losses (kW): _____

Generator Transformer Resistance and Reactance:

- Positive Sequence Resistance (HV to LV): _____
- Positive Sequence Reactance (HV to LV): _____
- Zero Sequence Resistance (HV to LV): _____
- Zero Sequence Reactance (HV to LV): _____
- Earthing Resistance: _____
- Earthing Reactance: _____

Generator Transformer Tap Changer:

- Attach description of Tap Changer []
- Which Winding is Tapped (HV or LV): _____
- Step Size (%): _____
- Number of Taps: _____
- High to Low Voltage Range (HI% to LO%): _____
- Number and Voltage of Nominal Tap Position: _____

HV Lines and Cables:

- Name and Conductor Type: _____
- Conductor Size: _____

- Length (km): _____
- Positive Sequence Resistance (Ohm/km): _____
- Positive Sequence Reactance (Ohm/km): _____
- Zero Sequence Resistance (Ohm/km): _____
- Zero Sequence Reactance (Ohm/km): _____
- Capacitance (nF/km): _____
- Attach Route Drawing []

Operational Data:

- Attach Details of any Low Load Restrictions []
- Cold Start Time to Achieve Minimum Load (All Plant Types):

- Warm Start Time to Achieve Minimum Load (Thermal Plant Only):

- Hot Start Time to Achieve Minimum Load (Thermal Plant Only):

- Typical time from Cold Start to Maximum Load (All Plant Types):

- Typical Power Ramping Rate from Minimum Load to Maximum Load:

Operational Profiles:

- Attach Estimated Generation / Demand Profile (in enough detail to enable identification of all generation scenarios): []

Declaration:

By submitting this inquiry I declare all of the above information and any attached information true and correct. I also acknowledge Eastland Network's full and unlimited right to disconnect our generation should any part of this application prove to be false or fraudulent.

Signature of applicant: _____

Post the completed initial application form and payment for the amount specified in Schedule 6, plus GST (payable to Eastland Infrastructure Ltd), to PO Box 1048 Gisborne or deliver to 172 Carnarvon St, Gisborne.

For office use only

Date received: _____

Date response required by: _____

Initial application processed by: _____

Initial application number: _____

Initial application handed to: _____

Confirm payment attached: _____

Date payment banked: _____

Confirm form correctly completed: _____

Form 2 – Final application

Eastland Network Ltd Application for Distributed Generation Greater than 10kW Capacity

Final application for connection of distributed generation:
(3 pages including this page)

- Unique identification number assigned to the initial application

Unique identifier: _____

- Contact details

Full name: _____

Postal address: _____

Street address: _____

Daytime phone: _____

Mobile phone: _____

Fax: _____

Email: _____

Attached 24 hour contact details []

- Confirmation that our requirements will be met (attach supporting documentation as necessary).
 - [] Safety requirements
 - [] Technical requirements
 - [] Operational requirements
 - [] Commercial requirements

- Confirmation that external regulatory requirements such as resource, planning or building consents will be met (attach supporting documentation as necessary).

[] Evidence showing external regulatory requirements have been met

- Grid operator requirements

[] Evidence showing grid operator requirements have been met

- A Certificate of Compliance certifying that the generation installation is electrically safe. This certificate must be signed off by both the electrical worker who installed the generation and a person who is a registered electrical inspector under Part 9 of the Electricity Act 1992 and who is competent with distributed generation.

Attached completed Certificate of Compliance []

- Details of energy retailer who will buy the energy generated

Company: _____

Attached copy of energy purchase agreement []

- Details of electrical worker who will connect the generation

Person _____

Registration _____

Declaration:

By submitting this inquiry I declare all of the above information and any attached information true and correct. I also acknowledge Eastland Network's full and unlimited right to disconnect our generation should any part of this application prove to be false or fraudulent.

Signature of applicant _____

Post the completed application form to PO Box 1048 Gisborne or deliver to 172 Carnarvon St, Gisborne. No payment is required.

For office use only

Date received _____

Date response required by _____

Final application received by _____

Final application handed to _____

Confirm form correctly completed _____

Form 3 – Initial application

Eastland Network Ltd Application for Distributed Generation Less than 10kW Capacity

Initial application for connection of distributed generation
(12 pages including this page)

- **Generator applicant contact details:**

Company name _____

Postal address _____

Street address _____

Contact name(s) _____

Daytime phone _____

Mobile phone _____

Fax _____

Email _____

- **Nature of entity:**

Single individual Limited company Incorporated society

Trust Other (please specify below)

- Will the generation be:

An entirely new installation

Generation to be installed in an existing installation

ICP No. _____

An addition to an existing installation containing generation

ICP No. _____

- Proposed location of the generation connection to the network (please specify map reference if possible):

- Generator Plant Identifying Name:

- Type of generation (eg. Hydro): _____

- Total rating (kW) of the generation installation:

- Maximum output (kVA) achievable at the connection:

- Maximum reactive power requirement (kVAr) at the connection:

- Connection Voltage:

- Connection phases:

1-phase 3-phase

- The configuration of the proposed generation:

Attach single line diagram

General generator details (per generator)

- Unit Designation (eg G1): _____
- Nominal kVA rating: _____
- Synchronous / Asynchronous: _____
- Primary Energy Source: _____
- Prime Mover Description: _____

- Nominal Generator Voltage: _____
- Rated Terminal Voltage: _____
- Terminal Voltage Range: _____
- Turbine / Generator Inertia Constant: _____
- Active Aux. Load at Rated Power: _____
- Reactive Aux. Load at Rated Power: _____
- Does Aux. Load Trip with Generator: _____
- Short Circuit Ratio (Synchronous): _____

Power Factor Correction Capacitors:

- Capacitors Total kVAr: _____
- Capacitor Step Sizes: _____
- Capacitor Dielectric Losses (kW): _____

Reactive Power and Voltage Control Systems:

- Attach detailed description []
- Settings and Parameters: _____

Governor or Frequency Control Systems:

- Attach detailed description []
- Settings and Parameters: _____

Other Equipment:

- Attach single line diagram showing CBs, Disconnectors, Capacitors, Transformers []

Connection Circuit Breakers (for each CB):

- Equipment Label (eg. CB1): _____
- Rated Voltage: _____
- Nominal Current Rating: _____
- Short Circuit Rating (3-second): _____

Network Connection Disconnectors:

- Equipment Label (eg. SW1): _____
- Rated Voltage: _____
- Nominal Current Rating: _____
- Short Circuit Rating (3-second): _____

Protection Settings:

- Attach single line diagram showing Protection System []
- List Protective Devices and Settings: _____

Restrictions:

- Attach details of any special islanding, protection, or synchronising requirements []

Operational Data:

- Attach Details of any Low Load Restrictions []
- Cold Start Time to Achieve Minimum Load (All Plant Types):

- Warm Start Time to Achieve Minimum Load (Thermal Plant Only):

- Hot Start Time to Achieve Minimum Load (Thermal Plant Only):

- Typical time from Cold Start to Maximum Load (All Plant Types):

- Typical Power Ramping Rate from Minimum Load to Maximum Load:

Operational Profiles:

- Attach Estimated Generation / Demand Profile (in enough detail to enable identification of all generation scenarios): []

Declaration:

In submitting this inquiry I certify all of the above information and any attached information to be true and correct. I also certify that the generation we intend to connect to Eastland Network Ltd's network is rated at less than 10kW, and acknowledge Eastland Network's full and unlimited right to disconnect our generation should it generate at a rate greater than 10kW, or if any part of this application proves false or fraudulent.

Signature of applicant: _____

Post the completed initial application form and payment for \$200.00 plus GST (payable to Eastland Infrastructure Ltd) to PO Box 1048 Gisborne or deliver to 172 Carnarvon St, Gisborne.

For office use only

Date received _____

Date response required by _____

Initial application processed by _____

Initial application number _____

Initial application handed to _____

Confirm payment attached _____

Date payment banked _____

Confirm form correctly completed _____