

Distributed Generation Connection Guide



A GUIDE FOR CONNECTING GENERATION THAT FALLS UNDER
G83/1-1 STAGE 2 TO THE DISTRIBUTION NETWORK



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In the event that there is any conflict or contradiction between this Guide and the engineering standards and codes referenced in the Guide, the terms of the referenced documents will prevail. These include inter alia Engineering Recommendation G83/1-1, Engineering Recommendation G59/2, the Distribution Code, the Grid Code, the Connection and Use of System Code and the Balancing and Settlement Code.

Distributed Generation Connection Guide: An Introduction

Who is this Guide for?

This Guide is intended to help you, as an owner or developer of Distributed Generation, to connect your generating plant to one of the UK's electricity distribution networks. The types of generation that most frequently connect to the distribution networks include renewable energy schemes (e.g. photo voltaic and wind) and Combined Heat and Power (CHP) schemes.

What is the aim of the Guide?

The main aim of the Guide is to provide a 'route map' of the processes for getting a generation scheme connected to the distribution network. The Guide provides an overview of the connection process, as well as more details on the notification stage.

In addition to its main aim of providing a 'route map' of the connection process, the Guide has a number of other aims:

- to provide background information about the UK power sector and the role Distributed Generation has to play;
- to describe the main factors affecting ongoing charges;
- to describe Feed-in Tariffs (FITs), a key financial incentives for Distributed Generation.

What is not covered in the Guide?

In addition to arranging a connection to the network, you may also have other issues to address in order to get your scheme up and running. These include:

- Designing, installing and operating the generation installation
- Planning the project
- Financing the project

- Resolving local planning issues

These issues are outside the scope of this Guide.

The format of the Guide

This Guide has been written and formatted with you, the reader, in mind. We have tried to make this Guide as clear and easy to read as we can, bearing in mind that some of the issues discussed are technical and complex. In particular:

- Terms which may be unfamiliar are defined or explained in boxes around the main text.
- Key points and summaries are highlighted.
- Text is **boldened** for emphasis.
- Where necessary the Guide distinguishes between the arrangements that apply in Scotland and those which apply in England and Wales. This is indicated with a Scottish flag.
- At the end of most chapters there is a pointer on where to find more information.



Distributed Generation Connection Guide: An Introduction

Governance of the Guide

This Guide is a Distribution Code Review Panel (DCRP) document. The DCRP will update the Guide using similar processes it has for updating other distribution related documents.

There are many areas of regulation and legislation relating to Distributed Generation which are evolving and a number of issues are under consultation. The Guide has tried to capture the most up to date position at the time of writing. However, for the most up to date information you should refer to key documents and organisation websites. Please see the reference section for more information.

Distributed Generation Connection Guide: Contents

Contents

A. The UK Power Sector
Quick Overview
A Guide

B. The Role of Distributed Generation

C. An Overview of Getting connected: G83/1-1 Stage 2

D. The Connection Application: Connection Notification G83/1-1 Stage 2

E. Costs and Charges: Ongoing Charges

F. Selling electricity: Feed-in Tariffs

Glossary

References

Revisions

A. The UK Power Sector: Quick Overview

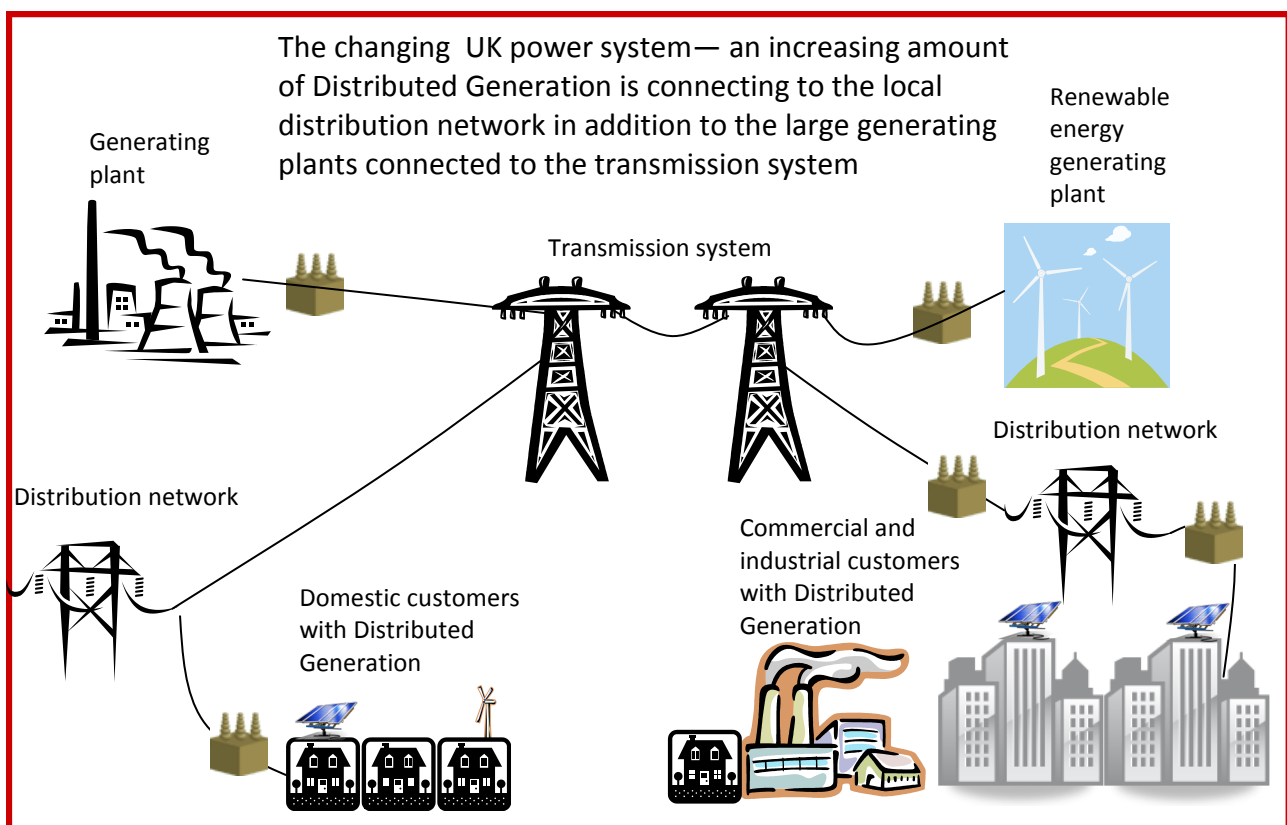
Distributed Generation (DG):

Your generation scheme is classed as Distributed Generation (DG) if it operates while electrically connected to the distribution network. The term “Embedded Generation” is sometimes used. You could consume the electricity you generate from your Distributed Generation scheme to reduce your consumption from the network. Alternatively you could export some or all of it to the Distribution Network Operator’s (DNO) network.

Distribution Network Operator (DNO): DNOs operate and maintain a public electricity distribution network. DNOs can form part of a group that undertakes other areas of business as well, e.g. electricity supply. However you will have to interface with the network operator business. You cannot choose which DNO you are connected to as it depends on where you are located geographically.

Electricity supplier: Electricity suppliers purchase electricity from Generators and sell electricity to commercial, industrial and domestic customers.

Regulator: Ofgem is the Office of Gas and Electricity Markets. Ofgem is responsible for regulating the electricity supply industry.



A. The UK Power Sector: A Guide

In this section:

- An introduction to the UK power sector
- A look at how the power sector is changing
- An overview of the commercial structure of the power sector
- A discussion on key parties and a definition of other parties that you may come across while developing your Distributed Generation scheme
- Guidance on where to find more information

Read the boxes for definitions or explanations of terms that may be new or unfamiliar.

Introduction

The power sector in the UK has been undergoing changes since the industry was privatised in the early '90s. This is due to the industry adapting to privatisation, changes in environmental awareness, technological developments and Government policy.

A key change is the movement from a relatively small number of large, centrally controlled power stations connected to the transmission system towards a greater number of generating plants connected to both the transmission and distribution systems. We will illustrate the traditional and the changing power sector, and introduce the parties involved.

Apart from the physical structure of the power sector, there is also a commercial structure. The trading chain differs from the physical flow of electricity. Parties are introduced that do not necessarily own any assets but help to organise the buying and selling of electricity.

The roles of key parties are discussed, and other parties that you may come across as you develop your Distributed Generation scheme are defined.

The Changing Power Sector

Traditional power sector

The diagram below illustrates the traditional power sector. Large power stations running on coal, natural gas and nuclear power are connected directly to the transmission system. In general, the majority of the coal and gas fired power stations are located in the north of the UK, and the nuclear sites are located around the coast. However, electricity consumption is weighted towards the population centres of south-east England and the Midlands. Each region in the country is served by a distribution network, which is connected to the transmission system at one or more grid supply points. Power passes

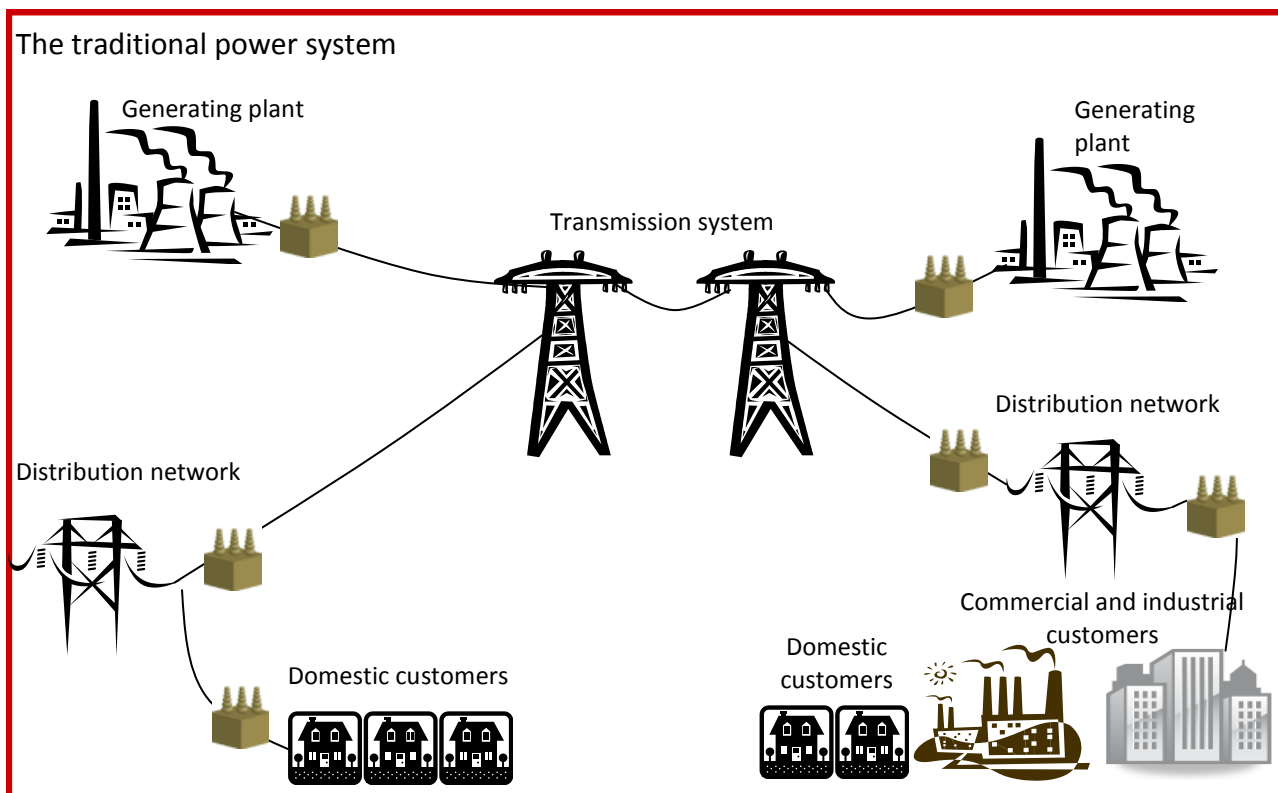
through the distribution network, from the grid supply point to the final users.

The physical components of the network are illustrated below, and they have associated parties or operators, and roles, as shown in the table.

Other roles and parties include:

- **System Operator:** The supply and demand on the physical system is balanced in real-time by the System Operator. National Grid Electricity Transmission (NGET) currently takes this role.

Components	Key Player	Role
Generating plant	Generators	Produce electricity
Transmission system	Transmission System Owners (TSOs)	Transport power from generating plants to distribution networks
Distribution network	Distribution Network Operators (DNOs)	Distribute power from the transmission system to customers



The Changing Power Sector

- **Balancing and Settlement Code Company:** The supply and demand balance of trading is managed by the Balancing and Settlement Code Company, Elexon.
- **Regulator:** As there are geographical monopolies associated with physical networks, there is a regulator to protect customers. The regulator is called Ofgem.
- **Suppliers:** Electricity suppliers purchase electricity from Generators and sell electricity to commercial, industrial and domestic customers.

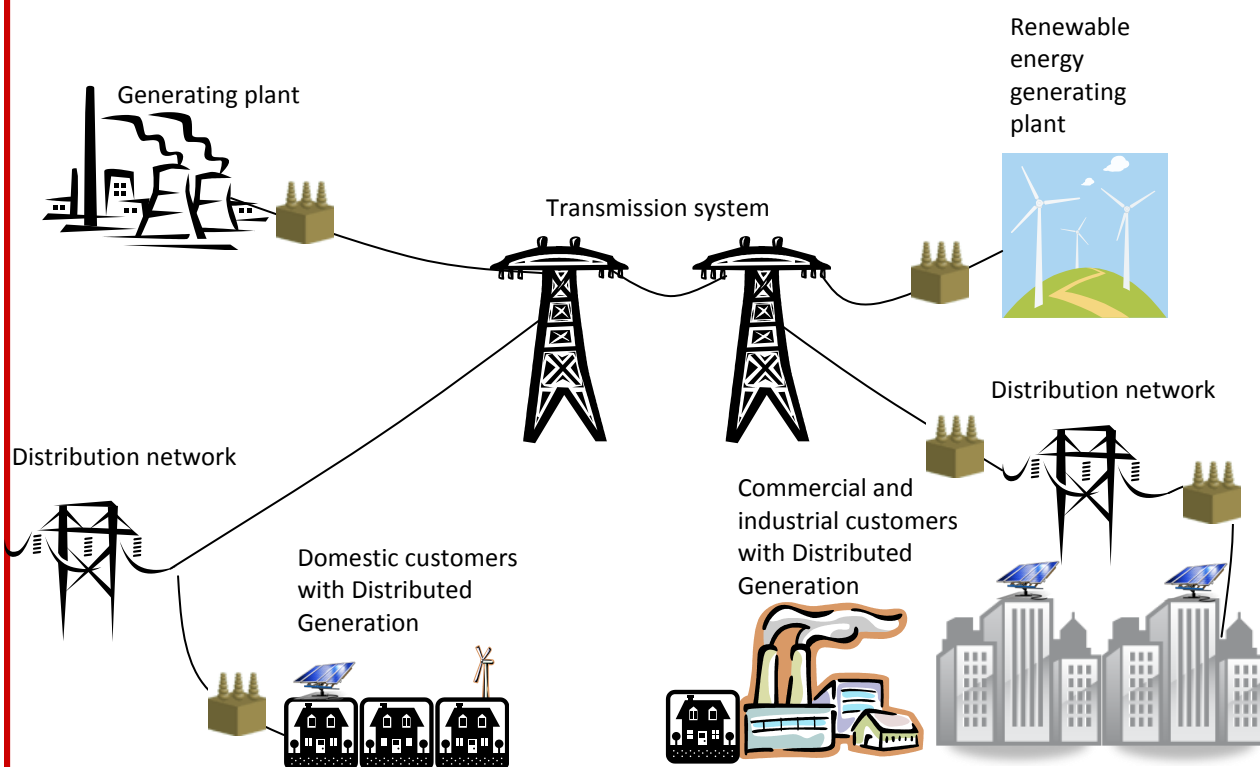
Changing power sector

In addition to the large generating plants connected to the transmission system, an increasing number of small electricity generating plants are connected throughout the distribution networks rather than to the transmission system. Generating plant connected to the distribution network is called Distributed Generation (DG). DG results in power flowing both from the distribution network to customers, and from customers with DG into the distribution network. The system is no longer a “waterfall” system, with power flowing from the large generating plants in one direction towards customers. Instead, it is more interactive.

We will now look at newer parties that have developed recently in the power sector.

Apart from the fourteen licensed distribution networks, which are owned and operated by the seven DNOs in Great Britain, there are new network assets being built and connected

The changing power system



The Changing Power Sector

to the existing distribution network. For example, these network extensions can be built to serve a new housing development. They can be owned and operated by Independent Distribution Network Operators (IDNOs).

As well as DG and IDNOs, another party that is relatively new to the power sector is the

Energy Service Company (ESCO). The definition of ESCO is quite broad; a company that provides customers with “energy solutions”. This could be a combination of providing soft solutions (e.g. advice) and providing assets (e.g. renewable generation).

We discuss these parties in more detail in the Key Organisations section.


Commercial Structure

The commercial structure of the industry

The commercial structure of the electricity industry in Great Britain provides a competitive market in electricity retailing. This enables customers to buy electricity from, and sell electricity to, any one of a number of competing electricity suppliers.

There is a wholesale electricity market, in which suppliers buy electricity in bulk from competing electricity generators. The wholesale market is governed by British Electricity Trading Transmission Arrangements (BETTA), which was introduced in 2005.

The transmission and distribution systems are owned and operated by regulated monopoly businesses. The transmission system owners are as follows:

- National Grid Electricity Transmission (NGET) in England and Wales
-  Scottish Power in southern Scotland (SP Transmission Ltd)
- Scottish and Southern Energy (SSE) in northern Scotland (Scottish Hydro Electric Transmission Ltd, or SHETL)

NGET is also the System Operator for the whole of Great Britain. The Scottish

transmission system owners are also DNOs in their respective regions. Seven DNOs operate the distribution networks in England and Wales. Transmission and distribution businesses recover the costs of operating and maintaining their systems by levying use of system charges on electricity traded using their network.

A description of trading

Generators sell the electricity that they generate in the wholesale market or directly to suppliers. Suppliers sell the electricity they purchase to customers. The majority of electricity trading occurs before it is actually used.

If you install Distributed Generation you can use the electricity you produce on-site, thus lowering your electricity demand and bills. You can also sell electricity to suppliers. You will read more about power trade options in Section F. Selling Electricity: Feed-in Tariffs.

Key Organisations

Distribution Network Operator (DNO)

A DNO is a company that:

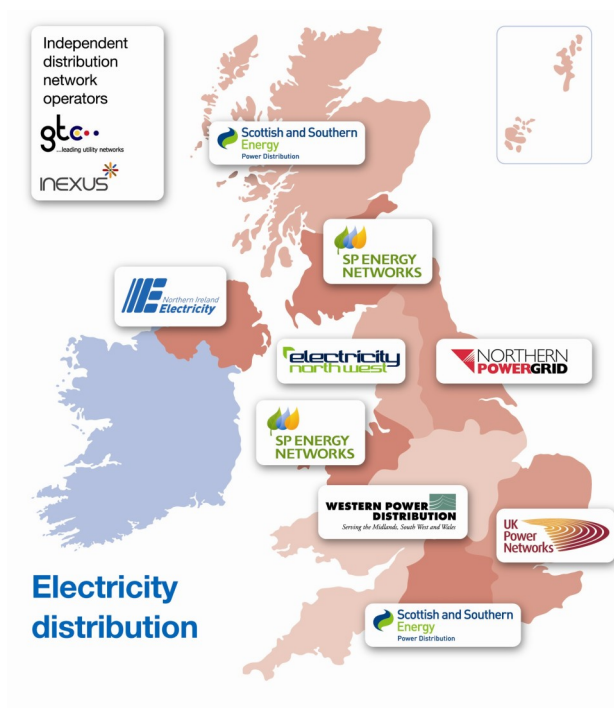
- Owns, operates and maintains a public electricity distribution network
- Holds a Distribution Network Operator Licence

There are six DNOs in Great Britain. The regions where they operate are shown on the map below. DNOs can form part of a group that undertakes other areas of business as well, e.g. electricity supply. However, you will

have to interface with the network operator business.

Under the terms of their licence, each DNO is allowed to distribute electricity both inside and outside its legacy geographic area. To facilitate competition in supply, each DNO is required to allow any licensed supplier to use its distribution network to transfer electricity from the transmission system (and from Distributed Generation) to customers. DNOs charge suppliers for using the distribution system.

Map of DNO regions in the UK



For DNO website details, please see Where to Find More Information at the end of this section.

What is Distributed Generation?

Your scheme is classed as Distributed Generation (DG) if it operates while electrically connected to the distribution network. The term “Embedded Generation” is sometimes used, but in this Guide we will use the term Distributed Generation. Your generating plant could be connected directly to the DNO’s network, or connected indirectly via a privately owned network. This is shown schematically on the next page.

You could consume the electricity you generate to reduce your consumption from the network. Alternatively you could export some or all of it to the DNO’s network.

Key Organisations

Independent Distribution Network Operators (IDNOs)

An IDNO designs, builds, owns and operates a distribution network, which is an extension of an existing DNO network. They typically build network for new developments such as business parks, retail and residential areas and leisure facilities. IDNOs differ from DNOs in that:

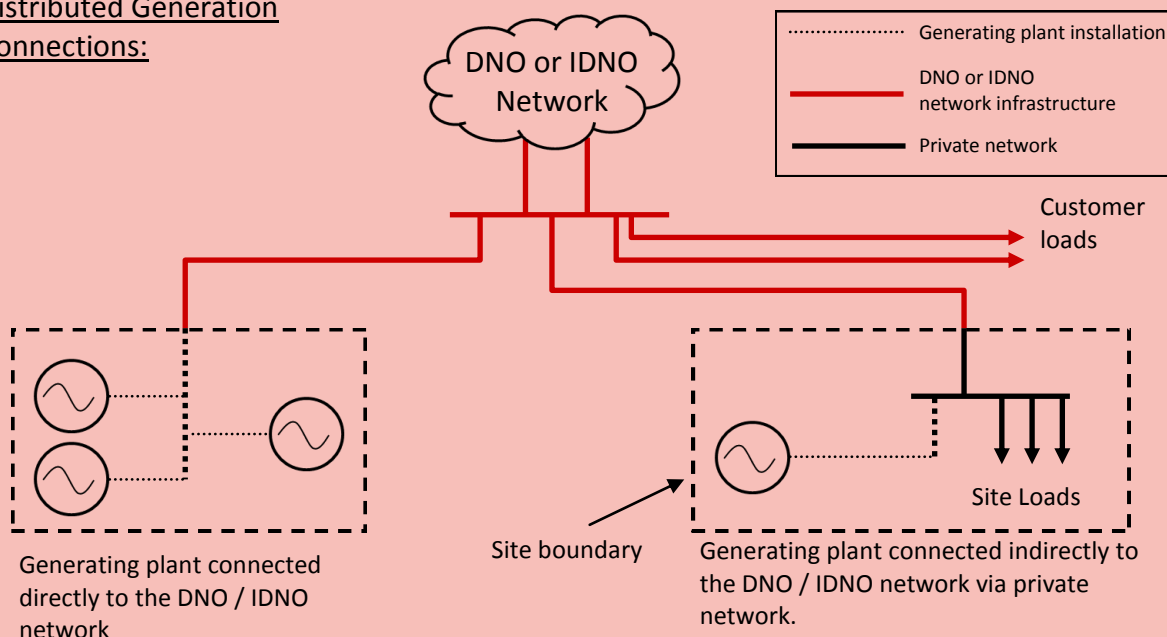
- they do not have service areas (e.g. they are not tied to a geographical location);
- although they are regulated like DNOs they have fewer licence conditions to meet.

IDNOs differ from private networks in that IDNOs, like DNOs, are licensed.

You may be connected to an IDNO's network instead of a DNO's network. Your local DNO will be able to inform you if this is the case.

Note: Throughout the Guide we refer to DNOs. However, where you are connected to an IDNO network, please read this as IDNO.

Distributed Generation Connections:



Private Networks: Your generating plant could be connected directly to a DNO's network, or connected via a privately owned network. For example, private networks can be owned by hospitals, airports, industrial sites, etc. This Guide is not intended to address connection to private networks. If you are connected to a private network, you should discuss your plans with the network owner as soon as possible.

Key Organisations

Energy Service Company (ESCO)

A Government paper defines ESCOs as “a company that provides a customer with energy solutions” rather than simply being an electricity or gas supplier. ESCOs can enter into long-term contracts to provide information, installation, finance and operation and maintenance.

There are various models the ESCO can take. It can work on a performance contract, where it guarantees energy savings and makes charges based on the extent to which these savings are achieved. This model is typically used by commercial and industrial customers. ESCOs can also work for communities, servicing a group of customers in the same

local area. ESCOs may also develop into a household model, to provide energy efficiency savings and small-scale generation for home owners, rather than just supplying electricity.

Suppliers

Supply is the retail of electricity. Suppliers buy in bulk, and then sell to consumers. They are responsible for providing bills and customer services, and arranging metering and meter reading. Electricity supply is a competitive market so you can choose and change your electricity supplier. Selling the electricity you produce to a supplier is also competitive; even with Feed-in Tariffs, these are minimum values and suppliers may offer more.

Other Organisations

Generators

Generators own, operate and maintain generating plant(s) which generate electricity from various energy sources, e.g. coal, gas, hydro and nuclear. Newer generation technologies include wind, solar, tidal and wave. For more on generating technologies, see the end of this section for links to more information.

Transmission System Owner

As mentioned, there are three transmission licence holders in Great Britain; National Grid Electricity Transmission, Scottish Power and Scottish and Southern Energy. They own and maintain the high voltage transmission system, known as the National Electricity Transmission System, referred to in this Guide as the transmission system. Transmission System Owners are responsible for making sure that transmission services are available to the System Operator.

System Operator

Electricity cannot be stored and so demand has to be balanced with generation on a second by second basis by the System Operator. National Grid Electricity Transmission (NGET) is the System Operator in Great Britain. To match generation with demand, the System Operator could ask larger generators to increase the output of their plant (this does not apply to you as a developer of small scale Distributed Generation). Conversely, some large customers on certain contracts can be asked to reduce their demand.

Other Organisations

Balancing and Settlement Code company

Note: the following arrangements do not apply to you as a developer of small scale generation. This is for background information only.

Elexon is the company that manages the balancing and settlement of electricity trading.

Imbalance can arise from:

- Generators' plants not providing all of the electricity that they have been contracted to provide; and
- Suppliers' contracted customers consuming more or less electricity than they have contracted for.

When this occurs, the System Operator faces additional costs because it may have to buy or sell electricity at short notice to keep the system in balance. The charges (prices) the participants face for being out of balance are based on these additional costs. The Balancing and Settlement Code (BSC) governs the operation of the balancing mechanism.

Regulator

Ofgem is the Office of Gas and Electricity Markets. Ofgem is responsible for:

- regulating prices and performance in the monopoly elements of the electricity supply industry; and
- resolving disputes between different parties when necessary.

Ofgem is also responsible for granting licences for the following activities in the power sector:

- Generation
- Transmission (and interconnection, a transmission link with another country)
- Distribution
- Supply

As a developer of small scale generation, you will not require a generation licence.

Where to Find More Information

There are some very good guides to the UK power sector available in the public domain. In particular, if you want to read more on this subject, you may wish to read the following:

- [A Guide: Sale of Power Opportunities for Distributed Generators](#); DTI (Department for Trade and Industry); Electricity Networks Strategy Group website
www.ensg.gov.uk
- Guidance Note – The Electricity Trading Arrangements: A beginner’s guide; Elexon
www.elexon.co.uk

A good source of information on the parties we have introduced are their own websites:

- Energy Networks Association —the industry body for UK energy transmission and distribution licence holders and operators. You can find DNO contact details on this website as they are members of the Energy Networks Association.
<http://2010.energynetworks.org>
- A list of IDNOs can be found on the Ofgem website:
<http://www.ofgem.gov.uk/Networks/ElecDist/Policy/IDNOs/Pages/IDNOs.aspx>
- Ofgem—The Regulator
www.ofgem.gov.uk
- National Grid Electricity Transmission (NGET)—The Great Britain System Operator and Transmission System Owner in England and Wales
www.nationalgrid.com/uk/Electricity/
- Elexon—The Balancing and Settlement Code Company
www.elexon.co.uk

For more information on ESCOs, the following document is a useful references:

- [Making ESCOs Work: Guidance and Advice on Setting Up and Delivering an ESCO](#); London Energy Partnership
www.lep.org.uk

The following websites give more information on generation technologies:

- Energy Saving Trust
<http://www.energysavingtrust.org.uk/Generate-your-own-energy>
- Carbon Trust
<http://www.carbontrust.co.uk/emerging-technologies/technology-directory/pages/default.aspx>

Where to Find More Information

Region	DNO	Website
North Scotland	SSE Power Distribution — Scottish Hydro Electric Power Distribution	www.ssepd.co.uk
South Scotland	SP Energy Networks	www.spenergynetworks.com
North East England	Northern Power Grid	www.northernpowergrid.com
North West	Electricity North West	www.enwl.co.uk
Yorkshire	Northern Power Grid	www.northernpowergrid.com
East Midlands	Western Power Distribution— East Midlands	www.westernpower.co.uk
West Midlands	Western Power Distribution— West Midlands	www.westernpower.co.uk
Eastern England	UK Power Networks — Eastern Power Networks	www.ukpowernetworks.co.uk/ products-services/networks/ index.shtml
South Wales	Western Power Distribution — South Wales	www.westernpower.co.uk
Southern England	SSE Power Distribution — Southern Electric Power Distribution	www.ssepd.co.uk
London	UK Power Networks—London Power Networks	www.ukpowernetworks.co.uk/ products-services/networks/ index.shtml
South East England	UK Power Networks — South Eastern Power Networks	www.ukpowernetworks.co.uk/ products-services/networks/ index.shtml
South West England	Western Power Distribution — South West	www.westernpower.co.uk
Cheshire, Merseyside and North Wales	SP Energy Networks — Cheshire, Merseyside and North Wales	www.spenergynetworks.com

B. The Role of Distributed Generation

In this section:

- An introduction to the role of Distributed Generation (DG)
- A discussion on the drivers for DG
- Some of the benefits and impacts of DG
- References for some documents where you can find out more on these issues

Introduction

From the 1950's until relatively recently, the design and operation of most electricity distribution networks in the UK has been based on a key assumption—that power always flows from higher voltage systems to lower voltage systems to the customer. The increased penetration of DG is changing this landscape.

There are three key drivers behind increasing levels of DG:

- Environmental issues;
- Technological innovation; and

- New Government Policy.

These are discussed, as well as some of the benefits and challenges of DG. The benefits and challenges are quite complex; they are evolving as DNOs' experience with DG increases. We refer to some useful documents and reports for further reading on this topic.

What is Driving Distributed Generation?

What is driving the change towards increased levels of Distributed Generation?

Traditionally, there were fewer, large generating plants, centrally controlled, which generated the majority of electricity in the UK. Now, this landscape is changing. Section A. The UK Power Sector introduced the idea of moving from the traditional power system towards a system where a greater number of generating plants are connected both to the

transmission and distribution systems.

There are three key factors driving this change. They are:

1. Environmental concerns
2. Technological innovation
3. New Government Policy

These factors are interrelated. We will look at them each briefly.

What is Driving Distributed Generation?

Environmental concerns

There has been increasing concern over greenhouse gas emissions, and the impact that they may be having. This is a global issue. Fossil fuel fired power stations, for example coal, gas and oil fired power stations, make a significant contribution to emissions.

These types of power station generate most of the electricity in the UK. As these are seen to be damaging to the environment, there is a drive to change the mix of generation technologies we have, to include more low-carbon options.

Technological innovation

Due to drivers such as environmental concerns and government policy, there are more generating technologies available now than there were when the national grid was being developed. For example, wind, wave, solar and biofuel generation. Although the connection and integration of these newer generating technologies may pose challenges, innovative technical solutions are being sought to overcome these challenges.

New Government policy

The Department of Energy and Climate Change (DECC) was set up in 2008 to oversee energy policy and climate change mitigation policy. The UK energy supply is one of DECC's key policy areas. DECC is developing policy to ensure that in the UK energy supplies are:

- secure;
- low carbon; and
- competitively priced;

with a diverse mix of energy sources.

Security of supply: As the UK increasingly relies on importing energy, the Government wants to make sure our resource supplies, such as oil, gas and coal, are delivered by reliable suppliers. This also ties in with having

a diverse mix of energy sources, which would make the UK less vulnerable to a restriction in one resource.

Low Carbon and Fuel diversity: Government has developed policy in response to environmental concerns regarding emissions reductions, and also to try to develop a more sustainable energy sector. Fossil fuels are limited resources; as such they will increase in price as they get more scarce, and are widely competed for. Reducing reliance on fossil fuel fired generation in favour of renewable energy sources, such as wind, solar and hydro, is a more sustainable path.

Competitively priced: these goals are all achievable, but at what cost? Government wants to ensure that policy achieves these aims but that energy prices are maintained at prices that are affordable.

Two relevant pieces of legislation have been introduced, which are:

- Climate Change Act 2008
- Energy Act 2008

The Climate Change Act sets out legally binding targets for emissions reductions. As such, policy has been developed, which introduces initiatives such as:

- Climate Change Agreement (Climate Change Levy)
- Zero Carbon Homes

As well as legislation from the UK Government, the EU also introduces relevant legislation and initiatives, such as the EU Emissions Trading System.

Benefits and Impacts of Distributed Generation

You can benefit as an owner of Distributed Generation in the following ways:

- With the introduction of Feed-in Tariffs **you will be paid for electricity you generate** for your own use, and any excess electricity you generate and export to the distribution network. This is discussed in Section F: Selling Electricity.
- DG can be a **renewable** generating technology, e.g. wind and solar. This means the DG does not rely on fossil fuels, so it is sustainable in the long term and does not produce emissions. Using renewable generation is one way of **reducing your carbon footprint**.
- The introduction of local generation in homes and communities can lead to **greater individual awareness of energy issues**.

DG can also benefit the Distribution Network Operator, for example:

- If the DG is connected close to the point of use, there is a **reduced need for the distribution and transmission infrastructure**. In some cases, DG can delay the need for reinforcement, although the DNO also needs to ensure that the network provides adequate security of supply for its users—the ability of DG to assist with this is more limited.
- Where there is a balance between Distributed Generation and local demand the **transmission and distribution losses are reduced**, when compared with the alternative of the centralised power stations and bulk transmission of electricity.

As well as introducing benefits, the increased penetration of DG in UK distribution networks also poses challenges to Distribution Network Operators. These challenges will depend on the generation technology, the voltage level the DG is connected to, the size of the generating plant and the type of network (e.g. urban or rural).

A single installation of small-scale DG (defined in Section C. An Overview of Getting Connected) is likely to have a negligible impact on the distribution network. However, if there are lots of installations of small-scale DG in a small geographic area, the cumulative affect of all of the generating plants could start to have a negative technical impact on the distribution network. This could result in the Distribution Network Operator needing to upgrade or replace equipment.

Where to Find More Information

There is a lot of development in Government policy that will impact DG. The following documents are useful references if you want more information on Government policy:

- [The UK Low Carbon Transition Plan—National strategy for climate and energy](#); Government; 2009
- [The UK Renewable Energy Strategy](#); Government; 2009

For the most up to date information on relevant Government policy, please refer to the DECC website:

www.decc.gov.uk

The benefits and challenges of DG are complex, and the industry's understanding of them is evolving as experience increases. For more information on some issues surrounding increasing levels of DG in the UK, the following documents are useful:

- [Review of Distributed Generation](#); DTI (Department for Trade and Industry) and Ofgem; May 2007
- [Future Network Architectures](#); BERR (Department for Business, Enterprise and Regulatory Reform); 2007

C. An Overview of Getting Connected: SSEG G83/1-1 Stage 2

In this section:

- An introduction to getting connected
- The main tasks in the process of connecting multiple units of Small-Scale Embedded Generation (SSEG)
- Guidance on where to find more information

Read the boxes for definitions or explanations of terms that may be new or unfamiliar.

Introduction

The tasks that you have to undertake to get connected vary with the size of the generating plant. In general, the bigger the plant, the more complex the connection requirements. While the process for connecting a single unit of small-scale generation is relatively simple, the process for connecting multiple units is more involved.

There is a key difference between connecting a single unit at one customer site and multiple SSEG units within different customer sites and in a close geographic region: for multiple units **you need to get approval from the Distribution Network Operator (DNO)** before you can connect. Projects involving multiple installations could be, for example:

- A housing refurbishment programme in the same road or street
- A new housing development

This section of the Guide presents the key actions that you have to complete to connect multiple units of small-scale generation within different customer sites and in a close

geographic region. These tasks are based on the requirements set out in Engineering Recommendation (ER) G83/1-1. The terms SSEG and ER G83/1-1 are described on the next page.

The key tasks that you must do are to:

- **Discuss the project** with the DNO as early as possible;
- **Complete an initial application form** and submit this to the DNO. They will assess the impact of your plant and specify conditions for connection;
- **Inform** the DNO of your installation; and
- **Submit the “installation commissioning confirmation”** to the DNO for each SSEG unit.

We will discuss these tasks in more detail.

Getting Connected Under G83/1-1 Stage 2

Getting connected—SSEG G83/1-1 Stage 2

To install a single unit of SSEG the connection process is very straightforward. It can be summarised as “fit and inform”. However, for multiple units of SSEG you need to get approval from the DNO before you can connect.

This process only applies when you are installing **multiple generating units** that comply with G83/1-1 within different customer sites and in a close geographic region. It is called G83/1-1 Stage 2, which is

the process we describe in this section.

To fall under G83/1-1 the plant has to be smaller than a certain **size**. It also needs to be approved and installed in accordance with G83/1-1. These are requirements your installer should be familiar with.

The size of the plant should meet the definition of SSEG, which is given below. If your generating unit meets the size requirements, there are two routes of getting connected under G83/1-1, depending on the

Ongoing responsibilities: Although the focus of this Guide is to inform you about the process of connecting your generation to the distribution network, once it’s connected you have a responsibility to keep it maintained by someone who is competent to do so.

What is Small-Scale Embedded Generation (SSEG)?

Embedded generation or Distributed Generation (DG) is generation that is connected to the distribution network rather than to the transmission system. Small-Scale Embedded Generation (SSEG) is low voltage generation. SSEG is defined in G83/1-1 as “a source of electrical energy rated up to and including 16 A per phase, single or multiple phase, 230/400 V ac”. This corresponds to around 3.68 kW on a single-phase supply and 11.04 kW on a three-phase supply.

The term “microgeneration” is sometimes used to describe low voltage generation. However, microgeneration is not defined as clearly as SSEG, so we will use the term SSEG in this document.

What is Engineering Recommendation G83/1-1?

Engineering Recommendations (ER) are documents that set out standards and guidance on technical requirements. ER G83/1-1 is called “Recommendations for the Connection of Small-scale Embedded Generators (Up to 16 A per Phase) in Parallel with Public Low-Voltage Distribution Networks.” It sets out the requirements you must meet before your generating plant can be connected to the network. The document is aimed the manufacturers and installers of your generating plant. **You don’t need to be familiar with the requirements of this document but your installer and / or advisor does.**

G83/1-1 is available on the Energy Network Association’s website for a fee of £90.00, but some of the Appendices are available for free—please see the end of this section for where to find more information.

Getting Connected Under G83/1-1 Stage 2

type of generating technology. Either:

1. The generating technology has a type testing annex in G83/1-1 and has been tested in accordance with that annex; or
2. The generating unit has to be connected through an inverter (see note on next page) that has been type tested in accordance with one of the annexes in G83/1-1, e.g. Annex C for Photovoltaic generation*.

The following generation types have a type testing annex in G83/1-1:

- Domestic Combined Heat and Power (CHP)
- Photovoltaic (PV)
- Fuel Cells
- Micro Hydro

Any other generation technology, such as wind, has to be connected through an inverter that has been type tested in accordance with one of the annexes in G83/1-1.

With G83/1-1 Stage 2 connections, although **each unit** is G83/1-1 compliant, the total capacity of all the units could be such that the DNO needs to assess the impact of the connection of multiple units on the network.

*At the time of writing, this alternative to making a G59/2 connection, whereby non type tested generation technology is connected via a type tested inverter under G83/1-1, is valid until the 2nd March 2012. Any connection proposed via route two after this date will need to be discussed with the DNO.

Getting Connected—Main Tasks

Finding an SSEG installer

The first task is to find a competent installer, who is using approved equipment (see note on next page). There are companies who design, install and commission domestic generation. They can fully certify and sign off installations.

Certified generation products and installers can be found on the following website:

www.microgenerationcertification.org

The Microgeneration Certification Scheme is operated by the Department for Energy and Climate Change (DECC).

Quick check:

Your generating unit falls under G83/1-1 if:	<ul style="list-style-type: none"> • It meets the size definition of SSEG • The generating unit has a type testing annex in G83/1-1 (listed above) and is approved—i.e. it has been tested in accordance with the appropriate annex and has passed the tests — OR the generating unit does not have a type testing annex but is connected through an inverter that has been type tested in accordance with one of the annexes in G83/1-1* • The generating unit is installed in accordance with G83/1-1
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If you are installing:	Refer to:
A single generating unit that falls under G83/1-1	Getting connected: SSEG G83/1-1 Stage 1
Any generating unit that does not fall under G83/1-1	Getting connected: G59/2

Getting Connected—Main Tasks

Discussions with the DNO

Irrespective of whether you are a homeowner planning to install two SSEG units in two adjacent locations or a housing developer planning to install a number of SSEGs in a small geographic area, you must discuss your plans with the DNO before starting work. If you are in any doubt about whether to discuss your plans with your DNO, you should contact them and they will be able to advise you. Your installer should be able to advise you on this matter.

Submitting an application form

Once you have planned the project and exchanged information about your plans with the DNO, it is time to submit an application form. The format of the application form is given in [Appendix 2 of G83/1-1](#), which is available free of charge on the Energy Network Association's website. Your installer should submit the application form on your behalf.

When you submit your application form you need to include technical details of the plant. The DNO needs this information to assess the impact that your generating plant may have on the network. Once the DNO has conducted these assessments, they will specify the conditions for your connection. Your

generating plant can then be installed and commissioned in accordance with G83/1-1, and meeting any specific requirements of the DNO.

Informing the DNO

For each of your generating units that is installed and commissioned, the DNO needs to be notified. Your installer should notify the DNO within 28 days of commissioning each generating unit (where commissioning is taking the plant from installation to full operation).

Submitting the “installation commissioning confirmation”

Within 30 days of each SSEG unit being commissioned your installer must provide the DNO with information on the installation. This information is called “installation commissioning confirmation”. The content and format of the installation commissioning confirmation is set out in [Appendix 3 of G83/1-1](#), which is available free of charge on the Energy Network Association's website.

Note: DNOs may have their own installation commissioning confirmation forms on their websites—a web search should help you locate the forms you need, or try telephoning your DNO.

What is “approved equipment”?

An approved Small-Scale Embedded Generating unit is defined in G83/1-1 as “one that has been shown to meet the type verification tests in the appropriate annex of this Engineering Recommendation”. The annexes contain methodologies for testing certain types of SSEG against a set of test conditions to demonstrate compliance with G83/1-1. If the conditions are met, the equipment can be considered approved. The manufacturer produces a Type Test Certificate to demonstrate compliance. The equipment is then Type Verified or Certified.

What is an Inverter?

An inverter is an electrical device that converts Direct Current (DC) to Alternating Current (AC). This is required when you want to connect a generating unit with a DC output (e.g. A Photovoltaic array) to the distribution network which operates at AC.

Getting Connected—Main Tasks

Dealing with disputes: If you are not satisfied with a particular aspect of service during the process of connecting your generation, your first port of call should be the party with whom the issue lies, e.g. the DNO, supplier, etc. If you cannot resolve the issue with the party directly, you can contact the Energy Ombudsman:

www.energy-ombudsman.org.uk

If you are still unable to resolve the matter, as a last resort it can be referred to Ofgem, the regulator.

Health and Safety considerations: Safety is very important in the design of generation connections, and there are a number of sources of information and help available to assist with safety engineering. The safety requirements for DG connections are set out in the relevant Engineering Recommendation, ER G83/1-1. This document references the Regulation that informs these requirements, the Electricity Safety, Quality and Continuity Regulations (ESQCR) 2002, and also lists the relevant British Standards.

You can find out more about Health and Safety aspects of DG connections on the following websites:

- The Electrical Safety Council (ESC)
www.esc.org.uk
- The Energy Networks Association—Safety, health and environment and Safe and Well:
<http://energynetworks.squarespace.com/she/>
<http://energynetworks.squarespace.com/safe-and-well/>

Where to Find More Information

If you want to find out more, these documents are particularly relevant:

- [Engineering Recommendation G83/1-1](#): Recommendations for the Connection of Small-scale Embedded Generators (Up to 16 A per Phase) in Parallel with Public Low-Voltage Distribution Networks—a technical document, with references to other relevant sources of detailed technical information. Some appendices are available free of charge.
- [Electricity Safety, Quality and Continuity Regulations \(ESQCR\) 2002, Section 22](#): Statutory Instrument Number 2665, available free of charge.

Some DNOs have produced their own guidance notes for SSEG connections - check your DNO's website.

D. The Connection Application: Connection Application Process— G83/1-1 Stage 2

In this section:

- How to apply to your DNO for connecting multiple generating units in the same physical area to the distribution network
- Details of the information that you will need to provide to the DNO and the design work they may need to do to assess your connection
- What the installer of your generating plant needs to do to notify the DNO that your plant has been installed and commissioned in accordance with G83/1-1

Introduction

This section of the Guide describes how to inform your DNO that you are planning to install a number of generating units that fall under G83/1-1 within different customer sites and in a close geographic region.

The Guide also explains the notifications which the installer of your equipment will need to give to your DNO, once it has been agreed that the generating plant can be

installed and the units are commissioned.

If you are installing only a single generating unit that falls under G83/1-1, you can appoint a competent installer to do this and then notify the DNO when the unit is commissioned. To install more than one generating unit, however, the DNO must be approached first, following the procedure outlined in this section.

Key stages in the Connection Procedure: Multiple Generating Units

1. The installer of your generating equipment submits an Application form to your DNO
2. The DNO assesses the likely impact of connecting your generating plant on the network and prepares a connection design if required.
3. The DNO confirms with the Installer if network reinforcement is needed before the SSEG can be commissioned
4. Your installer installs and commissions the generating units
5. Your installer notifies the DNO of your installation within 28 days of commissioning your generating units, and submits supporting information (commissioning pro-forma) within 30 days

The Application for Connection Pro-forma

The Application for Connection Pro-forma included in G83/1-1 should be completed by your installer if you are planning to install multiple generating units of the types covered by G83/1-1 within different customer sites and in a close geographic region. This should be submitted **before any generation is installed**, as the DNO needs to assess the possible impact of your generating plant on the distribution network. The format for the application is shown in [Appendix 2 of G83/1-1](#), which is available free of charge on the [Energy Networks Association website](#).

The form requires a number of pieces of information:

- details about the **site(s)** where you are connecting your generating units;
- details of the **installer** of the generating units, including their qualifications;
- **contact details** for the owner of the generating units;

- **technical information** about the generating units, including the name of the manufacturer, the type and serial number, and key information about the unit's ratings;
- copies of **system diagrams, site plans** and details of **earthing arrangements**;
- a **signed declaration** that the design of the generation installation meets with the requirements of G83/1-1.

There is a section of the form for the DNO to complete, stating whether they wish to attend the plant commissioning and giving permission, or not, for the installation to go ahead. If permission is not given, an explanation will be provided. For example, reinforcement of the distribution system may be required before the units can be commissioned.

Plant Installation and Commissioning

If you are given permission to proceed with the generation installation by the DNO, your installer will install and commission the generating units and must then notify the DNO that this has been done, in accordance

with the Electricity Safety, Quality and Continuity Regulations (ESQCR). The process and timescales for doing this are described below.

The Commissioning Pro-forma

The Commissioning Pro-forma included in G83/1-1 is a convenient way of capturing all of the information that the DNO needs to know once your installer has commissioned each of your generating units.

This can be found in [Appendix 3 of G83/1-1](#), which is available free of charge on the [Energy Networks Association website](#).

The Commissioning Pro-forma

The information required in this Pro-forma is similar to the information required at the approval stage, and includes:

- details about the **site(s)** where you are connecting your generating units;
- **contact details** for the owner of the generating plant;
- **technical information** about the generating unit itself, including the name of the manufacturer, the type and serial number of the generator, and key information about the unit's ratings.
- details of the **installer** of the generating unit, including the party's accreditation and qualifications;
- **supporting information** relating to test reports, circuit diagrams etc., and details of the electricity meter(s) associated with the generating unit;
- a **signed declaration** as to the compliance of the generating unit with the requirements of G83/1-1 and other standards.

One commissioning pro-forma is required for each generating unit.

Other Requirements

The declaration that your installer signs on the Commissioning Pro-forma requires them to confirm that they've installed your generating unit in accordance with G83/1-1 and BS 7671 (also known as the IEE Wiring Regulations—17th Edition). It's important that you use an installer who is familiar with the requirements

of these standards. If you appoint a competent installer (see Section C. An Overview of Getting Connected: G83/1-1 Stage 2), they should know about these standards and make sure that your installation meets with all the relevant standards.

Notification Timescales

According to G83/1-1, the installer of your generating units has to tell the DNO about the generation installation at or before the time when it's commissioned. This requirement is based on ESQCR.

The notification timescale was relaxed by the Health and Safety Executive in August 2008, so now you have to advise your DNO about your generating plant **within 28 days of the date of commissioning** (including the commissioning day itself).

As well as telling the DNO that your generating unit has been commissioned, your installer needs to provide a number of pieces of information to the DNO **within 30 days of the date of commissioning**. This information is defined in a Commissioning Pro-forma, which is provided in [Appendix 3 of G83/1-1](#).

Your installer should prepare all of the details requested in the Commissioning Pro-forma and submit all this with the form to confirm that your plant has been commissioned.

E. Cost and Charges: Overview of Charges

In this section:

- An introduction to connection costs
- The basis of DNO connection charges for infrastructure
- Other elements of connection charges and where to find indicative costs and examples
- Generation Distribution Use of System charges

Read the boxes for definitions or explanations of terms that may be new or unfamiliar.

Introduction

There are two categories of charges made by the DNO:

- **Connection charge:** this is a one-off charge made by the DNO, which primarily covers the cost of work and equipment associated with connecting your generating scheme to the distribution network.
- **Use of System charges:** these are ongoing charges, which primarily cover the cost of reinforcement and operation and maintenance costs.

As a developer of multiple G83/1-1 generating units, you may be subject to connection charges. This would arise if there is a need for remedial work on the distribution network to mitigate adverse effects associated with your generating plant.

DNOs are obliged to publish documents describing the basis of their connection charges and their charging methodology. They also present the different elements of

connection charges, and indicative costs for works and equipment of significant cost. This will help you to understand the charges they quote you.

This information is contained in the DNOs Statement of Methodology and Charges for Connection to the electricity distribution system. All DNOs' statements follow the same format, and are available on their websites. This document contains:

- The DNO's connection charging methodology (i.e. how they calculate their charges);
- The DNO's connection charging statement (i.e. what the charges are);
- An indication of the costs of providing a connection quotation / estimate; and
- Other relevant information for connecting customers.

Introduction

The basis and elements of connection charges, as well as indicative costs and examples are discussed in this section.

Use of System charges are levied by the DNO on the supplier, so as a generator you will not be charged these directly. However, this section is included for your information, as Use of System charges may appear as an item on your bill.

Connection Charges—Infrastructure

Basis of DNO connection charges

Depending on the location and size of your generating plant the DNO may have to modify an existing part of the network to accommodate your scheme. Reinforcement work may be required to increase the electrical capacity of those parts of the network which form part of the electrical path from the generating plant to the network. This will result in some initial costs, which will be charged to you up front as part of the connection charge.

The asset costs that you are charged for include a **portion** of reinforcement costs. DNOs are obliged to publish a document describing the basis of their connection charges and their charging methodology. You can refer to this document to see what portion of reinforcement costs you will be charged for. These are available on DNO websites.

Connection Charges—Other Elements

Elements of charges

As well as charges for the reinforcement, there are other elements that are covered in the connection charge. These can include some of the following:

- Connection application
- System / feasibility / fault level studies
- Provision of Wayleaves
- Additional meetings with the DNO or site visits
- Administration

Note that not all DNOs apply charges for all of these items, and that not all of these items will be relevant for your scheme.

Indicative costs and examples

Equipment costs and charges for services vary across DNOs; it could therefore be misleading to give you indicative costs in this Guide. If you want to get an idea for indicative costs, the best place to look is the **DNO's Statement of methodology and charges for connection**. You can find this on the DNO's website. Aside from giving indicative costs for connection charges, these documents typically contain other useful information, including guidance on the connection process.

The Statement of methodology and charges for connection document also gives examples of various connections and their associated cost breakdown. It is updated annually.

Connection Charges—Other Elements

Estimating costs and getting a quotation

You can obtain indicative costs for works and equipment from DNO documents. To obtain a more accurate picture of the connection costs for your project, you can:

- Ask the DNO for a budget estimate
- Obtain an estimate of connection costs from a specialist engineering consultant

You should exercise care in interpreting budget estimates. DNOs use reasonable endeavours to identify remote reinforcement costs associated with the proposed connection at this stage. However, it is possible that not all of the reinforcement costs will be included at this time. For more on budget estimates, see the box below.

Payment of connection charges

Connection charges are paid either:

- in full at the time that the connection offer is accepted; or
- in staged or phased payments, as per a payment schedule.

Staged payments are typically used for generation projects which are greater than a certain size, e.g. in project value or duration. The staged payments cover committed expenditure by the DNO.

What is a budget estimate?

You may read about **budget** or **indicative estimates** and **formal** or **firm quotations**. The differences between these two terms are summarised in the following table.

Budget or Indicative estimate	Firm or formal quotation
Requested in the early stage of a project, and generally only for larger capital schemes	Requested when electrical requirements have been finalised
The DNO doesn't require much information from you	The DNO requires a lot of information from you
Based on a desktop study—the DNO is unlikely to carry out detailed designs or studies	Based on detailed design work, and may require other input such as site surveys
To give an indication of costs and is therefore subject to change—some risk involved using this for budgeting your project	Provides formal contract offer
Not open for acceptance	Open to acceptance, subject to terms and conditions

Assuming that you ask the DNO to undertake all of the work involved in your connection, the timescale for the DNO to provide a budget estimate is 10 working days.

Use of System Charges

What are Use of System charges?

Use of System charges cover the development, operation, maintenance and repair of the distribution network. DNOs make Use of System charges to suppliers. Suppliers may reflect these charges to their customers as either:

- a 'pass-through' item so that the customer can clearly see the Use of System element; or
- 'wrapped-up' in a total electricity supply tariff where the customer may not be able to clearly see the Use of System element.

DNOs are obliged to publish documents about their Use of System charges. These cover their Use of System charging methodology and a statement of what the charges are for both generation and demand customers. You can find these on DNOs' websites.

All generators connected at Low Voltage are subject to Generation Distribution Use of System charges under the Common Distribution Charging Methodology (CDCM). These charges are currently negative (i.e. credits). You can find out more about the Common Distribution Charging Methodology (CDCM) by looking at [Distribution Charging](#) on the Ofgem website, [Structure of Charges](#) on the Energy Networks Association website and some DNOs' websites.

Categories of Use of System charges

UoS charges are categorised by:

- the voltage level your plant is connected to and;
- the type of meter you have.

The boxes below define the voltage level that will apply to SSEG (Low Voltage) and the metering arrangements that are likely to apply to SSEG (Non-Half Hourly meters). With the Common Distribution Charging Methodology charges for LV generation customers with NHH meters are in the form of a single unit rate (p/kWh).

Non-Half Hourly Meters (NHH): Meters record the flow of electricity. Non- Half Hourly (NHH) meters record total power consumption, but do not record the times the power is consumed. Typically the recorded data would be collected a few times a year, e.g. every quarter. Most domestic and small commercial properties have NHH meters. You can contact your current electricity supplier to discuss the provision of NHH meters, or other meter suppliers.

LV (Low Voltage)

400/230 V in practice, less than 1 kV in general.

F. Selling Electricity: Feed-in Tariffs (FITs)

In this section:

- An introduction to the Feed-in Tariff Incentive
- The structure of the tariff
- Eligibility and Accreditation
- Technical considerations
- Feed-in Tariff Review
- Guidance on where to find more information

Read the boxes for definitions or explanations of terms that may be new or unfamiliar.

Introduction

In April 2010 the Government introduced a financial incentive scheme to support small-scale renewable energy generators. The scheme is called a Feed-in Tariff (FIT).

All developers of Small-Scale Embedded Generation (SSEG) will be of a size where FITs are potentially available. FITs are available for the following generation technologies:

- Anaerobic digestion
- Hydro
- Solar PV
- Wind

A number of domestic Combined Heat and Power (CHP) plants are also supported through FITs under a Micro CHP pilot scheme.

The FITs structure should provide the right level of simplicity and certainty to encourage non-energy professionals to invest in small-scale generation.

The tariff structure should give you an incentive to consume the electricity you generate and become more energy efficient.

Tariff Structure

The tariff structure provides three strands of benefits from FITs if you use your electricity on site:

- Generation tariff: A fixed price for each unit of electricity generated - this price will remain constant throughout the

lifetime of the installation's eligibility for FITs payments (See next page for proposed generation tariffs)

- Export tariff: A guaranteed price for each unit of electricity exported to the grid

Tariff Structure

- Benefits from reducing your import from the grid by using your own electricity and the resulting decrease in your bill.
- RPI of 4.8%. This applies to both:
 - the generation tariffs, which are shown in the table below; and

Tariffs are linked to the Retail Price Index (RPI) and they are adjusted annually for inflation. The tariffs in Year 2 (01/04/2011—31/03/2012) have been adjusted by the 2010

- the export tariff, which has increased from 3p/kWh in Year 1 (2010/11) to 3.1p/kWh in Year 2 (2011/12).

Technology and scale (Total Installed Capacity)	Generation tariff for installations registered in FIT Year 1 (p/kWh)		Generation tariff for installations registered in FIT Year 2	Tariff lifetime (Years)
	Year 1 (1/4/2010—31/3/2011)	Year 2 (1/4/2011—31/3/2012)	Year 2 (1/4/2011—31/3/2012)	
Anaerobic digestion ≤ 500 kW (see page 35)	11.5	12.1	12.1	20
Anaerobic digestion > 500 kW	9.0	9.4	9.4	20
Hydro ≤ 15 kW	19.9	20.9	20.9	20
Hydro > 15 kW but ≤ 100 kW	17.8	18.7	18.7	20
Hydro > 100 kW but ≤ 2 MW	11.0	11.5	11.5	20
Hydro > 2 MW but ≤ 5 MW	4.5	4.7	4.7	20
Micro CHP ≤ 2 kW (see note on next page)	10.0	10.5	10.5	10
PV ≤ 4 kW new build	36.1	37.8	37.8	25
PV ≤ 4 kW retrofit	41.3	43.3	43.3	25
PV > 4 kW but ≤ 10 kW	36.1	37.8	37.8	25
PV > 10 kW but ≤ 100 kW (see page 35)	31.4	32.9	32.9	25
PV > 100 kW but ≤ 5 MW (see page 35)	29.3	30.7	30.7	25
PV Stand alone system (see page 35)	29.3	30.7	30.7	25
Wind ≤ 1.5 kW	34.5	36.2	36.2	20
Wind > 1.5 kW but ≤ 15 kW	26.7	28.0	28.0	20
Wind > 15 kW but ≤ 100 kW	24.1	25.3	25.3	20
Wind > 100 kW but ≤ 500 kW	18.8	19.7	19.7	20
Wind > 500 kW but ≤ 1.5 MW	9.4	9.9	9.9	20
Wind > 1.5 MW but ≤ 5 MW	4.5	4.7	4.7	20
Existing microgenerators transferred from RO	9.0	9.4	9.4	To 2027

Tariff Structure

You will receive generation tariffs (FITs) for a fixed number of years and a guaranteed export price. The export price is 3.1p/kWh during Year 2 of the scheme (2011/2012) and generation tariffs vary according to the generation technology and size of your plant. You will also have the option to negotiate export tariffs on an open market.

The generation tariffs were designed to allow you to achieve an annual rate of return between 5 and 8%. They are summarised in the table on the previous page.

After the first two years of the scheme, the generation tariffs “degress” each year. Degression is the percentage by which the levels will decrease each year **for new projects**. The generation tariff you are eligible for at the start of your project will last the lifetime of your scheme (adjusted annually for inflation).

The Government will review the generation tariffs regularly to account for cost reduction and enlarged scale of production. The degression in generation tariffs will only affect new installations, and you will keep whichever FIT you had at the time of full accreditation.

FITs—An example

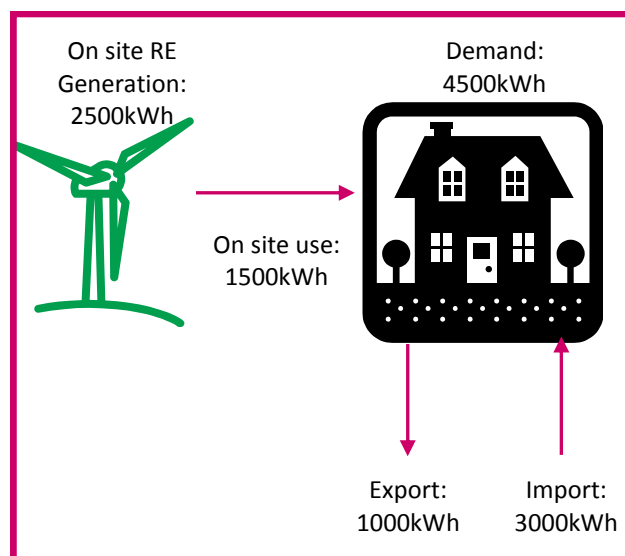
The following example illustrates the possible benefits that you could achieve by accessing FITs. The numbers used in this example are indicative.

In the example:

Assuming an import tariff of 10p/kWh

Without on-site generation:

You will pay 4500 kWh x 10p/kWh = £450 per year



With a 1 kW Bergey wind turbine:

- You will pay 3000 kWh x 10p/kWh = £300 for the electricity imported from the grid; (import tariff: 10p/kWh);
- You will save 1500 kWh x 10p/kWh = £150 on the electricity you generate and use on-site (import tariff: 10p/kWh);
- You will earn 2500 kWh x 36.2p/kWh = £905 for all the electricity you generate on site (FIT for wind turbine < 1.5kW of 36.2kWh); and
- You will earn 1000 kWh x 3.1p/kWh = £31 for the electricity you export to the grid (export tariff of 3.1p/kWh).

In a year you will make £636. Your net benefit, relative to the scenario without on-site generation, will be £1,086.

kWh is a unit of energy.
Energy (kWh) = power (kW) x time (hours)

Micro CHP Pilot: The Micro CHP pilot will support up to 30,000 installations with a review to start when the 12,000th installation has occurred. To qualify the CHP unit must have an electrical capacity no greater than 2 kW.

Eligibility and Accreditation

Renewable Energy generators with plant under 5 MW are eligible for Feed-in Tariffs. Renewable Energy generators supplying off-grid or private networks are also covered by the FITs scheme. They receive generation tariffs and the benefit of avoiding the costs of generating electricity by other means e.g. Diesel.

Accreditation steps

There are two routes to accreditation; the route you take depends on the size and type of your generating plant. For SSEG that is wind, solar PV, hydro or Micro CHP the accreditation process is as follows (“MCS-FIT”):

1. Install your generating unit—**you must use a Microgeneration Certification Scheme (MCS) installer** (see below);
2. Your installer will register you on a central accreditation system;
3. You will receive a certificate confirming you are eligible for FITs;
4. Register for a FIT with your supplier, and provide them with your FIT compliance certificate so that they can verify your eligibility;
5. Indicate to your supplier if you are opting for the guaranteed export tariff

or if you would prefer to sell your electricity using a Power Purchase Agreement (a legal contract between you and your electricity supplier);

6. Your supplier will then be responsible for the level of payment you will receive for the electricity generated and exported, for which you may be required to provide meter readings.

For anaerobic digestion plants and as a transitional arrangement for micro hydro (see note on next page) the following process (“ROO-FIT”) applies:

1. Install your generating unit;
2. Apply for accreditation through Ofgem’s Renewable and CHP register;
3. Successful applicants will be awarded an accreditation number;
4. Register for a FIT with your supplier, and provide them with your accreditation number so that they can verify your eligibility.

Steps 5 and 6 are as above.

While Ofgem is responsible for establishing and maintaining the central FITs register, suppliers manage the registration process—they will be your point of contact.

What is the Microgeneration Certification Scheme (MCS)?

The MCS is currently the only formalised industry standard in the UK based on European and international standards for microgeneration projects. MCS is a BS EN 45011 Certification scheme covering Renewable Energy products (wind and PV up to 50 kW (electrical), solar thermal, biomass and heat pumps up to 45 kW (thermal), Micro CHP and hydropower) and Renewable Energy installation companies.

MCS checks for the products’ performance and quality and for the installation methods and quality. MCS will enhance your confidence in the Renewable Energy technology you are buying and in the company installing it. The MCS is linked with FITs accreditation for Renewable Energy generation < 50 kW electrical capacity.

For more information please refer to the MCS website:

www.microgenerationcertification.org

Feed-in Tariff Review

As the department responsible for Renewable Energy policy, the Department of Energy and Climate Change (DECC) is conducting the first review of the FIT scheme. This review was announced in February 2011. The aim of the review is to:

- Determine how to achieve efficiency savings set out in the Spending Review October 2010 (£40 million savings required from the FIT scheme in 2014/15);
- Reflect on how the scheme has worked so far; and
- Determine whether any changes are needed.

The comprehensive FIT review will take place over summer 2011, with the aim of completing the review by the end of 2011. It is expected that the outcomes of the comprehensive FIT review will be implemented in April 2012.

However, two areas of the FIT scheme have undergone a “fast-track” review, affecting

some Anaerobic digestion and PV FITs.

The FIT generation tariff for PV installations will be reduced to:

- 19.0p/kWh in the range > 50 kW but ≤ 150 kW
- 15.0p/kWh in the range > 150 kW but ≤ 250 kW
- 8.5p/kWh in the range > 250 kW but ≤ 5 MW and stand-alone installations

The FIT generation tariff for Anaerobic Digestion installations ≤ 500 kW will be increased to:

- 14.0p/kWh for ≤ 250 kW
- 13.0p/kWh in the range > 250 kW but ≤ 500 kW

These tariff changes are due to be implemented from 1st August 2011. The changes will not affect any installations that are already registered on the FIT accreditation register.

For the most up to date information on the FIT review, see DECC’s webpage on [Feed-in Tariffs](#).

Accreditation arrangements for Anaerobic Digestion and Hydro: Anaerobic Digestion installations of any size are to be accredited by the Renewables Obligation (RO) Order Feed-in Tariff (“ROO-FIT”) process, rather than the MCS accreditation process (“MCS-FIT”). The ROO-FIT accreditation process is run by Ofgem (rather than the generation installer / supplier), via Ofgem’s Renewable and CHP register. There is more information about it on Ofgem’s website:

<http://www.ofgem.gov.uk/Sustainability/Environment/fits/Apply/Pages/Apply.aspx>

The Feed-in Tariff (Specified Maximum Capacity and Functions) (Amendment) Order 2011 introduces some modifications to the FITs Order 2010. This is to reflect clarifications and refinements to the FITs Order 2010 now that the FITs scheme has been running for some time. The Amendment Order includes a transitional arrangement for Hydro generating schemes that are less than 50 kW (micro hydro). If they are commissioned between 1st April 2010 and 1st October 2011 then they can be accredited by the Renewables Obligation mechanism (“ROO-FIT”) accreditation, rather than MCS accreditation (“MCS-FIT”). Any micro hydro commissioned after 1st October 2011 must be accredited via the MCS.

Technical Considerations

You will need to measure three electrical flows to get the most out of the FIT scheme:

- The amount of electricity your Renewable Energy plant is producing - basis of your “generation financial stream”
- The amount of electricity you export to the network - basis of your “export financial stream”
- The amount of electricity you import from the network - basis of your supplier electricity bill.

If you have two types of RE generation, you will need to measure the amount of electricity produced by each of the units separately, as each technology will receive its own generation tariff.

For your generation financial stream, your generating units must be metered.

For your export payments, there are currently two options:

1. The Government is allowing an interim measure of estimating export, subject to conditions. For example, the Energy Savings Trust website states that domestic FIT installations are likely to have an estimated export level of 50% of electricity generated.
2. Alternatively you could record your export to the network with a meter (called an export meter). Smart meters will have the capability to record generation and export.

Your electricity supplier is a good first port of call to discuss metering arrangements.

Where to Find More Information

For more guidance and the most up-to-date information on Feed-in Tariffs, please see the following organisations’ websites:

- Energy Saving Trust — Initial port of call for information
www.energysavingtrust.org.uk/Generate-your-own-energy/Sell-your-own-energy/Feed-in-Tariff-Clean-Energy-Cashback-scheme
- Carbon Trust — Initial port of call for information for businesses
<http://www.carbontrust.co.uk/policy-legislation/energy-supply/renewable-energy/pages/feed-in-tariff.aspx>
- Department of Energy and Climate Change (DECC) — Policy setting
http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/feedin_tariff/feedin_tariff.aspx
- Ofgem—FIT administrator
<http://www.ofgem.gov.uk/Sustainability/Environment/fits/Pages/fits.aspx>

Note that your electricity supplier is your point of contact for the FIT scheme.

Glossary of Terms

Balancing and Settlement Code (BSC): The Code which determines the rules governing the Balancing Mechanism and settlement process for electricity trading in Great Britain. A BSC Panel has been charged with overseeing the management, modification and implementation of the BSC rules, as specified in Section B of the BSC. The Balancing and Settlement Code Company (ELEXON) supports the BSC Panel.

Balancing Mechanism: The National Electricity Transmission System Operator (NETSO) has a licence obligation to manage the Transmission System and, in so doing, may anticipate that more energy will be generated than consumed, or vice versa. Unchecked, this would result in system frequency falling or rising to an unacceptable degree. The balancing mechanism provides a means by which NETSO can buy or sell additional energy close to real-time to maintain energy balance, and also to deal with other operational constraints of the Transmission System.

Capacity: The capacity of a generating plant is the maximum power that can be produced if the plant is running normally at full power.

Climate Change Levy (CCL): Part of a range of taxation measures designed to help the UK meet its legally binding commitment to reduce greenhouse gas emissions. This levy / tax is chargeable on the industrial and commercial supply of taxable commodities for lighting, heating and power by consumers in the following sectors of business: industry, commerce, agriculture, public administration and other services.



Distributed Generation (DG): A generating unit which is connected to a distribution network rather than to the transmission system. Distributed Generation is generally smaller than plant connected to the transmission system as the maximum operating voltage of distribution networks is 132 kV in England and Wales and 33 kV in Scotland.



Distribution Network (System): The distribution system is the network that comprises the equipment between the transmission system and the customer's service switch. In England and Wales the distribution systems are the lines with a voltage less than or equal to 132 kV. In Scotland the distribution network is composed of lines less than 132 kV.

Distribution Network Operator (DNO): A holder of a Distribution Licence, the DNO owns, operates and maintains a Distribution network and is responsible for confirming requirements for the connection of Distributed Generation to that network.

Embedded Generation: Another term used for Distributed Generation (DG). See above.

Energy Service Company (ESCO): A Government paper defines ESCOs as "a company that provides a customer with energy solutions" rather than simply being an electricity or gas supplier.

EU Emissions Trading System (ETS): Formerly referred to as the EU Emissions Trading Scheme, the EU Emissions Trading System (EU ETS) is one of the key policies introduced by the European Union to help meet its greenhouse gas emissions reduction target. It is a Europe-wide cap and trade scheme that started in 2005. The EU ETS covers electricity generation and the main energy-intensive industries.

Extension: It is sometimes necessary to extend the DNO's distribution network in order to provide a connection for a new user (demand or generation customer).

Generating Plant: A power station including any generating unit.

Generating Unit: Any apparatus which produces electricity. Is a synonym of a generation set as defined in the Distribution Code.

Glossary of Terms

Generator: A person who generates electricity under licence or exemption under the Electricity Act 1989.

Grid Supply Point (GSP): Any point at which electricity is delivered from the National Electricity Transmission System to the DNO's Distribution system.

Independent Distribution Network Operator (IDNO): A holder of a distribution licence, an IDNO designs, builds, owns and operates a distribution network, which is an extension to existing DNO network. They typically build network for new developments such as business parks, retail and residential areas and leisure facilities.

Low Voltage (LV): A voltage normally exceeding 50 V AC between conductors and earth or 120 V DC between conductors but not exceeding 1000 V AC or 1500 V DC between conductors or 600 V AC or 900 V DC between conductors and earth.

National Electricity Transmission System Operator (NETSO): Operates the electricity transmission system in England, Wales and Scotland (see System Operator).

National Grid Electricity Transmission (NGET): Owns the electricity transmission network in England and Wales, and operates the transmission system in England, Wales and Scotland (takes the role of the NETSO). NGET is a member of the National Grid group of companies.

Ofgem: The Office of Gas and Electricity Markets.

Reinforcement: Reinforcement work is usually required to increase the electrical capacity of those parts of the network which are affected by the introduction of new generation or demand. Other work might include upgrading the switchgear at a substation some distance from the proposed generation scheme, due to the increase in fault level caused by the connection of a generating plant.

Renewable Obligation Certificates (ROCs): A green certificate issued to an accredited generator for eligible renewable energy generated within the UK and supplied to customers within the UK by a licensed electricity supplier. ROCs are issued for each MWh of eligible renewable output generated, the amount of ROCs received depend on the technology of the generating station.

Retail Price Index (RPI): General purpose measure of inflation used in the UK.

Small Scale Embedded Generation (SSEG): A source of electrical energy and all associated interface equipment, rated up to and including 16 A per phase, single or multi phase 230/400 V AC and designed to operate in parallel with a public low voltage distribution network.

Supplier (Electricity Supplier): Electricity suppliers purchase electricity (on the market or in contracts) and sell electricity to customers (commercial, industrial and domestic).

System Operator (SO): The operator of the transmission networks, the System Operator balances supply with demand on a minute by minute basis.

Transmission System (Network): A system of lines and plant owned by the holder of a Transmission Licence and operated by the GB SO, which interconnects Power Stations and substations. In England and Wales the transmission system is the equipment principally rated above 132 kV while in Scotland they are those principally at or above 132 kV.

Use of System (UoS): The use of a transmission or distribution system by a generator, supplier, customer or an interconnected party for the purposes of transporting electricity.



References

Standards and other documents:

[Balancing and Settlement Code \(BSC\)](#) is available free of charge on Elexon's website

[Connection and Use of System Code \(CUSC\)](#) is available free of charge on NGET's website

[Distribution Code](#) of Great Britain—available free of charge on the Distribution Code website

[Engineering Recommendation G83/1-1](#): Recommendations for the Connection of Small-scale Embedded Generators (Up to 16 A per Phase) in Parallel with Public Low-Voltage Distribution Networks—a technical document, with references to other relevant sources of detailed technical information. Some appendices are available free of charge.

[Engineering Recommendation G59/2](#), relating to the connection of generating plant to the distribution systems of licensed Distribution Network Operators—available to buy on the Energy Networks Association website.

[Engineering Recommendation G81](#) is called “Framework for design and planning, materials specification, installation and records low voltage housing development installations and associated new HV/LV distribution substations”. It can be found free of charge on the Energy Network Association's website.

[Electricity Safety, Quality and Continuity Regulations \(ESQCR\) 2002](#), Section 22: Statutory Instrument Number 2665, available free of charge.

[Grid Code](#) of Great Britain — available free of charge on NGET's website.

[IEE Wiring Regulations](#) (British Standard 7671) are available to buy on the IET website.

[Metering Codes of Practice](#)

[Statutory Instrument 2001 No. 3270, The Electricity \(Class Exemptions from the Requirement for a Licence\) Order 2001](#)

[Statutory Instrument 2008 No. 2376, The Electricity \(Applications for Licences, Modifications of an Area and Extensions and Restrictions of Licences\) Regulations 2008](#)

References

Useful websites:

Association of Electricity Producers	www.aepuk.com
Association of Meter Operators	www.meteroperators.org.uk
British Hydropower Association	www.british-hydro.org
Renewable UK	www.bwea.com
Carbon Trust	http://www.carbontrust.co.uk/emerging-technologies/technology-directory/pages/default.aspx
Combined Heat and Power Association	www.chpa.co.uk
Department for Energy and Climate Change	www.decc.gov.uk
Distribution Connection and Use of System Agreement (DCUSA) website	www.dcusa.co.uk
Electricity Networks Strategy Group	www.ensg.gov.uk
Elexon	www.elexon.co.uk
Energy Networks Association	http://2010.energynetworks.org
Energy Saving Trust	http://www.energysavingtrust.org.uk/Generate-your-own-energy
Lloyds Register	http://www.lloydsregister.co.uk/ners.html
Microgeneration Certification Scheme	www.microgenerationcertification.org
National Grid Electricity Transmission (NGET)	www.nationalgrid.com/uk/Electricity/
Ofgem	www.ofgem.gov.uk
Renewable Energy Association	www.r-e-a.net

References

Relevant reports and guides:

[A Guide: Sale of Power Opportunities for Distributed Generators](#); DTI (Department for Trade and Industry); Electricity Networks Strategy Group website

[Electricity Trading Arrangements: A Beginner's Guide](#); Elexon

[Future Network Architectures](#); BERR (Department for Business, Enterprise and Regulatory Reform); 2007

[Making ESCOs Work: Guidance and Advice on Setting Up and Delivering an ESCO](#); London Energy Partnership

[Overview of Embedded Generation Benefits](#); Elexon; November 2006

[Review of Distributed Generation](#); DTI (Department for Trade and Industry) and Ofgem; May 2007

[The UK Low Carbon Transition Plan—National strategy for climate and energy](#); Government; 2009

[The UK Renewable Energy Strategy](#); Government; 2009

[The Tradable Value of Distributed Generation](#); DTI (Department for Trade and Industry); 2005

Revisions

Version Number	Date	Details of Changes
1	June 2010	<p>A major revision of the Technical Guide for the Connection of Generation to the Distribution Network, DTI document reference K/EL/00318/REP (URN 03/1631).</p> <p>Key changes include division of Guide into three Guides for different DG applications (G83 Stage 1, G83 Stage 2 and G59/2); revision of the style of the Guide to “plain English”; and inclusion of chapters on the role of Distributed Generation, Technical and Commercial Interfaces and Selling Electricity (FITs and ROCs).</p>
2	October 2010	<p>Minor edits to the Guides:</p> <ul style="list-style-type: none"> • Addressing issues raised in HSE response to the consultation direction (8 July 2010); • Changes to timescales associated with a Section 16 connection applications arising from DNO advice; • Alteration to the text on Assessment and Design Fees and reference to the Statement of Methodology and Charges for Connection; and • Inclusion of a note about dealing with disputes.
3	November 2010	<p>Minor edits to the Guides to reflect the changes in ownership of networks from EDF Energy to UK Power Networks.</p>
3.1	April 2011	<p>Edits to the Guides to reflect the issuance of a Guidance Note from the Distribution Code Review Panel on:</p> <ul style="list-style-type: none"> • the application of G83/1-1 to small scale wind, and other small scale generation technologies that do not have a type testing annex in G83/1-1; and • a relaxation of G59/2 to small scale generating equipment greater than 16 Amps per phase and up to 50 kW 3-phase (17 kW single-phase) provided that certain conditions are met. <p>Edits to clarify the applicability of G83/1-1 Stage 2 to multiple generating units within different customer sites and in a close geographic region.</p>
3.2	June 2011	<p>Minor edits to the Guides to reflect the changes in ownership of networks from E.On Central Networks to Western Power Distribution. Update of Feed-in Tariff and Renewables Obligation sections to reflect recent changes, e.g. tariff increases and scheme review details.</p>

Revisions

Version Number	Date	Details of Changes
3.3	November 2011	Minor edits to the Guides to reflect rebranding of C E Electric to Northern Power Grid.