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Distributed Generation Metering Guide

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Prepared by SEANZ for forward thinking people in New Zealand

FAQ covering metering of network-connected small scale distributed generation installations in New Zealand - May 2008

The purpose of this guide is to give an overview of the metering requirements for small scale distributed generation (DG) systems in New Zealand. It is written as a general set of guidelines for anyone looking to install their own network-connected DG system. It contains a number of helpful [hyperlinks](#) to online references that should operate on any internet connected PC.

What are the rules?

[Government regulations](#)¹ released in August 2007 provide a process that governs connection of DG to a distributor's electricity network and the requirements on each of the parties. The regulations are set out in two categories:

- for DG with rated output of 10 kW or less and
- for DG rated in excess of 10 kW.

Household scale DG – such as a small solar PV array or a micro-wind turbine - will normally fall into the lower output category above and the regulations have been designed to provide a simplified and streamlined connection process for these. This guide focuses on these smaller DG installations.

Which parties are involved?

1. **You**, the person considering having a DG system installed.
2. The **distributor**, which is the local lines company that is already providing the electricity network (transformers, poles, wires and cables) in your area and connected to supply your premises.
3. The **retailer**, which already supplies you with electricity and bills you for this delivered electricity service. Under NZ electricity market governance rules, *the retailer is also responsible for providing a standards-compliant electricity meter that measures the amount of electricity you use.*
4. The **metering services company**, which owns meters and installs and maintains them when requested to do so by a retailer. Metering services companies in NZ are commonly owned by retailers and distributors but it

¹ Formally titled: *Electricity Governance (Connection of Distributed Generation) Regulations 2007 (SR 2007/219)*

helps the understanding of industry roles to treat them as a separate entity.

What types of metering systems are we talking about?

Before you install your first DG system, you'll have one or more simple **import meters** on your meter board that measure the electricity consumed within your premises in units of kilowatt-hours (kWh) – commonly, 1 kWh is referred to simply as 1 “unit” of electricity. Most premises have a single import meter but, depending on the electricity price option chosen, you might have more than one. For example, in some areas a second meter separately measures the electricity that is used by your hot water storage cylinder and the retailer provides a lower price for this electricity and in return retains the right to switch this supply off for a limited number of hours daily.

The vast majority of simple import meters installed today in NZ have a single energy register that you can see as a tumbler dial on the front of the meter or as a series of radial dials for each digit. Typical examples are shown below.



These meters are read manually by a meter reader on a monthly or, most commonly, a two-monthly read cycle. Retailers typically bill you monthly and therefore make an estimate of your consumption in the off-read months that is settled out when an actual read is subsequently carried out.

Once you've installed DG at your premise, you'll need more than a simple import metering system as your needs are now slightly more complex. With DG installed, [regulations](#)² require you to provide a metering installation that separately measures the quantities of electricity that flow (a) from the network

² See Schedule 2, clause 4 Meters

(import) and (b) back into the network (export). We call this type of metering system **import/export metering**. A [later section](#) in this document deals with net-metering and net-billing.

While there are quite a few meter manufacturer/model options, they will likely have a more modern appearance and typically incorporate a simple LCD display, such as this one:



An import/export meter will have **two separate energy registers** that can be read manually by a meter reader. An alternative is to install two simple meters, one wired to read imported electricity only and the other to read exported electricity. The exact arrangement used is determined by the metering services company and is possibly influenced by the age of your existing meter and the availability of space for mounting meters on your meter board.

Increasingly commonly in NZ from 2008, manually read meters are being phased out and replaced by so called **smart meters**, also known as **advanced metering systems** (AMS). AMS uniquely and importantly has a two way communications capability – e.g. via the mobile/cellular or land line telephone network. This provides the ability to remotely read the meter, upgrade the meter's internal programming on the fly and measure and log energy use in much shorter time intervals than the usual two-monthly reads by walk-around meter readers. The most likely time interval to use will be a half hour period, as this fits in with the way that energy is traded in the wholesale electricity market in NZ.

Importantly for DG, an AMS can also be set up in an import/export configuration.

Who needs a metering system?

You, your **distributor** and your **retailer** all rely on a metering system in general and, in particular where a DG system is also installed at your premises, the interests of each of the parties in a metering system are as follows:

1. Because your DG may have the capacity to generate electricity in excess of your immediate electricity needs, **you** want to know how much excess generation is exported back to the network. The metering system installed will have the capability to separately measure the amounts of electricity you take off the network and the amounts of excess electricity you inject back into the network.
2. There are two reasons why the **distributor** relies on a metering system at your premises. Firstly, the price the distributor charges the retailer to deliver electricity to your premises has a component based on the amount of electricity delivered to you, measured in kWh³. Thus, the distributor needs access to the metered consumption data so as to determine its charges for network services.

Secondly, by law the distributor is the party responsible for the overall quality of network supplied electricity, regardless of whether all the electricity flows from the network or whether some is injected (exported) back into the network from a DG. Hence, the distributor is likely to be particularly interested in parts of its network where there are significant levels of exported electricity occurring. While this is not so much of an issue today, it is one that distributors are keeping a close eye on and metered export data is a useful tool for this. This also explains why distributors publish network connection standards and request a comprehensive schedule of technical information on prospective DG installations before consenting to their connection to the network.

[Schedule 1](#) of the 2008 DG Regulations referenced above and distributors' own website published [DG connection guides](#) are further useful references to the specific information required in support of each DG connection

³ This is the most common commercial arrangement that distributors have in NZ for charging for use of their networks. Confusingly for consumers, there are other possibilities. The details of the commercial arrangements between distributors and retailers have an important bearing on the usage of metered data where DG is installed at a premise.

application.

As a final point here, note that under the 2007 [DG Regulations](#), the distributor *may* recover from you the reasonable costs incurred by them of connecting your DG to the network and operating their network with your DG connected, net of any identified benefits provided by the connection and operation of your DG system. For small-scale DG, specifically the installation of systems of under 10 kW capacity, it has been argued that these costs and benefits are generally small and approximately net out to zero; in fact, in current practice, distributors are not generally requiring up-front or ongoing connection charges where there is no new connection equipment provided by them in the process of connecting your DG system.

Further, the distributor *may* charge you for costs it incurs in *processing your DG connection application* and for any *inspection it might carry out* once your system is installed. Both of these charges are subject to [regulated caps](#); currently in May 2008 for installations of 10 kW or less capacity these are \$200 for processing applications and \$60 for inspecting installations.

3. Your **retailer** sells electricity to you at your point of connection with the network. They rely on the metered quantities of electricity you consume to make up your bill.

With no DG present within the premises, this situation applies to the vast majority of NZ. When DG is introduced into the picture, unless you choose to completely disconnect from the network, you will still very likely continue to draw electricity supplies from the network and the above arrangement will continue. However, it is possible that your DG output at any instant might exceed your own electricity needs at that same instant. In this case, electricity in excess of your immediate needs will flow back into the network, since it cannot be stored in your premise's wiring system. Commercially, you have become a wholesale, network-connected generator and the retailer is your customer for your excess electricity. To set this up so you get paid or credited for your electricity sales, you will need to enter into a separate agreement with your retailer before

switching on your DG system. You'll be very interested in the export register quantities, as this is the measurement by which you will get paid by or credited from the retailer for your excess generation.

I've heard of net-metering and net-billing being used overseas where DG is installed. Can I get a net-metering system or net-billing contract from a retailer in NZ?

Net-metering relies on a simple import meter that operates normally when you take electricity off the network and effectively "runs the dial backwards" at times when you export your excess DG capacity back to the network.

Net-billing provides the same outcome as net-metering but the meter used is an import/export meter and the "netting" is done by the retailer subtracting the exported energy quantity from the imported energy quantity and then billing on the net (subtracted) amount.

The NZ distributed generation regulations effectively prohibit the use of net-metering by requiring an import/export metering installation in all cases. There's nothing *in law* that either requires or prevents net-billing in this country but in NZ's competitive retail electricity market there are currently no known retailers that offer this as an option for DG owners.

Absent being forced to by regulation, there's no purely commercial incentive for a retailer to offer a net-metering DG option or indeed any other option that values the exported electricity at a higher level than their normal wholesale energy purchase price. However, there might be other reasons why retailers may offer more generous buy-back rates - as these can change over time, it's certainly worth shopping around. Net-metering effectively requires the retailer to pay you at their full retail sale price for your exported electricity. Retailers buy goods at wholesale prices and sell them to customers at (higher) retail prices. They incur fixed and variable costs in the process of carrying out their business and seek to make a profit for their shareholders. Exported DG electricity that exceeds your own needs is commercially a wholesale purchase opportunity for a retailer that they will weigh up against their alternative energy purchase options.

In countries where they are used, feed-in tariffs (i.e. regulated fixed minimum prices that retailers must pay DG owners for their exported electricity) and net-metering arrangements are invariably put in place by governments pursuing specific energy policy goals.

So can I provide my own export meter?

The DG Regulations require you to ensure an appropriate metering installation is installed. While strictly speaking, with your retailer's agreement you could undertake to do this, e.g. by contracting directly with a metering services provider, the simplest approach is to let your retailer make these arrangements.

These days, both technically and from a cost perspective, there is little if any difference between a modern simple import meter and a combined import/export meter. Retailers arrange for metering services companies to install and maintain millions of metering systems nationwide. As a mass-market retailer, they will likely be reluctant to agree to a one-off special case where *they* provide the import meter but *you* provide the export meter (bear in mind that there is currently no compulsion for any retailer to agree to purchase your excess generation from you).

Retailers' costs to track and operate special case arrangements added on top of your costs to provide a standards and rules compliant export meter would make this a complex and inefficient scenario from everybody's perspective. A single modern import/export meter managed centrally is both an administratively simple and cost-effective solution.

If the retailer arranges for the metering system, then presumably they will charge me for this service?

They will but it is typically a very small component of the overall bill. Recovery of the cost for providing a metering system at your premise in your pre-DG days has always been included within each retailer's retail prices. It is typically not broken out as a separately identifiable charge component by retailers. It is also a mistake to assume that the fixed daily charge shown on your bill – which may contain a descriptive name that references a particular metering configuration – is *solely* a charge for metering services or distributor lines charges or retail operations costs or any other item. It is not possible for you to unbundle this

cost component without access to the retailer's commercially sensitive information.

What happens to the data collected by the metering system?

Whether the data is manually read by a walk-around meter reader or automatically by an AMS, metering data for both import and export quantities is processed by a service provider known as a data administrator. The data has several uses:

1. From **your** perspective, the data is used for invoicing. With export-capable DG installed and a buy-back agreement in place with your retailer, a typical invoice will have two components⁴: (a) a normal import component that shows what you've bought off the network and a charge for that at the prevailing retail electricity price and (b) a new export component that shows the excess electricity you've injected back into the network and the credit or payment you receive for that at the price you've agreed for that in accordance with the terms of the agreement you will have entered into with the retailer.
2. The **distributor** receives a copy of the metered **import quantities** that they then use in preparing invoices for lines charges. They might also request a copy of the **export register quantities** for network planning and management purposes.
3. The **retailer** firstly uses import and export quantities for reconciling the net amount of electricity it purchases from its suppliers and from the wholesale electricity market. It then uses these quantities to make up its customer invoices/buyer created tax invoices, as in item 1 above. Note that as an exporting distributed generator, you effectively become one of the retailer's electricity suppliers!

So I'm tied to whatever the retailers offer then?

In the current market conditions and under current Government energy policy settings for DG, this is broadly the situation. However, times change, markets

⁴ More technically, the DG energy buy-back part of this invoicing arrangement is called a **buyer created tax invoice**. At the time of writing this guide, the Electricity Commission has published for consultation an updated *Model Domestic Contract for Delivered Electricity* that is intended to guide retailers in establishing their own customer contracts. See in particular *Schedule 1: Payment for electricity you send into the network* starting at page 40 of [this document](#).

develop and Governments evolve their policies over time. As more people connect DG systems, metering systems are upgraded to provide AMS capabilities and energy management technologies are developed, it is possible that options will be discovered that unlock the hidden values in DG and related consumer energy solutions.