

Distributed Generation - Guidelines & Application Form

For medium and large generators – total capacity greater than 10 kW

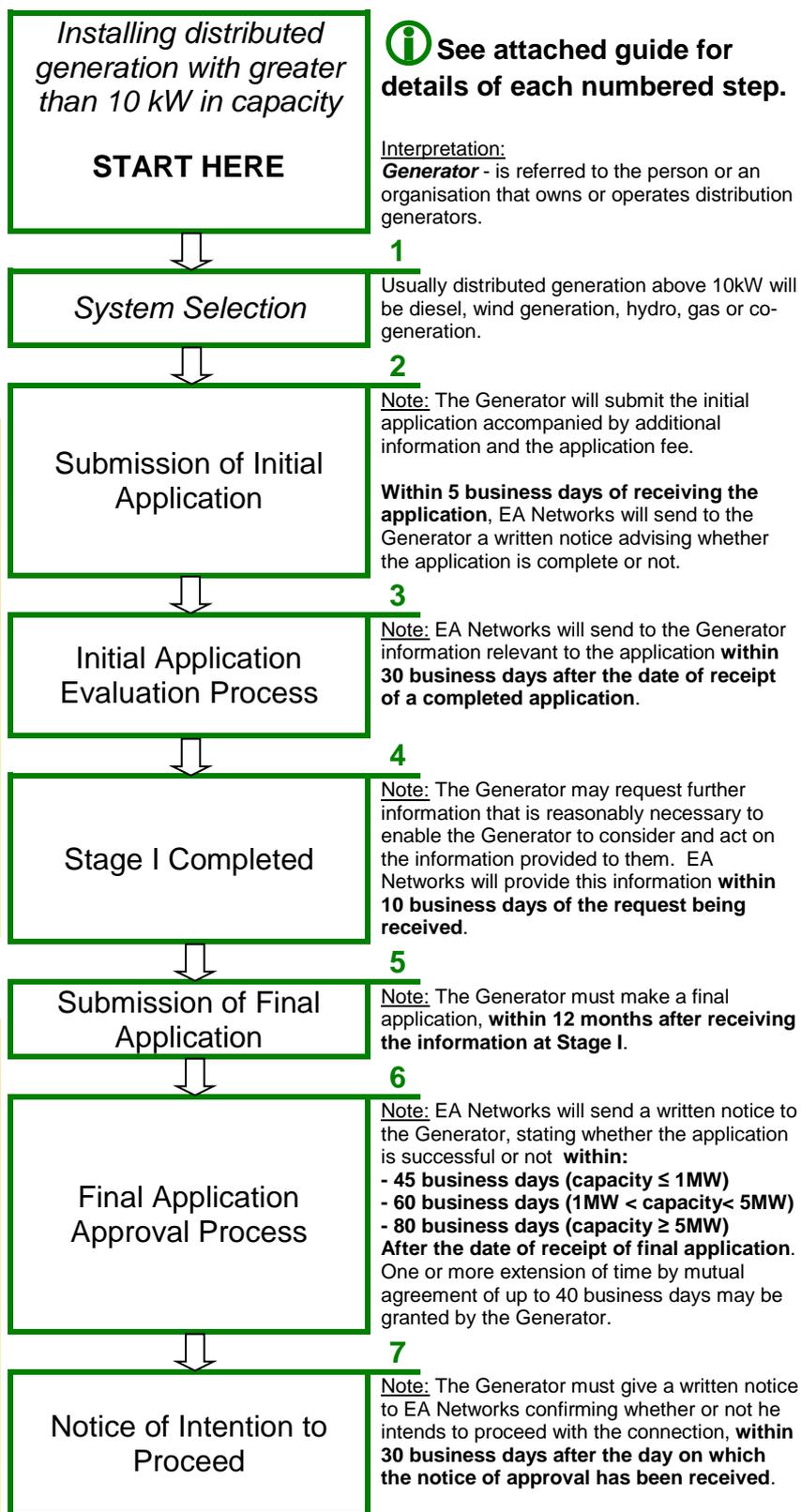
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Initial Application Process – Stage I

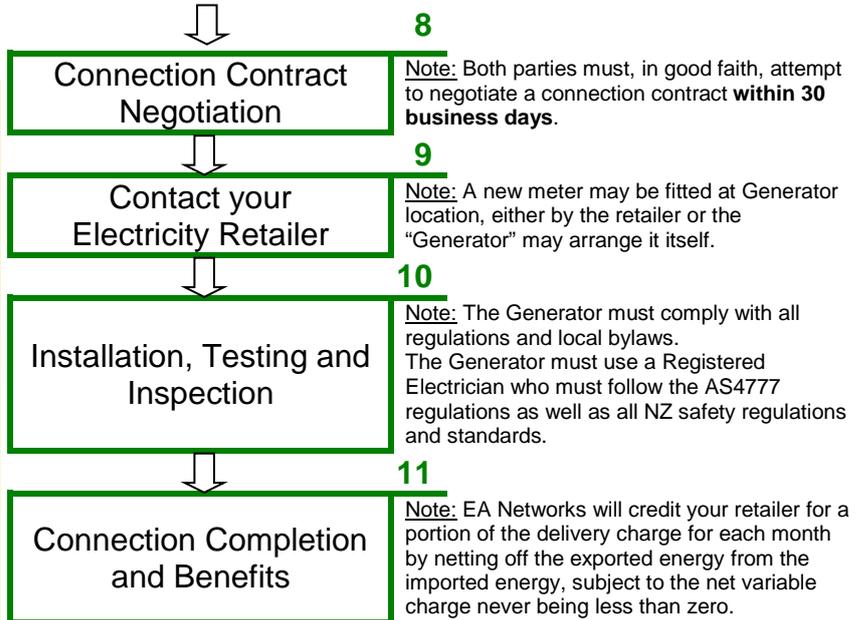
Final Application Process – Stage II



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Connection Process



The income from this generation will depend on the price negotiated with the retailer.

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Guide to installing distributed generation with capacity greater than 10kW

Introduction

This informational guide is for individuals or organisations who want to connect medium to large distributed generation systems (above 10kW) to EA Networks' Distribution 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.

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

Larger generators (above 1,000kW) may be subject to Transpower's terms and conditions. If this is the case, we will facilitate responses to Transpower's requests. The generator (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 a distributed generator is connected to our network, the generator is responsible for 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's [website](#).

For information about connecting smaller distributed generation, see "**Guide to installing distributed generation with capacity less than 10kW**".

These requirements apply to all existing or prospective distributed generators that may operate in parallel with the distribution network regardless of whether energy is exported or not.

These requirements do not apply to generators that have no connection to the distribution network.

1. System Selection

Usually distributed generators above 10kW are diesel or wind generation. Occasionally it could be hydro, gas or co-generation. Your system must comply at all times with the requirements of the [Health and Safety in Employment Act 1992](#), [Electricity Act 1992](#) and the rules and regulations made under the Electricity Act 1992. Your distributed generation system must also comply with the EA Networks connection and operation standards (EA Networks' "Conveyance and Use of System Agreement").

For this reason, EA Networks recommends you contact an experienced electrical contractor/consultant, to make sure that your distributed generation complies with all these requirements prior to submitting the application. This may involve extra charge.

All distributed generators connected directly to EA Networks' low voltage distribution network shall, as a minimum requirement, comply with the requirements of the "EEA Guide for the Connection of Generating Plant" (<http://www.eea.co.nz>) and shall be installed in accordance with NZECP4:1993 and/or NZS/AS 3000:2000 - Electrical Installations (known as the Australian/New Zealand Wiring Rules) or any subsequent revision.

The general requirements outlined in AS 4777 shall also be followed, where the generation plant uses inverters.

The presence of distributed generation shall not restrict EA Networks' requirements for switching on the distribution network.

2. Submission of Initial Application

Any person or organisation who wishes to connect distributed generation that is capable of generating electricity at a capacity above 10 kW in total, must apply to EA Networks by using the application form attached to this guideline and provide any information in respect of the distributed generation proposed to be connected.

If the application is for an increase in capacity for an existing connection, the generator has to provide information about the size (nominal capacity) of the additional generation and the size (nominal capacity) of all generators at the point of connection.

The application form has to be accompanied by detailed information requested in the form and the application fee.

Within 5 business days from the date when the application has been received, EA Networks will advise you in writing whether or not your application contains all the information required.

3. Initial Application Evaluation Process

Within 30 business days of receiving your completed initial application EA Networks 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:
 - i. whether we agree to you, or a suitably qualified agent for you, undertaking those studies; or
 - 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 Governance Rules);
- g. any additional information or documents that we consider would assist your application; and
- h. Information about the extent to which planned and unplanned outages may affect the operation of your distributed generation.

4. Stage I Completed

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

5. Submission of Final Application

If you decide to proceed with the connection, you must submit to EA Networks a final application together with the results of any investigative studies that were identified by EA Networks under clause 3.(e) above, within 12 months after receiving the information for the initial application (stage I).

After receiving your final application, EA Networks will notify all other persons and organisations that made an initial application for connection of distributed generation to that particular part of the network, that EA Networks' decision would be affected by the connection of the distributed generation that is the subject of the final application.

6. Final Application Approval Process

EA Networks will assess, based on the information provided in the final application, whether:

- a. the generator will comply at all times with the requirements of the [Health and Safety in Employment Act 1992](#);
- b. the distributed generation will comply at all times with the [Electricity Act 1992](#), and the regulations and rules made under this Act; and
- c. the connection of the distributed generation complies with EA Networks' connection and operation standards (EA Networks' "Conveyance and Use of System Agreement").

Within the time frame specified below, EA Networks will give you a notice in writing stating whether the application has been approved or declined. The time frame below is considered after the date of receipt of the final application.

Time within EA Networks will decide the final application

Distributed Generation Capacity	Time Frame
Less than 1 MW	45 business days
Between 1 MW and 5 MW	60 business days
Greater than 5 MW	80 business days

Due to situations which occasionally arise, EA Networks may seek one or more extensions of the final application processing time. In these circumstances, EA Networks will send you a notice in writing specifying the reasons and the additional time required for processing the application.

You may grant an extension of up to 40 business days and must not unreasonably withhold consent to an extension.

7. Notice of Intention to Proceed

Once the final application to connect distributed generation is approved, you must provide a written notice to EA Networks confirming whether or not you intend to proceed with the connection and if so, confirming:

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

Notice must be given to EA Networks within 30 business days after the day you received the approval to connect distributed generation, or within a longer period of time mutually agreed between EA Networks and you.

Failure to give prior written notice to EA Networks within the time limit specified, the application will be considered cancelled and EA Networks' responsibilities under the Electricity Industry Participation Code 2010, [Part 6](#) (the Code) will no longer apply. This does not prevent you from submitting a new application for connection of distributed generation.

8. Connection Contract Negotiation

After the written notice of intention to proceed has been received by EA Networks, both the applicant and EA Networks have 30 business days (starting on the date on which the EA Networks receives the notice) during which they must, in good faith, attempt to negotiate a connection contract.

If no connection contract has been negotiated by the expiry of the period for negotiating a connection contract, the regulated terms attached to this guideline will apply for the connection of distributed generation.

The period for negotiating a connection contract may be extended by mutual agreement between both parties.

9. Contact your Electricity Retailer

You must discuss your generator scheme with an electricity retailer as you may be selling any surplus of energy (exported energy) back to them. You can purchase from, and sell to, any retailer trading in EA Networks' area.

The electricity retailers that currently have a "Conveyance and Use of System Agreement" with EA Networks' network are:

- TrustPower
- Energy Online
- Meridian Energy
- Mercury Energy
- Just Energy
- Genesis Energy
- Pulse Energy
- Contact Energy
- Simply Energy

You need to have an agreement with an electricity retailer completed before you can connect your generator to EA Networks' network.

10. Installation, Testing and Inspection

All wiring associated with the system must comply with AS/NZS 3000 - Electrical Installations (Australian/New Zealand Wiring Rules) or any successive standard or legislation, and be undertaken by a registered electrician, where required by the legislation. You must also ensure that all building and other consents required are obtained, by discussing the proposal with your local council.

A system complying with Australian Standard (AS) 4777.2 and with protection systems installed in accordance with the AS 4777.3 will provide isolation and prevent this happening.

Your registered electrician should closely follow AS 4777.1 for Installation requirements. This Standard is downloadable from [Standards Australia](#). While AS 4777.1 deals primarily with the connection of inverter based systems, the principles covered by this standard shall also be followed for distributed generation systems that do not employ inverters.

The installation must also comply with EA Networks' "Conveyance and Use of System Agreement".

For generators above 10 kW that are connected to EA Networks' HV network, the minimum metering requirement will be to measure active and reactive energy, in half-hour intervals. This will require 4-quadrant "Time of Use" (TOU) metering to be installed. This metering will require either a telephone connection or a cellular connection for remote interrogation.

You should discuss the metering with your electricity retailer first, as they may install the required metering or choose to modify your existing metering.

Please note that after your application has been approved and the steps outlined above are complete, as a minimum you must:

- a. test and inspect your distributed generation before connection;
- b. give EA Networks adequate notice of the tests and inspection – we may send qualified personnel to the site to observe the testing and inspection;
- c. provide EA Networks with a written test report when testing and inspection is complete, including suitable evidence that the metering installation complies with the metering standards in the rules; and
- d. pay the fee specified by EA Networks for observing the testing and inspection, up to the maximum fee prescribed in Schedule attached.

The following tests should be carried out on both generation and associated control equipment:

- secondary injection testing of all protection
- proof of tripping circuits for protection operation
- automatic synchronising and interlocking
- load and VARs sharing stability
- loss of mains testing
- and compliance of warning notices and labelling.

Whether or not you entered into a connection contract with EA Networks before the period for negotiating a connection contract, you must complete the testing and inspection presented above prior the connection of distributed generation.

If you have entered into a connection contract with EA Networks, your distributed generation will be connected in accordance with that contract as soon as practicable. Otherwise, EA Networks will connect the distributed generation on the regulated terms as soon as practicable after the expiry of that period.

11. Connection Completed - Benefits

Once the connection has been completed, you and EA Networks must perform all obligations under the negotiated connection contract or regulated terms in accordance with connection and operation standards.

As owner of the distributed generation installation, you will need to negotiate a contract for the amount of electricity that is sold to an electricity retailer or to another party via an electricity retailer.

EA Networks will credit your retailer for a portion of the delivery charge for each month by netting off the exported energy from the imported energy, subject to the net variable charge never being less than zero.

EA Networks will credit you a portion of the avoided Transpower transmission charges – subject to negotiation of suitable terms and conditions.

12. Glossary

Business day means any day of the week other than Saturday, Sunday, or a public holiday (within the meaning of the [Holidays Act 2003](#))

Connect, in relation to distributed generation, means to be connected to a distribution network or to a consumer installation that is connected to a distribution network

Distributed generation means equipment used, or proposed to be used, for generating electricity that:

- a. is connected, or proposed to be connected, to a distribution network, or to a consumer installation that is connected to a distribution network; and
- b. is capable of injecting electricity into that distribution network

Distribution network means the electricity lines, and associated equipment, owned or operated by EA Networks, but does not include:

- a. the national grid; or
- b. an embedded network that is used to convey less than 2.5 GWh per annum

Distributor means a person who supplies line function services to any other person or persons (such as EA Networks)

Generator means a person who owns or operates distributed generation

Any term that is defined in the Electricity Industry Participation Code 2010, [Part 6](#) (the Code) and used but not defined, in this guideline has the same meaning as in the Code.

Please return completed form to:

EA Networks
Private Bag 802
Ashburton 7740

Phone: 03 307 9800
Fax: 03 307 9801

Details of your proposed distributed generation

The owner of the Distributed Generator must provide sufficient information to EA Networks to enable successful connection to the Distribution Network without affecting other connected Customers on the network.

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 (i.e. the maximum amount of electricity that your generation is able to inject into our network), to assess whether your proposed generation will exceed the capacity 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.

The extent of the information required will depend on the size and type of generation. This information will remain confidential between us unless agreed otherwise, however we reserve the right to release information about the distributed generation to meet our obligations to Transpower, the operator of the national grid, or as required by the Electricity Industry Participation Code 2010, [Part 6](#) (the Code).

We will use the information supplied in your application to evaluate and model our network to decide what method of connection would be needed and at which voltage level the connection should be made.

You must obtain our written agreement before you can connect distributed generation to our network

Details of a person/organisation applying to connect a Distributed Generator	Details of customer at premises where a Distributed Generator is to be connected
Name: _____	Name: _____
Company: _____	Company: _____
Address: _____	Address: _____
Phone: _____	Phone: _____
Cell phone: _____	Cell phone: _____
Fax: _____	Fax: _____
Email: _____	
ICP of Installation (from power account):	
Connection: <input type="checkbox"/> Existing <input type="checkbox"/> New <input type="checkbox"/> Residential <input type="checkbox"/> Commercial	
Expected Connection Date: _____	

Technical information for distributed Generators

The information required to be supplied to EA Networks for all Distributed Generation is as follows:

Data required for each Distributed Generator

Data required for range of power output	10~100 kVA	100~750 kVA	>750 kVA
Type of generator unit - synchronous, asynchronous, etc;	✓	✓	✓
Type of prime mover;	✓	✓	✓
Rated terminal Voltage (kV)	✓	✓	✓
Rated generator capacity (kVA);	✓	✓	✓
Rated minimum power factors (both over and under excited) at rated kVA;		✓	✓
Maximum continuous active power generated (kW);	✓	✓	✓
Maximum short term active power generated (kW);		✓	✓
For asynchronous generators, reactive power requirements (kVAr);	✓	✓	✓
Anticipated operating regime e.g. continuous, intermittent, peak lopping;	✓	✓	✓
Method of Voltage control;	✓	✓	✓
Generator transformer details, if applicable;			✓

Interface Arrangements

Data required for range of power output	10~100 kVA	100~750 kVA	>750 kVA
The means of connection and disconnection;	✓	✓	✓
The means of synchronisation between the Distribution Network and the Distributed Generator;	✓	✓	✓
Generator neutral and earthing arrangements;			✓

Technical Data

Data required for range of power output	10~100 kVA	100~750 kVA	>750 kVA
Lowest frequency at which the Distributed Generator can run			✓
Actual low frequency trip setting and time delay	✓	✓	✓
Actual over frequency trip setting and time delay.	✓	✓	✓
Minimum operating power;			✓
<i>Generator kW/kVAr capability charts (at lower Voltage terminals at nominal and $\pm 10\%$ of nominal voltage) at:</i>			
(a) maximum short term power;			✓
(b) maximum continuous power;		✓	✓
(c) 75% Output			✓
(d) 50% output			✓
(e) minimum power			✓
<i>Auxiliary power requirements at:</i>			
(a) Rated power output			✓
(b) Minimum power output			✓
(c) Start up			✓
<i>Start up times to minimum operating power:</i>			
(a) From Cold			✓
(b) From Warm			✓
(c) From Hot			✓
Normal ramp rate			✓
Time for cold start to full rated output;		✓	✓
Inertia constant (secs) (whole machine);			✓
Stator resistance;			✓
Direct axis synchronous reactance;			✓
Quadrature axis synchronous reactance;			✓
Direct axis transient reactance;			✓
Quadrature axis transient reactance;			✓
Direct axis sub transient reactance;			✓
Quadrature axis sub transient reactance;			✓
Leakage (positive sequence) reactance;			✓

Negative sequence reactance;			✓
Zero sequence reactance;			✓
Earthing resistance/reactance;			✓
<i>Time constants:</i>			
(a) Direct axis transient open circuit;			✓
(b) Quadrature axis transient open circuit;			✓
(c) Direct axis sub transient open circuit;			✓
(d) Quadrature axis sub transient open circuit;			✓
Generator transformer details (impedance, tap changer, vector group, earthing, maximum over voltage capability at rated frequency etc.);			✓
Type of excitation system: (block diagram/specifications, forward/feedback gains/time constants and limits);		✓	✓
Speed governor and prime mover data: (detailed functional description of governing system with all subsystems including system control and turbine time).		✓	✓

Control arrangements

It is preferable for Distributed Generators not subject to despatch, to export reactive energy (kVArh) whenever real energy (kWh) is being exported onto the Distribution Network. Subject to network voltage remaining within agreed limits, the desired power factor should be between 0.85 and 0.9 – see sections 6 and 7 regarding islanding detection requirements.

EA Networks will advise if continuously acting fast response automatic excitation and/or governor control systems are required to control the Distributed Generator voltage and frequency without instability over the entire operating range of the Distributed Generator. This will depend on the size and type of Distributed Generator and the characteristics of the part of the Distribution Network to which it is connected to.

Protection

The Distributed Generator shall be equipped with the appropriate protection elements as required by the “EEA Guide for the Connection of Generating Plant”. Distributed Generator owners are to consult EA Networks with regard to any special arrangements or protection that may be necessary due to the characteristics of the Distribution Network.

PROTECT REQUIREMENTS			
	10 ~ 100 kW	100 ~ 750 kW	> 750 kW
Generator Circuit Breaker	✓	✓	✓
Dedicated Transformer			✓
Disconnect/Isolate Switch	✓	✓	✓
Over-voltage protection	✓	✓	✓
Under-voltage protection	✓	✓	✓
Over-frequency protection	✓	✓	✓
Under-frequency protection	✓	✓	✓
Earth-fault protection		✓	✓
Over-current Voltage Restraint Protection			✓
Neutral Voltage Displacement Protection	✓	✓	✓
Synchronisation	✓	✓	✓
Loss of Network supply (Islanding see section 7)	✓	✓	✓
Power factor or Voltage Regulation Equipment		✓	✓

The protection associated with a Distributed Generator shall co-ordinate with the protection associated with the Distribution Network as follows:

- (a) In order to reduce to a minimum the impact of faults on the Distribution Network, the generator must meet target clearance times, that are agreed between EA Networks and the generator, for fault power flowing from the Distribution Network, EA Networks will ensure that the relevant protection settings are compatible with the target clearance times that are specified by EA Networks;
- (b) The settings of any protection which controls a circuit breaker, or the operating parameters of any automatic switching device at any Network Connection Point, shall be approved by EA Networks;
- (c) It will be necessary for the Distributed Generator protection to co-ordinate with any auto-re-close settings specified by EA Networks, and;
- (d) Any Distributed Generator connected to the Distribution Network may be required to withstand, without tripping, the negative phase sequence loading incurred during the clearance of a close-up phase-to-phase fault by Distribution Network back-up protection and which is within the plant short time rating.

Islanding

The part of the Distribution Network to which a Distributed Generator is connected, may inadvertently, or during emergency conditions, become detached from the rest of the Distribution Network, creating an "island". EA Networks will decide based on the local Distribution Network conditions, whether islanding is a credible possibility, and whether it is desirable for the Distributed Generator to continue to generate while connected to the islanded section of the Distribution Network. EA Networks would generally require that the Distributed Generator disconnect from the Distribution Network upon the detection of islanding.

If no facilities exist for the subsequent re-synchronisation with the rest of the Distribution Network, the Distributed Generator owner will, under EA Networks' control, disconnect the Distributed Generator prior to reconnection of the island to the rest of the Distribution Network and the subsequent re-synchronisation of the Distributed Generator.

Where EA Networks determines that islanding is a credible possibility and that the Distributed Generator is to disconnect upon detection, EA Networks will require that the Distributed Generator always export more reactive power than any credible islanded load can absorb. The Distributed Generator owner is to install equipment that is capable of detecting the resulting reduction in reactive power export/increase in voltage which would be caused by islanding and disconnect the Generator from the Distribution Network.

Under emergency conditions, some Distributed Generators may continue to operate outside the statutory frequency limits. Where Distributed Generators are connected to the Distribution Network at a Voltage level of 22kV or less, it is possible that there could be automatic low frequency load disconnection equipment within the load. Consequently, Distributed Generator owners should ensure that all protection on their Distributed Generator's has settings to co-ordinate with those on the automatic low frequency load shedding equipment. EA Networks will provide information on this equipment on request.