



## **CUSTOMER GUIDELINES for EMBEDDED GENERATION Up to 30kVA**

### **INTRODUCTION**

The guidelines deal with the installation of small private generating sources up to 30kVA that customers may wish to connect to Aurora Energy's distribution network via electronic dc/ac inverters. These guidelines do not cover engine-driven generators.

### **PURPOSE**

It is intended that such generating sources (utilising renewable energy sources) be allowed to be connected to the grid on the basis that:

- The purpose of the source is to reduce the customer's electricity bills.
- The customer still requires a supply of electricity from the Aurora Energy grid for at least part of the time (i.e. not stand-alone)

The guidelines have been developed in order to:

- Promote customer installations that are safe for both the customer and Aurora Energy line maintenance personnel.
- Protect customer installations against damage under fault conditions
- Ensure that other Aurora customers are not exposed to hazards or to disruptions of supply.

The primary concern of Aurora Energy is with the mains wiring and inverter, which provide the interface with the Aurora grid, and which must be approved by Aurora. The DC wiring of the renewable energy system and any batteries are the responsibility of the customer.

For larger plant up to 1000kVA in capacity and all engine-drive generators refer to a companion document that has been produced.

### **AURORA ENERGY POLICY**

In line with Aurora Energy's environmental policy of operating its business in a clean, green and sustainable way to ensure current and future generations are able to enjoy the benefits of a healthy, cultural environment, Aurora Energy seeks to cooperate with proponents of embedded generation projects

to ensure that inappropriate barriers are not put in the way of their connection to the distribution network. At the same time Aurora Energy seeks to ensure that technically acceptable methods of connecting the embedded generators are utilised and that the distribution network is developed in an economical, safe and reliable manner.

The technical requirements for network interconnection vary depending on the connection point. However, some common principles apply to all embedded generation sources, particularly in relation to safety.

As alternative sources of supply to the network are not common, Aurora Energy's network switching facilities are not routinely equipped with synchronisation check facilities. Accordingly, unless special arrangements are made, private generators are not permitted to remain electrically connected to the network in an "Islanded" mode, where the embedded generator and associated network becomes physically disconnected from Aurora Energy's network and one or more embedded generators maintains a supply of electrical energy to the isolated network. The prevention of "Islanding" may require the installation of extensive protection, control and monitoring facilities.

Embedded generators are required to make an equitable contribution towards the cost associated with installation and operation of any embedded generation systems.

## **GENERATOR CLASSIFICATIONS**

Embedded Generators are classified as follows:

Band 1 "MICRO" Domestic Combined Heat and Power (CHP) and all micro-generation connected at a voltage Level of 230/400V up to 16A per phase including single phase and three phase installations (3.7 kVA single phase, 11kVA three phase)

Band 2: "MACRO" Other small generation connected at voltage level of 230/400V capable of being connected to a 100A whole current metered service position (10kVA single phase or 30kVA three phase)

Band 3 "SMALL LV" Generation connected to the LV system at a voltage level of 230/400V (180kVA/162kW)

Band 4: "LARGE LV" Other generation connected to the LV system connected at a voltage level of 230/400V up to 1MVA

Band 5: "MEDIUM VOLTAGE" Generation connected to MV systems (i.e. 11kV or 22kV)

Band 6 “HIGH VOLTAGE” : Generation connected at 33kV or higher up to 30MVA.

Band 7: “CODE”: Above 30MVA above which rating the load would be despatchable by NEMMCO, unless an exemption is sought from NEMMCO. In the case of renewable sources that are dependent on availability of resource (such as wind), it would normally be expected that NEMMCO would provide an exemption.

## **MAJOR GENERATOR TYPES**

The types of generating equipment covered by these guidelines include:

- Photovoltaic solar arrays
- Small wind generators
- Small hydro generators
- Fuel cells

All of these generally produce direct current (DC) electricity and must transmit their generated electricity via DC to alternating current (AC) sine wave inverters.

When you are operating your generating equipment to reduce your power bills, a storage battery may not be necessary. However, you may install one for independent operation.

## **INVERTER REQUIREMENTS**

The electronic sine wave inverter should be of the grid-interactive type, be of good quality and performance in order to avoid mal-operation or damage to your household electrical appliances. Your inverter must generate an AC voltage having a good quality sinusoidal waveform with low harmonic distortion. Only Aurora Energy approved models, which satisfy the Australian Standard AS4777-2002 “Grid Connection of Energy Systems via Inverters” may be connected to the grid. Information on models of inverter that satisfy these guidelines is available from the Business Council of Sustainable Energy (BCSE). Their website is as follows: <http://www.bcse.org.au/>

An important safety requirement for the inverter is that it must be prevented from back-feeding the Aurora Energy network if the grid supply is externally de-energised. It should also be capable of restarting within a short period after the external grid supply is restored.

## **PLANNING AND SELECTION**

Aurora Energy’s main involvement with local generation is with the mains wiring and the sine wave inverter, which provides the interface with the grid. Aurora Energy is not able to offer assistance in the planning and selection of your proposed generating equipment other than the advice relating to the

interface with the Aurora Energy grid. You may seek to engage the services of an experienced consultant in this field.

The Business Council for Sustainable Energy has details of Accredited Installers, Suppliers and Consultants who are experience in this area.

## **RELEVANT STANDARDS AND GUIDELINES**

- Tasmanian Electrical Safety Code Feb 1997
- Aurora Service and Installation Rules
- Australian Standard AS/NZS 3000:2000 - SAA Wiring Rules published by Standards Australia
- Australian Standard AS 4777:2002 Grid Connection of Energy Systems via Inverters
  - AS 4777.1-2002 Part 1: Installation requirements
  - AS 4777.2-2002 Part 2: Inverter requirements
  - AS 4777.3-2002 Part 3: Grid protection requirements
- ESAA Customer Guide to Electricity Supply Mar 2002

## **INSTALLATION AND CONNECTION TO GRID**

The installation of the renewable energy generating sources should always be carried out strictly in accordance with the manufacturer's recommendations, and must meet the requirements of your local council's planning and building departments.

A registered electrical contractor must carry out the electrical cabling and connection to your switchboard. The wiring and equipment must be in accordance with the SAA Wiring Rules (AS/NZS 3000:2000).

Your new installation must be checked by a licensed electrical inspector prior to connection to your main switchboard.

The customer's inverter must be connected to a dedicated circuit on your main switchboard via a lockable isolating switch, protective device and cables which are suitably rated for at least the short time rating of the inverter. The switchboard busbar rating should also be checked by your registered electrical contractor.

The switchboard must be clearly and permanently labelled as having an inverter energy system connected to it. The circuit breaker, fuse or switch must also be clearly labelled.

Surge protection is also needed to prevent external network surges from damaging your renewable energy-generating source.

In order that maintenance work can be carried out on your equipment and on the grid connection, a manually-operated switch or circuit breaker must be provided in an accessible location and have the ability to be locked on and off.

In order to limit an in-rush of damaging current from the grid if a fault develops in your equipment, a fuse or circuit breaker is required for automatic disconnection. These are most conveniently fitted at your main switchboard where the mains connection is made or at the inverter.

## **INSTALLATION APPROVALS**

Information on models of inverters, which satisfy the Australian Standard, is available from the Australian Business Council for Sustainable Development.

The electrical wiring will need to be inspected by a licensed electrical inspector. The Office of the Tasmanian Energy Regulator maintains a listing of licensed electrical inspectors.

## **AURORA ENERGY RESPONSIBILITIES**

Aurora Energy is responsible for the safe and reliable transport of electricity to your premises and to the premises of all its other customers.

Aurora Energy reserves the right to inspect your installation by prior arrangement to ensure that it does not pose a hazard.

Aurora Energy may be obliged to disconnect your generating plant if it is causing nuisance to other customers connected to the grid.

## **CUSTOMER RESPONSIBILITIES**

The customer is responsible for the safe installation, operation and maintenance of its generating source. The installation must conform to Australian Standards AS/NZS 3000:2000, Aurora Energy's Service & Installation Rules and should be regularly inspected and maintained in accordance with the manufacturer's instruction manuals.

The customer is responsible for the safety of any person operating or maintaining generating equipment and accessories that are on its premises.

The customer is responsible for fitting adequate protective devices to prevent damage to its generating equipment under conditions of short circuit, voltage surges or other faults.

Your equipment should be regularly inspected and maintained in accordance with the manufacturer's instructions.

The customer is responsible for meeting all current codes and regulations dealing with storage and use of inflammable fuels, with levels of noise and atmospheric emissions, and with personnel safety and health.

## **ENERGY PRICING**

The value to you of the electrical energy generated by the power source (kilowatt hours (kWh)) will be determined by Aurora Energy Retail. For units of a renewable energy source in Band 1, Aurora Energy accepts a net metering approach, giving you full credit for all energy exported at the same price as the energy purchased from Aurora Energy Retail.

## **FEES**

A project fee may need to be paid to Aurora Energy depending on the rating of the unit. Aurora Energy may also make a charge with respect to Metering fees. In the case of small solar generators (Band 1 'Micro') this metering fee is currently waived.

## **METERING**

For existing premises your meter may need to be replaced. Aurora Energy is responsible for arranging the metering for new installations.

## **INSURANCE**

Most household insurance policies do not cover the failure of electrical devices such as inverters. The generation equipment may need to be separately specified on your insurance policy.

You are advised to contact your own insurance company to check coverage.

## **APPLICATION FORM**

Customers seeking to install inverter-connected generating sources must fill out the Application Form attached.

Please provide all relevant details requested on the form in order to avoid delays in approval.

You may also be asked for a sketch of the electrical wiring changes proposed by your registered electrical contractor.

## **DISCLAIMER**

While Aurora Energy makes every effort to ensure that this information and material is current and accurate, the information and material is provide to you on the understanding that:

- Aurora Energy makes no warranty, guarantee or promise, express or implied, in relation to the content or accuracy of this information and material
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